

Robert Cathcart III,
M.D.

Emanuel Cheraskin,
M.D., D.M.D.

Carl Ebnother,
M.D.

Ruth Harrell,
Ph.D.

Abram Hoffer,
M.D., Ph.D., F.R.C.P.(C)

Masatoshi Kaneko,
Ph.D.

Linus Pauling,
Ph.D.

Carl Pfeiffer,
M.D., Ph.D.

Fowler Poling,
M.D.

Bernard Rimland,
Ph.D.

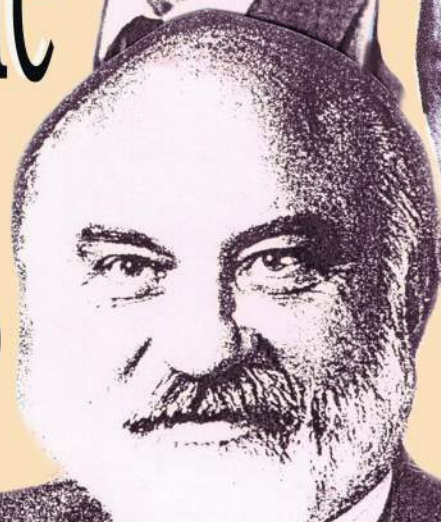
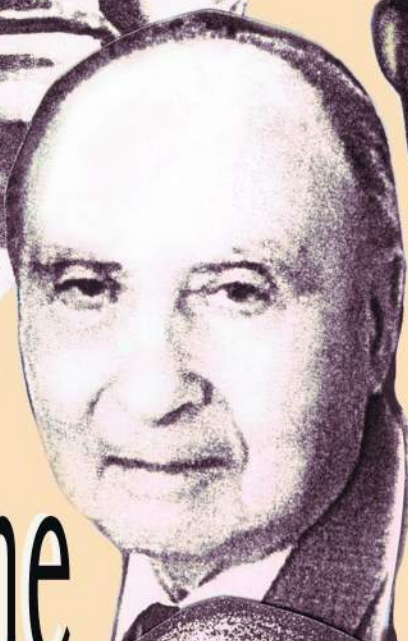
Hugh Riordan,
M.D.

Roger Williams,
Ph.D.

Medical Mavericks

by Hugh Desaix Riordan, M.D.

volume
3



MEDICAL MAVERICKS

Volume Three

Hugh Desaix Riordan, M.D.

Bio-Communications Press
3100 North Hillside Avenue
Wichita, Kansas 67219 USA
Copyright © 2005

MEDICAL MAVERICKS

Volume Three

Copyright © 2005

This book may not be reproduced in whole or in part, by any means, electronic or otherwise, without permission.

For information, contact:

BIO-COMMUNICATIONS PRESS
3100 North Hillside Avenue
Wichita, Kansas 67219 USA

ISBN 0-942333-13-6

First Edition

Published in The United States of America

Cover design by Dean Dodson

BCP and the Bio-Communications Press are service marks of
The Center for the Improvement of Human Functioning
International Inc.

“It is impossible
for anyone to
begin to learn
what he thinks
he already
knows.”

EPICTETUS

Table of Contents

| | |
|--|------|
| Maverick | vi |
| Dedication | vii |
| Acknowledgements | viii |
| Foreword | ix |
| Foreword II | xi |
| Foreword III | xiii |
| Tribute | xv |
| Robert F. Cathcart III, M.D. | 1 |
| Emanuel Cheraskin, M.D., D.M.D. | 15 |
| Carl Ebnother, M.D. | 29 |
| Ruth Flinn Harrell, Ph.D. | 43 |
| Abram Hoffer, M.D., Ph.D., F.R.C.P.(C) | 69 |
| Masatoshi Kaneko, Ph.D. | 93 |
| Linus C. Pauling, Ph.D. | 109 |
| Carl C. Pfeiffer, Ph.D., M.D. | 141 |

| | |
|----------------------------|-----|
| Fowler Border Poling, M.D. | 153 |
| Bernard Rimland, Ph.D. | 163 |
| Hugh Desaix Riordan, M.D. | 181 |
| Roger J. Williams, Ph.D. | 221 |
| Chronological List | 239 |
| Appendix | 241 |
| Bibliography | 243 |
| Postscript | 251 |

Maverick

The word “maverick” is derived from an American pioneer, Samuel A. Maverick, who chose not to brand his cattle. Through usage the word “maverick,” in addition to meaning an unbranded range animal, has come to mean an independent individual who refuses, because of what he or she has learned, to conform to prevailing group thought.

This book is about such independent individuals who have followed the advice found in this anonymous quotation:

Do not follow where
the path may lead.
Go instead where
there is no path,
and leave a trail.

Dedication

This book, like volumes one and two, is dedicated to the memory of all those medical doctors who, since history has been recorded, have contributed to the progress of the science and art of medicine.

This book is also dedicated to the countless numbers of those people we call patients who have, throughout the ages, endured much, suffered greatly, and benefited considerably from those who have practiced the science and art of medicine.

This book is dedicated to the maverick in you – that wonderful element perhaps obvious, perhaps hidden, which has moved you to choose to read this bit of writing.

And lastly, this book is dedicated to the memory of Fowler Border Poling, M.D., my first mentor in the usefulness of orthomolecular therapies to reduce mental and emotional illness.

H.D.R.

Acknowledgements

The initial draft of this third *Medical Mavericks* volume has been in the making for several years. Why so long? Because the eleven people featured are complex and have been enormously productive. To reduce lifetimes of effort and accomplishment to a few pages is a daunting task for which I needed assistance.

Thanks to all those who provided materials, and a special thanks to Angela Addario whose research, organization, creativity, and writing assistance in preparing the material have been essential in bringing *Medical Mavericks Three* to fruition.

I would also like to express gratitude to research librarian Barbara Dodson, and to Patti Jobst, Anh Le, Michael Stewart, Paul Taylor, and Kelly Wong for their assistance in manuscript development for the orthomolecular.org website and its implementation.

H.D.R.

Foreword

Medical Mavericks Three is about some of the orthomolecular pioneers I have personally known. There are obvious giants in furthering orthomolecular therapies who are missing from this context, such as Fred Klenner, M.D., whose legacy taught us much about the therapeutic benefits of high dose vitamin C.

There are many others whom I hope to chronicle in future volumes of *Medical Mavericks*. They include but are not limited to such names as: Burt Berkson, M.D., Ph.D.; Hyla Cass, M.D.; Jonathan Collin, M.D.; Alan Gaby, M.D.; Leo Galland, M.D.; Richard Huemer, M.D.; Fred Klenner, M.D.; Oscar Kruesi, M.D.; Richard Kunin, M.D.; Michael Lesser, M.D.; Derrick Lonsdale, M.D.; William Philpott, M.D.; Michael Schachter, M.D.; Melvyn Werbach, M.D.; Julian Whitaker, M.D.; and Jonathan Wright, M.D.

I am personally grateful to these people and to those featured in *Medical Mavericks Three* for inspiring me and for impacting my life as well as the lives of countless others who benefit from their knowledge and

courage to apply what they believe in without knuckling under to orthodoxy.

H.D.R.

Foreword II

What is orthomolecular medicine anyway? Since less than one percent of practicing M.D.s in the U.S. classify themselves as orthomolecular, let's review what the 1% know.

The standard definition of orthomolecular medicine is:

“THE PRACTICE OF PREVENTING
AND TREATING DISEASE BY
PROVIDING THE BODY WITH
OPTIMAL AMOUNTS OF SUBSTANCES
WHICH ARE NATURAL TO THE BODY.”

(From www.orthomolecular.org)

There is another truth that is essential to understand when using the orthomolecular approach. That is that many illnesses are genetotrophic. This is a term developed by the brilliant mind of Dr. Roger Williams, who is featured in one of the chapters in *Medical Mavericks Three*.

Genetotrophic:

“THESE ARE DISEASES IN WHICH THE GENETIC PATTERN OF THE AFFLICTED INDIVIDUAL REQUIRES AN AUGMENTED SUPPLY OF ONE OR MORE NUTRIENTS, SUCH THAT WHEN THESE NUTRIENTS ARE ADEQUATELY SUPPLIED, THE DISEASE IS AMELIORATED.”

Roger J. Williams, Ph.D.

I prefer to think of it as practicing good medicine which is effective, has side benefits instead of side effects, is less costly than medications, and in many cases should be the first choice for therapy. After reading a glimpse into the lives of these superb observers and doers, you will agree.

H.D.R.

Foreword III

Those who are superb chronological thinkers may prefer that the vignettes in this book were sequenced according to life span rather than alphabetically. For you, they are so listed at the end of the book.

Although there is considerable merit in using the chronological approach, I, being somewhat of a maverick myself, preferred not to follow that convention.

I did this, in part, because the underlying messages we receive from this material are timeless. Whether it be the most ancient Hippocrates or the more recent Hoffer, the vignettes repeatedly reflect the wisdom of Schopenhauer's observation that new thought and new truths most often go through three stages. First, they are ridiculed. Next, they are violently opposed. Then, finally, they are accepted as being self-evident.

H.D.R.

A Tribute to Hugh D. Riordan, M.D. **1932 –2005**

by Abram Hoffer, M.D., Ph.D., F.R.C.P.(C)

The world lost one of its greatest visionaries and humanitarians when Hugh D. Riordan, M.D., passed away suddenly and unexpectedly on Friday, January 7, 2005. Dr. Abram Hoffer, one of the original founding fathers of the field of orthomolecular medicine and one of the medical mavericks featured in this book, offers the following tribute to his long time friend and colleague, Dr. Hugh D. Riordan.

Orthomolecular psychiatry and medicine emphasize the vast importance of nutrition and of reinforcing the diet with nutrients which are needed in large doses. For many patients, the usual amounts of nutrients that are present in the best of diets are not sufficient to achieve and maintain good health. The term “orthomolecular” was created by two-time Nobel Prize winner, Dr. Linus Pauling, whose contribution to what we know about the biochemistry of the body became the basis for much of modern medicine. But because he emphasized the use of doses of vitamins that are much larger than those recommended by our “recommended daily allowances” (RDA), his view became very unpopular, and the word “orthomolecular” achieved fame as an irritant for the medical and other healing professions. Dr. Pauling’s conclusions were derived from the studies of a number of pioneering physicians who found that certain vitamins in large doses had therapeutic properties that had been previously unrecognized.

Many years were required before the medical profession recognized that vitamins had any value at all. At first, the usefulness of such vitamins was restricted exclusively to preventing classical deficiency diseases, such as scurvy, pellagra, and rickets. This is the old “vitamins-as-prevention” paradigm. This is what we all grew up with. This meant that vitamins were needed only in very small doses and only for the classical diseases. It also meant that they were not to be used for other conditions and never in large doses.

The early orthomolecular pioneers – or, in Dr. Riordan’s terms, “Medical Mavericks” – persisted in demonstrating that vitamins are more versatile. Gradually, this led to the establishment of the “vitamins-as-treatment” paradigm, in which vitamins were recognized as having value for conditions not considered “deficiency” diseases, and in much larger doses. The best example is vitamin B3, the niacin form, which in doses of 3 grams daily (which is 150 times the amount needed to prevent pellagra) lowers total cholesterol, elevates HDL (the beneficial type of lipoprotein) and generally normalizes blood lipid levels. This modern paradigm is slowly growing – in spite of the opposition from governments, from the standard medical professions and from their journals. Instead, this new paradigm is being supported by a small group of “Medical Mavericks.” And of these, Dr. Hugh Riordan was one of the most knowledgeable, both as a Maverick par excellence and as an historian of Medical Mavericks.

We need these “Mavericks” desperately. Indeed, we have needed them for at least the past three hundred

years. If these great physicians and powerful fighters for the Truth had not existed in the past, we would still be treating people who suffer from smallpox by increasing their fevers. One of the early Mavericks on this subject was Sir Thomas Sydenham. About three hundred years ago, Lieutenant Sydenham, who had served in Oliver Cromwell's army in England, was demobilized when Cromwell won the war. Lieutenant Sydenham then decided to become a doctor. There were no medical schools. The apprenticeship method was used. He walked behind a doctor for two years, wrote his exams and was awarded his degree. I think there is a lot to be said for this method.

The pandemic of that age was not SARS, nor HIV/AIDS; it was smallpox. Nothing was known about viruses or bacteria. The classical theory held that smallpox was caused by the increased pressure of the "humors" which were hypothesized to be present. In trying to break out of the body, these pressurized "humors" created little vesicles, like tiny volcanoes, which erupted through the skin. Based upon this hypothesis, the traditional therapy, which was at least 1,500 years old, was that one should facilitate the release of these "evil vapors." This was done by increasing the pressure and by increasing the fever. Sydenham was a good orthodox doctor and he followed that ancient treatment. But, in England, there was another problem. There was no central heating. Even indoors, people were cold in the winter and hot in the summer. The medical treatment for smallpox thus consisted in covering each victim with blankets to retain the heat, giving them strong English whiskey, and keeping all the windows closed to keep the air out. This meant

that in the summertime the heat treatment was quite effective in heating up the patients – but in the wintertime, such was not the case. Eventually, Sydenham noticed that the death rate of his patients was very much higher in the summer than it was in the winter. Such an observation was directly opposite to the theory. According to the theory, the death rate should have been higher during winter months. In fact, the death rate in the summer was close to 50% of all patients, and in the winter it was under 10%. This was very disturbing to Dr. Sydenham because it directly contradicted theory. Eventually, he had to conclude that the theory and treatment were wrong, and that instead of increasing the fever he should do the opposite. Thereafter, he allowed his patients to remain uncovered, he did not allow them anything stronger than a light English ale, and he kept the windows open. As a result, the death rate of his patients in the summer dropped down to the winter level.

Dr. Sydenham would not keep his mouth shut. This proved to be a big mistake. His colleagues were aghast at this assault on their theory and practice. He was challenged to a duel and threatened with the loss of his medical license. Eventually, he wrote a long letter to a member of the nobility outlining his medical observations and the reaction he was getting. He ended his letter with the comment that, “A medical discovery is like a sapling in the middle of the King’s highway. If it is not fenced in, it will be destroyed by the galloping hordes.” Dr. Hugh Riordan helped us to build these protective fences.

If the medical establishments had had their way for the past 300 years, we would still be treating fevers by making them worse. Dr. Sydenham was eventually supported; he was knighted and became a titled “Sir,” and today he is recognized as the father of clinical bedside medicine, as well as one of the first to show that fever should be decreased rather than increased, especially in the treatment of smallpox. Today, there is a bronze plaque dedicated to this great Maverick near Parliament in London. I do not think that Dr. Hugh Riordan was ever challenged to a duel, but he was challenged legally when he wanted to treat his patients with high dose vitamins in the hospital. He won. He deserves a plaque at the University of Kansas School of Medicine, at the very least. Meanwhile, however, one of the domes at The Center is named after him in his honor. Modern medicine was built by Medical Mavericks such as Dr. Hugh Riordan.

Hugh and I worked together editing the *Journal of Orthomolecular Medicine*, and we also collaborated on the board of the Canadian Schizophrenia Foundation, now the International Schizophrenia Foundation. Hugh joined the editorial board of the JOM in 1991, and he then became Associate Editor in 2000. He also served on the board of directors for the International Schizophrenia Foundation since 2003. Hugh was a good colleague and friend, very supportive personally and of the work of the Foundation. In 2000, he presented the “Annual Pearl Maker Award” to the *Journal of Orthomolecular Medicine*, and in 2002 Hugh was honored by the International Society of Medicine with the “Orthomolecular Physician of the Year” Award.

Dr. Riordan published four books, including this one, and about 70 clinical and research reports. Dr. Andrew Saul's impressive website, www.doctoryourself.com, carries a complete list of Hugh's publications up through 2002. Additional publications are in the *Journal of Orthomolecular Medicine*. Hugh's productivity did not go down with age as it does for so many scientists, and he contributed his column regularly to our Journal, each time presenting very interesting cases. These anecdotes are very useful in teaching. Among other topics, his areas of research included histamine metabolism, which arose out of his interest in the classification developed by Dr. Carl Pfeiffer, who had classified some patients as having either too much or too little blood histamine. Hugh did numerous studies on chelation, showing that it has measurable clinical and physiological value. Under his direction, his laboratory has for many years investigated food allergies and uses a cytotoxic test for identifying such foods. But Hugh's main work had to do with the schizophrenic syndrome, and also with the treatment of cancer using nontoxic vitamin C chemotherapy.

Cancer has become the major disease in the world today. The only acceptable, conventional treatment, as recognized by standard medicine, is a direct attack on the tumor. Unfortunately, every such major attack – which includes surgery, radiation and chemotherapy – is very difficult, highly toxic, and there is very little evidence that such means are effective. Any advantages of the usual chemotherapy are so minor that if a controlled trial involving thousands of patients shows even a five percent advantage over treatment involving a placebo, there is a massive outburst of enthusiasm from the leaders of stan-

dard cancer treatment. Meanwhile, means of preventing cancer are much less well funded. Hugh also attacked cancers directly, but his “chemotherapy” is safe. I have not heard of ascorbic acid killing anyone. If it had, such news certainly would have been headlined in the *New York Times*.

Ascorbic acid has been given in doses as high as 200 grams per infusion, over a matter of hours. At the doses that Hugh used, which he had established through laboratory studies, he found that 100 grams or less of ascorbic acid, given over a five-or-six hour infusion, is enough to directly attack cancer tumors. Additionally, vitamin C is such a natural, robust healing nutrient that it activates the body’s immunological defenses – rather than destroying such defense systems, as standard radiation and chemotherapy do. Hugh’s methods improve the body’s natural immune defenses and decrease the ability of the cancer cells to resist such defenses. In sharp contrast to standard chemotherapy, which always makes patients feel much worse, Hugh’s treatments with ascorbic acid would always make the patients feel much better. Hugh was the leader in making available to cancer patients a treatment that is effective, safe, economical, and very tolerable. Few oncologists have ever seen these advantages – unless they visited Hugh’s clinic. Oncologists worldwide suffer from the delusion that vitamin C is “toxic.” This is based upon no reports in the medical literature. The vitamin C intravenous chemotherapy studies that Dr. Hugh Riordan began and established are being continued at the University of Kansas and McGill University in Montreal, among other places.

Very few people knew that Hugh was a psychiatrist. His interest in rational diagnosis and treatment was eclectic. He pioneered the biochemical classification of these patients and the use of rational therapy based upon this classification. Few people realize that psychiatric nomenclature is of very little value since there is almost no relationship between the diagnosis and the treatment. Hugh expanded the use of the mauve factor, later called “kryptopyrrole,” and was part of an international team that is still examining this factor further. It probably is one of the best markers of oxidative stress and is, therefore, found mostly in patients who are under severe stress. Such patients include those suffering from the various schizophrenias, as well as autistic children, people suffering from a wide host of other mental diseases, and also a number of cancer patients who also are under severe oxidative stress. I think Hugh liked working with schizophrenic patients because he got such good results from his treatment. He and I were, of course, in complete agreement. If vitamins were ever to be driven off the face of the earth, I would promptly give up all medicine and go into major mourning.

Hugh was one of the Medical Mavericks who fought hard and consistently on behalf of orthomolecular concepts. By doing so, he became a member of an elite group that includes Linus Pauling, Roger Williams (the discoverer of two vitamins), Carl Pfeiffer, Humphrey Osmond, Irwin Stone, David Hawkins, Robert Cathcart, Allan Cott, and many others. Ten of these mavericks were inducted into the Orthomolecular Hall of Fame in 2004; Dr. Hugh Riordan will be added in 2005.

Hugh was not shy about defending orthomolecular medicine. I remember that when Linus Pauling first coined the term in 1968, many from our group who had been administering vitamin B3 were not very happy with the name because it generated so much antagonism. “Orthomolecular medicine” became the favorite epitaph of the American Psychiatric Association. But Hugh relished a good fight. This included writing letters to editors. On April 29, 2003, the *New York Times* published an article voicing the concern which many medical experts had about the increasing use of vitamins. Many conventional doctors were afraid that they were “overdosing.” The heading read: “Vitamins: More May Be Too Many.” I have always been amazed at the bold faced hypocrisy of these physicians who express such concerns about vitamins. As Dr. Andrew Saul writes, “Where are the bodies?” Until last year, I heard very few of the same doctors expressing any concern about Vioxx, for example, which has killed many thousands of people. There are no deaths from vitamins. I doubt that anyone could commit suicide by overdosing with them.

Hugh responded to the *New York Times*, on May 1, 2003, with the following letter:

“What an amazing article, ‘Vitamins: More May Be Too Many.’ It is missing a few details. According to the latest available U.S. Government statistics, the percentages of Americans over age 20 who are not getting even the RDA of many nutrients is appalling.”

He pointed out that 40% of Americans are not getting even the abysmally low RDA of vitamin C, 55% are not getting the low pyridoxine RDA, 70% are not getting the recommended magnesium allowance and 75% are not getting enough zinc. Then he added,

“Based upon its own data, our government and a responsible publication like the *New York Times* should be screaming that the nutrient intake of America is so low in so many that it is a national scandal and a public health menace.”

Hugh was enormously productive in medical history. His three-volume series *Medical Mavericks* should be required, essential reading in every medical school curriculum. And he was a doer as well, more than just a man of letters. He worked tirelessly in building up The Center for the Improvement of Human Functioning International, Inc., and in developing this superb treatment center to which I was very happy to refer patients with full confidence that they would be treated seriously, gently, and effectively. His research, in a very difficult field and against the opposition of the entire psychiatric and medical establishment, was innovative and productive. He was a great teacher at the meetings he addressed. Most notable is the recent documentary that he produced, in which he featured the “Eat, Exercise, Excel!” program, which was designed and implemented in certain “problem” elementary schools. Just by introducing proper nutrition, exercise, and a nurturing “family” atmosphere into the schools, it was demonstrated that dramatic, even

revolutionary results in improved student performance are easily obtained.

Following Hugh's passing, his family, as well as The Center that he had founded, built and directed, both received a large number of very warm, supportive and helpful letters – all tributes to Dr. Riordan's lifetime of generosity toward others. I have selected one which I believe summarizes the high regard in which Hugh was held by those who knew him. This is from the Hilton Family Foundation, the first foundation to seriously support orthomolecular medicine:

“I first recall meeting Dr. Hugh Riordan at an Orthomolecular Conference in Vancouver in 2000. Dr. Abram Hoffer had introduced him as one of the foremost researchers in vitamin C. I was fascinated to learn about his clinic, and soon thereafter we visited him in Wichita to see for ourselves ‘The Bright Spot for Health,’ its research and educational facilities. At our meeting in Vancouver, we met with Dr. Riordan and other orthomolecular pioneers to learn what our family could do to best further the development of orthomolecular psychiatry, and he suggested that we have a super orthomolecular website. Thanks to his vision, www.orthomolecular.org was created!

“Of course there were countless projects Dr. Riordan led and participated in to further orthomolecular medicine and to save and transform the

lives of patients, not the least of which was his authorship of the '*Medical Mavericks*' book series...

“Dr. Riordan’s personality and communication style reminded me of my dad’s, and although he was a man of few words, I always got a lot out of his words. Whether it was words of encouragement when we had sponsored the orthomolecular section of the Food As Medicine Conference in 2001, or words of wisdom when he encouraged us to move forward with orthomolecular research studies yet spend our funds judiciously, or guidance on health matters that helped me and others get and stay well, or words of understanding and thoughtful advice about my family, Hugh Riordan was an amazing influence to my family and to all of those who knew him....

“As I continue to reflect on the many ways Dr. Riordan has been a teacher to me, my family, the orthomolecular family, his community, and the world, I remain a student and an advocate, more determined than ever to get the word out and make ‘orthomolecular medicine’ a household word and orthomolecular treatment the standard of care for patients around the world!

With love, Julie,
for Charles, Lela, and Julie Hilton”

As my dear friend, colleague and fellow maverick, Hugh
will be deeply missed.

Abram Hoffer, M.D., Ph.D., F.R.C.P.(C)

Victoria, Canada

January, 2005

Robert F. Cathcart III,
M.D.

1932 – present



When the Society for Orthomolecular Health-Medicine bestowed its Linus Pauling Award for 2002 upon Dr. Cathcart, the President of the organization, Dr. Richard Kunin, offered the following words:

“Linus Pauling would be pleased to know that OHM is honoring Dr. Robert Cathcart, who was among the first to apply Dr. Pauling’s analysis of the anti-viral effects of vitamin C with great success in his primary care practice at Lake Tahoe in the 1970s. Since then Dr. Cathcart has performed research into the actions and applications of ascorbic acid, both in physiology and medicine. Dr. Cathcart was among the first to consider the physiochemistry of vitamin C in the regulation of antigen-antibody reactions. Dr. Cathcart appreciated the possible mechanism of redox control in allergy and infection over 20 years ago, before the antioxidant revolution of the 1980s. In fact, his paper about the influence of vitamin C on antibodies was published in *Medical Hypothesis* before we had a clear understanding of the structure and

function of antibodies. And then there is ‘the 100 gram cold.’ Dr. Cathcart had the intellectual vision to propose theoretical advantages for vitamin C at large megadoses and the intellectual courage to offer it to his patients. Many clinicians have been influenced by Dr. Cathcart, and many more patients have benefited. The officers and board members of OHM hereby honor our esteemed colleague, Dr. Robert Cathcart, recipient of this year’s Linus Pauling Award.”

Indeed, Linus Pauling himself had much to say about Dr. Cathcart. In his book, *How to Live Longer and Feel Better*, Dr. Pauling devotes no less than seven full pages to Dr. Cathcart. He begins by stating,

“The physician who has had the greatest amount of experience with vitamin C and viral diseases is Dr. Robert Fulton Cathcart III, of Los Altos, California.” (p. 169)

Robert Cathcart received a B.A. in Economics from Stanford University in 1954, and an M.D. from the University of California at San Francisco Medical School in 1961. His surgical internship was then at Palo Alto Stanford Hospital, followed by a residency in orthopedic surgery at Stanford University School of Medicine, where he later also served as assistant professor of orthopedic surgery.

Dr. Cathcart’s teacher in residency in orthopedic surgery at Stanford, Dr. C. Howard Hatcher, was a world famous bone pathologist. Dr. Hatcher encouraged his students

“not to trust the literature but to make our own observations about medical problems.” As Dr. Cathcart later acknowledged, “I blame this philosophy for some of the observations that I have made over the years that have put me at odds with standard medical practice.”

Dr. Cathcart’s first observation to contradict convention involved the shape of the femoral head. He noticed that it is not spherical. Careful measurements of 45 hip dissections at Stanford had left him with this undeniable fact. Nevertheless, the conventional assumption of the day was that the femoral head is spherical. Replacements such as the Austin Moore and the Judet hip prostheses were designed according to this wrong assumption. As technology advanced and it became possible to manufacture perfectly spherical prostheses, the results became worse. The patients suffered more pain as cartilage was worn away, and sometimes the prosthesis bore through the acetabulum into the pelvis. The earlier prostheses, which were poor replicas of spheres, were not as bad.

Dr. Cathcart recalled a British anatomist stating that no animal joint is ever a surface of revolution. In other words, no animal joint can ever be perfectly spherical, round, conical, or even perfectly flat. However, these are the first shapes that an engineer would use in making a bearing surface – and yet nature avoids these shapes. From his 45 hip dissections at Stanford, Dr. Cathcart “began to regard a sphere as a pathological shape and an early sign of degenerative arthritis. Late stage degenerative arthritis shows a flattening of the head,” and healthy joints are clearly non-spherical as well.

Dr. Cathcart also realized that the cartilage of the acetabulum derives its nutrition from the synovial fluid, since there is no blood circulation directly to the cartilage. A perfectly spherical joint, no matter how it turns, will not pump the synovial fluid through the cartilage. Similarly, X-ray movies of the cartilage revealed no changes in thickness of the cartilage upon weight bearing. Therefore, the circulation of the synovial fluid through the cartilage was due entirely to a “pumping action” from the non-spherical shape of the femoral head.

Based upon his own independent observations, Dr. Cathcart thus developed and patented a hip prosthesis which, unlike its immediate, modern predecessors, was more egg-shaped instead of spherical. Dr. Cathcart’s new design, which resembled more closely the natural shape of the femoral head, eliminated many of the problems that patients had suffered with spherical prostheses. The acetabular cartilage was no longer worn away, the synovial fluid was allowed to circulate, and the patient no longer suffered any pain. Interestingly, his design also prevented loosening of the prosthesis stem in the femur shaft, which had been another common problem associated with spherical prostheses. This loosening had been caused by a “reflex sympathetic dystrophy of the bone” due to inflammation of the synovial lining, which in turn was due to sloughing of the cartilage under the perfect sphere. Simply by designing a new type of prosthesis, modeled after the natural shape of femoral joints, he had solved all of these problems. He had also defied conventional “wisdom.”

His invention, the “Orthocentric Cathcart Hip Prosthesis,” was patented in 1971. Thirty years later, over 67,000 of these prostheses have been implanted.

Dr. Cathcart recalls that, from an early age, he excelled more easily in math and physics than in languages, because he does not think in words but rather “in terms of weight, heat, flow of electrons, inertia, smells, etc.” This inclination would serve him well throughout his life, in applying innovative techniques to a number of medical problems. Indeed, his success with problem-solving went far beyond orthopedics.

For many years Dr. Cathcart had suffered frequent colds, as well as seasonal hay fever. He heard about Linus Pauling’s work with vitamin C, and “was ready to try anything.” However, he did not know how much vitamin C he should take. He guessed about one teaspoon full of ascorbic acid crystals, which was approximately four grams. To his surprise, his hay fever symptoms disappeared in five minutes but returned in about four hours. So he took another teaspoon full, which again relieved his symptoms for another four hours. By the end of the day he had taken 15 grams. He then went nine months before catching another cold. This time, after taking a teaspoon full of ascorbic acid crystals, his symptoms did not vanish until after 15 minutes, and this relief lasted only for about an hour. By the end of the day, he had taken 60 grams of ascorbic acid without it causing diarrhea. The next day, his cold was gone and his bowel tolerance to ascorbic acid had rapidly dropped to the level of 16 grams per day.

He found this very interesting and tried it out on friends and patients. Invariably he found that a person's bowel tolerance would increase whenever he or she had a cold.

At this time he also started giving vitamins C and E to his patients after hip surgery. The results amazed him. These patients needed very little pain medication, they quickly returned to full mobility, and he was able to discharge them from the hospital in half the time as patients who had not received the vitamins after surgery. His new found success with helping patients to a speedy recovery continued for about three months, until the other doctors on the hospital staffs discovered what he was doing. Then, all of his referrals suddenly stopped.

Fortunately, however, by this time he was receiving royalties from the hip prosthesis patent, so financially he was secure. Having all of one's referrals suddenly cut off would have bankrupted the average physician, but even without patients, Dr. Cathcart was earning more money than average. After three years in San Mateo, he decided to look elsewhere for a less intellectually hostile environment. He relocated to Incline Village in Nevada, where at that time there were no other doctors in town. Here, he was able to gather all the experience that he wanted in treating patients with vitamin C, and without any opposition from other physicians. He quickly began to realize that ascorbate was effective not only against colds, but also against all other acute infections. In fact, he even found it to be effective in healing injuries. He began to use vitamin C not only in the treatment of infectious diseases but also for bone fractures from skiing. He noted that ascorbic acid facilitated healing and recovery

in all cases. For infectious diseases, he found vitamin C to be particularly effective in curing beta hemolytic streptococcus infection, and he found scarlet fever to be “the easiest disease of all to cure with ascorbate. Scarlet fever results from an allergic reaction to a minute amount of strep toxin left from a previous infection a couple of weeks before.” The ascorbate works rapidly to neutralize the minute amount of toxin, which instantly shuts down the disease. “I presume it would prevent rheumatic fever in the same way.” He also used vitamin C to treat spider bites, as well as traumatic conditions including bone fractures and skin lacerations. The vitamin C was especially quick to reduce swelling and prevent infection. Although none of the other doctors would recognize this, vitamin C also greatly facilitated the healing of surgical wounds. As Dr. Cathcart recalls,

“Patients undergoing major surgery would amaze their surgeons in that their wounds would be fully healed within a week or two. A typical response of the surgeon would be to bring in all of their colleagues to show how rapidly the wound had healed. But when the patient would then announce (I had trained them to wait for the maximum crowd) that it was because of taking bowel tolerance doses of vitamin C, everyone would stalk out of the room without further comment.”

Dr. Cathcart noticed that tolerance to ascorbic acid was proportional to the “toxicity” of a disease, which he later realized was a measure of free radicals. He also observed that the ascorbic acid did not become effective until it had reached a certain “threshold dosage,” which was dif-

ferent for each condition, but which was always just below the dosage that would cause diarrhea. As Dr. Linus Pauling wrote,

“Cathcart makes it his practice to establish for each of his patients their bowel-tolerance intake of vitamin C ...The intake is different for different people, and different for the same person at different times. Cathcart observed that the bowel-tolerance intake is usually very large for seriously ill patients and becomes smaller as the patient’s health improves. He was astonished that for some severely ill patients the bowel-tolerance limit was more than 200 grams per day. Within a few days, as the disease was controlled, the limit would fall toward intakes of 4 to 15 grams per day. Having thus established a standard for administering vitamin C to his patients in a manner responsive to their biochemical individuality, Cathcart has accumulated a wealth of experience with this orthomolecular treatment of many different kinds of infections. He indicates that vitamin C has little effect on acute symptoms until doses of 80 to 90 percent of bowel tolerance are reached.” (From *How to Live Longer and Feel Better*, by Linus Pauling, p. 170).

When Dr. Cathcart first arrived in Incline Village in 1970, they were in the midst of a beta hemolytic streptococcus epidemic. He gave penicillin and bowel tolerance doses of ascorbic acid to 300 patients, none of whom had an allergic reaction to penicillin. This lack of allergic reaction was highly improbable, since he should have seen

about nine people with reactions, based upon the published rate of 3%. One day, a patient who had received his penicillin elsewhere, without any ascorbic acid, came to see Dr. Cathcart with the typical urticarial rash all over his body. Dr. Cathcart seized the opportunity to give him an intravenous push of 20 grams of sodium ascorbate. In 15 minutes, the rash was gone. He then prescribed some Benadryl. The next day, the patient returned to ask Dr. Cathcart why he had wasted his money on Benadryl, since the rash had not come back and he felt great.

Dr. Cathcart found that ascorbate is particularly effective in acute hepatitis:

“Intravenous sodium ascorbate for a couple of days followed by bowel tolerance doses of ascorbic acid will eliminate any form of acute infectious hepatitis, including acute hepatitis C. The problem with hepatitis C is that only 25% present as acute cases. The rest are chronic and require not only the bowel tolerance C but also a complete nutritional program, perhaps for the rest of their lives. But even here I have seen no hepatic necrosis, no cancer of the liver, and no necessity for liver transplant. Because of the recommendation of Dr. Burt Berkson, I have added alpha lipoic acid to the treatment of chronic hepatitis.”

As Dr. Linus Pauling wrote, Dr. Cathcart, “was so much impressed by the effectiveness of vitamin C that he gave up his practice as an orthopedic surgeon and became a general practitioner, specializing in the treatment of infectious diseases. By 1981 he was able to report on his

observations on 9,000 patients treated with large doses of vitamin C.” (From *How to Live Longer and Feel Better*, by Linus Pauling, pp. 169-170).

After nine years of private practice in Incline Village, Dr. Cathcart returned to San Mateo. He felt confident that the other doctors would accept his orthomolecular methods by now, but instead he found that only physicians belonging to the Orthomolecular Medical Society or ACAM were open to such ideas. He joined a like-minded physician, Dr. Carl Ebnother, at his Orthomolecular Center in Palo Alto for about a year. But, to his dismay, Dr. Cathcart found orthodox physicians in the Bay Area to be just as resistant to the use of vitamin C in 1980 as they had been a decade earlier. He discovered that the only attention which vitamin C receives from the established medical community is when a trial fails – and it is always a trial that is performed with too small of a dosage and for too short a period of time. These negative results are always published and receive widespread attention from the standard medical establishment, whereas a vitamin C study with positive results will not pass peer review. The fact that a threshold level of vitamin C must be attained before its effectiveness will be seen is always ignored.

Regarding the importance of the “threshold” concept, Dr. Cathcart coined the phrase “the 100-gram cold.” He began referring to “mild colds as being 30 to 60 gram colds, whereas a bad cold may be a 100-gram cold. A 100 gram cold is defined as a cold that allows you to take 100 grams of vitamin C at its peak without it producing diarrhea. With a 100 gram cold, it takes at least 90 grams at

its peak to reverse the symptoms.” He cites an Australian study in which participants received only four grams of vitamin C per day upon the onset of a cold. Such a low dose actually extended the cold for a few hours. Dosage! Dosage! Dosage!

As Dr. Cathcart has said, “This explains why patients know that vitamin C works, and doctors know that it doesn’t!” People will usually self-medicate a 5-or-10-gram cold. But for a cold requiring larger doses of vitamin C, people tend to want to see a doctor, and the doctors won’t know to prescribe vitamin C, at least not in adequately large amounts.

Dr. Cathcart explains that massive doses of ascorbate augment cellular immunity while suppressing humoral immunity – which is why it is so effective in treating allergies such as hay fever and asthma. Cortisone, by contrast, suppresses both immunities simultaneously and, therefore, increases the incidence of infections and other complications.

Dr. Cathcart has been particularly active in research involving vitamin C’s role in electron transport. He wishes to emphasize to other doctors that this electron transport chain is the reason why ascorbate is the most effective of all the free radical scavengers. Other non-enzymatic free radical scavengers or antioxidants rely upon the mitochondria for their electrons. However, massive amounts of ascorbate can carry large numbers of electrons themselves, thereby neutralizing the free radicals that run rampant throughout the body in serious conditions. Dr. Cathcart offers some extreme examples:

“Extremely serious diseases such as Ebola, Marburg virus, Lassa fever, and other hemorrhagic fevers ... are 300 to 500 gram diseases and they induce sudden acute systemic scurvy. Collagen fibers break down and all the capillaries and other blood vessels bleed. Hence the hemorrhagic fever. ... All of these conditions should be treated with intravenous sodium ascorbate.”

Likewise, he also points out that even “the death rate from anthrax would be markedly reduced with the prompt administration of ascorbate intravenously along with the appropriate antibiotics.”

He mentions the work of Wendel Belfield, D.V.M., who has been curing dogs of distemper and kennel fever for 20 years with the administration of intravenous sodium ascorbate. “Even though the dog is an ascorbate producing animal, and this is why they do not usually catch colds, they will fall ill to a 300 to 500 gram disease. Belfield has found that if he helps them along for a few days with intravenous ascorbate, the dogs will survive.”

To quote Dr. Linus Pauling once again,

“The success of vitamin C in controlling other viral diseases suggests that it be tried with AIDS. Dr. Ewan Cameron, Dr. Robert Cathcart, and I separately during the last three years made this proposal to appropriate medical groups, but with no response. One study has been published. Cathcart (1984) examined nearly ninety AIDS patients

who had sought medical care from other physicians and who also took high doses of ascorbate on their own initiative. He also treated twelve AIDS patients with high doses (50 to 200 grams per day) of oral and intravenous ascorbate. From his limited observations he concluded that vitamin C suppresses the symptoms of the disease and can reduce the incidence of secondary infections. It is evident that additional work along this line is needed.” (From *How to Live Longer and Feel Better*, by Linus Pauling, p. 174).

Dr. Cathcart’s vitamin C work has been based upon massive doses of ascorbate in the neutralization of free radicals. This is why his methods are so effective in treating infections, trauma, surgery, burns and allergies, since the common denominator in all of these conditions is rampant free radicals. However, as Dr. Cathcart says, he has been so focused over the years on the interaction of ascorbate with free radicals that,

“To my surprise, I missed completely the extreme usefulness of massive doses of intravenous sodium ascorbate in cancer. The definitive use of this substance in cancer is being described by Hugh Riordan.”

Interestingly, Dr. Cathcart sees more and more physicians and members of their families who come to him as patients. But these very same physicians will not give vitamins to their own patients, nor will they refer their patients to Dr. Cathcart, “for fear of reprisals by fellow physicians or the medical boards. California is fairly progressive now but I still get two or three calls a year

from physicians who are being investigated by their boards for using intravenous vitamin C,” Dr. Cathcart laments.

In his groundbreaking book, *The Vitamin C Controversy: Questions and Answers*, Dr. Emanuel Cheraskin offers a quote by Kenneth J. Carpenter:

“If we exclude straightforward famine, scurvy is probably the nutritional deficiency disease that has caused the most suffering in recorded history.”
(*The History of Scurvy and Vitamin C*, 1986).

Indeed, Dr. Cathcart takes this statistic one step further. In light of the innumerable diseases and injuries that could be helped with vitamin C, but aren’t, he says:

“It is hard to estimate the cost to humanity of this refusal of orthodox medicine to look at various aspects of orthomolecular medicine. The standard physician seems to be in the clutches of the drug companies. I estimate that this refusal to look at how to use vitamin C in massive doses costs at least 3,000 lives, or one set of World Trade Center Twin Towers, every couple of months.”

Dr. Cathcart’s former teacher at Stanford University, Dr. C. Howard Hatcher, would be proud of him.

Emanuel Cheraskin,
M.D., D.M.D.

1916 – 2001



Dr. Linus Pauling once wrote:

“There is no doubt, as pointed out by Cheraskin and Ringsdorf in their book, *Predictive Medicine* (1973), that your general health is affected to some extent by the health of your mouth and that the health of your mouth serves as an indicator of your general health. If you have trouble with your gums or teeth, increase your regular daily supplement of vitamin C and other vitamins to see if the problem cannot be solved in this simple way. Also, keep in touch with your dentist – and be sure that he or she knows about the value of proper nutrition.” (From *How to Live Longer and Feel Better*, p. 285).

Of course, not every dentist is well versed in “the value of proper nutrition.” Dr. Cheraskin was one very notable exception to this rule.

Throughout his long and productive life, Dr. Cheraskin would pioneer a wealth of new discoveries about the relationship between oral health and total health. On this subject he authored over 700 scientific publications, in-

cluding 17 books. Between 1972 and 2001, the year of his death, 40 of his papers had been published in one journal alone, *Journal of Orthomolecular Medicine*. During a 30-year period, between 1958 and 1988, he and his colleagues conducted over 1,000 clinical experiments. For the last 53 years of his life, he served, without interruption, as professor of numerous medical school and dental school courses, and he was the recipient of more than 80 honors and special scientific recognitions from around the world. In 1985, sixteen years prior to his death, his curriculum vitae numbered over 60 pages in length.

Emanuel Cheraskin was born on June 9, 1916, in Philadelphia, Pennsylvania.

After receiving his bachelor's degree in 1939 and his master's degree in 1941 from the University of Alabama in Tuscaloosa, he went on to earn his M.D. in 1943 from the University of Cincinnati College of Medicine in Ohio. He then earned his D.M.D. (Doctor of Medical Dentistry) in 1952 from the University of Alabama School of Dentistry in Birmingham.

It was this unique combination of dentistry, built first upon a foundation of general medicine, that enabled "Cherri," as he was known amongst his friends and colleagues, to offer his particular insights into holistic health and nutrition from the perspective of oral health and disease.

Needless to say, Dr. Cheraskin's affiliation throughout his life with universities and the learning environment

was extensive, both as a student and as a teacher. After completing his medical internship in Hartford, Connecticut, Dr. Cheraskin served as a captain in the U.S. Army Medical Corps for two years. He then went to Evansville, Indiana, for his residency. Then, for more than half a century – for the next 53 years of his life, until his death – he would serve in an uninterrupted capacity as professor of a series of medical and dental school courses at several universities. His first teaching position, in 1948, was as instructor of anatomy at the Medical College of Alabama, where later, while he was still a dental school student, he would hold the position of assistant professor of physiology from 1950 to 1952. He would also become associate professor, chairman and director of postgraduate studies in the Department of Oral Medicine at the University of Alabama School of Dentistry in Birmingham, where twice he would also serve as professor and chairman of the Division of Oral Surgery and Oral Medicine. Meanwhile, back at the Medical College of Alabama, he also held the position of assistant professor in the Department of Medicine for 20 continuous years, from 1959 through 1979. During this time he was also Visiting Lecturer and Adjunct Professor at the College of Dental Medicine at the Medical University of South Carolina, and he had been made an honorary professor in the dentistry departments at universities in Guatemala, Bolivia, and Brazil. From 1979 until the time of his death in 2001, he was Professor Emeritus at the University of Alabama at Birmingham, while simultaneously a consultant to numerous organizations throughout the world.

He was a Diplomate of the American Board of Oral Medicine from 1956 until his death; an honorary member of the Chinese Medical Association; a Fellow and later an Honorary President (1974-1975) of the International Academy of Preventive Medicine; an advisory committee member of the American Physical Fitness Research Institute; Consultant Emeritus to the U.S. Army Health Services Command in Fort Benning, Georgia; a Fellow of the Academy of Orthomolecular Psychiatry; an honorary member of the Italian Medical-Dental Association; and a Lifetime Member of the Royal Society of Medicine in London. Few people have been honored with such distinction for their lifetime of service to others, as was Dr. Cheraskin.

Because of this remarkable breadth and depth to his medical background, Dr. Cheraskin could quickly and easily see relationships between seemingly disparate subjects. Often, he could see connections that nobody else saw. Few people, for example, were able to make the connection between oral health and total health. Yet Dr. Cheraskin left a treasure trove of pioneering work in this field. As recently as 2005, newly published articles in the medical and dental journals are just now attracting attention for their descriptions of the “latest discovery” which links gum disease to cardiovascular disease, such as heart attacks and stroke. Dr. Cheraskin had investigated and described such a link more than 50 years prior to this “modern” discovery. He also studied the direct effects of lifestyle on health and disease, long before it became fashionable to do so. More obvious was the connection between basic nutrition and overall health, which, like everything else, always seemed clear and straight-

forward to Dr. Cheraskin. In fact, it seemed strange to him that such a connection was not immediately apparent to everyone. In 1978, he stated a rather obvious, yet grossly overlooked, point:

“Man is a food-dependent creature. If you don’t feed him, he will die. If you feed him improperly, part of him will die.”

Surely, everyone is aware of the simple fact that if we do not eat at all, then we will die. Strangely, however, few people notice the next obvious fact, which is that if we do not eat properly, then we will partially die – or in other words, our health will suffer. As one of Dr. Cheraskin’s friends and colleagues, Dr. Carl Pfeiffer, would later write, “Malnutrition may afflict up to 80% of the nation’s population, according to Drs. Cheraskin and Ringsdorf.” (From *Mental and Elemental Nutrients*, by Carl Pfeiffer, p. 3). Just because a fact is simple and obvious does not mean that people will be aware of it. Even in the United States, where there is certainly no shortage of food, there nevertheless seems to be an appalling shortage of knowledge about food. When as much as 80% of the population may be malnourished, due not to a lack of food but to a lack of understanding about proper food, this is no minor problem. Dr. Cheraskin pointed out that, ironically, it is possible to eat too much food, and even to be grossly overweight, yet still suffer from malnutrition. And as everyone may currently see, this is exactly the phenomenon that is now predominant throughout developed nations, especially in the U.S.A. – along with an accompanying epidemic of related health complaints, both physical and psychological.

On a similar topic, that of exercise, Dr. Linus Pauling referred once again to Dr. Cheraskin's work:

“It is generally agreed that physical activity is important for the preservation of good health. Cheraskin and Ringsdorf, in their book *Predictive Medicine*, conclude that ‘the addition of physical activity discourages disease; the absence of exercise invites disease.’” (From *How to Live Longer and Feel Better*, by Linus Pauling, p. 295).

Dr. Cheraskin wrote prolifically about specific nutrients, including the roles that they play in physical activity. One result of his research, which may seem surprising to many, is that the mere act of walking for half an hour or longer, three or more times a week, will tighten the gums and hold teeth more firmly in place. He even invented a small device for measuring the tightness of teeth, or “tooth mobility,” in millimeters, on which he based this finding. Plasma and tissue levels of vitamin C play a key role in maintaining healthy teeth and gums – but so does physical activity. Many people who suffer from loose teeth, therefore, may be helped simply by adding light yet regular walking to their schedules, in combination with vitamin C supplementation.

Dr. Cheraskin was the first to analyze “subclinical scurvy” and “subclinical tooth mobility” in detail. The first findings of his studies in this field appeared in a report entitled exactly that, “Subclinical Scurvy and Subclinical Tooth Mobility,” which he published in the *Journal of Western Society of Periodontology*, in March of 1959. At this early date, he established the close rela-

tionship between loose teeth and inadequate vitamin C intake. Prior to Dr. Cheraskin's work, there had been very little information available in the literature on subclinical scurvy, its causes and effects. Since "classical scurvy" is now quite rare, few people were even aware of the existence of "subclinical scurvy." Dr. Cheraskin demonstrated that it is possible for a person to show "no clinical evidence of vitamin C deficiency" yet still "demonstrate laboratory proof of subclinical laboratory deficiency." (From *The Vitamin C Controversy: Questions and Answers*, by E. Cheraskin, p. 77). These findings paved the way for further work by other researchers into the myriad aspects of "subclinical scurvy."

To the nonscientific person, Dr. Cheraskin had a natural gift for unveiling the simple and obvious logic behind topics which would otherwise seem mysterious and complex. As Dr. Abram Hoffer would later write, "Dr. Cheraskin's research was first class. He took simple concepts and tools and made them work to establish the importance of optimum nutrition." (From *Journal of Orthomolecular Medicine*, 2001). While most of his writing was directed toward the professional medical and scientific communities, he could distill essential points on any topic for the lay public to understand as well.

Dr. Cheraskin had a fast wit and a disarming sense of humor, which often found an outlet even within a scientific or technical context. As one such example, he once pointed out the physiological consequences of certain eating and drinking habits that people sometimes display, which he found to be rather peculiar from a medical perspective. Specifically, in regard to alternating hot and

cold food or drink (such as having ice cream with coffee, or soup with iced tea), he said, “If you ever did that to yourself once rectally, you’d never do that again orally.” The point was that this behavior is not good for teeth. Dr. Cheraskin was widely admired and respected for his vast knowledge and expertise on a wide range of subjects, but he was also purely and simply a lot of fun to be around. No doubt his keen and animated ability to portray serious matters in a humorous light contributed to this fact.

Possibly as a result of his vast, lifelong experience in academia, Dr. Cheraskin was ultimately drawn to The Center for the Improvement of Human Functioning International, in Wichita, Kansas. Few professors in any discipline can claim over half a century of teaching experience, which included chaired positions, directorships, and honorary appointments, in as many universities in as many countries, as could Dr. Cheraskin. But, as he liked to tell Dr. Riordan, one reason why he was drawn so strongly to The Center was because The Center has “the intellectual and academic atmosphere of a university, but without the b.s.” Dr. Cheraskin had certainly grown familiar with the idiosyncrasies of academia. For example, during his many years in various universities, he noticed that large volumes of paperwork would impress people. Whenever one of his ideas was up for review, he would arrive at the committee meetings bringing large stacks of papers. The stacks themselves seemed to be what always impressed his university peers, whether or not anyone ever actually read the papers. By contrast, at The Center for the Improvement of Human Functioning International, Dr. Cheraskin could enjoy a different type of intel-

lectual milieu. The Center is a place where people may come to learn, where people enjoy learning, and where they are encouraged to learn without having to get swept up in the politics that usually accompany an academic organization. Such an open environment of free-flowing ideas offered a refreshing venue for Dr. Cheraskin, within which his multifaceted creativity was deeply respected. Not only did he enjoy a long tenure with this organization, but he also maintained a close friendship with its founding President and Director, Dr. Hugh Riordan. Beginning in 1981 and lasting for the next 20 years, until his death in 2001, Dr. Cheraskin's skills and expertise were highly valued at The Center. And of Dr. Riordan, Dr. Cheraskin said, "Once you meet him, you will never forget him."

In 1988, Dr. Cheraskin authored one of his most popular books, *The Vitamin C Controversy: Questions and Answers*, which was published by the Bio-Communications Press, a division of The Center for the Improvement of Human Functioning International. In the introduction to this book, Dr. Hugh Riordan wrote:

"Knowing more about vitamin C and how it affects our lives, health, and energy is probably one of the most important pieces of information we can have to reduce the likelihood of getting disease or becoming diseased. As one of the few animal species on earth incapable of making its own vitamin C, humans need to fully appreciate the importance of obtaining optimal amounts of this essential nutrient. While every standard medical textbook cites the many problems associated with too little

vitamin C, very few physicians ever do the relatively simple tests which determine how much vitamin C their patients have in their blood, urine and tissues. ... By reading this book, each person concerned with the health of others and with their own health will learn a body of knowledge which is enormously important to the successful building and maintaining of the human immune system.”

Such was the direct simplicity yet profound elegance of Dr. Cheraskin’s work. His research and measurements also explained why there are some people who are “40 going on 70,” while other people are “70 going on 40.” His lifetime of work describes the nutritional mechanisms behind such physiological processes. Always young at heart himself, Dr. Cheraskin was an accomplished artist, but he did not even begin to try his hand at art until he was in his early 80s.

Dr. Cheraskin described the treatment of patients as akin to peeling an onion. The signs of disease exist at the outermost layer, the symptoms may be found at layers beneath that, the biochemistry beneath that, and the causes of the illness are hidden within the core. Effective treatment, therefore, can only occur at the core. The reason why so many standard medical treatments are not effective is that they treat the outer layers and not the core. In other words, most methods of standard medicine deal only with the symptoms, and not with the causes of the illness itself. However, getting to the core may not always be easy; it may first be necessary to peel away innumerable layers. But Dr. Cheraskin knew how to peel away these layers and reveal the core, root causes of dis-

ease. He taught how to look beneath that which is external. In his book, *The Vitamin C Controversy: Questions and Answers*, he wrote:

“It is generally agreed that disease begins far in advance of its clinical expression. In other words, long before there are symptoms and signs of disease, the pathologic process is already operating at the cellular level. Thus, the continuing problem of clinical investigation is to discover criteria and invent methods for the earliest possible recognition of the disease process.” (p. 123)

Clearly, few people were as tireless in their invention of new methods and discovery of new criteria as was Dr. Cheraskin.

Another problem with standard medicine is that prescription drugs often cause dangerous side effects, which can be as bad as, or worse than, the diseases they purport to cure. Once again, Dr. Linus Pauling pointed out the importance of Dr. Cheraskin’s work in this field:

“It is especially important to try improved nutrition in the effort to control ‘incurable diseases,’ as was pointed out by Cheraskin and Ringsdorf (1971), who gave multiple sclerosis as one of their examples. A recommendation to try a drug when there is not strong evidence for its probable effectiveness should not be made, of course, because drugs are dangerous. It is fortunate that vitamins are so lacking in toxicity and harmful side effects that this caveat does not apply to them.”

(From *How to Live Longer and Feel Better*, by Linus Pauling, p. 124).

Like Dr. Pauling, Dr. Cheraskin would continue to write papers into the last months of his life. At the age of 85, Emanuel Cheraskin died on August 3, 2001, in Birmingham, Alabama. As a memorial tribute to him, his friend and colleague, Dr. Abram Hoffer, wrote in the *Journal of Orthomolecular Medicine*,

“Cherri was one of my favorite speakers. No one could walk away after one of his superb presentations without having gained a tremendous amount of information about the need for optimum nutrition if one wanted to maintain good health.... Each of his papers was a model of the scientific method, where he presented his data and proceeded to the final conclusion so clearly that anyone would have to come to the same conclusion.”

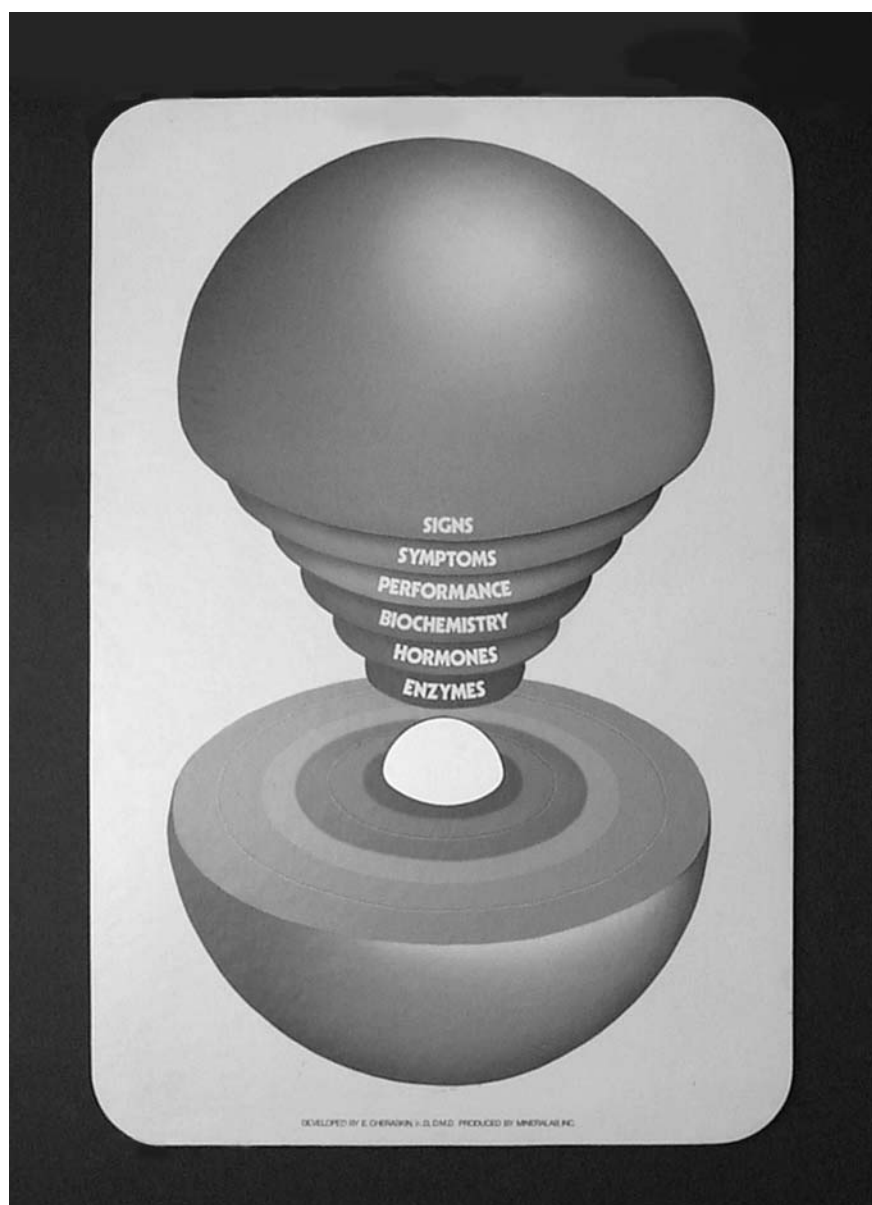
Most of all, Dr. Hoffer recalls that Dr. Cheraskin “was not afraid to challenge orthodoxy.” Indeed, this is the common trait that effective medical mavericks share. Dr. Hoffer even offers a specific example:

“I was having breakfast with him one morning when he ordered a three-egg omelet. This was during the era when eggs were considered anathema and doctors were advising their patients to eat no more than two eggs each week, and ‘egg beaters’ were developed to meet this particular craze. He told me he had been doing this since childhood. His cholesterol levels were normal. I suppose that

one could, in jest, say that if you eat three eggs every morning for 80 years you may die. That is a risk most people would simply ignore.”

Despite his many years of groundbreaking work on vitamin C, Dr. Cheraskin liked to emphasize the point that “Man does not live by vitamin C alone!”

The many ways in which he found expression and fulfillment in his own life are certainly testament to that.



Carl Ebnother, M.D.

1924 – present



A vigorously active medical maverick for six decades, Dr. Carl Ebnother has fearlessly blazed new trails in orthomolecular medicine. One of the first physicians ever to use chelation in the treatment of his patients, he has worked single-handedly to create several radically new, pioneering organizations. At the age of 80 years young, he is still seeing patients, writing new books, and swimming a mile or more every day as he has done for nearly 20 years. With a voracious, insatiable intellect, and a contagious zest for life, he continues to be joyfully engaged in his life-long passion of always learning, and applying, something new.

“I had been trained to be a professor of cardiology,” he says, “but it never happened.” What follows is his story.

Carl Ebnother is originally a Midwesterner who was transplanted to the west coast. He was born on June 12, 1924, in Kansas City, Kansas, although his family actually lived in Wichita at the time. His mother was an English teacher, and his father was a banker and bank examiner. As such, Carl’s father was gone from home often,

but Carl credits him with teaching him, by example, about “honesty and integrity.”

When Carl was about four or five years of age, his family moved from Wichita back to Kansas City, where they would remain until Carl’s senior year of high school. His family then relocated to Stockton, California, where Carl completed his final high school year in 1942. By 1946 he had graduated with a B.A. in science from Stanford, and in 1948 he attained his M.D. degree in Washington, D.C. from George Washington University’s School of Medicine. This, in turn, was followed by a one-year internship, also in our nation’s capital.

Carl left Washington, D.C., in 1949 and entered the U.S. Navy, where he would remain for four years, spending most of that time on an aircraft carrier. During this time he was in charge of the medical well-being of Naval personnel in the San Francisco bay area for one year. This task involved starting a laboratory on the aircraft carrier that could measure the physiological parameters of 18,000 people.

By the time he left the service, he had accumulated a total of five years of residency and fellowship in internal medicine and cardiology. This included two years at the U.S. Naval Hospital in Oakland, one year in residency at the V.A. Hospital in San Francisco in internal medicine, and a two-year fellowship in cardiology, one year of which had been in both cardiology and radiology at Stanford.

Part of his fellowship in cardiology had involved finding “patients” for new research procedures that were still being tested. Usually these “patients” were younger doctors or research candidates who had nothing wrong with them. Dr. Ebnoter does not mince words in remembering his boss as “a very good cardiologist but not a very good human being,” who wanted Dr. Ebnoter to persuade the younger residents and researchers to volunteer to have these new procedures performed on themselves. As a more senior level physician, Dr. Ebnoter never encountered any opposition in persuading the more junior level residents and researchers to “volunteer” for such procedures, so at first, Dr. Ebnoter’s tasks ran smoothly. However, during one of the procedures, involving a new cardiac catheterization procedure that was still being tested and developed, the catheter got stuck in the saphenous vein of the “patient.” For about four hours, as Dr. Ebnoter still vividly recalls, “I was sweating blood.” Finally, emergency surgery was necessary in order to remove the catheter. Two weeks later, the same problem happened again, on yet a second volunteer. These “volunteers” never would have undergone the procedure at all had it not been for the fact that Dr. Ebnoter had persuaded them to do so, for research purposes. On both occasions, the individuals recovered and suffered no long-term physical ill effects from the complications. Yet they had each experienced something drastically different from what they had expected to experience, and from what they were led to believe they would experience. They had been told that they would undergo a simple, safe, and minimally invasive catheterization – when instead, they had actually, unwittingly, “volunteered” for surgery. Needless to say, at least in the short-term, such

surgery was not without its trauma, both physical and psychological.

After these two experiences, Dr. Ebnoter was overcome with guilt. Apparently, however, such was not the case with his boss, who seemed unphased and insisted that Dr. Ebnoter continue to persuade the healthy, young residents and Ph.D. candidates to undergo further experimental cardiac procedures.

Realizing that something could go terribly wrong and that such procedures could possibly end in unforeseen complications, pointlessly risking the health of otherwise normal individuals, Dr. Ebnoter refused.

“If this is what you have to go through in academic medicine, I realized that I damn well can’t do it. So I got angry at that point.” He, therefore, left the field of cardiology – along with any hopes that he may have had to become a professor of cardiac medicine – and he began practicing as a family doctor.

The year was 1956, and after renouncing academic cardiology he happened to stumble upon the office of a G.P. in Palo Alto who had just died, so he took over the practice. “I had to learn how to be a general practitioner,” he recalls, which was “a very interesting experience.” It was also fundamentally different from his years of training as a specialist. But he enjoyed the challenge of seeing and treating a wide range of ailments and illnesses, and his practice grew very successfully. Since he was still known among the medical community as a cardiologist, he was, after eight years in this practice, also appointed

as an EKG consultant at Stanford hospital, known at that time as the “Palo Alto Stanford Hospital.” He would hold this position for the next 22 years, before deciding to relinquish his title “to someone younger,” who had not yet had the chance to serve at that level.

Simultaneously, after a few years of general practice, Dr. Ebnoter decided to put a bit of research back into his work. He, therefore, applied for and received a grant from Parke-Davis to perform a study on hypertension. This was his first research study in the pharmaceutical field, and his results were successful. He then decided to conduct another research experiment, this time with human fibrinolysin therapy and acute myocardial infarction. After discussing his proposed study with the manufacturer of fibrinolysin, he was given a token grant of \$700 to \$1,000, with which he studied the treatment of five or six patients. They all improved. Next, he received a \$200,000 grant from N.I.H. to see whether or not thrombolysin therapy would be of any value if given in the early stages to myocardial infarction patients. The study lasted two years. Over this period of time, he found that, if they caught the patients early enough, in the first three hours of their infarct, there would be a 30% improvement as well as a reduction in the risk of various complications such as shock and heart failure. Over the years his research ideas and studies continued to proliferate, as did the number of his patients and his success rate in treating them.

Dr. Ebnoter reflects that he has always felt that doctors never really have complete information about their patients. Nevertheless, they are required to make decisions

about their patients, based upon this incomplete information. If they could only, somehow, gather more physiological data about their patients, then doctors would be able to treat their patients more effectively. Perhaps this eagerness to learn as much as possible about as many different things as possible is what inspired Dr. Ebnoter to approach new ideas with a healthy open-mindedness. Over the years, his wide ranging interests led him to study a variety of fields. Eventually, after an exhaustive study of “standard” medical practices, his interests turned more and more toward the only thing that was left for him to study, namely, “alternative” medical practices. Within this context it was, therefore, entirely logical that he began to learn about hypnosis. In time, he would eventually recommend this form of treatment to many of his patients, with whom he had surprising success. He also began a hypnosis class that met in his house for nearly a year, where he would teach his patients how to perform self-hypnosis. Ultimately, he was treating so many patients by hypnosis and teaching self-hypnosis to so many people, that he decided to start a separate hypnosis center. He, therefore, incorporated his endeavors, and The Peninsula Hypnosis Center, Inc., was born. He directed this organization for eight years, in Los Altos. “That’s where I discovered that I’m really a teacher,” he recalls, as he had not had the opportunity to realize how much he loves teaching until that time.

His research, teaching, and clinical activities were growing so vigorously and successfully that by 1978 he realized he needed more space. So once again, he embarked upon a new and ambitious project by founding The Orthomolecular Medical Center – certainly one of the first

of its kind anywhere in the country. Located on prime property in Palo Alto, and measuring 5,000 square feet in area, this new Medical Center had nearly five times as much space as did The Peninsula Hypnosis Center. Dr. Ebnother directed this organization for the next seven years. Among other features, this new building had a built-in lecture room with 40 chairs, so he immediately started a new lecture series as well, the “Palo Alto Lecture Series.” He describes this period in his life as “very enriching for all,” a time of great learning for everyone, himself included, as well as for all of the other doctors and patients involved.

Around 1980, Dr. Robert Cathcart joined Dr. Ebnother at his Orthomolecular Medical Center. For about a year, these two pioneers worked alongside the rest of the staff, which included a chiropractor, a nutritionist, an acupuncturist, and a psychotherapist whom Dr. Ebnother had hired and taught to conduct hypnosis. Dr. Ebnother recalls that having hired such a diverse yet complementary staff provided him with an excellent opportunity to learn about the latest therapeutic techniques in these related yet distinct disciplines. This was a rare opportunity which he otherwise would not have been able to enjoy, had he not been unafraid to hire such diverse therapists. As most doctors at that time did not routinely have the opportunity of working alongside a chiropractor, a nutritionist, an acupuncturist, and a psychotherapist, this enhanced his perspective of medicine. One chiropractor in particular whom he hired had approached him with the specific request of working in his Medical Center, and this chiropractor also knew a great deal about nutrition. “She taught me a lot,” Dr. Ebnother recalls. “I loved it – and it

helped me to do a better job.” Another colleague of his, who worked with him for 10 years, was “a psychiatrist who acted like a G.P.,” because he had such a broad range of knowledge about medical matters. Dr. Ebnother greatly enjoyed the company of all of his colleagues, and enjoyed learning something new from each one of them. But such open-mindedness was not the norm in those days – nor is it yet, even today. “And,” he adds, “the amazing thing is that I was able to work in this setting without being upset by it. Most of the other doctors with whom I speak are so worried about what everybody thinks of them, that too often it keeps them from really taking the action that they’d like to take.” But Dr. Ebnother was unafraid of what others would think of him. He just continued to blaze the new trails that he believed to be right, without worrying about whether anyone else would approve or disapprove of his endeavors.

It was during this time, at his Orthomolecular Medical Center, that he also started doing chelation – and his mother was his very first patient. A resident of San Francisco, she had experienced some angina, and “for years she had been telling me that she had heart disease, but I never really believed her, because her story was so unusual. But once she said something which made me think that she might be right – so I checked her out, and it was real. So I chelated her.” This was in 1978. Carl treated her with a series of 35 chelations, and then she never needed medical treatment again. She lived another 23 years, well past the age of 100. “The chelation was a gift to her of 23 years,” Carl acknowledges.

Around 1970, Dr. Ebnoter took it upon himself to meet Dr. Linus Pauling. Having heard him speak several times, Dr. Ebnoter decided to visit Dr. Pauling at his foundation in San Francisco, to meet him personally and to learn more about ascorbate and its properties, directly from “the source.” He then began incorporating megadoses of vitamin C not only into his treatment of patients, but also into his own daily regimen of supplementation. Now, more than 30 years later, he ingests 10 grams of vitamin C, twice per day, for a total of 20 grams of oral vitamin C per day – along with many other key nutrients that he has selected for their specific properties.

Around 1985 or '86, Dr. Ebnoter was restless yet again for new, fresh activities. His Medical Center and his Lecture Series, both of which he had created from scratch, were thriving. Yet he wondered if perhaps he should retire, since by now he was approaching “retirement age.” Consequently, he sold his Medical Center, with the intent of turning his energies to new endeavors. And although he lost over \$100,000 in the sale of his Center, from a doctor who had agreed to buy it but then did not pay the agreed upon amount, Dr. Ebnoter, nevertheless, quickly moved on to new activities. He refused to dwell too long on this financial loss, and he also refused to get embroiled in any time-consuming litigation.

By 1986, Dr. Ebnoter was on “sabbatical,” in order to pursue some of his many other interests – which included becoming a long-distance swimmer. It was at this time that he began swimming at least a mile everyday as part of his schedule. Twenty years later, this is a daily routine which he still maintains. But in 1986, after approxi-

mately a year off from seeing patients, and physically refreshed from the grind of his previous administrative duties, he decided that he loved medicine too much to give it up completely. So at an age when most doctors are retiring, Dr. Ebnoter, with his new athletic regimen, very energetically returned to private practice.

He settled in the city of Campbell, California, and took over the practice of a young friend who had just died. After four years there, he was then approached by another friend of his, a nurse, who asked him to join her at the clinic where she works in San Jose. “She’s the best R.N. with whom I’ve ever worked – and I eventually decided that she knows more about medicine than most of the doctors in the world!” A “good business woman,” and “very intuitive,” she succeeded in persuading Dr. Ebnoter to join her in San Jose, which he did around 1995. He has remained there ever since, treating patients according to his orthomolecular expertise.

When asked if he was ever threatened with losing his license, as so many other physicians were in the early days of orthomolecular medicine, Dr. Ebnoter recalls that he had only one such confrontation with the medical authorities. It involved some treatment that he had given to a man from San Francisco, who had been suffering from fatigue and depression. Instead of prescribing expensive medication for the man, Dr. Ebnoter instead measured his amino acid levels, put the man on a nutritional program, taught him how to do self-hypnosis, and had him see a psychotherapist. The entire bill was around \$900, for treatment and follow-up sessions that lasted a few months, during which time the patient markedly im-

proved. Local medical doctors were not pleased. Members of the licensing board called a meeting with Dr. Ebnother, and “in fact, I was so naïve,” he now recalls, that he thought these doctors were visiting him because they wanted to learn from him. Instead, they were there to threaten him with a loss of his license. Measuring amino acid levels and correcting imbalances with nutrition were not procedures that standard medicine sanctioned. Had Dr. Ebnother chosen to shock and sedate his patient instead, his treatment methods would have gone unnoticed and without criticism. The medical authorities sternly reprimanded Dr. Ebnother; but, as it turned out, their bark was worse than their bite. After their meeting, the authorities concluded by sending him a final letter in which they stated that they did not approve of his treatment methods, but they would not take any further action to stop him, either. In effect, they hoped he would “be a good boy” in the future. “But I hadn’t done anything wrong,” he recalls. “I really felt that I had done the right thing.” So in the future, Dr. Ebnother did not alter his orthomolecular approach to treating patients, and his patients continued to improve. The medical establishment did not bother him again. This was his only “run in” with the authorities, “and it wasn’t that bad, although it did bother me for awhile.” Surprisingly, Dr. Ebnother was never involved in any confrontations resulting from his early use of chelation. Even he, himself, expected that the medical establishment “would have screamed and yelled, and tried to stop it,” especially since he gave lectures every week, openly explaining what he was doing, for anyone who was interested to learn. “But I was lucky. No one tried to stop me.” And countless patients benefited as a result. He also explains that he never

really worried much about losing his license, or about being threatened by the medical authorities. He was confident that, “If I did the right thing, eventually they’d realize that. And if they thought I was wrong, then there would be nothing that I could say, and nothing that I could do, about that. They’d put me out of business, and that would be that.” Either way, worrying, or trying to change his approach in order to avoid criticism from others, was not his style. He believed that one must simply keep doing what one believes to be right, regardless of the reaction of others.

Dr. Ebnoter reflects that, during his years of practice, “I got to be a moderate homeopath.” He now regards homeopathy as “the highest grade of medicine available.” He describes it as “a tremendous tool,” but adds that “it takes a very long time to learn – as long as 20 to 25 years, or longer.” He therefore insists that “you shouldn’t go to a homeopath unless he or she is very well seasoned.”

Today, at the age of 80, Dr. Ebnoter is still seeing patients, and still swimming a mile every day, even though he was diagnosed with heart failure in 1995. But he has been treating himself with his own orthomolecular protocol, which is a variation of that developed by Dr. Linus Pauling. Now, any heart problems that he may have once had, according to his most recent physical examinations, are no longer evident. “Nothing interferes with my swimming,” he emphatically states.

His patients have stated that they deeply appreciate his approach to medicine, which involves spending sufficient time with them, testing their various parameters, and then

educating them in the proper maintenance of their own health. Increasingly, people are beginning to realize that this is the only, truly effective way to treat an illness, rather than simply being given a pill for each and every complaint. One patient in particular, who was suffering from extreme fatigue, recounts Dr. Ebnoter correctly diagnosing him with hypoglycemia upon their first meeting – a diagnosis that had escaped the evaluation of many other physicians. Quickly, simply, inexpensively, and without medication, Dr. Ebnoter was able to balance the young man's biochemistry solely through orthomolecular means, and to return the young man's life to normal. The man is now no longer suffering from hypoglycemia, nor from fatigue. Nor is he, any longer, a patient of Dr. Ebnoter's, but instead has become a trusted and loyal friend.

One of Dr. Ebnoter's favorite activities is participating in the "Smart Life Forum" of San Francisco, of which he was one of the consulting founders. The Forum hosts a series of lectures by individuals who are distinguished within their fields, and offers a highly stimulating intellectual environment for all participants. Thus, Dr. Ebnoter continues his passionate involvement in yet another cutting-edge lecture series, which also allows his joyful engagement in something vitally essential to his life: being able to learn something new.

In this, as well as in the countless other endeavors that he has so avidly led throughout the years, he remains an exemplary role model for all, in the noble virtues of life-long learning and growth.

Ruth Flinn Harrell, Ph.D.

1900 – 1991



One day, at her home in Norfolk, Virginia, Dr. Ruth Harrell's telephone rang.

Upon answering it, Dr. Harrell heard a man's voice say, "Didn't you know that it couldn't be done?"

Not recognizing the voice, Ruth waited to hear what else her caller would say.

The man's voice at the other end of the line continued: "Didn't you know that it couldn't be done? Didn't you know that I had told this child's family that he would forever be a vegetable? That I had had to remove the left hemisphere of his brain and with it his intellect and the skill of his dominant hand and any hope that he could ever communicate? He didn't recognize his parents and never would – didn't you know that?"

Ruth then replied, "Heavens no! I didn't know that!"

The caller identified himself. "This is Walter Dandy," he said. "I'm Chief of Neurosurgery at The Johns Hopkins

Hospital in Baltimore, Maryland. Do you know Dr. so-and-so?"

"Yes, I know him very well," was Dr. Harrell's reply.

"He's standing here by my desk, here in Baltimore." Dr. Dandy continued. "He tells me that you taught him. Did you?"

"Yes," replied Dr. Harrell.

"How long did it take you?" Dr. Dandy asked.

"It took about six months – and it was the hardest teaching I ever tried to do!" Dr. Harrell answered.

Dr. Walter Dandy then gave Dr. Ruth Harrell an ultimatum. "We are going to bring you to Hopkins."

"Oh?" was Dr. Harrell's response. "Dr. Dandy, I'm a child psychologist and I'm under contract here in this public school system," she said.

"How much do you make in a year?" was Dr. Dandy's reply.

After Ruth told him, he said, "We'll double that." Then he immediately added, "We'll triple it."

"Wait a minute," Dr. Harrell interjected. "I just have to think about this, whether I want to move to Baltimore or not, etcetera."

“We’ll quadruple it,” Dr. Dandy interrupted.

“Dr. Dandy, please wait a minute. It isn’t the amount of money,” Dr. Harrell said.

Dr. Dandy then made his point as bluntly as he possibly could. “You have got a handle on something so priceless, we are going to bring you to Hopkins,” he stated emphatically. “You might as well get used to the idea that you are coming to Baltimore!” (From the Fourth International Conference on Human Functioning).

Ruth Flinn Harrell was born on April 19, 1900, in Americus, Georgia.

As she would often acknowledge, she was initially inspired in the early years of her career by the work of Dr. Roger J. Williams. Based upon his findings, Dr. Harrell devoted her life to groundbreaking research and experimentation regarding nutrition and megavitamins in the treatment of genetotrophic diseases. The term “genetotrophic” was first coined by Dr. Williams, which he defined as:

“... diseases in which the genetic pattern of the afflicted individual requires an augmented supply of one or more nutrients such that when these nutrients are adequately supplied the disease is ameliorated.”

Most notably, Dr. Harrell had particular success throughout the years in treating children with Down syndrome and other forms of mental retardation. Her objective, she

initially wrote was, “to explore the hypothesis that mental retardations are in part genetotrophic diseases.” Her extensive results over many years would repeatedly confirm this hypothesis to be true.

After obtaining her B.S. from Wesleyan College in Macon, Georgia, in 1920, Ruth Harrell enrolled in Columbia University’s Teachers College in New York. Here she obtained her M.A. in child psychology in 1924 and her Ph.D. in 1942. She then remained at Columbia University as a Research Associate for the next fourteen years, until 1956. Her Ph.D. thesis was entitled, *Effect of Added Thiamine on Learning*, which was followed by another publication, *Further Effects of Added Thiamine on Learning and Other Processes*, published by Columbia University in 1947. She began her private practice as a child psychologist in 1926, which she maintained continuously until the final years of her life. From 1926 until 1937 she served as school psychologist with the public schools of Norfolk, Virginia. From 1934 to 1945 she served in the Neurosurgery Ward of Johns Hopkins Hospital. From 1955 through 1970 she served as professor of psychology and as the Chairman of the Psychology Department at the College of William and Mary. Throughout her life, she served in a variety of public and private capacities, with extensive consulting experience. With each passing year, her unique expertise was increasingly sought.

In 1946, Dr. Harrell stated in a *Journal of Nutrition* article that “a liberal thiamine intake improved a number of mental and physical skills of orphanage children.” By 1956, she had investigated the “Relation of Maternal

Prenatal Diet to Intelligence of the Offspring.” Her findings indicated that “supplementation of the pregnant and lactating mothers’ diets by vitamins increased the intelligence quotients of their offspring at three and four years of age.” (*Journal of Orthomolecular Medicine*, 2004; 19(1): 21).

Some of her most pioneering work in the field of nutrition, however, began with Dr. Dandy’s unexpected phone call. By persuading her to join him at Johns Hopkins, Walter Dandy could provide her with a proper clinical venue in which her radically new work could begin to take root and flourish. Prior to this time, Dr. Harrell’s work with nutrition had begun almost accidentally.

When Dr. Dandy startled Dr. Harrell with his unannounced telephone call, the year was 1934. As a result of his call, Dr. Harrell did indeed relocate to Baltimore. She spent the next eleven years at Johns Hopkins, working in the hospital’s neurosurgery department with Dr. Dandy, until his death. Serving as rehabilitation psychologist during this period of time, Dr. Harrell worked with Dr. Dandy’s worst-case patients. Although most were adults, the youngest patient was eight years old. All of these individuals had one thing in common: they had all lost the left hemisphere of their brain, first to cancer and then to surgery under Dr. Dandy’s skilled hands. Although Dr. Dandy had always tried to leave as much of the hemisphere as he possibly could, most of the patients had lost the entirety of their left brain.

Because of one particular experience prior to agreeing to move to Baltimore, Dr. Harrell had presented her own

ultimatum to Dr. Dandy. Although he had offered her any salary that she could want, she had made it clear to him that she would join him at Johns Hopkins if and only if one condition would be met. And as she had already told him, that condition had nothing to do with money. She warned him, in fact, that it would be a difficult condition for him to be able to meet. “You’ll have to handle the kitchen people for me,” she told him. “You must be able to guarantee that the food purveyors of the hospital will be available to do what I tell them to do.” Not unusual for 1934, Dr. Dandy responded by exclaiming, “What on earth for!” Dr. Harrell then tried to impress upon him the idea that food would be “*the* most important thing” in the treatment of his patients. “You’re not coming here under any other condition?” Dr. Dandy asked. Dr. Harrell explained to him that without this one condition being met, without her being able to regulate the nutritional input of her patients, any work that she would try to perform at Hopkins would be useless.

Without fully believing her claims, Dr. Dandy obligingly granted Dr. Harrell’s one and only request. Over the next eleven years, he would come to understand the logic and the science behind her strange demand.

Dr. Harrell herself had stumbled upon her own discovery primarily by accident. Initially, she had no particular interest in employing nutritional supplementation in the treatment of her patients. However, she credits her first neurosurgery patient, an eight-year-old boy, with having taught her the value of doing so.

As child psychologist for the public school system in Norfolk, Virginia, Dr. Harrell was routinely involved in matters having to do with “problem children” in the public schools. It was not at all uncommon for exasperated parents, teachers, or school principals to call her for help in situations that they alone could neither understand nor handle. One situation, however, was unusual in a variety of ways.

A particularly frustrated elementary school teacher had telephoned Dr. Harrell, imploring her to come over to the school as quickly as possible. As the teacher had described, one of her students was “a lump,” totally unresponsive to anything. When Dr. Harrell saw the child, an eight-year-old boy, she agreed to work with him even though she was not immediately optimistic about whether or not she would be able to help him. As she was already booked with a full schedule for most of the week, Dr. Harrell agreed to work with the boy during the only time available to her, which was every morning for one hour, between 8:00 and 9:00 a.m. As it happened, there was only one room available in the school where Dr. Harrell and the elementary school teacher could meet with the boy during this time. That room was the cafeteria. This random, haphazard coincidence would prove to be of lasting and profound significance.

For the first few weeks, Dr. Harrell got nowhere. The boy remained a “lump,” unresponsive and without any progress or improvement whatsoever. Dr. Harrell had noticed, however, that each morning when the boy arrived with his parents, he was holding a bottle of cola and a bag of potato chips. According to his parents, he re-

fused to eat anything else. One day, amidst the background noise of all the clatter of plates in the school cafeteria, Dr. Harrell approached the kitchen staff. She asked if they could prepare a small plate of food, containing a little bit of everything that would be served that day for lunch, whatever it might be. They agreed to do so, adding that “it won’t be free!” “I didn’t expect it to be free,” was Dr. Harrell’s response, so the kitchen was adequately paid for preparing such a plate of food.

On the first day, the luncheon selection contained meatloaf, turnip greens, fruit and a buttered biscuit, to which Dr. Harrell also persuaded the kitchen staff to add a glass of milk. Dr. Harrell had to forcibly pry open the boy’s mouth in order to feed him the food, which he strongly resisted. She persevered, however, and on the second and third days she was met with slightly less resistance. On the fourth day, the boy responded with his first word: “good,” he said. “Yes, this is applesauce and it is very good!” Dr. Harrell reassured him. She had been unsuccessful in dealing with the boy in any other way, but now he was gradually beginning to respond to the food. Dr. Harrell continued meeting with the boy on a daily basis, simply making sure that he had a balanced meal of warm, freshly prepared, nutritious food each day. Gradually, the boy began to make progress at other levels of his development. Within a few months, this “lump” had made a full recovery. Not only was he now able to run as well as walk, but he had learned to read and write, he scored within the normal range for his age group, which was at the third grade level, on a nationally standardized Intelligence Test, and he knew his ABCs and his multiplication

tables. He was also no longer interested in cola and potato chips.

Unbeknownst to Dr. Harrell at the time, this boy had been one of Dr. Dandy's patients. This boy, in other words, had become a "lump" after having had the left hemisphere of his brain surgically removed by Dr. Dandy. Dr. Harrell would not discover this until months later, during Dr. Dandy's surprise phone call. After joining Dr. Dandy at Johns Hopkins, she would then see this eight-year-old boy again, during one of his routine checkups with Dr. Dandy.

At his checkup at Johns Hopkins, this young boy met with Dr. Dandy and Dr. Harrell in her office. Dr. Dandy asked the boy, who only a few months earlier had been described by his teacher and parents as an unresponsive "lump," if he could read. The boy replied, "Yes. Would you like me to read?" at which point the boy picked up the top letter from Dr. Harrell's desk and began to read it aloud. Additionally, the boy then turned to Dr. Harrell and described to her that "this letter is from a man who is asking you what day he can come here to see you, his name is such-and-such and he says that his little boy has something wrong with his head." Dr. Harrell then asked the child, "Do you think I should meet with the man?" The boy asked her, "Do you know how to help his little boy?" Dr. Harrell replied, "Yes, I think so," to which the child told her, "Then I think that you should meet with him."

At this encounter, Dr. Dandy was speechless. His immediate response was that he refused to believe this was the

same child on whom he had so recently performed surgery, removing the left hemisphere of the child's brain. But Dr. Dandy felt underneath the boy's curls, and indeed found the scar. The boy was now able to read, to ask questions, to converse with others, and to think about and weigh the answers to his own questions. He displayed a reservation of judgment until he had asked his questions and heard the answers, before making his own decisions. Previously, this same child had been unresponsive and unable to speak at all. In Dr. Dandy's mind, this change was nothing short of miraculous. In Dr. Harrell's words, the Chief of Neurosurgery was "flabbergasted."

As Dr. Harrell further described, it was this child, her first neurosurgery patient, who taught her this most valuable of lessons. A teacher does not raise a child's I.Q. just by teaching, she would later say – or at least she, Dr. Harrell, had certainly been unable to do so. But when the plate of food was given to the child who previously had been receiving nothing of nutritional value, then and only then did intellectual improvement become possible. Since his parents had been unable to communicate with him, they had left this young boy to do whatever he wanted to do – which had been to eat only potato chips and cola. But then, when a variety of protein, vegetables and fruits were added to the boy's diet, "there was a drive, a biochemical ability that he had to learn, and he did learn," as Dr. Harrell would explain.

It was from this one experience with this young boy that, when Dr. Dandy made his famous phone call to Dr. Harrell, she knew the conditions that would have to be

met. She knew that there would be no point in her moving to Baltimore to work with him at Johns Hopkins Hospital unless he would be able to guarantee her the authority with which to plan, deliberately and specifically, the nutritional regimen for his patients.

Dr. Dandy agreed to give Dr. Harrell access to any cuisine that she wanted. “What do you want the patients to have?” he asked her. “Canary bird tongues?” The regimen that she would develop for his patients was to be much less exotic. Her carefully designed menu that she developed at Hopkins would include a meal six times per day for each patient: three main meals with three mid-meal snacks. In other words, each patient was given a nutritious and substantial amount of food every three hours throughout the day. The patients were fed so often because this was the only way, in the 1930s and ’40s, for anyone to receive vitamins and minerals on a regular basis. At that time, the only vitamin that existed in a supplement form was vitamin A. Later, this would be followed by the discoveries of other vitamins by the biochemist brothers, Drs. Robert and Roger Williams, who would isolate several of the B vitamins. However, this process of discovery, isolation, and synthesis of vitamins was a gradual one, slowly unfolding over decades of work by many researchers in a multitude of laboratories. Meanwhile, Dr. Harrell was developing a method of treating patients with nutrition prior to the wide availability of vitamins, minerals, and other supplements that we enjoy today. In the 1930s and ’40s, the only method by which she could provide vitamins and minerals to her patients was through food itself.

Contrary to what one might expect, the patients did not gain weight inappropriately. Those who were overweight actually lost weight by eating more of the right type of food. Those who were underweight gained weight in a healthy manner, not in the form of fat but as tissue and bone mass. Since the meals were carefully designed for their high nutritional value, with optimum vitamin and mineral content, the patients responded not to caloric intake but to balanced nutrient intake. This resulted in their overall increased physical health.

During her eleven years at Johns Hopkins, Dr. Harrell treated Dr. Dandy's worst-case neurosurgery patients. Every one of them was able to return to his or her job and to lead a normal life once again, except for two patients. These two patients, it turned out, had been illiterate prior to undergoing neurosurgery, and they were not able to learn to read and write after their surgeries. Because of this, Dr. Harrell considered herself a "failure" with these two individuals. She was unable to help these patients to become literate, although it may still be said that she was able to help them return to their "normal" lives, such as their lives had been prior to neurosurgery. They had not known how to read or write before their surgeries, and they lacked the ability to do so afterwards as well. The other patients that Dr. Harrell treated, however, regained the full range of their physical and intellectual skills. They were all able to resume their professional and personal lives, despite having lost the left hemispheres of their brains to neurosurgery.

On one occasion, Dr. Harrell had a particular discussion with Dr. McCollum, the director of biochemical research

at Johns Hopkins, whom Dr. Dandy had introduced to her. She asked Dr. McCollum for his input in formulating a new theory that she was beginning to develop. She explained that Dr. Dandy's patients with whom she was working in the neurosurgery department had all experienced a "Great Depriver," as she called it. In each case, this "Great Depriver" had been the loss of the dominant half of the brain to neurosurgery. Yet through the treatment of "super feeding" that she developed, all of the patients, except the two who had been illiterate, were able to show remarkable improvement.

"What if," Dr. Harrell wondered, "the Great Depriver would be something else, something other than neurosurgery?" What if someone had experienced in his or her life anoxia, for example, whether at birth or from adult trauma such as a near drowning or some other such event? Suppose that someone had suffered from "some internal disturbance of biochemistry that we don't even understand yet – but which would yield the clinical picture of mindlessness." Dr. Harrell presented such hypothetical situations to Dr. McCollum. "Could we then feed such people extra nutrients, as we are doing with Dr. Dandy's neurosurgery patients, and would they improve? Could they be taught in the same way?" Dr. McCollum's immediate response was to tell her, "It's a tall order. But let me think about it." A couple of days later, his secretary contacted Dr. Harrell and notified her that he would like to speak with her about her ideas. As this was still during the 1940s, Dr. McCollum had both the biochemical expertise as well as the historical sense of foresight to say to Dr. Harrell, "It is in line with every known thing. But," he added, "I think it's about 75 years ahead of the

times in which we are living.” Nevertheless, he offered his moral support by adding, “I think you should try it. Try ‘super feeding’ on some mindless persons to see if there would be any measurable improvements.”

Shortly after Dr. Dandy’s death, Dr. Harrell would leave Johns Hopkins. In the years that followed, the work that she would conduct in a variety of places would continue the success that she had begun at Johns Hopkins in nutritional supplementation. But henceforth, her subjects would no longer be patients recovering from neurosurgery. Remembering Dr. McCollum’s encouragement, her patients from now on would be children who were considered to be mentally retarded.

Dr. Harrell’s regimen of “super feeding” to these children was so successful that at first the results backfired on her. Her “mentally retarded” patients recovered so fully and quickly, with such dramatic improvement, that people responded by claiming that nothing had been wrong with the children in the first place. In other words, the only explanation that parents and teachers could find was that there had originally been some mistake, and that these children had not actually been mentally retarded after all.

As a result of these claims, in which people denied that there had ever been anything wrong with her patients, Dr. Harrell conducted a carefully monitored, double-blind study in which she found 20 children who were considered to be so severely mentally retarded that they had been formally and officially certified as such. On standardized tests, these children scored in a range of 15 to 70 for their intelligence quotients. As the study was con-

ducted over the period of one year, and as five children withdrew during that period of time, there were 15 children who completed the study. At the beginning of the year their ages ranged from 5 to 15 years of age, and by the end of the study their ages ranged from 6 to 16 years of age.

As more vitamins had been isolated and synthesized by this time, and more was also known about minerals, it was now possible to administer a nutritional supplement in the form of a multivitamin tablet. During the study, each child therefore received a supplement of 19 vitamins and minerals. These supplements had been specially formulated by Dr. Roger Williams and Dr. William Shive, both of the University of Texas at Austin. Drs. Williams and Shive had developed this formula from the initial work of Dr. Mary Allen, who, working closely with Dr. Harrell in Norfolk, Virginia, began to formulate specific combinations of vitamins and minerals for four particular children whom Dr. Harrell was treating. Dr. Allen, a biochemist, based her formulations of vitamin and mineral supplements for the children upon her own laboratory analysis of the children's blood and urine, in an effort to try to determine their specific nutrient deficiencies. Dr. Allen died, however, in the middle of Dr. Harrell's study. "If anyone deserves credit and praise for the success of this study," Dr. Harrell would later say, "it is Dr. Roger Williams and Dr. William Shive," who continued where Dr. Allen's work had stopped. Drs. Williams and Shive formulated this particular combination of vitamins and minerals themselves, which was manufactured in supplement form. Dr. Harrell then administered the supplements to the children in her study. As she later

pointed out, “it was much less expensive than administering food!”

Of the 15 children who completed Dr. Harrell’s study, a control group was given a placebo for four months while the other children were given two of these nutritional supplements with each meal. The children were then re-tested for their intelligence quotients. Those children who had received the placebo showed no change at all in their IQs. Those children receiving the nutritional supplement, however, showed an average increase in IQ of 10 points. For the next four months, all children were then given the nutritional supplement, including those who had previously been given the placebo. After another four months, every child showed an average increase in IQ of 10 points. After yet another period of four months, some of the children exhibited an increase in IQ of as much as 16 points. Several of these children, when they returned to their schools for the mentally retarded, were quickly spotted by their teachers, tested by psychologists, found to be normal and re-entered into regular school classrooms.

Dr. Harrell and her colleagues published a full description of this study in the January 1981 issue of the *Proceedings of the National Academy of Sciences*, under the title, “Can Nutritional Supplements Help Mentally Retarded Children? An Exploratory Study.” As recently as 2003, twelve years after her death, *Journal of Orthomolecular Medicine* published an article on Dr. Harrell, recalling this historic study which she performed over 20 years ago. Entitled, “The Pioneering Work of Ruth Flinn

Harrell: Champion of Children,” the article opens with the following statement:

“Early in 1981, the medical and educational establishments were shaken to their socks. Ruth F. Harrell and colleagues, in the *Proceedings of the National Academy of Sciences*, showed that high doses of vitamins improved intelligence and educational performance in learning disabled children, including those with Down syndrome.” (*Journal of Orthomolecular Medicine*, 2004; 19(1): 21- 26).

The same year as her publication, Dr. Harrell would also recount her results at the 1981 International Conference on Human Functioning in Wichita, Kansas. These statistically significant and reliable results surprised everyone, including Dr. Harrell and her colleagues. While she had expected some improvement in some of the children, she had not expected there to be such a dramatic improvement in all of the children, without exception. Most surprising of all, however, were the participants who were classified as Down syndrome children. Prior to the study, some of the researchers involved in planning the study had insisted that children with Down syndrome should not be admitted into the study, as they would “sink” the study. Dr. Harrell, however, thought it would be worthwhile to have a few Down syndrome children in the study, although not so many that they might skew the results for the non-Down syndrome children. If, after a year in the program, there would be no change in the Down syndrome children, then, Dr. Harrell argued, she would simply have to report that there had been no change. She would report the results, positively or nega-

tively. But she insisted on including Down syndrome children in the study. As she would later describe, it was the Down syndrome children who turned out to be “the stars of the show.” By the end of the study, these children had changed physically as well as mentally. Improvement was dramatic in all of the children, but most noticeably in those with Down syndrome. These children grew in height, their body fat naturally decreased, and their IQs increased by an average of 15 points.

Among the children who did not have Down syndrome, three of the four children in the study who wore glasses had voluntarily removed them after the first four month period of supplementation. Of these, two were advised by their ophthalmologists to permanently discontinue wearing glasses. One nine-year-old child, who did have Down syndrome and who had been diagnosed with cataracts at the start of the experiment, was examined after eight months and found to have cataracts that had “stabilized, not worsening, not progressing as most cataracts do.” Although unrelated to the nutritional supplement, Dr. Harrell and her group also saw a very interesting improvement in children who were suffering from internal strabismus. These children had been in the control group, so they received only a placebo for the first four months. Dr. Harrell found that they were helped by extra thyroid, which by itself straightened the eyes although it did not improve IQ. Improvements were also found in the hair, skin, and fingernail texture of all the children when they were given the nutritional supplementation, and it was observed that hyperactivity in six of the children ceased. There were no unfavorable side effects

found in any of the participants at any time during the study.

Dr. Harrell discovered that when a child has a 10 point increase in IQ, the family knows about it. When a child has a 15 point increase in IQ, the teachers know about it. And when a child has a 20 point increase in IQ, the neighborhood knows about it. One such child was a boy who at the age of seven was still in diapers, had never spoken a word in his life, could walk but was unable to run, and did not recognize his parents. His IQ was considered to be between 25 and 30. Prior to Dr. Harrell's formal study of 20 children, Dr. Allen had prescribed a four-page long list of vitamin and mineral supplements for this child. After 30 days of taking the supplements, there was still no improvement at all in the boy. Dr. Allen, after performing some laboratory tests to measure the level of these nutrients in the boy's blood, asked Dr. Harrell if she was sure that the boy's parents were giving him the prescribed supplements. Nothing was showing up in his blood tests, but Dr. Harrell confirmed with the parents that they were indeed giving him the correct supplements, as specified. Dr. Allen then doubled the boy's recommended dosage of everything, except for a few vitamins and minerals which she decided to triple. Ten days later, the boy's mother called Dr. Harrell on the phone and was screaming so euphorically that Dr. Harrell could not understand what the woman was trying to say. The only thing Dr. Harrell could figure out with certainty was that the woman was ecstatically happy, although why exactly, she could not tell. She asked the woman to call back in a few hours, when she might be more calm, which the boy's mother agreed to do. When she called

back later that evening, the boy's mother described to Dr. Harrell that her son had "turned on like an electric light." The seven-year-old boy, who had never spoken a word before in his life, was suddenly talking and asking about everything. He especially wanted to know the names of every small and large thing that he saw. He went all throughout the house pointing to things and asking what each thing was. "That is a desk," or "this is a cup," his mother would say. At one point, the boy pointed to his father and asked for the name, to which his mother replied, "This is your father. You call him 'daddy.'" Then the boy pointed to his mother, and she told her son, "I'm your mother. You call me 'mommy.'" Upon recounting this to Dr. Harrell, the boy's mother burst into tears. "I think he sees us for the first time," she told Dr. Harrell. Soon the boy learned to read and write. When he was nine years old, he could read and write at his appropriate elementary school level, he was moderately advanced in arithmetic, and, according to his teacher, was "mischievous and active." He rode a bicycle and a skateboard, he enjoyed playing ball with other children, he played the flute, and he had an IQ of 90. "It appeared that, even after seven years of deprivation," Dr. Harrell wrote, "he responded to some nutrients in a remarkable fashion."

Another child, a little girl who had been considered mentally retarded, improved to such an extent that she too tested normal on IQ and other tests, and was re-entered into regular school classes. Her mother, so astounded by the improvement in her daughter, told Dr. Harrell that she was finally able to do what she had always hoped to do, namely, to be able to forget about the time when her

child was considered “retarded.” There was now no longer any evidence that such a time had ever existed.

In the 1980s, Dr. Harrell received a letter from a group of people who had set out to test her theories and studies. Dr. Carlton, et al., at New York’s Rockefeller University, reported to Dr. Harrell that their findings confirmed hers. He pointed out that it was not at all difficult to notice a sharp rise in IQ when people previously considered to be “mentally retarded” are given nutrient supplements. What surprised him and his colleagues, however, were the dramatic behavioral changes that such individuals would also exhibit.

Dr. Harrell had certainly observed these behavioral changes in her own patients. One little girl, who was previously thought to be retarded, but who showed profound improvement upon receiving nutritional supplementation, said to Dr. Harrell one day, “I don’t know how to think about myself anymore.” Dr. Harrell then asked the girl, “Do you want to talk about it?” The girl replied, “Yea, I want to talk about it. I used to be a funny girl. I used to be called a funny girl. And I was funny looking then too. But I’m not funny anymore. And I don’t know how to think about myself anymore.” Dr. Harrell tried to reassure the girl of her new, and apparently frightening changes. “Shannon, you’re a nine-year-old little girl. You’re a very pretty nine-year-old little girl. Why don’t you just think about yourself as being a well mannered, thoughtful, pretty little girl who’s nine-years-old?” After thinking this over for a moment, Shannon replied, “Well mannered – that means lots of ‘pleases,’ and ‘thank yous,’ and ‘excuse mes?’” “Well,

yes,” Dr. Harrell responded. “Yes, in general, it does mean that. It means that you’re very thoughtful and considerate of others.” “Yes,” Shannon decided, “I think that’s how I’ll be. I know now that people were laughing at me. I didn’t know that then but I know it now. And I don’t want people to laugh at me any more.” “Well then, in that case,” Dr. Harrell told her, “just think of yourself as a thoughtful, considerate little girl who’s nine-years-old and who has very good manners.” “Yes,” Shannon said, “I think I will.”

The author of the 2003 *Journal of Orthomolecular Medicine* article, Andrew W. Saul, Ph.D., noted that Dr. Harrell used dosages in her study that were many times higher than the adult, not the child’s, RDA of nutrients. Her “super feeding” regimen for these children included:

“... over 100 times the RDA for riboflavin (B2), 37 times the RDA for niacin (B3, given as niacinamide), 40 times the RDA for vitamin E, and 150 times the RDA for thiamine (B1). Supplemental minerals were also given, as was natural desiccated thyroid. Harrell’s team achieved results that were statistically significant, some with confidence levels so high that there was less than one chance in a thousand that the results were due to chance ($p < 0.001$). Simply stated, Ruth Harrell found IQ to be proportional to nutrient dosage. This may simultaneously be the most elementary and also the most controversial mathematical equation in medicine.” (Andrew Saul, *Journal of Orthomolecular Medicine*, 2004; 19(1): 21-26).

According to Dr. Saul, “Dr. Harrell anticipated that her use of megadoses would result in ‘controversy and brickbats.’ She was right. ... Nutrition, critics say, cannot undo trisomy 21.” (Ibid.) Not everyone who heard of Dr. Harrell’s studies believed them, and not everyone who tried to replicate her results was accurate in replicating her methods. Among others, the American Academy of Pediatrics was swift to criticize her work. In fact, they issued a widely circulated policy statement against Dr. Harrell which was so negative and so erroneous, both in language and in content, that Dr. Harrell and her coauthors considered a lawsuit against the American Academy of Pediatrics. Although Dr. Harrell died in 1991, at the age of 91, the implications of her work are certainly still alive and well today. Over a decade after her death, her advocates are still fighting for her work to be made more widely known, if not immediately accepted as well.

Dr. Harrell may have been the first person to treat Down syndrome with megadoses of nutrients, but she was not the last. Her work pioneered the way for others to follow in her path:

“For over forty years, Dr. Henry Turkel treated Down syndrome children successfully using orthomolecular methods. He used a combination of vitamins, minerals, and thyroid hormone replacement. His patients improved mentally and they lost the typical Down syndrome facial appearance. With over 600 children treated, he found an 80% to 90% improvement rate.” (Ibid.)

Nevertheless, the formal position of the National Down Syndrome Society, as issued in their “Position Statement on Vitamin Related Therapies,” in August of 2003, is:

“Despite the *large sums of money* which concerned parents have spent for such treatments in the hope that the conditions of their child with Down syndrome would be bettered, there is *no evidence* that any such benefit has been produced.” (Ibid.)

Dr. Harrell’s 1981 study cost “a little over \$11.00 (eleven dollars) per month per child.” (Personal communication between Ruth Harrell and Bernard Rimland, 1982). If this constitutes “large sums of money,” then an accurate description for the price of pharmaceutical medications may defy words altogether.

Dr. Harrell had been asked if she ever received any funding from the National Institutes of Health for her study. Her reply was, “Heavens, no! Nobody knows anything about the area of dietary supplementation, but the National Institutes of Health knows for sure it’s impossible.” (Ibid.)

So, obviously, does the National Down Syndrome Society.

Will Rogers once remarked, “It’s not what he doesn’t know that bothers me, it’s what he knows for sure that just ain’t so.” Nearly 70 years of work by Ruth Harrell, over 50 years of work by Henry Turkel, and the successful attempts of Rockefeller University’s Dr. Carlton, et

al., to repeat Dr. Harrell's investigations, have all escaped the notice of this Society.

With or without official recognition, the results of Dr. Harrell's work remain what they are. The results of her studies speak for themselves, and the children whose lives she changed can also speak for themselves. Should anyone doubt her published material, the most resounding proof of all may be seen in the lives of the children, now grown adults, whom she treated. These individuals are not waiting for a Society to tell them whether or not they have been successfully treated.

At the scientific, biochemical level, it may certainly be said that Dr. Harrell did indeed find very strong evidence to support the genetotropic concept of mental retardation as a valid one.

On a more basic, humanistic level, such a lifetime of work offers compelling proof of the power of proper nutrition to restore meaning, purpose, and ability to lives that might otherwise be forsaken as hopeless.

Based upon the principles of biochemical individuality and genetotropic disease, Dr. Harrell and her colleagues resoundingly concluded that, "it should be possible to tailor supplements to meet individual needs," thus offering "new hope for improving the quality of life for the mentally retarded 3.2% of our population."

Abram Hoffer, M.D.,
Ph.D., F.R.C.P.(C)

1917 – present



In the introduction to his book, *How To Live Longer And Feel Better*, Dr. Linus Pauling writes,

“I am grateful to Dr. Abram Hoffer ... for having aroused my interest in vitamins about 20 years ago.” (p. xii)

This acknowledgement, dated September 1, 1985, places the time of Dr. Pauling’s initial interest in vitamins in the mid 1960s. By that time, Dr. Abram Hoffer had already been working in the field of nutrition for over twenty years. So resoundingly strong and convincing were Dr. Hoffer’s results with his patients that his work grabbed the attention of scientists and physicians from around the world. When Linus Pauling took note of Abram Hoffer’s work, the gathering storm that would ultimately come to be known as “orthomolecular medicine” was about to be fully unleashed. Very soon, as a direct result of Dr. Hoffer’s ground-breaking work, a new and irrepressibly powerful concept in medical science would sweep across the globe. One of the original founding fathers of orthomolecular medicine, Dr. Hoffer had been sailing in new

and uncharted waters. Soon, however, he was about to discover many new lands.

Abram Hoffer was born in 1917 on a farm in the town of Hoffer, in Saskatchewan, Canada. He was born in his family's first wooden house, and his three older siblings had all been born in a sod shack. His elementary and high school years were all completed in single-room schools.

Dr. Hoffer's introduction to this world prepared him well for the unique leadership positions that he would hold throughout his long and pioneering life. When he was born into the rugged Canadian landscape and climate, traits such as self-sufficiency, independence, and a strong backbone were the norm. Growing up on a farm in this environment was not without its lasting influence. The young Abram learned from an early age what it means to have to survive, literally, on the merit of one's own labors, without reliance upon others. Additionally, his parents were very supportive and encouraging of him in his youth. As he would later recall, this helped to imbue him with a strong sense of self-confidence from an early age. This combination of fierce independence and an unshakable confidence would later prove to be essential skills throughout Abram's professional life.

Abram Hoffer first became interested in chemistry through his high school chemistry teacher, whose friendship motivated Abram to pursue a study of the field. This led to an interest in biochemistry, which Abram decided to combine with the agricultural background of his upbringing. He obtained his Bachelors degree in 1938,

and his Masters degree in 1940, both in agricultural chemistry from the University of Saskatchewan in Saskatoon. He then received a graduate scholarship to study at the University of Minnesota in St. Paul the following year. Also as a result of his agricultural upbringing, Abram began studying water soluble vitamins in cereal chemistry. In his first job, with a flour mill in Winnipeg, he developed chemical assay methods for measuring thiamine in flour and in other wheat products. With these assays, he ran the control analyses of the flours to ensure that government standards and nutrient levels were maintained. From his research in this laboratory, he received his Ph.D. in 1944 from the University of Minnesota.

Dr. Hoffer would later credit this experience with stimulating his interest in vitamins and human nutrition. It was also at this time that he realized “that in order to be effective as a nutritionist, I would have to have a medical degree.” He, therefore, decided to attend medical school, turning down an offer to be Head of the Department of Cereal Chemistry at the University of Saskatchewan. He received his M.D. degree from the University of Toronto in 1949, and then returned to Saskatoon to intern. During his internship he accepted an invitation to become Head of the Department of Biochemistry at the University of Saskatchewan.

By this time, Dr. Hoffer had become interested in psychiatry, especially psychosomatic medicine. From 1950 to 1957, Dr. Hoffer served as the Director of Psychiatric Research for the Department of Public Health in the Province of Saskatchewan. He was also Assistant Professor of Psychiatry from 1955 to 1958 and Associate

Professor of Psychiatry from 1958 through 1967 at the University of Saskatchewan's College of Medicine. He has been in private practice continually since 1967.

When Dr. Hoffer completed medical school, the combination of a Ph.D. and an M.D. was uncommon in Canada. Throughout the future, however, it would prove to be a useful combination for him. Furthermore, the order in which he had attained these degrees was not insignificant. As he later realized in retrospect, he felt it fortuitous to have received his Ph.D. before his M.D., instead of vice versa. His initial training in the techniques of scientific research, to which he was exposed during his Ph.D. work, provided him with a very different set of intellectual tools from what he would later discover are promoted in medical school. Dr. Hoffer would often point out the differences between these two schools of thought. On the one hand, there are principles of inquiry and the "scientific method," taught and respected within Ph.D. programs. By sharp contrast, however, are the rote memorization skills and indoctrination into established beliefs that are required for survival within medical schools. It may even be said that the same intellectual habits which are encouraged in one program of study are discouraged by the other. As a result, Dr. Hoffer felt that he had inadvertently obtained an educational advantage by receiving his Ph.D. first. Throughout his career, he would transfer his skills of inquiry, scientific investigation, and analysis into the field of medicine.

In January and February of 1951, Dr. Hoffer and his wife spent six weeks touring the few research centers that ex-

isted in psychiatry throughout the U.S. and Canada. As he now recalls,

“This proved to be very valuable when later we decided which research program we would start. The three most memorable visits were with Dr. Nolan Lewis, at the Psychiatric Institute in New York City, Dr. H. Kluver at the University of Chicago, and Dr. Franz Alexander at a psychoanalytic institute which he directed. Lewis and Kluver introduced me to the fascinating possibilities of the hallucinogens, especially mescaline, and from Dr. Alexander’s luncheon clinic I learned that psychosomatic medicine had no basis in fact.”

Dr. Nolan Lewis had been a friend of Freud, but he was a biochemist and a pathologist as well as a psychiatrist. In 1951, with his new insights from these three researchers, Dr. Hoffer began focusing on the treatment of schizophrenia, alcoholism, and depression. Dr. Humphrey Osmond, who was the superintendent of Weyburne Mental Hospital in Saskatchewan, joined Dr. Hoffer in 1952. As Dr. Hoffer would later recount,

“We decided to tackle the most important single problem, schizophrenia. Half of our mental beds were occupied by these patients, and one quarter of all hospital beds in Canada were occupied by these patients. But there were very few tangible leads. Psychoanalysis was sweeping into North American psychiatry, and the biological psychiatrists were facing imminent defeat in their views about the nature of this disease.”

Convinced that schizophrenia is the result of an abnormal biochemical change, Drs. Hoffer and Osmond were struck by the chemical similarities between mescaline and adrenaline. They also had found that adrenochrome, a metabolic by-product in the decomposition of adrenaline, produces many of the symptoms associated with mescaline intoxication. This observation led them to hypothesize that schizophrenia may be caused by a chemical disorder involving the production of adrenochrome. This became known as “the adrenochrome hypothesis of schizophrenia.” If this could be proven to be true, schizophrenic patients could then be helped by a reversal of this biochemical process.

In order to conduct an investigation into this hypothesis, Drs. Hoffer and Osmond received, in 1954, what was at that time a very large grant. With \$600,000 from the Rockefeller Foundation to conduct a study over six years, they were able to begin exploring the adrenochrome link to schizophrenia. One of the requirements for the grant, however, was that Dr. Hoffer first travel to Europe and visit the research centers there. “By the time I left, we had a very large, well-established research group, a truly cross-fertilized group in which psychologists, psychiatrists, nurses, and social workers all worked together,” he later described.

From their research with “the adrenochrome hypothesis of schizophrenia,” Drs. Hoffer and Osmond made the following discoveries:

1. Adrenochrome is a hallucinogen.

2. Adrenochrome is made in the body and is measurable.
3. Niacin is a powerful antidote against adrenochrome, and megadoses of vitamin B3 in combination with ascorbic acid are therapeutic in the treatment of schizophrenia.
4. Vitamin B3 also lowers cholesterol levels.

In addition to being a hallucinogen, adrenochrome had already been known to be an “anti-mitotic” compound, a fact which may explain why schizophrenic patients very rarely develop cancer. Additionally, researchers in Sweden have shown that niacin protects the body against some of the toxic effects of adrenaline. Of particularly major significance, however, were the results by Drs. Hoffer and Osmond in demonstrating that vitamin B3, in combination with ascorbic acid, is therapeutic in the treatment of schizophrenia.

The adrenochrome hypothesis proposes that too much adrenaline is oxidized to adrenochrome. Accordingly, a treatment for schizophrenia would, therefore, exist if the production of adrenaline could be decreased, which in turn would decrease the formation of adrenochrome. In 1952, Drs. Hoffer and Osmond proposed that this decrease in adrenaline could be accomplished by preventing the addition of methyl groups to noradrenaline, which would then decrease the amount of adrenaline produced, and, consequently, also the amount of adrenochrome that could be formed. Since niacin picks up methyl groups, it is, therefore, competitive with noradrenaline. Building upon this idea further, Drs. Hoffer and Osmond also

hoped to inhibit the oxidation of adrenaline to adrenochrome, for which they used vitamin C.

According to their hypothesis, Drs. Hoffer and Osmond suspected that vitamin B3 (niacin or niacinamide) may perhaps decrease the formation of adrenaline, whereas vitamin C would limit the oxidation to adrenochrome of any adrenaline which had already formed. In 1952, however, Drs. Hoffer and Osmond did not have access to the modern laboratory equipment that exists today, so actual measurements of adrenochrome levels in the blood were not possible. Nevertheless, by testing their hypothesis on patients, they were able to demonstrate that vitamin B3 in combination with vitamin C is a remarkably effective treatment of schizophrenia. As Dr. Hoffer explains,

“We did not have any of the modern facilities and we had to have faith in our hypothesis, and to test it without waiting for the direct evidence. If we had waited, nothing would have ever been done. In conclusion, I believe that niacin does antagonize the effect of adrenochrome and that it may also decrease the amount that is formed, but I cannot state that as a scientific fact. These basic experiments have never been done because psychiatry never took any of this work seriously. One day, it will have to be done.”

Drs. Hoffer and Osmond published their discovery that niacin lowers cholesterol in 1955. This is credited with sparking the new paradigm in nutritional medicine in which vitamins are used not only for the prevention of deficiency diseases, but also for the treatment of disease.

That same year Dr. Hoffer was invited to the Mayo Clinic as a Fellow to deliver a series of lectures on his research. This led to Dr. William Parsons, a Senior Fellow at the Mayo Clinic, conducting the first corroborative studies of Dr. Hoffer's work, which were published shortly thereafter. Dr. Parsons subsequently became recognized as the world's leading authority on niacin and cholesterol, and he and Dr. Hoffer have remained good friends throughout the years.

In the field of schizophrenia, the work of Drs. Hoffer and Osmond offered a radically different type of alternative treatment from anything that was previously available. Prior to their research, an effective treatment for schizophrenia did not exist. Tranquilizers, electroshock therapy, insulin coma, and psychoanalysis did not eliminate the disease, but instead suppressed the symptoms while often causing complicated side effects as well. In all cases, patients would often relapse. Niacin and vitamin C, by contrast, are vastly different. These two nutrients work at the root of the disease, to eliminate not just the symptoms but the origin of the disease itself. Furthermore, even in very large doses, niacin and vitamin C are without significant side effects.

When Drs. Hoffer and Osmond introduced vitamin therapy as a treatment, a series of dramatically positive results in their patients led them to design the first ever double-blind, placebo controlled study, in 1952. Wanting to be absolutely certain of their data, however, they repeated the study to confirm their results, and did not publish their first paper until 5 years later, in 1957.

Ironically, their double-blind placebo controlled study has now become the standard in investigative, orthodox medicine. However, at the time, their results from this type of study failed to convince orthodox psychiatry of the efficacy of vitamin therapy in the treatment of schizophrenia. Were the study to be published for the first time today, the results would probably be accepted, solely because it is double-blinded and placebo controlled. Over the intervening years, Dr. Hoffer has continually pointed out the dangers and pitfalls of relying too heavily upon only the double-blind, placebo controlled type of study. Many an orthodox critic of Dr. Hoffer's work has in fact used the methods of his own study against him. A prime example of this often occurs with patients who have been given dozens of various types of standard treatment over a period of many years, sometimes decades, without success. Then, when these same patients are given vitamins, oftentimes they will suddenly recover. When this happens, many a critic has insisted that such patients have been cured of their maladies not because of the vitamin treatment, but because "of the placebo effect."

As Dr. Hoffer has stated,

"The fact that the double-blind, placebo controlled method has never itself been tested seems not to matter. It has become the gold standard of clinical research. It is probably a very useful test for officials who have to grant money for research, for officials who have to decide if a drug has any value in treatment, and for editors who have to decide whether they should publish a paper or not. For

total dependence on the value of $P = 0.05$ removes the need to think, to reason, and to do so wisely. I have been critical of the double blinds for many years even though under my direction we were the first psychiatrists to conduct these experiments starting in 1952. I consider this test not to be the gold standard of modern investigations, but a rather inefficient, expensive method of doing human experimental trials. I consider it unethical ... and I doubt that any more than a very small number of these trials are really blinded, as this is really very difficult to do.”

In double-blind, placebo controlled studies, the exception to the rule is disregarded. If one person has a different response from a thousand other people, that single case is reported in such a way that it is of no significance, mathematically, medically, or otherwise. In orthomolecular medicine, however, the single, exceptional case is of vital importance. And, Dr. Hoffer emphasizes, there are some types of studies for which the double-blind, placebo controlled model is grossly inappropriate. When he designed and conducted the first such study in 1952, it was for specific reasons, under specific circumstances. The model was never intended to apply to all types of studies, at all times, in all places, under all conditions. But, of course, to force all studies everywhere to comply with this model eliminates the burden, or the risk, of independent thought.

Coincidentally, around the same time as Dr. Hoffer’s ground breaking work with niacin and vitamin C, there was an emergence of a new class of anti-psychotic drugs.

These medications seemed to overshadow temporarily the full implications of his work, which did not receive the widespread notice that it deserved. After all, vitamins are neither expensive nor patentable, unlike their more profitable, albeit often toxic, pharmaceutical counterparts. Gradually, however, the tide would turn – but not without many years of resistance from the medical establishment.

Instead of being commended and congratulated for his pioneering discoveries, as he should have been, Dr. Hoffer instead encountered hostile opposition from his colleagues in standard medicine. This was due primarily to the strong orientation of the medical establishment toward treatment by drugs instead of by vitamins. As a result, “my freedom to publish and discuss our therapeutic trials using vitamins was being severely restricted by my two main employers, the University of Saskatchewan and the Department of Public Health.” When this began to happen, Dr. Hoffer did not hesitate to renounce his positions with these two organizations, resigning from his appointments as Associate Professor of Psychiatry and Director of Psychiatric Research. As he explains,

“The psychiatric establishment was violently opposed to our work, which did not have the support of the drug companies who were promoting their own products, the tranquilizers. Not a single attempt was made to repeat our double-blind controlled studies (five), nor to examine our claims clinically. I decided I could be more effective free of any of these adverse influences. Since then, I have been happily working with thousands of pa-

tients, applying what we had discovered in those early years in Saskatchewan.”

In nearly 40 years of private practice, Dr. Hoffer’s orthomolecular treatment of over 5,000 patients with schizophrenia has yielded an average recovery rate of 90 percent among acute patients who stay on his orthomolecular program for two years. The chronically ill patients take longer, but they too recover on his program. “By recover, I mean the person is able to function well enough to work and pay taxes,” Dr. Hoffer pointed out once in an interview. (From *Health Counselor*, Vol. 6, #4). Additionally, he has personally trained more than 50 physicians in his practice over the past 40 years, who have become enthusiastic orthomolecular practitioners despite the relentless criticism from the medical establishment.

Almost as if in reaction to his continued success, Dr. Hoffer and his work have been deliberately and systematically ignored, censured, and expunged by the standard medical establishment. He recalls that,

“As long as I published research findings that were insignificant, I had no difficulty having my papers accepted for publication. But following our reports that vitamin B3 was therapeutic for acute schizophrenia, it became increasingly difficult to gain access to the pages of standard medical journals.”

This culminated in 1967, when the associate editor of the *American Journal of Psychiatry* announced that he would

never allow any article authored by Dr. Hoffer to appear in his journal again. Thereafter, this became the policy of the Journal. Prior to this time, Dr. Hoffer had approximately 150 articles in standard medical journals, and he also had several books in print. The American Psychiatric Association then attempted to censor some of these articles even several years after they had already been published. The associate editor of the Journal had been the chairman of a task force set up by the APA, which had condemned both Drs. Hoffer and Osmond for publicizing a treatment that was “not accepted by standard psychiatry.” From that moment on, Dr. Hoffer found that “it was impossible to obtain entry into the official journals of psychiatry and medicine.”

Dr. Hoffer’s response was to found his own journal. When it first appeared in 1967, he named it the *Journal of Schizophrenia*. In 1969 he shortened the title to *Schizophrenia*, and in 1972 it was renamed the *Journal of Orthomolecular Psychiatry*. In 1986 he re-christened it yet again as the *Journal of Orthomolecular Medicine*, to reflect the growing interest among physicians in the field.

As Dr. Hoffer explains,

“This new journal was to become the forum available to practitioners of the new psychiatry which official psychiatry found so unacceptable. The peer reviewed journals did their job very effectively, i.e., they prevented any of these new ideas from appearing in their journals. Peer reviewed journals do not protect the public from research reports of inferior quality, nor do they protect the

public from dangerous ideas. They protect the establishment from ideas that run counter to their own.” (From www.orthomed.org)

The *Journal of Orthomolecular Medicine* became the first medical journal to bring public attention to many important subjects, not only in the field of psychiatry. Studies related to chronic yeast infection, and to mercury toxicity from amalgams, among other topics, appeared first in this Journal. Today the Journal is perhaps the most comprehensive reference source for information on megavitamin therapies anywhere in the world. The early pioneers in orthomolecular medicine all contributed to this Journal, so it is an especially unique source of the early studies conducted in the field. Linus Pauling, Carl Pfeiffer, Hugh Riordan, Robert Cathcart, Emanuel Cheraskin, Richard Kunin, Bernard Rimland, William Philpott, Humphrey Osmond, and even Abram Hoffer himself all contributed to this Journal throughout the years. As Editor-in-Chief, Dr. Hoffer acknowledges that he has “an advantage since I submit my reports to an editor who cannot refuse to accept them. Dr. Humphrey Osmond, as co-editor of this Journal, had the same advantage.” Between 1967 and 1996, Dr. Hoffer contributed 131 reports including 48 editorials, and Dr. Osmond contributed 39 reports including four editorials. As Editor-in-Chief, Dr. Hoffer invited Dr. Linus Pauling to join the editorial board of the Journal, on which Dr. Pauling served for 23 years. Dr. Pauling submitted his first paper to the Journal in 1970, and his last in 1992, two years prior to his death. In total, Dr. Pauling contributed nine articles to the *Journal of Orthomolecular Medicine*, two of which, on his work with vitamin C and cancer, he co-

authored with Abram Hoffer. Dr. Pauling's revolutionary articles showing the relationship between vitamin C levels and cardiovascular disease also appeared in Dr. Hoffer's Journal. These studies were considered to be among Pauling's "most important clinical contributions." The National Academy of Sciences refused to publish these reports by Dr. Pauling, but they were accepted by Abram Hoffer and published in the *Journal of Orthomolecular Medicine*.

Nearly four decades after its founding, the *Journal of Orthomolecular Medicine* is now distributed in more than 35 countries, with Germany, Brazil, and the Netherlands having their own editions. Dr. Hoffer remains the Editor-in-Chief. Still, the National Institute of Mental Health and the National Library of Medicine have never recognized his Journal, repeatedly refusing to include it in their Index Medicus. Even though it contains original papers by such medical luminaries as Linus Pauling, with some papers never having appeared in any other journals, the *Journal of Orthomolecular Medicine* does not exist in the eyes of the NIMH or the NLM. Even with the support of Dr. Pauling and a senator from California, the Journal was still rejected. Doctors, scientists, researchers, and members of the lay community who search the Index Medicus for medical information will not find Dr. Hoffer's name. This not only deprives the public of access to nearly 40 years of publications of his Journal, but it also denies access to over 50 years worth of medical information and scientific evidence accumulated by the long list of researchers from around the world who have contributed their findings to his Journal.

Although critics from the medical establishment have seized every possible opportunity to criticize and ignore Dr. Hoffer's work, Dr. Hoffer has never taken any of this personally. In fact, due to his sterling credentials, many critics have backed away from any direct confrontations with him. He recounts that,

“There has been no attempt to lift my license, and I am able to maintain a very comprehensive, stable psychiatric practice which depends entirely on referrals. There has been no drop-off in referrals no matter what strange ideas I might publish. The attack has been upon my ideas and not upon my person.”

People do not easily forget that he holds a Ph.D. and an M.D., and that he was associate professor of psychiatry, the director of a large research organization, and the recipient of numerous grants from local and federal government agencies, as well as from private industry. All of this has afforded Dr. Hoffer a status that is beyond reproach and an enviable prestige no doubt coveted by even his most acrid opponents.

In 1962, Drs. Hoffer and Osmond developed “The Hoffer Osmond Diagnostic” test (HOD), which offers a simple card sorting test for the diagnosis of schizophrenia. It has been widely accepted and used with great success by leading physicians around the world, including, among others, Dr. Carl Pfeiffer. Also as a mutual collaboration, Drs. Hoffer and Osmond coauthored *How to Live with Schizophrenia* in 1966. This was the first book ever written for the lay reader that offered a thorough discussion

of orthomolecular treatments of schizophrenia. It was this publication that attracted the attention of two-time Nobel Laureate, Dr. Linus Pauling. Dr. Pauling found Dr. Hoffer's work to be so compelling that Dr. Pauling would devote the remaining years of his life to its research and development.

Throughout the years, Drs. Pauling and Hoffer collaborated together on a number of projects. In 1968, Dr. Pauling's now famous article, "Orthomolecular Psychiatry," appeared in *Science*, thereby ushering in the dawn of a new era. It was here that he first coined the term "orthomolecular," thereby officially defining the nature of the work that Dr. Hoffer had already been conducting for years.

In 1964, Dr. Hoffer organized the American Schizophrenia Association (later known as the Huxley Institute for Biosocial Research), and in 1968 he organized the Canadian Schizophrenia Foundation, both based in Toronto. In May of 1987, Dr. Linus Pauling honored the Canadian Schizophrenia Foundation by speaking at its Sixteenth Annual International Conference, held that year in Israel. After the Conference, Dr. Pauling was also present at the Ben-Gurion Medical School for the dedication of the Hoffer-Vickar Chair of Psychiatry, an endowed position for orthomolecular research.

In April of 1994, Dr. Hoffer chaired the inaugural meeting of the newly formed International Society for Orthomolecular Medicine. This new Society brought together the dozens of orthomolecular groups that were already active worldwide, including groups from Australia, Bel-

gium, Brazil, Denmark, France, Germany, Holland, Italy, and the Philippines.

Now in his 80s, Dr. Hoffer remains vigorously active in the field that he helped to found. Currently located in Victoria, British Columbia, he maintains a full lecture and publication schedule. He also continues to see patients, as he has done for more than half a century, all of whom are referrals from other doctors. He has authored fifteen books, over 500 papers, and he is not finished yet.

In the two papers that Dr. Hoffer coauthored with Linus Pauling, they described their treatment of cancer patients with orthomolecular techniques. Using megadoses of vitamin C in combination with other nutrients, they attained substantial improvements in the patients. Today, although most of his patients are referred to him for psychiatric reasons, Dr. Hoffer continues to treat some patients with cancer who are referred to him by their oncologists. In the past 20 years, he has treated over 1,000 patients for cancer.

After more than six decades as an orthomolecular research scientist, more than half a century as a practicing orthomolecular physician, and nearly four decades in private practice, Dr. Hoffer is beginning to see some changes taking place. He has witnessed a slow but sure paradigm shift that is underway in medicine. Ever so gradually, yet unstoppably, the scientific logic behind nutritional medicine is being accepted in ever widening circles. As he has observed,

“In medicine, the move into nutrition or orthomolecular medicine is well underway, and will sweep into most of the medical schools within the next five years. The move into psychiatry has been dismally slow. Psychiatrists cannot untrack themselves from the influence of tranquilizers, which are helpful, but when used alone hardly ever restore a schizophrenic patient to normal. With orthomolecular treatment, on the other hand, up to 90% of early patients, not yet badly damaged by the illness or by standard treatment, can have their health restored to normal. With chronic patients, most will achieve this after six or seven years of treatment.”

“I am pleased with my medical colleagues who are quickly moving into this modern paradigm, and I am very frustrated by the massive inertia of my psychiatric colleagues who are still waiting for the Holy Grail, that new tranquilizer which appears every year, which will do for schizophrenia what insulin does for diabetes. The number of homeless chronic schizophrenics in the streets of all large American and Canadian cities is evidence of their inability to do more for them than we could do in 1950 before we had any tranquilizers. But at least then we had hospitals which provided shelter and food and some care. Today the downtown slums have become the surrogate mental hospital beds for the chronic patients whose treatment has been wholly tranquilizers.”

In 1997, at the invitation of the Council Chairman, Dr. Hoffer appeared before the Law, Justice and Human Service Committee of the King County Council in Canada. Here, he suggested that elected officials ask County psychiatrists a simple question: “How many of your patients are well, doctor?” If the answer indicates that there are patients who are not well, another question, “Why not?” should follow. Dr. Hoffer testified that every schizophrenia patient who is not successfully treated costs the public at least \$2 million over his or her lifespan. By treating such patients with the simple and cost-effective orthomolecular protocols developed by Dr. Hoffer and others, every community could save many millions of dollars over many decades. On April 25, 2000, the film star Margot Kidder also testified before the King County Council, as someone whose schizophrenia had been successfully treated by orthomolecular means.

Years ago, in his readings, Dr. Hoffer became aware of a curious historical phenomenon. He noticed that with all classic discoveries in science and medicine there was a delay time of at least 40 years before the new ideas became accepted. With an average of 20 professional years per generation, this represented two full generations. Frequently, however, the delay time was much longer. For example, James Lind published his discovery that citrus fruit could prevent scurvy in 1753. He died in 1794, and it wasn’t until 40 years after that, in the 1830s, that the British navy finally required all of its ships to carry either lime juice or limes on board. Meanwhile, at a rate of four to five thousand deaths per year from scurvy, between 320,000 and 400,000 British naval men died of scurvy during these 80 intervening years. They died not

because a means of prevention or cure was unknown. A means of prevention and cure was known, but they died because the standard medical establishment failed to accept and implement this cure.

Two centuries later, little has changed in the policy makers of today.

As Dr. Hoffer explains,

“About 30 years ago I predicted that it would take at least forty years before megavitamin treatment would be accepted. After all, Moses walked his Israelite followers in circles in the desert for 40 years before initiating the invasion of the Holy Land. He realized that two generations of people born and raised in slavery would have to die before he could depend upon them to have enough fighting spirit and spunk to attempt the invasion. Do we have to wait for more than two generations of psychiatrists bred in the analytic and tranquilizer era to die before their offspring can begin to think about the orthomolecular treatment of schizophrenic patients? Our first megavitamin treatment paper was published in 1957.”

The time has come for the medical establishment to stop wandering around lost in an intellectual desert.

Literature on Dr. Hoffer's treatment of schizophrenia is available from:

The Canadian Schizophrenia Foundation
16 Florence Avenue
Toronto, Canada M2N 1E9
Tel: (416) 733 – 2117
Fax: (416) 733 – 2352

More information on Dr. Hoffer and orthomolecular medicine may be found at:

www.orthomolecular.org

Masatoshi Kaneko, Ph.D.

1935 – present



Today, one of Japan's most successful movements in the orthomolecular profession is the "Know Your Body," or the "KYB" club. This organization, with a membership that now exceeds 30,000, is comprised of many physicians and other health care professionals, members of the scientific and business communities, and lay people from all walks of life. As one of the first organizations anywhere to approach matters of health and disease through nutritional analysis, the KYB club celebrated its 20th anniversary in 2004. Increasingly growing in enthusiasm and success, this pioneering organization has now become a model for orthomolecular awareness throughout the world.

As the founder of this increasingly popular KYB movement, Dr. Masatoshi Kaneko is finally able to enjoy widespread recognition and honors. This was not always the case, however. As with most, if not all, medical mavericks, Dr. Kaneko endured a long road paved with many hardships before eventually receiving his current, numerous accolades.

When Dr. Kaneko first founded the “Know Your Body” club in 1984, he did so to fill what he saw was a serious void in modern Japanese health care. At that time, Dr. Kaneko felt that most Japanese people lacked even a basic understanding of the mechanisms of the human body, and, therefore, of how to maintain health and prevent or treat disease. Additionally, he felt that the majority of people in Japan also lacked an understanding of how the medical care system in their country really operates. Wishing to offer an enlightened solution to this situation, he formed a study group – which would later become known as the “Know Your Body” club. Initially, only a handful of other doctors were brave enough to join Dr. Kaneko in this radically new type of entity, which today might be more accurately described as a “think tank” than a study group. But, as time would prove, the ideas crystallized by this small group of pioneering individuals, as led by Dr. Kaneko, would grow to be a successful and formidable force in medical science – not only within Japan but on an international level as well.

Dr. Kaneko’s early work began rather conventionally. He started his career in a pharmaceutical company, where his research involved studying the development of monoclonal antibodies and other molecular mechanisms of carcinogenesis. Even at this early stage of his career, however, he began to doubt the efficacy of conventional medical treatments. Growing to understand the molecular science of chemotherapy in intricate detail, Dr. Kaneko came to believe that there must be a better approach to the treatment of cancer. He also recalls that, “I came to realize that there was no single chemotherapeutic substance – no single magic bullet.”

Then, in the early 1970s, during a fellowship in the United States, Dr. Kaneko met Dr. Rei Kitahara from Kumamoto University Medical School. Later Dr. Kitahara would recommend Dr. Kaneko as a non-resident fellow to the I.C.A.N. (International College of Applied Nutrition). Interestingly, these two doctors had never met until this chance encounter outside of their homeland, in the United States. Dr. Kaneko remembers the fortuitous encounter as one which ultimately led him into orthomolecular medicine. During this fellowship in the U.S., not only was Dr. Kaneko introduced to the principles of orthomolecular science, but he would even meet Dr. Linus Pauling. This was “a major turning point of my life,” Dr. Kaneko recalls.

Although the concept of a “Know Your Body” type of movement had already been proposed in the U.S. approximately a decade earlier, the idea failed to gain enthusiastic or widespread acceptance. Nevertheless, Dr. Kaneko immediately understood the merit of such a concept, and he knew that it could ultimately be of value to the people of Japan as well. Since no one else at that time was pursuing such ideas in Japan, Dr. Kaneko realized that he must be the one to introduce and promote this concept himself. He, therefore, decided to do exactly that. However, as events would later prove, time and persistence would be key ingredients in the success of this radical, new idea.

The level of scientific medical understanding among the general populace in Japan at this time, in the 1970s and 1980s, was not much different from that of the general populace in any other modern country of the day, the

U.S. included. Not only did the average lay person know very little about how to keep himself/herself healthy, but very little was understood about the scientific choices that exist in the treatment of illness, once it does occur. In fact, this widespread lack of awareness existed not only among lay communities throughout the modern world, but among professional medical communities as well. The number of patients who were developing iatrogenic diseases after receiving standard treatments was on the rise, and not only in Japan, but throughout the U.S. and Europe as well. Dr. Kaneko realized that basic biological knowledge and an understanding of nutritional medicine were egregiously absent everywhere. Wishing to spare people from the dangers of invasive and often unnecessary medical procedures, Dr. Kaneko thus began educating the people of his homeland in the art and science of managing their own health. His study group, formed with a small number of other like-minded individuals who were willing to listen, was Dr. Kaneko's first step in formulating and introducing this new type of educational process to the people of his country. The Kaneko School and the "Know Your Body" club were then formed, both born out of this group. A new movement in Japan's modern health care system was thus born.

Dr. Kaneko's orthomolecular protocol in treating patients consists of conducting blood tests before making a diagnosis, and then providing a nutritional "prescription" before resorting to any other type of remedy. After many years of helping patients with a wide variety of ailments, Dr. Kaneko's success in treating patients is now undisputed. Today, in Japan, although there is still some lingering opposition to integrative medicine in general, the

tide is visibly changing. Thanks to more than 20 years of dedicated work by Dr. Kaneko through his KYB organization, his approach is increasingly accepted and respected. He has now been recognized with many honors, not only in Japan but internationally as well. In the early days, however, the opposition and criticism were fierce.

The widespread resistance to new ideas in general and the constant criticism of orthomolecular medicine in particular were, in the early days of KYB, a constant source of resistance to Dr. Kaneko. Not unlike the standard medical systems of other countries, Japan's medical establishment has often been characterized by authoritarianism and conservatism. Such an establishment systematically disregards noninvasive orthomolecular approaches to the maintenance of health and the prevention and treatment of disease, even though such approaches continue to garner greater and greater success. Meanwhile, while history awaits the full recognition and implementation of these new, successful therapies by the establishment, the true cost of any delay is measured in ongoing human suffering.

One particular example of the resistance which Dr. Kaneko has encountered, and continues to encounter, involves Japan's recommended daily allowance (RDA) of vitamins. Based upon the idea of "prevention of deficiency" rather than upon the idea of achieving optimal performance, the RDAs are widely supported throughout Japan without being scientifically understood – especially in situations where nutritional demands are not met due to various types of illness. For instance, the RDA for vitamin B1 in Japan is one milligram per day, but Dr.

Kaneko recommends 200 to 300 milligrams per day of vitamin B1 in a complete B complex form. Despite his long history of success with patients who have suffered from a variety of ailments, his recommendations are still often rejected. There still remains a widespread lack of understanding of “mega” doses, which are still considered to be “unsafe” by most standard medical authorities. However, for as long as records have been kept on such matters, for more than the past 20 years, nobody has died either in the U.S. or in Japan from excess nutrients.

The proof is in the results, however. In response to Dr. Kaneko’s continued success in using “mega” doses with his patients, Japan’s Ministry of Health, Labor and Welfare (M.H.L.W.) organized a special committee to examine the issue of RDA dosages, and exactly how they should be established. Finally, as of 2002, slightly higher levels of vitamin B1, in fortified TPN (total parenteral nutrition) formulas, have been approved by the M.H.L.W., although the increased RDA is now only three milligrams per day of vitamin B1. Consequently, although this may be seen as “progress” of a sort, many patients still suffer needlessly, due to a lack of scientific understanding among the medical establishment of the idea of “optimum dosage.” For many years, therefore, and at his own risk, Dr. Kaneko has supplied his own supplements to his patients, based upon the optimum dosage concept. Without carrying the M.H.L.W.’s stamp of approval, Dr. Kaneko’s own supplements have improved the quality of life for an innumerable number of patients.

From among the more than 30,000 members of his KYB organization today, many other physicians and health care professionals are now enjoying repeated success by following the same vitamin supplementation methods that Dr. Kaneko developed. He attributes the sustained success of his procedures not to his own merit, but rather to the orthomolecular ideas first instilled in him by Doctors Linus Pauling and Abram Hoffer. Meanwhile, however, and despite his growing popularity and success, Dr. Kaneko finds that the majority of professionals in the medical community are still either skeptical of his approaches or deny their value altogether.

Today, the increasing popularity of nutritional supplementation in Japan is indirectly fueled by the U.S. market. Although such supplements are widely available throughout Japan, their established doses have little if anything to do with nutritional science. Consequently, doses of nutrients that are only slightly above that required to prevent a deficiency disease, and which are based upon highly restricted RDAs rather than upon scientific evidence, are commonly available for sale throughout Japan. All prominently display the M.H.L.W.'s stamp of approval. Although not as widespread as in the past, fear and hostility born out of ignorance still remain the greatest hurdles for the advancement of orthomolecular medical science among the populace.

Why is there still such resistance to orthomolecular methods that have been proven for years to be safe and effective?

One answer may be found in an antiquated medical educational system. Dr. Kaneko points out that medical school students in Japan are allowed very little time for learning about common pathological conditions, such as the ordinary head cold or anemia. Emphasis instead is placed on the study and research of rare and more exotic pathologies which might never be seen in an entire professional career. Complacency among both faculty and student bodies contributes to the problem, resulting in a national attitude of denial about the need for updating the medical educational system. The cycle is self-perpetuating. By the time the medical student becomes a practicing physician, the fundamental ethical mandate to “treat the person and not the disease” is neglected because it has never been instilled. Additionally, core subjects such as biochemistry and physiology are discounted in medical schools, and consequently any rigorous biological understanding of the complete human being is compromised. It is, therefore, not at all surprising that orthomolecular medical concepts are accepted slowly and reluctantly among physicians. “Orthomolecular” is not the answer to any questions posed in medical school.

In order to encourage an intellectual atmosphere that is unafraid of new and worthy progress within the medical sciences, the educational system must be among the first entities to change. The way in which “medicine” is taught must be updated to reflect new scientific discoveries.

Nevertheless, even with the strong resistance that still exists, progress cannot be denied. In early 2000 and 2001, interest in orthomolecular medicine increased dramati-

cally among clinicians in Japan. In 2003, for the first time, a seminar on orthomolecular nutrition was given to clinicians. These physicians, who have come to realize the innate logic of enhancing the body's natural mechanisms of healing, have now begun to educate their patients on nutritional approaches to health. This marks a radical departure from the mainstream medical approach, which was to blindly administer the government-approved therapies as described in treatment guidelines and as reimbursed by health insurance companies.

Years ago, Dr. Kaneko realized that in order to have the legitimacy of orthomolecular medicine accepted by the authorities who persist in holding on to their classic yet outdated paradigms, there must be a formal accumulation of scientific evidence. Originally, Dr. Kaneko had thought that he could follow up on patients by monitoring their biochemistry during the phases of his nutritional support. However, in Japan, due to the restrictive reimbursement system "resembling that of socialism," only a very limited number of laboratory tests could ever be performed. So Dr. Kaneko developed his own set of laboratory tests, much more comprehensive than any previously in existence.

One particular example involves a health screening program as paid by employers, and as set by the Industrial Safety and Health Law standard. This screening program is designed to measure a total of seven blood parameters, which consist of nothing more than liver enzymes, cholesterol, hemoglobin, and a red blood cell count. However, such a blood test can only serve as a screening of morbidity and is not useful for early disease detection,

nor for monitoring of treatment response. Dr. Kaneko, therefore, designed a more comprehensive panel of more informative tests. In addition to those already mentioned, these new tests measure over 50 additional blood parameters. Included in the measurements are fatty acids, select vitamin and mineral levels, a white blood cell count, six protein fractionation parameters and six leukocyte fractionation parameters. These tests are conducted by the KYB clinical laboratory, and the patients pay for these tests themselves, since such evaluations are not yet recognized by insurance companies. However, the value of such tests far exceeds their monetary price. The blood parameters are checked at certain intervals, and simply by normalizing these values, Dr. Kaneko has been able to attain dramatic improvements in the clinical outcome of his patients. As he points out, "Blood components are elegantly regulated by the mechanism of homeostasis," and a careful observation of fine differences in the blood's parameters will alert the trained eye to important changes, which in turn will help to identify the underlying causes of the imbalance.

It may come as a surprise to people in the West that the people of Japan are prone to iron-deficiency anemia. The general belief that the Japanese diet is healthier than the western diet is not completely accurate, and Dr. Kaneko has found anemia to be one of the more prevalent results of the Japanese diet. Certainly, it is true that a lifelong ingestion of soy products is associated with low mortality from prostate and breast cancer. Similarly, it is also true that obesity and cardiovascular morbidity are lower in Japan than in the West, also as a result of a greater amount of plant-derived food than animal-derived food in

the Japanese diet. However, the decreased protein intake with its resultant amino acid imbalance and iron deficiency often results in anemia among people on such diets. Especially among menstruating women, the most recent data indicate the prevalence of anemia at greater than 80% in Japan. Since the main symptoms are of a neuropsychiatric nature, it is often difficult for individuals suffering from anemia to pinpoint their exact problems, as their complaints are often nonspecific. Since the standard diagnosis of anemia in Japan is based upon measurements of hemoglobin and hematocrit alone, some types of anemia are often overlooked if these measurements fall within the “normal” range. Dr. Kaneko, therefore, began recommending the routine testing of serum ferritin and found this to be low in many women with nonspecific health complaints. Simply with the replacement therapy that Dr. Kaneko developed in his supplement regimen, patients with this type of anemia improve much more quickly than they do with standard medical treatment, which often fails to correctly identify the malady in the first place. Conventional treatment of anemia often encounters another problem as well.

The iron preparations that are available for clinical use contain inorganic iron, which is poorly absorbed and inevitably causes mucosal injury in the stomach. Consequently, when patients fail to respond to standard medical treatments with inorganic iron, they are often labeled as “neuropsychotic” instead of simply anemic. Dr. Kaneko himself has witnessed many patients who were hospitalized for “neuropsychosis,” when in actuality the illness was not psychiatric in nature at all. Many patients still suffer needlessly from antidepressants or antipsychotics

which are prescribed according to the misdiagnosis of a psychiatric illness. But in many cases, the illness is really anemia due to a nutritional deficiency, primarily in iron and secondarily in protein, B vitamins or vitamin A.

As more and more psychiatrists are implementing Dr. Kaneko's orthomolecular approaches in the treatment of their patients, many misdiagnosed patients have been successfully weaned off antidepressant and antipsychotic drugs. The improvements are dramatic.

A partial list of symptoms that have been improved by Dr. Kaneko's nutritional approaches, and the corresponding recovery rates (as measured in percentage of all patients seeing Dr. Kaneko with the same complaint), are included in the following:

1. Orthostatic hypotension, dizziness, tinnitus (> 80%)
2. Fatigue (> 65%)
3. Gingival bleeding, frequent bruising (> 80%)
4. Headaches and/or "dullness" in the head (> 75%)
5. Decreased attention, irritability (> 80%)
6. Loss of appetite/ anorexia (100%)
7. Hyperarousal/hypervigilance/being on edge (100%)

Often, when a patient would present with "unclear complaints," Dr. Kaneko realized that it was necessary to consider the various events to which the patient had been exposed throughout his or her lifetime, beginning in childhood. Without conducting such a history, the doctors of these patients would too often erroneously misdi-

agnose them with “neurosis,” “psychosomatic disorders,” “depression,” “autonomic imbalance disorders,” and other such diseases. This in turn would often result in unnecessary hospitalization and medication. In standard medicine, hospitalization due to “psychiatric disorders” still remains a common event in Japan, even without an analysis of physiological parameters being conducted. In orthomolecular nutritional medicine, however, as one can see from the unusually high success rate listed in the data above, pioneers such as Dr. Kaneko look beneath the surface and search for answers that may remain hidden to the superficial observer.

Surely, a doctor cannot be expected to correct what he cannot see, or what he does not know exists. But with the knowledge of Dr. Kaneko’s discoveries now freely available to the public, there is no longer any excuse for not knowing.

Today, Dr. Kaneko is leading the implementation of a mass-screening of serum ferritin levels for all adolescents in Japan. Such screening tests would be especially practical among adolescent girls, preventing possible future complications in conception and pregnancy. Additionally, countless people, both men and women, who might otherwise be misdiagnosed and erroneously treated for the wrong disease, will have Dr. Kaneko to thank for sparing them from such agony. What many people have increasingly come to regard as a “miracle” is simply the result of a blood test – which still remains unknown and unrecognized by many physicians.

Finally, after a lifetime of distinguished work and more than 20 years of outstanding success in treating and educating patients through his KYB organization, Dr. Kaneko's work is receiving more and more recognition. Gradually, the public is becoming more and more aware of the fruits of his brave and pioneering labors. For anyone with lingering doubts, however, Dr. Kaneko always invites any skeptical doctor or researcher to review the more than 20 years of sequential clinical test results from patients treated according to his approach, and let the results speak for themselves.

One result of Dr. Kaneko's KYB organization is the accumulation of vast amounts of data. A very large and growing body of knowledge now exists from the measurements that have been compiled of the KYB members. Data from their "self-controlled health management" and from their recovery from illness and improved quality of life have been carefully recorded. This growing body of data, from over 20 years of compilation, continues to offer a wealth of information to anyone who is interested. The simple idea that you can "Know Your Body," via objective test results, is spreading as a scientifically sound and logical approach to the prevention and treatment of disease. As such a successful idea continues to grow, it becomes more and more "contagious." Most recently, The Japanese Society for Complementary & Alternative Medicine was established at the Kanazawa University Medical School, and the "Know Your Body" concepts are also now officially taught at the Nippon Medical School. Additionally, a report entitled "Studies of Hiroshima University for a Link Between H. Pylori Infection and Gastric Atrophy" correlates very strongly with

studies on the same topic that were conducted at the KYB laboratories. More and more corroboration continues to mount as more and more people begin to see the quantifiable, measurable, repeatable results of Dr. Kaneko's KYB concepts.

Dr. Kaneko's KYB movement continues to grow in number and activity and enthusiasm. Through the work of more than 30,000 members, an increasingly vast body of scientific data continues to accumulate in clear support of the efficacy, the safety, and the logic of orthomolecular medicine.

Clearly, time and patience are essential. But, thanks to people such as Dr. Kaneko, humanity might actually be able to enjoy an acceleration of the process by which new, simple, and elegant ideas are no longer feared and attacked, but instead become accepted and welcomed.

Linus C. Pauling, Ph.D.

1901 – 1994



No single biographical endeavor can fully do justice to the life of any one great individual, but perhaps with no one is this more true than with Linus Pauling. As any reader must certainly already know, Dr. Pauling was a man of titan achievement, the likes of which this world is rarely privileged to see. A mere litany of his accomplishments would be a daunting task even to the most ambitious of writers. A full description of the innumerable and immeasurable ways in which he changed this world for the better is certainly beyond the scope of this book – and perhaps any book. Nevertheless, were it not for Dr. Pauling, orthomolecular medicine, as it is known, would not exist. This fact is not merely because he gave the field its name but, more importantly, because it is upon the foundation which he helped to build that all orthomolecular scientists after him are able to stand.

In his now famous article, “Orthomolecular Psychiatry,” which appeared in the April 1968 issue of *Science*, Dr. Pauling first coined and defined the term “orthomolecular.” Prior to this time, of course, he was already renowned for a multitude of spectacular achievements in biology, chemistry, physics, and even in the political

arena of world peace. He was the only individual in history to be awarded two unshared Nobel Prizes. His description of the nature of the chemical bond won him the Nobel Prize for Chemistry in 1954. His success in convincing the world's nuclear superpowers to sign a treaty banning the atmospheric testing of nuclear bombs won him the Nobel Prize for Peace in 1962. Indeed, there were few matters of lasting global importance during the 20th century in which Dr. Pauling did not make a significant impact.

Dr. Pauling did not turn his attention to nutritional medicine until the latter years of his life, but when he did so, he gave the field the full vigor and rigor of his robust talents. He would also give the field the last quarter century of his years on this earth. As a result of his interest in vitamins, which he attributed directly to the inspiration of Dr. Abram Hoffer, Dr. Pauling brought his unique breadth and depth of knowledge to orthomolecular medicine. He suffered severe criticism as a result, however, especially because of his views on megadoses of vitamins. However, to this day, over a decade after his death, the world continues to reap the benefits of his ardent dedication and contributions to this field. In fact, it has taken this long for many of his controversial views to be proven correct.

Linus Carl Pauling was born on February 28, 1901, in Portland, Oregon, to Lucy Isabelle and Herman William Pauling, a pharmacist. After graduating from Oregon Agriculture College (now Oregon State University) with a B.S. in chemical engineering in 1922, Linus then went on to the California Institute of Technology in Pasadena.

Here, he was highly influenced by the renowned scientists Arthur A. Noyes, Richard C. Tolman, and Roscoe G. Dickinson. Joined a year later by another accomplished scientist, Ava Helen Miller, whom he would marry, he pursued studies in chemistry, physics, and mathematics. He received his Ph.D. in chemistry (*summa cum laude*) from Caltech in 1925, with minors in physics and mathematics.

Already distinguished by his appointment as a National Research Fellow, Linus was awarded many further honors. A Guggenheim Fellowship allowed him to study in Europe for a year and a half, which he spent mainly at Arnold Sommerfeld's Institute for Theoretical Physics in Munich. He also enjoyed a month at the Niels Bohr Institute in Copenhagen, and several months in Zurich where he studied with the renowned physicist and discoverer of wave mechanics, Erwin Schrodinger. In 1927, Dr. Pauling returned to California where he joined the faculty of Caltech as an assistant professor of theoretical chemistry, thus beginning his long and illustrious career as a teacher and researcher.

Here at Caltech, Dr. Pauling became Chairman of the Department of Chemistry. He also became one of the first American chemists to master the skills of X-ray diffraction. This new technology made possible, for the first time, measurement of the distances and angles of the atomic bonds in 3-dimensional structures of crystals and molecules. The result of such a powerful new tool was a revolution in the life sciences, culminating in the birth of a new field which today is known as molecular biology.

In these early years at Caltech, Dr. Pauling conducted much of his research on the X-ray diffraction of inorganic crystals. These included topaz, the micas, the silicates, and the sulfides. He developed the coordination theory for complex substances, thereby launching the new field of crystal chemistry. This in turn led to the creation of yet another new discipline, that of the structural analysis of organic molecules by X-ray diffraction. Dr. Pauling trained many of his country's future X-ray crystallographers in these techniques, including the future Nobel Laureate, W.N. Lipscomb.

In 1930, Dr. Pauling also became interested in electron diffraction. He then combined this powerful new tool with X-ray diffraction in his analysis of the structure of large organic molecules.

X-ray analysis and electron diffraction had given Dr. Pauling the appropriate experimental tools with which to explore the structure of molecules. Similarly, his study of quantum mechanics had provided him with the appropriate theoretical tools. It was, thus, through this unique combination of empirical and theoretical techniques that he was able to ignite the complete reconstruction of the foundations of modern chemistry. What emerged was a "new" chemistry, of which Dr. Pauling was the principal architect. In this new science, the bonds that exist within and between the atoms of a molecule could be seen and established by the behavior of electrons. Described in his monumental book, *The Nature of the Chemical Bond*, his work in this field defined a pivotal moment in the history of science. Later, for his research into the nature of the chemical bond and its application to the elucidation of

the structure of complex substances, Dr. Pauling would, in 1954, receive his first Nobel Prize.

Although Dr. Pauling's early work had been exclusively with inorganic molecules, by the late 1920s he had become interested in biological molecules. At that time he began applying the same analytic techniques that he had used in physics and inorganic chemistry to the organic substances of life. By the 1930s, his interests led him to study the hemoglobin molecule. He was attracted by its "striking color" and by its unusual property of combining reversibly with the oxygen molecule. He was the first to discover and explain the nature of the bonding of oxygen to iron in hemoglobin.

His interest in hemoglobin led him next to a broader interest in proteins. With Alfred Mirsky, in 1935, he published a paper on the general theory of protein structure. As Dr. Robert Paradowski of the Rochester Institute of Technology later explained, Drs. Pauling and Mirsky suggested that:

"The polypeptide chain of each protein is coiled and folded into a specific configuration, which accounts for that molecule's function in the body. The molecule loses this function, and is 'denatured,' when that configuration is lost by breakage of the chemical bonds that coil and fold the molecule." (From *How to Live Longer and Feel Better*, by L. Pauling, 1986).

This phenomenon of the coiling and folding of proteins would later prove to have a significance greater than

anyone could have ever predicted. Among the consequences of Dr. Pauling's "general theory of protein structure" would be the ultimate discovery of the double helical structure of DNA. It is, thus, significant to note that Dr. Pauling had published his work on this subject as early as 1935, nearly two decades before most scientists were even aware of protein coiling and folding. This dates him certainly as one of the first scientists to have ever considered this particular phenomenon, if not in fact the first. Exactly how many people had been thinking of this problem as early as 1935 is not known with certainty, but it is known with certainty that Dr. Pauling was.

In 1936, Dr. Pauling was introduced to the field of immunology when he met Karl Landsteiner, the discoverer of blood types, during one of his visits to the Rockefeller Institute in New York City. Soon thereafter, Dr. Pauling formulated his concepts of "molecular complementarity" and "biological specificity." His first paper on the formation and structure of antibodies appeared in 1940. In 1945 he contributed a chapter to Dr. Landsteiner's book on immunology, which, according to the Nobel Laureate Joshua Lederberg, was one of Dr. Pauling's most important publications.

During World War II, Dr. Pauling's work was redirected toward the exigencies of the day, and he applied himself to finding an artificial substitute for blood serum. For his service to the wartime Office of Scientific Research and Development, he was awarded the Presidential Medal for Merit.

By the end of the war, Dr. Pauling had become interested in the molecular properties of sickle-cell anemia. He speculated that an abnormal hemoglobin molecule might be the culprit, and in 1949 he proved this to be the case. Collaborating with Harvey Itano and others, Dr. Pauling showed that sickle-cell anemia is caused by a hemoglobin molecule containing a single amino-acid anomaly in one of its polypeptide chains. Dr. Pauling's work with sickle-cell anemia was, therefore, of particular significance not merely because he discovered the cause of this disease; equally as important was the fact that he had classified it as a "molecular disease," the first disease ever to be recognized as such. This new concept would later form the basis of his work in orthomolecular medicine during the last 25 years of his life.

In 1947, Dr. Pauling authored a paper entitled, "Atomic Radii and Inter-atomic Distances in Metal," published in the *Journal of the American Chemical Society* (69: 542). Prior to this time, Dr. Pauling's work had dealt primarily with covalent bonds. But this landmark paper explored the nature of metallic bonds, and predicted the metallic radii of elements. Nearly 60 years after its publication, it still remains one of the most frequently cited articles in the Journal's 125-year history.

In 1948, while a guest professor at Oxford University, Dr. Pauling revisited the same topic that had occupied his attention over a decade earlier. He wanted to understand, in more detail, the coiling properties of the polypeptide chain in proteins. Once again, as with his paper on protein structure in 1935, the discoveries in this field would

later prove to have revolutionary implications and applications.

While in bed with a bad cold, Dr. Pauling discerned the answer to the problem of protein coiling:

“By folding a paper on which he had drawn a polypeptide chain, he discovered the alpha helix. Dr. Pauling and Robert B. Corey published a description of the helical structure of proteins in 1950, and this structure was soon verified experimentally.” (Dr. Robert Paradowski, the Rochester Institute of Technology, from *How to Live Longer and Feel Better*, by L. Pauling, 1986).

Their description was published in a series of papers in two journals. One of the managing editors referred to their articles as “the scientifically most distinguished of the first 50 volumes” of the journal. In addition to the alpha helix, their papers also described the gamma helix, the pleated sheet and the structure of collagen.

As distinguished and significant as this work was, however, it did not put the issue to rest. In fact, another revolution in science was just beginning to stir. Soon, Dr. Pauling’s original discovery of the helical structure of proteins would be overshadowed in the excitement of subsequent events.

Deoxyribonucleic acid (DNA) was now recognized to be a genetic molecule, and the race was on among scientists to discover its 3-dimensional structure. Dr. Francis Crick would later describe the ensuing frantic years in his book,

What Mad Pursuit. In the quest to describe DNA, Drs. Pauling and Corey, building upon their 1950 paper, proposed in 1953 that DNA consists of a triple helix. They proposed that the three helices are “twisted around each other in ropelike strands.”

Simultaneously, however, Dr. Pauling was also attracting attention with his efforts to educate world governments on the dangers of nuclear testing. A severe response by the U.S. government to his pacifistic work at this time would prevent Dr. Pauling from completing his research on DNA in a timely manner.

When Drs. James Watson and Francis Crick proposed a double helical structure for DNA, this was proven to be the correct theory. The triple helix theory was quickly forgotten. As they themselves later acknowledged, Watson and Crick had the advantage of X-ray photographs of DNA that had been taken by Dr. Rosalind Franklin. This was “an advantage denied Pauling because the U.S. State Department had lifted his passport (which it then reissued upon his receipt of the 1954 Nobel Prize in chemistry).” (Ibid.) For the “crime” of openly, truthfully explaining the dangers of unrestrained international atomic testing, the U.S. government rescinded Dr. Pauling’s passport and impugned his citizenship. Had this not happened, and had he not been denied the rights of international travel, Linus Pauling might have been the recipient of three, not two, Nobel prizes in his lifetime. Instead, for being the first to describe the double helical structure of DNA, Drs. Watson and Crick shared the 1962 Nobel Prize in Chemistry. The new fields of genetics and genetic engineering were born, and Drs. Watson and Crick

were catapulted to fame. (Although their success could not have been possible without Dr. Rosalind Franklin's work, she died before the Nobel Prize was awarded and, therefore, was not recognized for her key contributions to the field). Nevertheless, it had been Dr. Pauling who discovered and published with Dr. Corey in 1950 the first description of the helical structure of proteins, which included the alpha helix. Dr. Pauling was the first to postulate and confirm with empirical data the relationship between form and function in biological molecules. And it was Dr. Pauling who was the first to discover and describe the role of hydrogen bonds in protein conformation. Even competing scientists respected these facts, and Francis Crick often acknowledged Dr. Pauling to be one of the founders of molecular biology. Yet few people today now recall that it was Dr. Pauling who first established the foundations in molecular biology upon which later discoveries, including those by the legendary Drs. Watson and Crick, were built.

With the increased public visibility that came with winning the 1954 Nobel Prize in Chemistry, Dr. Pauling began to devote more of his attention to humanitarian issues. His wife, Ava, was herself a peace activist and strongly supported Dr. Pauling in this arena. As Dr. Paradowski described,

“In 1958, Dr. Pauling and his wife presented a petition signed by over 11,000 scientists from around the world to Dag Hammarskjold, then secretary-general of the United Nations, calling for an end to nuclear weapons testing. He had to defend that petition before a congressional subcommittee in

1960, and he even risked going to jail for refusing to turn over the correspondence with those who helped to circulate his petition. Meanwhile, he had published his book, *No More War!* ” (Ibid.)

It was in this realm that Dr. Pauling first gained widespread public attention. Unrelated to his scientific accomplishments, his efforts to ban nuclear weapons testing won him the greatest notice – very little of which was favorable. But he persevered, and ultimately his efforts were successful. During this period, Dr. Pauling gave over 500 lectures on the dangers of nuclear testing and the consequences of radiation exposure. Initially he was severely maligned by government authorities, even threatened with imprisonment and loss of his U.S. citizenship. But in time he gathered strong public backing, especially from other scientists. In 1963, the United States, the Soviet Union, and the United Kingdom signed a treaty banning the testing of atomic bombs in the atmosphere. This treaty was due to Dr. Pauling’s tireless and fearless efforts. For his courageous leadership in this accomplishment, Dr. Pauling was awarded the 1962 Nobel Prize in Peace. Again, Dr. Robert Paradowsky recalls the events:

“From the time the atomic bomb tests began in earnest on Frenchman’s Flats near Las Vegas, Nevada, in 1951, the Atomic Energy Commission regularly issued reassuring press releases. High energy radiation had caused no abnormal number of defects in the offspring of parents exposed at Hiroshima and Nagasaki, they said. Generations of fruit flies raised in radioactive containers

showed ‘more vigor, hardiness, resistance to disease, better reproductive capacity.’ It was Linus Pauling, speaking with the authority of a Nobel laureate (in chemistry, 1954), who exposed the fraud of this government public relations campaign. He translated the physics of nuclear explosions into words and numbers people could understand. It was known that the neutron flux in an explosion transmutes atmospheric nitrogen into radioactive carbon-14. The Atomic Energy Commission called upon another Nobel Prize winner to show this effect would have negligible consequences. The large molecules of the living cell are constructed around carbon, however, and C-14 readily substitutes for the nonradioactive isotope C-12. Pauling calculated that the output of C-14 from the then-scheduled weapons tests would cause 55,000 children to be born with gross physical and mental defects, result in more than 500,000 miscarriages, stillbirths, and newborn deaths, and cause as much leukemia and bone cancer as that caused by all the fission products from the explosions combined. The public controversy, sustained by Pauling’s robust contributions, eventually induced the superpowers to suspend the testing of atomic bombs in the atmosphere; they signed the treaty in 1963, and it went into effect on the very day of the bestowal of the Nobel Peace Prize for 1962 to Linus Pauling.” (Ibid., p. 394).

His success in the international political arena, however, was not without its repercussions in his professional life. Due largely to institutional hostility at Caltech toward his

peace efforts, and after nearly four decades on the faculty, Dr. Pauling decided to leave Pasadena in 1963 for Santa Barbara. Here, he joined the Center for the Study of Democratic Institutions, where he would remain through the middle of the 1960s. At this Center he hoped to be able to work both on matters of science and peace. He turned his attention to the structure of the atomic nucleus, proposing his “close-packed spheron theory,” with protons and neutrons arranged in nucleus clusters. This is the atomic model that is still accepted and taught today. The theory offers a simple yet elegant explanation of nuclear properties, including asymmetric fission.

During this time, Dr. Pauling also coauthored several influential papers on molecular evolution with Dr. Zuckerkandl. Together they suggested that proteins, particularly hemoglobin, could be used to date the evolutionary divergence of organisms. This work on the molecular clock prompted National Medal of Science winner Alex Rich of MIT to note, “At one stroke he united the fields of paleontology, evolutionary biology, and molecular biology.” Francis Crick also referred to this work as among Dr. Pauling’s greatest contributions.

All of these groundbreaking accomplishments in molecular science paved the way for Dr. Pauling’s development of orthomolecular medicine. Similarly, all of the harassment that he had endured in his efforts to ban nuclear weapons testing had also prepared him well for what he would face in his orthomolecular work.

In 1967, Dr. Pauling left Santa Barbara to become research professor of chemistry at the University of Cali-

fornia at San Diego. It was here that, in 1968, at the age of 67, Dr. Pauling published his now historic paper, entitled “Orthomolecular Psychiatry.” Appearing in the April 1968 issue of *Science*, this article introduced the world to yet another novel idea. From the Greek word “ortho,” meaning “straight” or “correct,” Dr. Pauling defined a medical approach that sought to attain health and prevent disease through attention to “correct molecules.” This would involve the use of substances naturally found in the body, such as vitamins and minerals, but not pharmacologically produced substances, since these do not naturally occur within the body. For his entire career, Dr. Pauling had been a recognized leader at the forefront of discoveries in the molecular world. Indeed, he was acknowledged to be one of the fathers of the field of molecular biology. He now saw orthomolecular medicine as a logical extension of applied molecular science. For the next quarter century of his life, until his death, he would be engaged in unraveling the molecular mysteries of human health and disease. Once again, his fertile ideas sparked a paradigm shift, spawning a new and revolutionary field of science – this time, in medical science. He credited Dr. Abram Hoffer for inspiring his interest in vitamins, and Dr. Irwin Stone for introducing him specifically to the properties of vitamin C. Yet by officially naming, defining, and codifying orthomolecular principles, Dr. Pauling launched what was to become a new global movement in medicine. In doing so, he also launched himself upon a new phase of his career.

While at UC-San Diego, Dr. Pauling also conducted original work on the molecular basis of memory. But it was orthomolecular medicine that would hold the focus

of his attention for the remainder of his life. When he moved to Stanford University, where he remained as Emeritus Professor into the 1970s, his expansive ideas were about to find a new home. His dedication to orthomolecular medicine led him to found, in 1973, the Linus Pauling Institute of Science and Medicine, located first in Menlo Park and then in Palo Alto. Here, at the Institute's laboratories,

“Scientists conducted research in molecular and viral carcinogenesis, cancer metastasis, genetics, aging, neurotoxicology, immunology, and the roles of vitamin C and other micronutrients in human physiology, cancer, cataracts, infectious diseases, heart disease, and other pathologies. Dr. Pauling also continued his research in theoretical physics and chemistry, including studies in the bonding of metals and intermetallic compounds, chemical structure, the structure of atomic nuclei, and superconductivity. [From P.B. Chowka, *The Choice*; 26(2)].

His central interest in nutrition and the role of micronutrients led to his publication, in 1970, of *Vitamin C and the Common Cold*. Written for the lay reader, it received the Phi Beta Kappa Award as the best book on science that year. Later, the Scottish physician, Dr. Ewan Cameron, drew Dr. Pauling's attention to the use of ascorbic acid in the treatment of cancer. Their collaboration resulted in numerous scientific papers and another book, *Cancer and Vitamin C*, published with Dr. Cameron as coauthor in 1979. Later, Dr. Pauling would appoint Dr. Cameron as Medical Director of his Institute.

Engaged as an international speaker into his 90s, Dr. Pauling brought his classical work in physics, chemistry, biology, medicine, nutrition, and peace into individual lecture halls and classrooms around the world. He also continued to write about these topics into his 90s. When Hugh Riordan, M.D., and his son, Neil, visited Linus at his home in Big Sur, when Linus was 92 years old, Linus was in the process of handwriting a new conceptual paper in molecular biology. His powerful intellectual productivity lasted into his final days.

Several years prior to this visit, while attending a meeting together, Dr. Hugh Riordan had asked Dr. Pauling how he was able to handle all of the criticism directed at his work. Dr. Pauling smiled and said, “Just remember, Hugh, when your colleagues aren’t up on something, they tend to be down on it.”

In 1983, the 25th anniversary revised edition of *No More War!* was published. As his friends would later recall, whether in an effort to improve our understanding of the microscopic world of matter, or to improve the lot of humankind, Dr. Pauling always remained faithful to his vision.

In April of 1994, the medical journalist Peter B. Chowka interviewed Dr. Pauling by telephone for a live radio broadcast. Four months later, Linus Pauling died. In this last interview that he ever gave, Dr. Pauling answered a number of fundamental questions about the nature of his work in orthomolecular medicine:

Chowka: “Dr. Pauling, could you summarize the role that vitamin C plays in human health and its importance to the nation as a whole?”

Pauling: “Vitamin C – ascorbic acid or sodium ascorbate or calcium ascorbate – is involved in a great number of biochemical reactions in the human body. Two of its major interactions are in potentiating the immune system and aiding the synthesis of protein collagen, which is a very important substance that holds together the human body. Collagen strengthens the blood vessels, the skin, the muscles, and the bones. You can’t make collagen without using up vitamin C. One piece of evidence that made quite an impression on me 20 years ago was when Irwin Stone, Ph.D., pointed out that most animals, except humans, monkeys, and guinea pigs, manufacture vitamin C. They don’t rely on vitamin pills or on foods. They make vitamin C in their livers in amounts proportional to body weight. For an adult man the proportion turns out to be on the average of 10 or 12 grams (12,000 milligrams) a day. That’s 200 times the Recommended Dietary Allowance, 200 times the amount people get in an ordinary diet! This is why I think we should be getting 200 times the amount of vitamin C that the Food and Nutrition Board recommends. The RDA, 60 milligrams, is far too small and indicates the importance of taking vitamin C supplements.”

Chowka: “Over the past two decades, you’ve studied cancer patients who have been treated with high doses of vitamin C. Recently, you’ve published several papers with Abram Hoffer, M.D., Ph.D., on the treatment of cancer with vitamin C. The results seem very promising.”

Pauling: “Oh, yes! I became interested in vitamin C and cancer in 1971 and began working with Ewan Cameron, chief surgeon at Vale of Levan Hospital in Scotland. Cameron gave 10 grams of vitamin C a day to patients with untreatable, terminal cancer. [His] patients lived far longer compared to patients who didn’t get 10 grams a day of vitamin C. The other patients lived an average of six months after they were pronounced terminal, while Cameron’s patients lived an average of six years. More recently I’ve been collaborating with Hoffer, a physician in Victoria, British Columbia, Canada. Hoffer has treated 300 cancer patients and has recommended to all of them essentially the same treatment. ... The terminal cancer patients who didn’t follow Hoffer’s regimen had a survival time of only about six months. But the ones who followed Hoffer’s therapy have done even better than Cameron’s patients. On the average they lived about 12 years after being pronounced terminal with untreatable cancer. Hoffer’s regimen includes 12 grams of

vitamin C per day, but also includes significant amounts of other nutrients, such as vitamin E, niacin, large amounts of other B vitamins, and vitamin A in the form of beta carotene. Apparently, the other vitamins cooperate with the vitamin C to give even greater control over cancer.”

Chowka: “You’ve recently published several papers on nutrition and cardiovascular disease.”

Pauling: “The papers contain a simple argument. I have trouble understanding why somebody interested in heart disease didn’t think of it 20 or 30 years ago, when it was accepted by cardiologists that the primary cause of atherosclerosis and heart disease is a lesion in the wall of an artery in a region of stress. So I asked myself two or three years ago, ‘Why should there be a lesion in the wall of the artery?’ Animals don’t have these lesions in regions of stress. Well, you have the lesions because the arteries are weak. Why are they weak? Ordinarily, animals’ arteries are strengthened by the deposits of collagen. And you can’t make collagen without using up vitamin C. Humans don’t get enough vitamin C, so their arteries are weak. And then a lesion forms, followed by the other stages of developing heart disease. Therefore, deficient intake of vitamin C is a primary cause of cardiovascular disease.”

Chowka: “For many years, you and your colleagues faced an uphill battle with the medical powers-that-be in terms of your ability to get a fair hearing for your ideas about vitamin C and for nutritional medicine in general. Has that situation changed?”

Pauling: “Oh, I think it has been changing. Scientists have tended to follow my recommendations, but I’ve had more trouble with the medical establishment. They seem to me to be bi-ased, not to have an open mind with respect to information that becomes available about vitamins and other nutrients in relation to cancer and other diseases. Recently, in the last year or so, part of my effort has been to counteract a strange stance on the part of the medical establishment. They have now accepted the fact that antioxidants taken in food cut down on the incidence of cancer. But in their books and articles they still say, ‘but don’t take vitamin supplements.’ This is completely illogical from my point of view. They don’t give any arguments at all to support the statement. A paper by James Enstrom, Ph.D., and his associates shows how valuable even a little extra vitamin C in the form of a supplement is.”

Chowka: “What’s going on lately at the Linus Pauling Institute of Science and Medicine in Palo Alto, California, which recently celebrated its 20th anniversary?”

Pauling: “The investigators there work on various problems, particularly ones involving vitamin C and other vitamins in relation to disease or, in some cases, just the basic chemistry of the vitamins. One observation they made about three years ago during test tube research is that HIV, the virus that’s involved in AIDS, was controlled by moderately high concentrations of vitamin C – concentrations you can get into the bloodstream by taking 10 or 20 grams of vitamin C per day. This discovery has attracted the attention of AIDS researchers at the National Institutes of Health (NIH) and they have set up a test to determine the effectiveness of high doses of vitamin C in controlling AIDS or HIV infection.”

Chowka: “Dr. Pauling, there are a number of other pioneers of innovative science and medicine of this century, like the late Albert Szent-Gyorgyi, M.D., Ph.D., who discovered vitamin C. Unfortunately, it appears that many people today aren’t as aware as they might be of the contributions of scientists like Szent-Gyorgyi and yourself. I’d like to ask you, then, how you would like to be thought of and remembered, especially by younger Americans?”

Pauling: “Well, this is a complicated question and difficult for me to answer. I think it’s likely

that the future generations will think of me as the ‘vitamin C man.’ And of course, I don’t think of myself that way. For 20 years, I’ve just been repeating the statements that Stone, and to some extent Szent-Gyorgyi himself, had made about the great value of high doses of vitamin C and other vitamins. But Szent-Gyorgyi, who discovered vitamin C and first isolated it in 1927, was not a very vigorous advocate of megavitamins. Abram Hoffer and Humphrey Osmond, M.D., much later became the principal advocates of high doses of vitamin C and niacin for schizophrenia patients – doses that were 500 or 1,000 times as great as the RDA. And I was much impressed by what Hoffer and Osmond wrote, as well as by Stone’s analysis of the situation with respect to vitamin C.”

Chowka: “Are you optimistic about the future?”

Pauling: “Oh, well, yes! I’m apparently optimistic by nature. I’ve been optimistic about controlling nuclear war, optimistic about better relations between the Soviet Union and the United States, and optimistic also about orthomolecular medicine. Many people are convinced that orthomolecular medicine is the medicine of the future. So, yes, I am optimistic!”

Dr. Pauling was the recipient of more than 40 honorary doctoral degrees from universities around the world. In 1986, Dr. Pauling and his wife bequeathed their personal and professional memorabilia to Oregon State University (OSU). At the time of his death on August 19, 1994, at the age of 93, Dr. Pauling had left “more than 400,000 journals, scientific writings, papers, models, and other scientific memorabilia to his undergraduate alma mater, Oregon State University.” [From P.B. Chowka, *The Choice*, 26(2)]. Prior to his death, Dr. Pauling had donated between 10,000 and 15,000 items to OSU every year.

In 1996, the Linus Pauling Institute of Science and Medicine transferred its research activities and assets to OSU, where the “Linus Pauling Institute” (LPI) now resides. As described on their website,

“The mission of the LPI at OSU is to determine the function and role of micronutrients, phytochemicals, and microconstituents of food in maintaining human health and preventing and treating disease; and to advance the knowledge in areas which were of interest to Linus Pauling through research and education. The LPI continues the pioneering efforts of Linus Pauling in orthomolecular medicine, an area of medicine devoted to restoring the optimal concentrations and functions of substances (e.g., vitamins) normally present in the human body. The research at LPI is aimed at understanding molecular mechanisms and physiological effects of nutritional factors, and exploring their utilization in health promotion through dis-

ease prevention and treatment. Areas of research interests include, but are not limited to, aging, cardiovascular diseases, cancer, neurodegenerative diseases, immune dysfunction, and diseases caused by exposure to toxins.”

In Dr. Pauling’s first contributions to science, in the 1920s, “he had brought quantum physics and his powerful imagination into chemistry.” For this, “Workaday chemists, content with their science in its pre-Pauling cookbook stage, attempted to repel the intrusion of physics into their field. They not only resisted his conceptual argument and challenged his data, but called his integrity into question. Two generations of chemists, brought up since then on textbooks, including Pauling’s own, that incorporate the revolution he brought to the foundations of chemistry, would have difficulty recognizing the ground of that forgotten controversy.” (Dr. Robert Paradowski, the Rochester Institute of Technology, from *How to Live Longer and Feel Better*, by L. Pauling, 1986). The same pattern of events occurred again with Dr. Pauling’s efforts to stop atmospheric testing of nuclear weapons: first, there was hostile resentment and resistance to his ideas, which was followed by global acceptance and even praise. In the latter years of his life, the controversy which surrounded his views on nutrition was just one more example of the tendency of such patterns to repeat themselves. Dr. Pauling’s contributions to our understanding of nutritional medicine “embroiled him in a controversy with organized medicine and old-fashioned nutritionists. The physicians, with only a few distinguished exceptions, denounced this non-physician’s intrusion into the practice of medicine.” (Ibid.) In all of

these controversies, the historical progression of events was the same. So, too, was Dr. Pauling's approach, which was "to establish the data and, in serene good humor, to state plainly what the data mean. He almost invariably turned out to be right." (Ibid.)

One of the most animated controversies surrounding Dr. Pauling in the last 25 years of his life involved his stance on megadoses of vitamins, especially vitamin C. For years, "on almost a weekly basis, a new scientific study is published that documents the benefits of vitamin C in a broad range of conditions." (P.B. Chowka, from *Six Years After Pauling's Death, Vindication on the Science of Vitamin C*, 2000). Now, more than a decade after Dr. Pauling's death, recent studies have provided new evidence vindicating his stance even further. A newly released book, *Ascorbate: The Science of Vitamin C*, published in 2004 by Drs. Steve Hickey and Hilary Roberts, exposes the many flaws that were involved in the establishment of the U.S. RDA for vitamin C.

These two University of Manchester scientists provide some alarming revelations in their book. "Millions of people could have delayed or avoided health problems such as cataracts, cancer, blood vessel disease, aneurysms, gallstones, and more had NIH (National Institutes of Health) researchers properly conducted tests to determine the human need for vitamin C." (Bill Sardi, *Knowledge of Health, Inc.*, 2004). The review continues,

"Hickey and Roberts note indisputable flaws in the RDA for vitamin C. NIH scientists waited twelve hours before measuring the concentration of ascor-

bic acid in the blood circulation to develop an RDA for 280 million people. Hickey and Roberts show that NIH investigators failed to calculate for the half-life of vitamin C, which is about 30 minutes in humans. ‘To be blunt,’ says Hickey, ‘the NIH gave a dose of vitamin C, waited until it had been excreted, and then measured blood levels.’ Then, 24 half-lives later, NIH researchers concluded this was the saturation level.” (Ibid.)

This is how the RDA for vitamin C for the U.S. population was established. There were many other flaws found to be inherent in the NIH research:

“It is also obvious that there weren’t enough subjects tested to develop adequate conclusions. The NIH only studied seven and fifteen subjects in the two studies they used to develop the RDA. Also, there was the false assumption that concentrations of vitamin C in blood plasma reflect the need for vitamin C in other tissues throughout the body. The brain has ten times greater vitamin C concentrations than the blood plasma. A 1991 study found that 2,000 milligrams of daily vitamin C increased vitamin C levels by 22% to 32% in the human eye over levels achieved by taking 148 milligrams.” (Ibid.)

A recent article in Health World Online, dated July 6, 2004, carried the headline, “Linus Pauling Vindicated; RDA for Vitamin C is Flawed.” The article went on to state:

“Hickey and Roberts’ revealing book confirms the work of Dr. Linus Pauling, a long-time advocate of high-dose vitamin C supplementation. Pauling advocated consumption of supplemental vitamin C throughout the day, and he consumed 18,000 milligrams of vitamin C in divided doses on a daily basis, a practice which overcomes the half-life decay problem. ... Hickey has called for the IM (Institute of Medicine) and NIH (National Institutes of Health) to retract the current RDA or provide scientific justification for their recommendation. The NIH has ceased communication with Hickey.”

Other studies conducted over the years which claimed to disprove Dr. Pauling’s stance on megavitamins have similarly been found to have been flawed both in design and in execution. Among such scientifically invalid studies are the now particularly notorious ones conducted at the Mayo Clinic, which Drs. Hickey and Roberts, among several other authors, now address. Dr. Pauling had recognized that the Mayo Clinic studies were flawed, and that the protocol used in these studies failed to replicate his protocol. The Mayo Clinic had promised Dr. Pauling the opportunity to respond, before they published their findings; instead, they then denied him any opportunity for response. Simultaneously, the *New England Journal of Medicine* had also denied Dr. Pauling the chance to challenge the Mayo Clinic’s flawed studies, by refusing to publish any response on Dr. Pauling’s part. Now, at last, Drs. Hickey and Roberts, among others, are finally making the truth more widely known.

Dr. Pauling would also be pleased with the findings of Thomas E. Levy, M.D., J.D., whose book, *Vitamin C, Infectious Diseases, and Toxins – Curing The Incurable* has also vindicated much of Dr. Pauling’s work with vitamin C. In his book, Dr. Levy writes,

“... Vitamin C has been able to cure or contribute to the cure of many common infectious diseases, including some deemed incurable such as hepatitis and polio. Because of these documented effects, the use of properly dosed vitamin C within a comprehensive treatment protocol can also eliminate the need for many vaccinations and toxic prescription medicines. ... Vitamin C is the treatment of choice for many potentially fatal toxins and other toxic medical conditions that poison the body, for which no effective treatments presently exist.... Vitamin C is remarkably free of any side effects. Vitamin C is unquestionably the most nontoxic nutrient and supplement that is available today.” (2002)

In regard to Dr. Pauling’s stance on vitamin C, there were many people who acknowledged his stature in science, yet “deplored his travel so far out of the ‘mainstream.’” (Dr. Paradowski, from *How to Live Longer and Feel Better*, p. 395). Today, more than a decade after his death, history seems to be confirming the words of Rene Dubos, who observed that, “the mainstream converges with Pauling twenty years later.” (Ibid.)

Stephen Lawson, the Administrative Officer of the Linus Pauling Institute at Oregon State University, remembered Dr. Pauling with the following tribute:

“Pauling was a maverick for most of his career. He was at the leading edge of science, making discoveries that opened new vistas for fertile work by thousands of other scientists. ... Pauling’s special genius was to formulate fundamental and seminal theories in advance of exhaustive data. He was able to do this because of his incomparably broad knowledge of science and his bold imagination. Any one of his major achievements, of which there were many, would be the crowning highlight of anyone else’s career. He made a few famous mistakes, which shows that he was willing to take risks. His incredible range of knowledge, combined with his prodigious memory and enviable scholarly record, enabled him to develop great confidence in his ideas. This confidence allowed him to serve as a tremendous advocate and educator, which stimulated and inspired many others to carry out experiments in nutritional medicine. His charisma was also certainly inspirational.”

“I especially admired him for his courage. For example, when threatened by the Senate Subcommittee with imprisonment if he did not reveal the names of those who helped him with the petition to end the atmospheric testing of atomic bombs, he declared that he would not disclose those names because he didn’t want the government to ruin the careers of young, idealistic scientists. He was

never afraid to confront the powerful if he believed that their ideas or positions were not sound or justified. When newspapers or magazines published derogatory statements about him because of his political activities, he responded by filing several lawsuits in the early 1960s, including one against William Buckley and the *National Review* that set precedent for celebrity libel.” (Personal correspondence to Hugh Riordan, M.D., 2001).

As Dr. Pauling demonstrated, public opinion can turn the tide. Through very strong public backing, he was able to bring about the signing and enactment of a global nuclear test ban treaty, despite initial resistance from government leaders. Likewise, this is how principles of orthomolecular medicine will ultimately prevail: with public knowledge and backing. Dr. Pauling stated that the American public is primarily responsible for the changing face of modern medicine, adding that, “The public as a whole responded better to the statements that Cameron and I, or Hoffer and I, were making than the medical establishment did.” (P.B. Chowka, from *Linus Pauling, Ph.D.: The Last Interview*, 1994). Before Dr. Pauling encountered opposition to his views on megavitamins, he had encountered opposition to his views on the banning of nuclear testing, and, prior to that, on applying the analytical techniques of quantum physics to chemistry. But these ideas are now so commonly accepted that they are taken for granted, and few people can recall a previous era when this was not the case. Ultimately, when the cause is sufficiently compelling, public tide attains a certain momentum or “critical mass.” Beyond that point,

any idea that is sound and true and correct can no longer be suppressed.

As Dr. Abram Hoffer wrote on the occasion of Dr. Pauling's Centenary,

“Genius is present when the individual continues to make discoveries, and this is what Linus did. He towered over chemistry like a colossus, completely altered it and made it modern. He helped the world achieve some freedom from atomic bombs and radiation, and having achieved these goals he pursued one of his greatest ambitions, to improve the lot of mankind by improving their health. Beginning at age 65, when he could have retired, he entered perhaps his toughest and most prolonged controversy, for the next 30 years. Without Linus Pauling, orthomolecular medicine would have required another 20 years or more before reaching its present state, there would be no *Journal of Orthomolecular Medicine*, no International Society for Orthomolecular Medicine, and those schizophrenic and other patients fortunate enough to have received orthomolecular treatment would either be dead, on the streets, or in some chronic institution.” (From the *Journal of Orthomolecular Medicine*, 2001; 16(4): 196).

In the Foreword to Dr. Richard Huemer's 1986 book, *The Roots of Molecular Medicine: A Tribute to Linus Pauling*, Dr. Bernard Rimland added,

“As the evidence favoring the orthomolecular concept continues to accumulate, and as the costs, risks, and failures of traditional medicine become increasingly apparent, reasonable people everywhere will recognize the wisdom of invoking health by filling the body’s needs, rather than by distorting its function with drugs. That day is coming, and its arrival will be due in no small part to the Herculean efforts of Linus Pauling.”

Dr. Pauling left humanity an immeasurable legacy of “startlingly original contributions in biology, chemistry, physics, medicine, and peace.” [From P.B. Chowka, *The Choice*, 26(2)].

Apparently, the world is just beginning to understand the full significance of these contributions.

Carl C. Pfeiffer, Ph.D.,
M.D.

1908 – 1988



On a typical November day in 1988, at The Brain Bio Center that he had established in Princeton, New Jersey, Dr. Carl Pfeiffer was vigorously at work in his office. Suddenly, he stood up, uttered the words “Oh boy,” and collapsed, lifeless. Instantly, without notice and without suffering, the founding director of this revolutionary new organization, and one of the most fertile minds in medical science, had died.

Dr. Carl C. Pfeiffer was an eminent research scientist, clinician, teacher, public speaker, philanthropist, author, and mentor. With degrees in chemistry, pharmacology, and medicine, Dr. Pfeiffer held a series of prestigious appointments in industry, academia, and government prior to establishing his own medical research and clinical center. Among his many achievements, he was especially recognized for his ground breaking work in subdividing the schizophrenias into biochemical categories. Additionally, he was the first physician ever to use the combination of zinc and vitamin B6 in the effective treatment of mental disease.

Remembered most notably as a pioneer in trace element biochemistry and biological psychiatry, Dr. Pfeiffer began his long and distinguished career in the mainstream, conventional medical establishment. Then, suddenly, in his 40s, he embarked upon what his friend and colleague, Dr. Abram Hoffer, would later describe as “an entirely new and unexpected direction.” Dr. Pfeiffer’s most ambitious endeavor in the field of orthomolecular medicine did not begin, in fact, until he was 65 years young. At this energetic and youthful age, he founded, in Princeton, New Jersey, what was then a radically new type of medical laboratory and research facility. He would direct this organization for the rest of his life. Of robust health despite his own heart problems, Dr. Pfeiffer boggled the minds of family and friends with his prolific output of ideas and publications that only increased in number and in volume with his age. Literally at work in his office until the moment of his death at the age of 80, Dr. Pfeiffer would refer to this period of his career, after he turned 65, as the most productive years of his life. Certainly, it was during this span of 15 years that he would leave the world his greatest legacy.

Carl Curt Pfeiffer was born on May 19, 1908, in Peoria, Illinois.

The first 50 or so years of his life, although highly productive and distinguished, “do not,” as Dr. Abram Hoffer would later write, “show why he stood out, why he became such an innovative, distinguished orthomolecular scientist.” But Dr. Pfeiffer’s work would eventually change the course of psychiatric medicine.

Carl received his B.A. in chemistry in 1931, an M.A. in pharmacology in 1933, and a Ph.D. in pharmacology in 1935, all from the University of Wisconsin at Madison. While working on his Ph.D., he was also assistant instructor in pharmacology at Wisconsin, and afterwards he was instructor of pharmacology at the University of Chicago, where he received his M.D. in 1937. Following an internship in Wisconsin, he returned once again to the University of Chicago where he resumed his earlier position as instructor in pharmacology. In 1940, he transferred to Wayne University College of Medicine in Detroit, Michigan, where he held the post of associate professor of pharmacology. In 1941, he became Chief Pharmacologist with Parke-Davis and Company in Detroit. From 1943 through 1945, he served as Lieutenant in the U.S. Naval Reserve, during which time he was in charge of pharmacology and toxicology at the Naval Medical Research Institute in Bethesda, Maryland. His work at this time was primarily on hallucinogens. Immediately following the war, he was professor and head of the Department of Pharmacology in the College of Medicine at the University of Illinois. In the mid-1950s, he then served as director of the Division of Basic Health Sciences and as professor of pharmacology at Emory University in Atlanta, Georgia, where he was also Chairman of Pharmacology in the School of Medicine. Up to this point, Carl had certainly accomplished all that he did with honors and distinction; there were, however, no noticeable indications of the pioneering trails that he would blaze in the latter years of his life. But the seeds had been planted.

During Dr. Pfeiffer's time as Chairman of the Department of Pharmacology at Emory University's School of Medicine, he suffered his first of what would be several heart attacks throughout the course of his life. Barely into his 40s at the time, he realized that something was wrong with such a scenario. With a formal education grounded so firmly not only in medicine but in chemistry, biochemistry, and pharmacology, Carl could not help but wonder why he would be afflicted with a heart attack at such a young age. His keen and restless mind thus set about to discover the answers to this very specific and personal puzzle. His curiosity into the causes and treatment of his own heart problem was, therefore, the motivating factor that led him into the field of nutrient therapy, or "orthomolecular medicine." Once he fully embarked upon this new path, this field of medicine would be the focus of his work for the remainder of his life. Ultimately, he would be able to unravel the mysteries not only of his own physical condition, but also of a wide range of other physical and mental conditions from which people throughout the ages and across the globe have continued to suffer.

In 1960, Carl joined the Neuropsychiatric Institute in New Jersey, where he held a 13-year position as head of the Section on Neuropharmacology. During this time he also served as deputy director and director of the Institute. Here, due to the neurological emphasis of the work, his growing interests in the connection between biochemical processes, mental health, and behavior were able to take root. However, so did the incipient rumblings of criticism from the more standard medical community. To quote Dr. Abram Hoffer again, "This re-

markable change in direction did not endear him to his academic colleagues; it did to all who began to benefit from it.”

Then, in 1973, Dr. Pfeiffer took an even more dramatic leap. At the age of 65, he formally launched a new phase in his life and career by founding The Brain Bio Center in Princeton, New Jersey. An extension of himself, this organization provided a venue for the full flourishing and expression of Carl’s scientific investigations into orthomolecular processes.

Sponsored by the Schizophrenia Foundation of New Jersey and the New Jersey Mental Health Research and Development Fund, Dr. Pfeiffer’s new creation was a radical concept. In 1973, The Brain Bio Center was absolutely unique in its research and educational programs, in its out-patient clinic, and in its methods of diagnosis and treatment of specific biochemical imbalances. The Brain Bio Center’s team of physicians, research scientists, laboratory technicians, and staff writers would cooperate to provide patients with the best possible nutritional care and guidance. They also worked to advance public understanding of the biochemistry of physical and mental illness. Physicians at The Brain Bio Center would determine a patient’s individual needs for certain vitamins and trace elements on the basis of specialized laboratory tests designed to reveal biochemical imbalances. Research scientists would then investigate the action of essential nutrients in people, and the editorial staff would prepare educational material for the public on all aspects of The Brain Bio Center’s work. As founding president and director of this organization, Dr. Pfeiffer was able to

devote his abundant energies to a new type of work that he truly loved. More than at any other time in his life, Carl was in his element.

From his 15 extremely productive years at The Brain Bio Center, Carl is especially remembered for his breakthrough findings on the various schizophrenias. In one of his many groundbreaking books, *Nutrition And Mental Illness – An Orthomolecular Approach to Balancing Body Chemistry*, which he published in 1987 at the age of 79, Carl describes “five main biotypes of schizophrenia”:

1. Histapenia: low blood histamine with excess copper; 50% of schizophrenias
2. Histadelia: high blood histamine with low copper; 20% of schizophrenias
3. Pyrroluria: a familial double deficiency of zinc and vitamin B6; 30% of schizophrenias
4. Cerebral allergy: includes wheat-gluten allergy; 10% of schizophrenias
5. Nutritional hypoglycemia: 20% of schizophrenias

For the arithmetically inclined reader, Carl pointed out that, “These percentages do not add up to exactly 100% because many patients have more than one disorder. In our out-patient clinic (The Princeton Brain Bio Center) we have treated over 5,000 patients labeled ‘schizophrenic.’ Of these, 95% can be categorized into the five types just described.”

He also grew to understand the metabolism of folic acid and vitamin B12 in intricate detail. The net result is that he could offer what few physicians prior to him were

able to give their “schizophrenic” patients: namely, hope and encouragement. “When the exact biotype guides the appropriate treatment,” Dr. Pfeiffer wrote, “90% of these patients will attain social rehabilitation.”

Carl’s work with histamine was among his many contributions to the field of neurotransmission. Although this particular neurotransmitter had already been known prior to The Brain Bio Center’s work, its function had not been fully described. Carl identified the role of this substance in various physiological processes, and showed how it is the determinant of certain qualities of behavior. Blood histamine that is either too low or too high can be an important factor in the classification and treatment of certain types of schizophrenia.

For the approximate 30% of schizophrenics who exhibit pyrroluria, the simple and straightforward treatment involves vitamin B6 supplementation in combination with zinc. These individuals are known as “pyrrole excretors” because they excrete large amounts of “pyrroles” in their urine. Pyrrolurics also tend to exhibit knee joint pain as well as white spots on their fingernail and toenail beds. In his book, *Mental And Elemental Nutrients – A Physician’s Guide to Nutrition And Health Care*, Dr. Pfeiffer explains that pyrroles “complex with pyridoxal to remove vitamin B6 from the body. A patient with this may require high levels of B6 to compensate for the urinary loss. Treatment with supplementary doses of B6 and zinc has also succeeded in removing schizophrenic symptoms.”

Mental And Elemental Nutrients – A Physician’s Guide to Nutrition And Health Care was Dr. Pfeiffer’s first book on nutritional psychiatry. To this day, it remains

the definitive, encyclopedic reference for a wide range of symptoms and diseases. Herein one may find a scientific explanation for the successful treatment of a variety of ailments, not by drugs but by nutritional supplements that restore a patient's nutritional balance. In this book, Dr. Pfeiffer discusses the cellular and molecular functions of the main nutrients that were known at that time, from the more familiar proteins and vitamins to the lesser-known trace minerals. Trace minerals in particular, he found, can make the difference between sickness and health, sanity and insanity, or even life and death. Case histories are featured, ranging from the most aggressive people in the world, the Qolla of South America (55% of whom are clinically hypoglycemic), to individuals in "civilized" societies who have been labeled by their conventional doctors as "incurable." In every case, Dr. Pfeiffer illustrates the role of nutrition and how nutrients may be used in the treatment. From one of the reviews of this book, we may read that:

"Dr. Pfeiffer's research, practice, and entire experience as Director of Princeton's Brain Bio Center have made inescapably clear the fact that many mental conditions derive from bodily malfunctions – specifically from the absence of vital nutrients in the body. The cause of this may be an abnormal loss of a trace mineral, an inability to keep a normal blood-sugar level, outright poisoning from pollutants, or simply adherence to our modern diet of pre-packaged dishes, empty-calorie snacks and processed and adulterated foodstuffs."

While treating the pyrrolurics, Dr. Pfeiffer and his researchers at The Brain Bio Center stumbled upon a related discovery involving vitamin B6. From *Mental And Elemental Nutrients*, Dr. Pfeiffer writes, "Patients who excrete pyrroles in their urine have constantly reported to us that they never recall their dreams or have not been able since childhood to recall dreaming." Then, upon vitamin B6 and zinc supplementation, these same patients were able to report dream recall for the first time in their adult lives. In fact, Dr. Pfeiffer continues, "If the dose of B6 is too large or mainly taken with the evening meal, then dreams become so vivid that the patient is awakened from sleep all night long. This restless-dream phenomenon is disturbing, so the dose should be reduced." After many such reports, Dr. Pfeiffer and his clinical staff were able to utilize dream recall as a reliable yardstick by which to measure brain B6 deficiency.

Dr. Pfeiffer was one of the earliest researchers to define the connections between nutrition and mental illness. He discussed, in clear and meticulous terms, the cellular and molecular processes involved in a myriad of physical as well as mental conditions. This, in turn, paved the way for other researchers and physicians to follow in his line of work. Furthermore, the Brain Bio Center doctors did not merely treat their patients in an effort to cure the particular diseases at hand. The skilled and caring staff of this remarkable organization would also strive to educate each individual in the expedient attainment of his or her optimum mental and physical well-being. Toxic considerations, such as heavy metals and the dangers of polluted air, water, and food were also emphasized, and the patients were instructed in how to avoid such dangers.

Dr. Pfeiffer and The Brain Bio Center staff set a new precedent for actually *teaching* patients, through personal education, how to enjoy a longer, happier, and more productive life. Indeed, the educational literature which The Brain Bio Center produced while under Dr. Pfeiffer's direction was extensive.

Carl continued working into his 80th year on multiple projects simultaneously, with ever greater vigor and enthusiasm. A prolific writer, he had coauthored over 300 papers in pharmacology and physiology, and half a dozen books, beginning in the 1930s. Recognized as a pioneer in neuropharmacology and neuropsychopharmacology, Carl continued to put in a full day of work at his office, every day – even, literally, until his final hour upon this earth.

The year after Dr. Pfeiffer's death, his Brain Bio Center closed. In June of that same year, 1989, "The Health Research Institute (HRI) and Pfeiffer Treatment Center" opened in Naperville, Illinois. Based upon Dr. Pfeiffer's original Princeton Brain Bio Center, the HRI offers treatments that "are designed to correct specific chemical imbalances such as histadelia, histapenia, pyrroluria, lead toxicity, hypoglycemia, malabsorption, and disorders of metal metabolism." The HRI Treatment Center specializes in treating "young persons with learning problems or behavior disorders," who constitute approximately 70% of all its patients. Around 100 laboratory chemistry tests are involved in each evaluation and diagnosis.

Thirteen years prior to Dr. Pfeiffer's death, and two years after his founding of the original Brain Bio Center in

Princeton, a similar organization was founded in Wichita, Kansas. “The Center for the Improvement of Human Functioning International, Inc.” (CIHFI) began almost literally as a direct command from Dr. Pfeiffer. While visiting one of his friends and colleagues, Dr. Hugh Riordan in Wichita, Dr. Pfeiffer was impressed by Dr. Riordan’s lack of pretense when he was unembarrassed to pick Dr. Pfeiffer up at the airport in his severely hail-damaged car. The two doctors became lifelong friends. Later, during the same visit to Wichita, Dr. Pfeiffer commented to a local philanthropist, “You should give him some money with which to establish a nutrition research laboratory,” pointing to Dr. Riordan. The philanthropist was Olive White Garvey, who had had a long-standing interest in nutritional medicine. She took Dr. Pfeiffer’s words seriously. As a result of Dr. Pfeiffer’s recommendation during this influential encounter, The Center for the Improvement of Human Functioning International, Inc. was founded in Wichita in 1975. It began with a generous contribution from Olive Garvey, and it was modeled directly after Dr. Pfeiffer’s Brain Bio Center in Princeton. In fact, after receiving Mrs. Garvey’s initial grant money, Dr. Riordan immediately called Dr. Pfeiffer to ask him, “What kind of a laboratory is it that I want to start?” Thirty years later, as The Center’s founding president and director, Dr. Hugh Riordan is still successfully leading the organization that was begun and crafted with Dr. Pfeiffer’s personal input and counsel. Like Dr. Pfeiffer’s Princeton Brain Bio Center, The CIHFI was designed with clinical, laboratory, research, and educational facilities, all coordinated together into one coherent yet multifaceted organization. “He’s

the entire reason why we came into being,” Dr. Riordan has often said, in remembering Dr. Pfeiffer.

At Carl Pfeiffer’s funeral, he was described as “self-sufficient,” a “man of values and principles,” and “an extraordinarily generous and kindly person who was frugal in his own life while enormously generous to all of us.” One of his long time friends and colleagues, Dr. Oscar Kruesi, remembered Carl with the following words:

“He was never one for taking the heed of the herd. He was out in front, and this of course was one of the faults that the medical world could put upon him. They didn’t understand all that he was trying to do. So many in the medical world looked upon him with suspicion, and The Brain Bio Center with suspicion. But in spite of that ... it never deterred him from what he felt he must do and wanted to do and did fearlessly and tirelessly.”

A titan of a scientist and humanitarian whose legacy still lives on, Carl Pfeiffer, Ph.D., M.D., continues to touch the lives of countless people. To defer once again to Dr. Abram Hoffer’s words, innumerable patients “owe their health and their lives to his findings,” as he worked so passionately “to develop the new rational psychiatry and medicine known as orthomolecular medicine.”

“Oh boy,” Carl.

Thank you.

Fowler Border Poling, **M.D.**

1914 – 1963



In our nation's heartland, in Wichita, Kansas, at The Center for the Improvement of Human Functioning International, which I, Dr. Hugh Riordan, have directed for the past 30 years, a plaque bearing the inscription, "Fowler B. Poling, M.D., Memorial Clinical Services" adorns one of the walls. Yet few people know very much about the man behind this name.

This book is respectfully dedicated to the memory of Dr. Fowler B. Poling, whose life exemplified the true essence of the modern medical maverick.

Dr. Poling was perhaps this country's first orthomolecular psychiatrist. Visionary, innovative, and truly ahead of his time, he was practicing orthomolecular medicine long before the term was ever coined.

Today, his name might be commonly known, were it not for the fact that, unfortunately, his brilliant life and career were tragically and needlessly cut short.

Fowler Border Poling was born on November 23, 1914, in Arlie, Texas. When he was still an infant, his family

moved to Oklahoma where he grew up. With two older sisters and three younger sisters, Fowler was the only Poling child who qualified for what would prove to be a prophetic name. His father, from an earlier experience that had occurred prior to Fowler's birth, had decided to name his only son after a local hero. The legendary barnstorming pilot and physician, Dr. Fowler Border, was known for the new and unusual meaning that he brought to the term "house call." Dr. Border spent his career flying throughout the state of Oklahoma, flying in to visit families at their homes, on their farms, landing his plane on the open fields and prairies, healing the sick and the injured who often lived many miles from cities and who had no one else to help them. Dr. Fowler Border quickly earned a reputation for saving lives by flying in, performing surgery on the kitchen table, and then flying back out again, off into the wild blue yonder. The elder Poling had been treated and cured by Dr. Border for a problem with his neck that had incapacitated him, and Mr. Poling consequently vowed to name his first-born son after Dr. Fowler Border. The young namesake would soon grow to exhibit the same brave, bold, compassionate, and pioneering qualities of his renowned eponym.

After graduating in medicine from Oklahoma University, Fowler went on to Iowa City, Iowa, for his internship. His residency, in Halstead, Kansas, was in neurology. Although he had received some introductory training in psychiatry by this point, psychiatry was not his main interest. What he enjoyed most of all was the field of neurology.

In 1943, however, Fowler entered the armed forces, serving in Tokyo from 1945 to 1946. After the end of the War, he then returned to Kansas, but by now, surprisingly, his interests had shifted to psychiatry. Having been assigned to work on the psychiatric treatment of pilots while stationed at Randolph Air Force Base in Texas, he discovered that he enjoyed psychiatry. Fowler thus began practicing as a psychiatrist. Later, after relocating to Wichita, Kansas, he invited this author to join him in practice – a rare invitation for anyone who was still in internship.

The year was 1958, and Dr. Poling was the busiest psychiatrist in the city. Needless to say, as a young intern, I accepted this extraordinary invitation – after first checking, that is, with the advice of my chief of psychiatry back at the Diagnostic Center in Wisconsin. The Australian, Dr. Leslie Osborne, told me, “If you respect the doctor, and if he’s willing to pay you to learn, you should jump at the opportunity.” A keen observer, a compassionate physician, and an astute scientist in every way, Dr. Poling brought fresh ideas, understanding and innovation to all that he did. Because his ideas were based upon concrete, observable fact, he was able to enjoy a level of success equally as rare and as solid as his brilliance.

As a young doctor, I learned more from Dr. Poling in the first month of working with him than I did anywhere else in a year. One of the first things he taught me was that, in order to keep mental patients out of the state hospital, we would give them intravenous vitamin B complex. It worked quite effectively. As health food stores did not

yet exist at that time, it was not possible for the common citizen to buy vitamins and minerals on the local neighborhood corner as it is today. Seven days a week, we had patients lined up to receive intravenous vitamin B. Oftentimes, upon receiving the B complex, the patients would say to us, “Doc, I can feel my craziness going away.”

In his famous article, “Orthomolecular Psychiatry,” published in the journal *Science*, Dr. Linus Pauling first coined and described the term “orthomolecular.” This seminal article, which paved the way for many of the pioneers in this groundbreaking, new field, was published in April of 1968 – five years after Fowler Poling’s death. Clearly, Dr. Poling had been a pioneer in orthomolecular medicine long before there was even a word for it.

Without ever being taught to do so by anyone else, Dr. Poling had somehow developed, by himself, a very keen awareness of nutrients. Herein lies another extraordinary aspect of Dr. Poling’s genius: no one had ever taught him the principles which he implemented in his practice. No one else had ever mentioned to him that various nutrients would be effective for this or for that ailment. He arrived at such an understanding on his own accord, deriving such principles through his own work, by his own extraordinary powers of observation, discernment, and innovation. And his results with psychiatric patients were unequalled for excellence in his day.

Furthermore, when he knew that he was right about something, he firmly held to his convictions – oftentimes against fierce opposition and criticism. It was not an in-

frequent occurrence for Dr. Poling to find himself at odds with other doctors at the local hospitals. Indeed, it was not uncommon for Dr. Poling to find himself taking a stance with which no one else agreed. But after further investigation, Dr. Poling was found to be right each time. On one such occasion, Dr. Poling had determined that one of his patients had a brain tumor, but the patient's other physician, a neurosurgeon, had simply made a diagnosis of migraine headaches and refused to consider any further evaluation. When Dr. Poling's attempts to reason logically and rationally with the neurosurgeon failed, Dr. Poling asked him to sign a statement. The statement described the situation in no-nonsense terms; namely, that Dr. Poling believed the patient to have a brain tumor, but that the other doctor did not concur. In writing, the document clearly stated that the patient would be released from the hospital only because of the other doctor's insistence, but against Dr. Poling's strong recommendation for further investigation. As this was long before the invention of MRI or CT scans, a clarification of their disagreement was neither as easy nor as forthcoming as it would be today. The other doctor refused to sign the statement, and agreed to do more testing. Further investigation then revealed that the patient had a brain tumor the size of an orange.

As a physician, Dr. Poling had an uncommon respect for his patients and a sixth sense in his differential diagnoses. These qualities allowed him to help his patients to a greater extent than might have otherwise been possible. Among other qualities, he was very good at being able to focus people on particular problem areas. For example, if a patient would present with ten complaints, Dr. Poling

could narrow the list down to that one malady which was the most important, and work on that first before moving on to the next.

Another important lesson to be learned from Fowler was how to listen to people. He was an extremely skilled listener. Learning to listen, he emphasized, was one of the most important skills that any doctor can cultivate. Fowler pointed out that most doctors do not listen, at least adequately, to their patients. In my own practice, I have found this still to be true to this day. The number one, top complaint from patients today is that they try to tell their doctor something, but he or she “won’t listen.” Very early on, Dr. Poling instinctively understood and implemented the importance of learning to listen, to observe, and to ask the right questions. Dr. Poling’s patients knew that he was concerned about their whole being, not just about their illness. In fact, he was known for such an excellent rapport and bedside manner with his patients that he could make them feel more at ease just by walking into the room. His mere presence seemed to exude a comforting, reassuring, healing radiance.

Dr. Poling impressed upon me a multitude of invaluable lessons that went above and beyond what was taught in medical school. For example, I learned from Dr. Poling never to deny patients their symptoms. In medical school, the attending physicians would often refer to a “high serum porcelain level” in patients, which was their code phrase for a “crock.” Dr. Poling, by contrast, taught that there is no such thing as a “crock.” Even if a patient is feigning his or her symptoms, he said, there are reasons for that, and it is the doctor’s responsibility to dis-

cover those underlying reasons. He also taught that the way in which a question is asked will determine how it is answered. Doctors must, therefore, be careful to let the patient speak in his or her own words, without having their answers framed according to the doctor's choice of words. In all matters, Dr. Poling was motivated by a deep and abiding respect for the basic dignity and humanity of every patient.

Additionally, Dr. Poling was keenly aware of the concept of time distortion (whether or not he was aware of Milton Ericson's work in the field). One of the first things he taught me was that, when making rounds in a hospital, the doctor should always go into the room and sit down by the bed when seeing each patient. By sitting down next to the bed, even if you are only there for a short period of time, the patient's perception will be that you are there for a long period of time, because you took the time to sit and you are communicating in close proximity to each other. And vice versa, if the doctor just stands at the head of the bed and speaks to the patient from a distance, even if for a long period of time, the patient's perception will be that the doctor is only there for a short period of time. At a multitude of levels, Dr. Poling was a very perceptive and astute observer. And in caring *for* his patients, he did, very genuinely, also care *about* them.

Dr. Poling also taught me to be direct with people. One time, I was trying to talk a very paranoid lady into going to the hospital, but she was, to put it mildly, resisting. So after a rather prolonged period without success, I finally asked Dr. Poling if he would come into the room and see what he could do. So he came in, introduced himself to

the woman, patted her on the thigh and said, “My dear, what Dr. Riordan is trying to tell you is that you’re crazy!” To which she replied, “Well, why didn’t he say so!” And she went right to the hospital. That’s where I learned to be direct as well as orthomolecular.

Dr. Poling was extraordinarily innovative in a variety of fields, not just in medicine. When his new office building was built, he had it stress tested to accommodate a heliport on the roof, so that patients could be airlifted from his office to the hospital if necessary. He also recognized that a lot of space is inefficiently occupied by sinks. As sinks are a useful, if not always aesthetically pleasing component of examining rooms, he decided to install Pullman sinks, which retract into the wall, in his new building. He had great problems with the city in getting such an unconventional idea approved, but he stuck to his guns. Indeed, every examining room that he built in his office was ultimately approved for Pullman sinks. A great deal of extra space was made available by having the sinks designed such that they were flat against the wall until opened. It was a sleek and practical improvement over the usual bulky contraption. His many other innovative contributions to the design of the building prompted the architectural company working for him to ask, “Why are you a doctor? You have so many great ideas for buildings, you should be an architect!”

Passionately dedicated to his profession, he would often put in 12 to 16 hours per day in his practice. Arriving at work by 5:00 or 6:00 a.m. and returning home between 7:00 and 10:00 p.m. was not uncommon for Dr. Poling. His security in his beliefs – in what he knew to be true

and right – in himself, in his work, and in his personal life as well, was absolute and unshakable. Indeed, this is a characteristic that he shared with most medical mavericks.

Dr. Poling greatly enjoyed entertaining, in ways that were extremely supportive of those who worked for him. For 10 years, Dr. and Mrs. Poling held parties at their home, every three months, for the interns, residents, and nurses who worked in area hospitals. The parties were great fun for everyone, and Dr. Poling once mentioned to his wife that “They’ll always remember these times.” Indeed, she would later find this to be true. For decades after Fowler’s death, Mrs. Poling would frequently run in to people who had previously been on his staff, and who remembered with great joy his many acts of kindness and gracious hospitality toward them.

On February 19, 1963, Dr. and Mrs. Poling were in an automobile accident. Both Dr. and Mrs. Poling survived the accident, but Dr. Poling did not survive the hospitalization that followed. Less than three months prior to this, he had celebrated his 48th birthday. He and I had planned out the next five years together on a Thursday, and by the following Tuesday he had died.

Now, over four decades later, Dr. Poling’s widow and his four children still remember him vividly, even though his children were very young at the time of his death. Betty Poling, Fowler’s wife, describes him as having been “a good Christian man,” who never drank nor smoked and who was content not to go out on New Year’s eve. He was an individual of high principle and firm moral con-

viction, and he was not afraid to defend his beliefs. He was also a man of supreme compassion and understanding. To this day, his daughter's last memory of her father was when the two of them stood in front of the picture window of their house one night, when the window acted as a reflecting mirror, and he practiced his daughter's cheerleading jumps with her. This was their last experience together before he died.

Once I asked Fowler, "How do you handle all the criticism from your medical colleagues who are so negatively against your emphasis on nutrient therapy?" His reply was, "Hugh, just be steady and do what you believe is right, and you'll find that all the critics will fall by the wayside." He was certainly right in his therapeutic approach, and in his belief that time would provide vindication – which it has. However, one additional factor is helpful for the Truth to prevail: physical survival.

Dr. Poling was certainly *my* father of orthomolecular medicine. His awareness and use of orthomolecular techniques before the term was even coined, however, have not, until now, been documented.

Any individual with the vision, passion, and integrity of Dr. Poling, regardless of their chosen profession, brings honor to their field of endeavor. The field of orthomolecular medicine is richer today for being able to acknowledge Dr. Poling as one of its earliest pioneers.

Bernard Rimland, Ph.D.

1928 - present



Dr. Bernard Rimland directs the largest accumulation of data on autism in the world. A research psychologist with the U.S. Navy for 32 years, he is also the father of a 48-year-old autistic son. His personal experiences inspired him to found the Autism Society of America in 1965, and the Autism Research Institute in 1967, which he still directs. He is the editor of the *Autism Research Review International*, and he served as primary technical advisor on autism for the film “Rain Man.” His award-winning book, *Infantile Autism: The Syndrome and Its Implications for a Neural Theory of Behavior*, which he authored in 1964, changed the field of psychiatry. Thanks to Dr. Rimland, autism is no longer mistakenly believed to be an emotional illness caused by hostile mothers, but is instead now recognized as a biological disorder.

Dr. Rimland is a co-founder of the “Defeat Autism Now!” (DAN!) project, which works to reorient mainstream medicine from its current over-reliance on marginally effective drugs toward a new emphasis on identifying and treating the basic biological causes of autism.

In addition to his lifelong work on autism, Dr. Rimland is also a leading proponent of orthomolecular medicine in general. In his book, *How to Live Longer and Feel Better*, Dr. Linus Pauling wrote:

“I have coined the term ‘orthomolecular medicine’ for the preservation of good health and the treatment of disease by varying the concentrations in the human body of substances that are normally present in the body and are required for health. Dr. Bernard Rimland has emphasized my point by suggesting that conventional medicine, which uses drugs, should be called ‘toximolecular’ medicine.” (p. 118)

From the same book, Dr. Pauling also pointed out that, “There is no accepted conventional therapy for autism.” (p. 256). Dr. Rimland is working to change that.

As Josh Greenfield wrote in *A Child Called Noah*,

“Dr. Bernard Rimland ... perhaps has done more for the cause of autistic children in America than any other single person.”

Bernard Rimland was born in Cleveland, Ohio, on November 15, 1928. His family moved when he was around 12 years old, however, and he has been a resident of San Diego since 1940. He received both his Bachelor's and Master's Degrees in Experimental Psychology from San Diego State University, in 1950 and 1951, respectively. He then completed his Ph.D. in Experimental Psychology from Penn State University in 1954. To his

delight, immediately prior to being awarded his Ph.D., the Navy established its Personnel Research Laboratory in his home town. He, therefore, served as Project Director to the Department Director at the Naval Personnel Research and Development Center in San Diego from 1953 to 1985. He was also Chief Psychologist and Director of the Institute for Child Behavior Research in San Diego, and he has been an Adjunct Professor at San Diego State University since 1955.

Despite his distinguished credentials and pioneering work, Dr. Rimland has been met by fierce resistance, opposition, and criticism from the standard medical community. The standard medical community, in return, has been met by even greater strength of determination from Dr. Rimland.

The father of three children, Dr. Rimland was inadvertently introduced to autism by his first-born son, Mark. When Mark was born in 1956, Dr. Rimland recalls, "It was obvious that this perfectly normal looking infant had something drastically wrong with him. I had earned my Ph.D. in experimental psychology three years earlier, and had never encountered the word 'autism.' Our pediatrician, with 35 years of experience, had never heard of autism either. Autism was extremely rare then. It is extremely common now."

Dr. Rimland thus began a lifelong quest to understand the nature of his son's affliction. "I didn't choose it, it chose me," he reflects. He remembers how he felt when he first encountered the phrase "early infantile autism" in a textbook:

“At last I knew the name of the unseen foe who had seized my child. I vowed not to rest until this enemy was defeated. If it took the rest of my life, so be it.”

His study of autism led him into a study of nutrition, which, he recalls, “I entered reluctantly.” But he grew to understand the crucial role that nutrition plays in all types of health and disease. He read the early works of Adele Davis, and was especially inspired by Dr. Ruth Harrell’s success in treating mentally retarded children with nutrition. Dr. Rimland has now conducted years of research on the relationship between nutrition and behavior himself, and his findings have helped many autistic children grow up to lead greatly improved lives.

When he founded the Autism Research Institute nearly 40 years ago, this opened up the floodgates. Parents of autistic children from throughout the country and the world began contacting him to describe their own experiences. But especially in recent years, when there has been a dramatic increase in autism worldwide, Dr. Rimland’s organization has been increasingly inundated by inquiries from parents of autistic children. “During the past few years,” he says, “the Autism Research Institute has been flooded with an upsurge of pleas for help from parents throughout the world, from wherever the World Health Organization Vaccine Guidelines are followed.”

Why has there been such a dramatic increase in autism in recent years? Dr. Rimland answers, “Unsafe vaccines are the only plausible explanation.”

In the past 10 years, the number of vaccinations that are required to be given to children prior to the age of two has risen from 8 to 22. As of the year 2002, by the time children enter school, they now receive 33 vaccines. These vaccines contain not only live viruses, but also significantly large amounts of highly toxic substances. Mercury, one of the most poisonous elements on earth, is contained in the preservative thimerosal, which is present in all vaccines, as is aluminum and formaldehyde. From these vaccinations, some children are given more than 125 times as much mercury in a single day as the maximum allowable amount which the EPA considers to be acceptable on the basis of body weight.

A recent California report documents a 643% increase in the prevalence of autism between 1987 and 2002. Similar increases in autism have also been seen throughout the rest of the U.S., the U.K., and other countries who follow similar vaccination policies. Could this simply be a coincidence? Dr. Rimland's response is a definitive "no." He attributes this horrendous rise in autism to excessive and unsafe vaccinations.

When Dr. Rimland's son, Mark, was born, the rate of autism in the U.S. was one or two births per 10,000. Today, autism occurs in about one child in 166, according to the American Academy of Pediatrics. At what rate can we expect autism to occur in another 10 or 20 years? Any thinking, rational individual must question the cause behind this tragic increase in such a devastating disease.

Despite the headlines that vaccines are safe, their safety has never been established. Even the widely accepted MMR has never been shown to be safe. In this arena, Dr. Rimland is unafraid to battle even the highest government agencies, as well as the media, who continue to support the unproven “safety” of vaccines. Dr. Rimland has written,

“It is the medical establishment’s burden to have proven that the vaccines are safe, not the critics’ burden to prove them unsafe. Safety testing should have been done 20 years ago, when the MMR triple vaccine replaced the measles, mumps and rubella vaccines which were given separately, over a period of time, and when the number of vaccines was 8 rather than 22.”

Dr. Rimland further enumerates the following points:

1. The MMR had not undergone adequate safety testing.
2. The practice of injecting increasingly large numbers of vaccines, many containing large amounts of mercury and other toxins, into the bloodstreams of immature infants was never evaluated for safety.
3. The Vaccine Adverse Event Reporting System (VAERS) is a “travesty,” with fewer than 10 percent of side effects ever being reported.
4. Thousands of U.S. and U.K. families say, and can demonstrate with videotapes and photos, that their

children were normal prior to being vaccinated, reacted badly to the vaccinations, and became autistic shortly thereafter.

5. A number of clinical laboratory studies demonstrate that vaccines may cause chronic damage to the G.I. tract, the immune system, the brain, and other organs.

From a report that he authored in 2002, Dr. Rimland continues:

“Even as I write these words, the California legislature is conducting hearings to decide if two more vaccines, Hepatitis A, and Prevnar, will be required before children can be admitted to day care or kindergarten. Parents of vaccine-injured children are opposing these measures. When will it end? Profit, not public health, is the goal of many who advocate the use of all of these unnecessary vaccines.”

In Britain, where there has been a recent epidemic of autism, hundreds of families have registered for projected class-action lawsuits. Newspapers have devoted full-page articles to the controversy, and a panel of experts who were charged with evaluating the safety of the MMR vaccine in the U.K. have issued a damning report. Among their conclusions, they wrote:

“Being extremely generous, evidence on the safety [of the MMR] was very thin. ... The granting of a product license was definitely premature. ... In

almost every case, observation periods were too short to include the time of onset of late neurological or other adverse events. Interaction between vaccines had not been considered adequately with multiple vaccinations and potentially ill-equipped immune systems.”

In the United States, Dr. Rimland has found a receptive ear in congressional Representative Dan Burton, who has conducted intensive investigations into the evidence linking vaccines to autism. Representative Burton had a very normal grandson who became autistic soon after receiving, in one day, multiple vaccines which contained 40 times the maximum limit of mercury considered safe by the EPA. Even the Institute of Medicine, a branch of the revered National Academy of Sciences, does not deny the possible link between vaccines and autism. This fact, however, is usually either widely misunderstood or entirely unknown. The IOM’s official pronouncement on the matter includes the statement that their committee “does not exclude the possibility that the MMR vaccine could contribute to ASD (Autism Spectrum Disorder) in a small number of children ...”

A 643% increase in the rate of autism over a 15-year period can hardly be considered “a small number of children.” Nevertheless, even the IOM has had to avoid issuing a blanket endorsement of the MMR vaccine.

Why are some children injured by vaccinations, but not all children? The answer, Dr. Rimland explains, is that “people are very different, in many ways. Part of the difference is genetic. Another part is environmental.”

Some children are extremely sensitive to thimerosal, the preservative used in vaccines, which is approximately 50 percent mercury. And even though thimerosal was supposed to have been removed from vaccines in the U.S. in 1999, it has not been removed due to mislabeling and other problems. As a result, package inserts, which are supposed to detail the exact contents of a vaccine, are not always accurate. Even the doctors who are administering the vaccines cannot know with certainty whether the vaccines contain highly toxic additives or not. As recently as 2004, Health Advocacy in the Public Interest (HAPI) tested vaccine vials which were found to contain not only large amounts of mercury but also aluminum, which “tremendously enhances the toxicity of mercury, causing neuronal death in the brain.” (*Autism Research Review International*, Vol. 18, #3, 2004). According to researchers, mercury binds to antigenic proteins in vaccines and cannot be completely removed, despite claims by the manufacturers that the vaccines are free of mercury. “HAPI officials have called upon the Food and Drug Administration to take action against ‘blatant mislabeling and misrepresentation of ingredients’ in the FDA licensed vaccines.” (Ibid.)

A study released in 2004 tested thimerosal on laboratory mice according to the U.S. immunization schedule for children. The doses were based upon the weights of U.S. boys at the ages of one, two, four, and six years. The study showed that even low doses of mercury can cause severe neurological alterations in developing brains. Such changes in the morphological structure of the brain

are usually irreversible, with lifelong disastrous effects upon learning and behavior.

The most frequent age of onset for autism is now 18 months, which is when the MMR vaccine is given. This is a recent development. Prior to the introduction of the MMR, the common age of onset for autism was not 18 months. This onset age rose sharply in the mid-1980s when the MMR first came into widespread use. Another coincidence? “Hardly!” Dr. Rimland replies.

In Japan in the 1970s, there was a sharp rise in sudden infant death syndrome (SIDS). In response to what was suspected to be a cause-and-effect relationship, the Japanese government, in 1979, ordered the postponement of routine DPT shots until after the age of two. As a result, SIDS has virtually disappeared from Japan.

What is a parent to do? There *is* an alternative to vaccinations. There *does* exist a better choice than injecting your child with toxic poison in quantities which, if you were to dump them into the ground, would be outlawed by the EPA. That better alternative is orthomolecular nutritional medicine. As Dr. Rimland points out:

“Alternative medicine provides a much more rational approach to preventing disease – including the diseases that are a direct result of vaccines: bolstering the immune system. Even during the most horrific epidemics, such as the bubonic plague, smallpox, and polio, most humans escaped death, despite exposure to the pathogen. Why? Obviously, because their immune systems were

competent to defend the body. That is the immune system's job. Can we enhance the immune system's capacity to defend us? Of course! Rely on nutrients, not drugs. Providing the immune system with the nutrients it needs by means of a high quality multiple vitamin and mineral supplement, with extra amounts of vitamins C, A, and E, as well as extra selenium and zinc, can make a big difference in your – and your child's – vulnerability to pathogenic viruses, bacteria, and yeasts."

In the nutritional treatment of autistic children, Dr. Rimland has had great success – including with his own son. Despite the advice of doctors in the early years of the boy's life, Mark has never been institutionalized. Today he lives a highly functional, albeit limited, life. Dr. Rimland explains that the best treatment for an autistic child is "a firmly structured, purposeful educational program," in combination with a carefully designed nutritional regimen. Through exasperating trial and error in the life of his own son, Dr. Rimland eventually achieved positive results with high doses of vitamin B6 and magnesium. This is vastly different from the only type of "treatment" that existed for autism prior to Dr. Rimland's work, which consisted solely of drugs for the autistic child and psychotherapy for the parents. When compared with the barbiturates that were commonly given to autistic children in the past, vitamin B6 in combination with magnesium not only costs much less but is actually more effective and does not have any side effects.

In collaboration with researchers at the University of California, Dr. Rimland completed the first double-blind

study that clearly demonstrated the benefits to autistic children from vitamin B6 supplementation. The results were published in the *American Journal of Psychiatry*, in April of 1978. Additionally, there were a total of 18 consecutive studies, conducted by researchers in six countries, which included eleven double-blind, placebo controlled cross-over studies – all of which had positive results in treating autistic children with vitamin and mineral supplementation. These studies showed that nearly half of all autistic children and adults respond favorably to high doses of vitamin B6 and magnesium, with no adverse effects reported. Nevertheless, these studies were labeled as “inconclusive” by the National Institute of Mental Health. These results included a series of 17 studies in vitamin B6 and magnesium, in the treatment of autism over a 30-year period, all of which yielded positive results. Yet these results remain virtually ignored by physicians of standard medicine. Dr. Linus Pauling stated that, “My opinion, based on these Rimland studies and others, is that treatment with vitamins and minerals should be tried for every autistic child.” However, the medical establishment still insists that there is no evidence for the effective treatment of autism with vitamins or minerals.

The Recommended Daily Allowance (RDA) of vitamin B6 for healthy adults is approximately two milligrams. Many autistic children, by contrast, require 500 to 1000 milligrams (or one-half to one full gram) of B6 per day, before improvements may be seen. Clearly, such levels are not obtainable through diet alone, but can only be reached through supplementation. At these levels, not only do the children show behavioral improvements, but

their biochemical parameters begin to return to normal as well. In particular, autistic children have been shown to excrete larger than normal amounts of homovanillic acid, or “HVA,” in their urine. As Dr. Rimland reported to the President’s Committee on Mental Retardation, in 1984,

“When both autistic and normal children were given vitamin B6, the urinary levels of homovanillic acid in the normal children were not changed, whereas they became normal in the autistic children.”

The pediatrician Stephanie Cave has also been able to achieve positive results with autistic children by ridding the children of mercury through chelation. Additionally, abnormally high cadmium levels have been associated with reading and behavioral problems, and testing for such levels may be conducted through hair analysis. Some orthomolecular doctors have also found improvement with many autistic children by eliminating foods containing gluten and casein from their diets. Of course, better than any treatment method would simply be the prevention of autism.

Dr. Rimland’s 14th International DAN! Conference, held in 2004, featured “formerly autistic children” who appeared to have been successfully treated. Mercury detoxification in combination with a gluten/casein free diet played an important role in the treatment of each of these “recovered” children who were featured at the conference. New research has also led to the development of the “Specific Carbohydrate Diet” (SCD), by Elaine Gottschall, which seems to be particularly effective in al-

leviating the symptoms of autism. Despite this promising new data, however, Dr. Rimland still cautions that, “The evidence is overwhelming, and continues to grow, that thimerosal containing vaccines are a major cause of the world-wide autism epidemic.” Dr. Rimland adds,

“Although the toxicity of mercury has been recognized for centuries, the specific biochemistry of mercury toxicity has been unclear until very recently. The research of Richard Deth, Boyd Haley, Jill James, and several other presenters at our conference has pinpointed the biochemical pathways in which mercury damage is implicated, and thus clarified the measures required for remediation. Much of this breakthrough level research has been funded by the Autism Research Institute.”

Maintaining the world’s largest databank on autism, Dr. Rimland’s Autism Research Institute now holds over 35,000 detailed case histories of autistic children and adults from over 60 countries. With its “DAN!” Conferences, its “Clinical Options Manual,” its “think tanks,” its research grants, its “Doctors List,” its *Autism Research Review International* newsletter, and its many other activities, the ARI is unparalleled in the scope of its activities to “identify the causes of, and effective treatments for, autism spectrum disorder.”

Dr. Rimland points out that the treatment of autism is changing and progressing because of the fact that parents are now involved in the movement. Prior to his founding of the Autism Research Institute, parents and their autistic children were at the mercy of doctors, who viewed au-

tism as “psychogenetic” rather than “biogenetic.” But Dr. Rimland’s work has proven the biological basis of autism, and this has allowed parents to get involved in its biologically-based treatment. The next step would, therefore, be the prevention and eradication of autism altogether. And even despite the endless criticism that he has received from the medical establishment over the years, Dr. Rimland remains hopeful for the future. His “Defeat Autism Now!” (DAN!) project, which currently has two conferences a year, is strongly focused on the simple concept of “doing what works.” Treatment with vitamins and minerals works; treatment with drugs does not. Because of the determination of other parents like himself, he believes that at some point in the future the term “functional mental disorder” will disappear from the medical lexicon altogether.

Dr. Rimland remains an avid supporter of orthomolecular medicine in general, not just for the treatment of autism. He points out that nutritional medicine is really just “intelligent medicine,” unlike standard medicine, which is, literally speaking, “toxic medicine.” When he first coined the phrase “toximolecular medicine,” Dr. Rimland meant it literally. He defines “toximolecular” as “the process of trying to bring about health by providing sublethal doses of toxic substances.” This is exactly what standard medicine does. He adds:

“Take the *Physician’s Desk Reference*, a comprehensive drug index that is about three inches thick, and subtract, line by line, all the drug contraindications, side effects, and adverse reactions, leaving only the drug indications. What you would have

left is a volume only about one-quarter inch in thickness.”

Dr. Linus Pauling defined “orthomolecular medicine” as achieving and maintaining health by the addition to the body of naturally occurring substances, such as vitamins and minerals. By the same logic, one should also avoid adding unnaturally occurring substances to the body, such as toxic chemicals and drugs. Yet standard medical procedures involve administering sub-lethal doses of these toxic substances. Despite the voluminous warnings and disclaimers that are published in the PDR and on prescription labels, tens of thousands of people accidentally die each year from such substances anyway. (The most recent statistics, as of 2004, indicate nearly 200,000 deaths per year, in the U.S. alone, from legally prescribed medications). Meanwhile, Dr. Rimland continues his ongoing effort to educate the public, not just about the dangers of vaccines but also about the dangers of toxic substances in general.

Especially in the field of autism, he remains tireless. Years ago, he stated:

“I will never stop until I have found the answer or die, whichever comes first. I will find the answer, and if living to be 150 is what it takes, I’ll do that, too.”

The rest of us can learn a great deal from Dr. Rimland’s lifetime of pioneering work. As Dr. O. Ivar Lovaas of UCLA has stated, “Bernie is a father and a psychologist

who has slain the Freudian dragon and brought light upon darkness.”

Dr. Ruth Sullivan, the President of the Autism Society of America, adds:

“In the world of autism, Bernard Rimland is the tower from which a most powerful and persistent light beam began, in the 1960s, to illuminate the fierce and lonely darkness of thousands of children with autism, and their families. That today he continues his work, at the same breathless pace, is our gift. Thanks, Bernie.”

Hopefully, the day when we stop poisoning our children with unnecessary vaccines is not far away.

Meanwhile, if orthomolecular medicine can have such positive effects on individuals who are autistic, just imagine the positive effects that it can have on those of us who are not.

Hugh Desaix Riordan,
M.D.

1932 – 2005



On November 23, 1988, at the funeral of Dr. Carl C. Pfeiffer, outside of Princeton, New Jersey, one of Dr. Pfeiffer's long-time colleagues and friends, Dr. Oscar Kruesi, said in his eulogy:

“[Carl Pfeiffer's] beloved Brain Bio Center ... was so uniquely his that it will be a hard pressure for all of us to try to find anyone who could approach that uniqueness, who could take over such an institution.”

Such a statement could not have been more true. The Brain Bio Center, the pinnacle of Dr. Pfeiffer's lifetime of extraordinary achievement, was the first of its kind in its day. But with its closing a year after Dr. Pfeiffer's death, a heavy burden of responsibility now fell upon the orthomolecular medical community to keep the vision alive. Such a challenge was not for the faint of heart. To try to fill Dr. Pfeiffer's shoes, and to walk in his path, was a tall order.

Fortunately, however, there were others who felt there was one man amongst the many who had gathered at Dr. Pfeiffer's funeral that day who was eminently qualified for the task. There was one man, in fact, who had already, for the past thirteen years, proven himself to be capable of this formidable challenge. One man, amongst many, would lead a new era in building upon the legacy that Dr. Pfeiffer had begun at his distinguished Brain Bio Center. But from now on, the center of the orthomolecular universe would no longer be Princeton, New Jersey.

The torch had been passed.

Hugh Desaix Riordan entered this world on May 7, 1932, in Milwaukee, Wisconsin. The younger son of Hugh and Tatiana Riordan, he was born a blue baby, due to a hole in his heart. Fortunately, shortly after his birth, his septum closed naturally, "allowing me to turn pink," as he would later state. This temporary abnormality resolved itself without the need of surgical intervention, which would have been impossible at that time, since such medical techniques had not yet been invented. He never suffered any significant problems from the condition, other than a lifelong arrhythmia. His green stools, however, and the timing of his birth at the height of the Great Depression, were of more immediate concern to his parents.

Hugh's older brother, Lee, was also a source of great concern to their parents. Six years older than Hugh, Lee suffered from streptococcal throat infections as a child. The doctors, who routinely made house calls, would visit Lee regularly to lance the huge pockets of pus in Lee's

throat. Although offering temporary relief, this treatment was unsuccessful in stopping the actual progression of the disease. Hugh recalls watching his brother grow increasingly ill. After Lee had been delirious with high fevers every night for more than a month, Hugh overheard the doctors telling his parents that they thought Lee would die within a few days.

However, Hugh's father had recently read in *Time* magazine about the discovery of sulfa. He asked the doctors, who always came together in twos for their house calls, if they would try it on Lee. The doctors had never heard of sulfa, but they said they would try to get some. Fortunately, this was in the 1930s, prior to a strong, controlling FDA. In two days the doctors returned with the sulfa drug. Decades later, Dr. Riordan still remembers the sight of them stirring the yellow powder in tomato juice, which Lee drank twice a day. After a week, Lee was no longer delirious. In two weeks, he no longer had a fever. And shortly thereafter, he was no longer sick at all. After suffering with streptococcus for more than seven years, Lee was cured by a simple powder in slightly over two weeks – a powder unknown even to his doctors.

Years later, when Hugh was in medical school, he learned that the benefits of sulfa in treating serious infections had been discovered twenty years before the sulfa had been given to Lee as a child. If that knowledge had been more widely known, Lee would not have been as sick as he was for such a prolonged period of time. In retrospect, Dr. Riordan credits that experience in his childhood with being the underlying reason for why he is

constantly looking for new, effective ways to eliminate illness in those who are ailing or hurting.

Hugh's first direct experience with orthomolecular medicine occurred when he developed a strep throat himself while attending the University of Wisconsin at Madison. For treatment, he saw a very knowledgeable doctor who offered him two choices. He could take aureomycin, the new antibiotic at that time, which would clear up his strep throat in three days, or he could take enough vitamin C, which would restore his health in six days. As a premedical student with tight finances, Hugh found the choice between \$9.00 for the aureomycin and fifty cents for the vitamin C to be an easy one. He chose the vitamin C and it worked just as the doctor had said it would.

A year before graduating from the University of Wisconsin at Madison, Hugh entered medical school at the same university. The completion of his first year of medical school thereby also marked his graduation from the undergraduate division of the university. It was here, in medical school, that he conducted an experiment which would have a lifelong impact upon him. All of the students in his medical school class conducted the same experiment. Divided into groups, the students were given six rats per group. They were then instructed to feed the rats a specially prepared food which was nutritionally complete except for one nutrient. A different nutrient was withheld from the feed of each group of six rats. In Hugh's group, the missing ingredient was folic acid. Other than the single missing nutrient, the chow fed to the rats was superior to the average American human diet. After a short while, the results were dramatic.

It didn't seem to matter which ingredient was missing, as the consequences were equally startling in each case. Over a period of a couple of weeks, the rats in each group became sicker and sicker. Hugh's group of rats became increasingly feeble, unable to walk without staggering. Additionally, they were uninterested in grooming themselves, and unable to do so. The students were then told to add the missing ingredient back into the feed. Although about one-third of the rats had died by this time, those that were still alive gradually became healthier and healthier. In a few weeks, those that survived once again looked and acted like normal, healthy rats. This was profoundly impressive to Hugh, and would have a huge impact on how he would perceive illness throughout the rest of his life. The lack of just one nutrient in an otherwise optimum diet would lead to serious illness and eventually to death. It was a lesson that he has never forgotten. And it was an experience that was basic to the concept of what Dr. Linus Pauling would later define as "orthomolecular" medicine.

Such a background would prove to be good training for Hugh's later work with Dr. Fowler Poling. In an unusual gesture of confidence directed toward a junior doctor, Fowler Border Poling, M.D., had hired Dr. Riordan while he was still in internship. But before accepting the position, Hugh called his former chief at the Wisconsin Diagnostic Center, the Australian, Dr. Leslie Osborne, to ask his opinion. During medical school, Hugh had lived in the Wisconsin Diagnostic Center, serving as its on site resident while also performing biochemical laboratory tests on the patients. Dr. Osborne told Hugh that if he

respects the doctor, and if the doctor is willing to pay him to learn, then he should jump at the chance. So Dr. Riordan accepted Dr. Poling's offer. And learn he did. As Dr. Riordan now recalls, he learned more from Dr. Poling in one month than he did in one year in any other medical setting.

One of the first things Dr. Poling taught his new associate was how to keep psychiatric patients out of the state hospital. The way to keep them sane, he said, was to give them intravenous vitamin B. Since this was during the 1950s, well-stocked health food stores did not yet exist, and the only way to obtain such vitamins at significant levels was from doctors. The treatment worked quite effectively. Not long after joining Dr. Poling, Dr. Riordan met a physician from Boston who was the doctor for many airline pilots. This physician said that the way he treated "time zone fatigue" (which was the term for "jet-lag" prior to the dawn of the jet age), was to give the pilots intravenous vitamin B. Within just a couple of months, the use of nutrients to combat illness and fatigue was endorsed by Dr. Riordan's physician-mentor and by another prominent doctor, neither of whom had known about the other. The orthomolecular influence on Dr. Riordan even before the term had been coined was becoming more manifest. Throughout the future, Dr. Riordan would often reflect that, "Dr. Poling was certainly *my* father of orthomolecular medicine."

Another individual who would influence Dr. Riordan greatly was Carl Pfeiffer, M.D., Ph.D. Both Drs. Poling and Pfeiffer were very keen observers, which made them outstanding clinicians. However, Dr. Pfeiffer wrote and

published his observations and results, whereas Dr. Poling did not. Years after his partnership with Dr. Poling, Dr. Riordan would meet Dr. Pfeiffer. Not only would the two become instant, lifelong friends and colleagues, but the encounter would change the course of Dr. Riordan's life.

Drs. Pfeiffer and Riordan first met each other at a meeting in Vancouver, organized by Abram Hoffer, M.D., Ph.D. After his presentation, Dr. Pfeiffer said something to Dr. Riordan which made a deep impression upon him. Dr. Pfeiffer told him, "You must have had a rough time about three months ago." Dr. Pfeiffer's comment was based upon a large white spot that he had noticed in the center of Dr. Riordan's left thumbnail. Since a new fingernail takes six months to grow, a mark in the middle of a nail would have been formed three months earlier. A white spot on the nail corresponds to a drop in zinc, which may be caused by some type of stressful event. To Dr. Riordan's surprise, this corresponded exactly with his first episode of gout, which had occurred three months prior to this meeting with Dr. Pfeiffer.

Dr. Pfeiffer then told Dr. Riordan about his work in describing the symptoms and chemical evaluation of schizophrenia. Dr. Pfeiffer had found that approximately 30% of all people suffering from schizophrenia are "pyrrole excretors," and can, therefore, benefit from zinc and B6. Pyrrole excretors also exhibit white spots on their fingernails and toenails, and they complain of knee joint pain. Dr. Pfeiffer was the first to discover, describe, and publish such findings. After this meeting in Vancouver,

Dr. Riordan began to put these new principles into practice.

At the time, Dr. Riordan served as consulting psychiatrist at a mental health center in northern Kansas. Here, upon his return from Vancouver, he saw a girl who had been hospitalized for three months because of psychotic behavior. She was also on so many psychotropic medications to control her behavior that she could not attend school. The health center had no laboratory facilities, but she had all the signs that Dr. Pfeiffer had described, including white spots on her fingernails and knee joint pain. Dr. Riordan started her on zinc and B6. In three weeks, she was off medication and symptom free. Unfortunately, the concept that simple nutrients could be more effective than medically prescribed drugs did not seem plausible to her parents, so the treatments were stopped. In a couple of weeks, the teen was clinically psychotic again. The zinc and B6 therapy was then reinstated, with especially good results, again. Even that was not enough proof, however. The parents doubted that the simple nutrients were the cause of her recovery, and again they stopped the treatment. Two more bouts of psychosis without zinc and B6 occurred before everyone concerned was finally convinced that her psychotic behavior could be so easily stopped and prevented.

The process of convincing people about the usefulness of nutrients can often be a source of frustration. In this particular case, this type of on and off, subsequent starting, stopping and then restarting sequence that this young lady experienced provided an excellent example of what is called an “N of one study.” In an “N of one study,” a

particular treatment is started and stopped to see what effect the treatment has on an individual's illness. In this instance, it took four times to convince the family. In cases such as this, there is no need to conduct a double-blind, placebo controlled study to establish the efficacy of the treatment. The girl acted as her own "control" during the periods when she withdrew her treatment of zinc and B6.

It may be noted that many people who suffer from schizophrenia are often quite intelligent and talented. This particular young lady who had been so disturbed went on to be a straight A student, as well as a state champion baton twirler. Years later, Dr. Riordan saw the former patient. She was healthy and married, with two children. Perhaps most importantly, she had continued taking her zinc and B6 throughout the years.

Zinc has been found to exhibit a wide range of vitally important properties. One of the essential trace minerals, zinc is required in a vast array of chemical reactions in the body. In his book *Mental and Elemental Nutrients – A Physician's Guide to Nutrition and Health Care*, from the entire chapter that he devotes to zinc, Dr. Pfeiffer writes,

"Zinc has been incorporated into almost twenty enzymes in the human body. These enzymes may be involved in many important functions, such as burning sugar and phosphorylating (attaching a phosphate group to) vitamin B6. In zinc deficiency, B6 will not function because the phosphate group cannot be attached. Many of the functions

of B6 and zinc concern the transformation of amino and nucleic acids, the basic building blocks of protein and cells.” (From the preface to the chapter entitled “Zinc as an Essential Element”).

One of the more obvious symptoms of zinc deficiency is a pungent body odor. This fact led Dr. Riordan to formulate what has become known as “The Riordan Maxim,” which states: “If you have enough zinc, you won’t stink!”

One time when Dr. Pfeiffer visited Dr. Riordan in Wichita, Kansas, he was impressed by Dr. Riordan’s lack of pretense when he picked him up at the airport in a Pontiac station wagon with severe and unsightly hail damage. Even many years later, Dr. Pfeiffer had never forgotten this. Dr. Pfeiffer drove an old and beat-up car too, because he refused to waste money on appearances or superficial luxuries. Instead, he put his money into areas of more lasting import, namely, research.

Dr. Pfeiffer was “a real giant,” as Dr. Riordan recalls. “We had a very good relationship. He never charged me, when he came to Wichita to speak at our international conferences. He asked me to speak at his meetings that he conducted, and I never charged him. In the old days, that’s how it was. There was something about Carl.”

Dr. Riordan’s friendship with Dr. Pfeiffer would lead to a chance encounter with a prominent Midwest philanthropist, which in turn would lead to the establishment of The Center for The Improvement of Human Functioning International, in Wichita, Kansas. As founding president

and director, Dr. Riordan would lead this extraordinary organization through brave new frontiers for 30 years.

This Center, as time would reveal, would prove to be a newly incarnate version of Dr. Pfeiffer's vision for his Brain Bio Center – but elevated to the next, higher level. Since both Centers operated at the same time, with a thirteen-year overlap, there was ample communication between the two founding presidents and directors. Indeed, during the last thirteen years of his life, Dr. Pfeiffer gave generously of his vision and insights to Dr. Riordan's new and pioneering entity.

The Center was founded as the result of a fortuitous convergence of events and ideas, of people, places, and timing. Once, while Dr. Pfeiffer was visiting Dr. Riordan in Wichita, they were together with Dr. Bill Schul, who was writing a book for the Garvey Foundation on medical advances. Dr. Schul suggested that Drs. Pfeiffer and Riordan go downtown to meet the executive for the Garvey Foundation, which they did. The executive, in turn, suggested that they meet with Olive Garvey, the matriarch of the Garvey oil and grain empire. Drs. Pfeiffer and Riordan were with her for a total of no more than ten minutes. During this time, Dr. Pfeiffer casually mentioned to Mrs. Garvey, "You should give him some money with which to establish a nutrition research laboratory," referring to Dr. Riordan. Nothing more was said about the idea at that time. Mrs. Garvey then gave copies of books that she had written to each of them, and the two doctors left. Later, the Garvey executive called Dr. Riordan and suggested that he submit a grant proposal for the laboratory. "We had never talked about it," Dr.

Riordan recalls, so he called Dr. Pfeiffer in New Jersey and asked, “What kind of a laboratory is it that I want to start?” In his reply, Dr. Pfeiffer described another trace mineral, toxic metal, polyamine, and histamine measuring facility, like the laboratory that he had established at his own Brain Bio Center in Princeton.

In one of the books that she had written and given to Dr. Riordan, Olive Garvey had written that, in business, men with beards should not be trusted. Dr. Riordan ignored suggestions that he should shave off his beard, and instead submitted a one-page, handwritten proposal to Mrs. Garvey, in which he wrote:

“You don’t know what I’m going to do, and I don’t know what I’m going to do, but if you’re willing to fund it, I’ll dedicate three years of my life to making it work.”

Two weeks later, Dr. Riordan received three years’ worth of underwriting funding to start a nutrition research laboratory.

Later, he learned that Mrs. Garvey had tried numerous times to give money from the Garvey Foundation to medical schools and universities to conduct research into nutrition, but the offers were always rejected. Prior to Dr. Riordan, nobody whom Mrs. Garvey had met was interested in studying the connection between nutrition and health.

The Center for the Improvement of Human Functioning International opened its doors to its first patient on No-

vember 1, 1975. Dr. Riordan has now devoted 30 years of his life to the idea which Mrs. Garvey originally funded for three years, and he is still successfully “making it work.” Mrs. Garvey, who was approaching 80 when she gave the initial funding with which to start The Center, enjoyed a vibrant and dynamic relationship with the organization until her death shortly before her 100th birthday. Today, The Olive White Garvey Center for Healing Arts, which is the clinical division of The Center, remains as vital and dynamic as she was herself.

Prior to the birth of The Center, Dr. Riordan had been highly successful with his own private practice in Wichita and with the consulting firm that he had founded, Psyche, Inc. Additionally, he was head of the EEG Department at a large Wichita hospital, and a private pilot. As such, he flew his private plane once each week to Dodge City, Kansas, where he saw patients, and to Chicago, periodically, where he was, over more than a five-year period, consultant to the Executive Vice President of the American Medical Association. In his capacity as consultant to the AMA, he was fired five times – but he was re-hired six times. He also served as President of the American Holistic Medical Association for two years. When The Center for the Improvement of Human Functioning International, came into being, Dr. Riordan redirected his full time and energies to the success of this new organization. By accepting the directorship of a nonprofit corporation, Dr. Riordan voluntarily accepted a drastic reduction in pay. Indeed, in the early years of The Center, it was not uncommon for him to go for months at a time without being sure of whether or not he would receive a paycheck. As the organization’s founding presi-

dent and director, he always made sure that all of the other members of The Center's staff were paid, but such was not always the case with himself. Such measures were necessary at times, and Dr. Riordan had not accepted the position for money. He has always considered the recovery of his patients to be the greatest and most fulfilling reward. Throughout the years, Dr. Riordan has typically put in 80 to 90 hours of work per week at The Center, and he has always done so with vigor, joyfully, and enthusiastically. Now, 30 years after The Center's founding, he has not had to miss a paycheck in years – and he still puts in 60 or more hours of work per week in his multitude of responsibilities as The Center's president and director.

As Dr. Riordan points out, The Center came into existence because of the need to fill a void. It was a void that no one else wanted to fill, and one which The Center was able to fill. The Center also came into existence directly because of Dr. Pfeiffer's recommendation – or, more precisely, because of his mandate. For the first thirteen years of The Center's operation, Dr. Pfeiffer's connections with and contributions to The Center were enormous. His teachings were instrumental throughout the early days in everything that The Center did, in the ways in which The Center treated patients, and ultimately in The Center's success.

During the first year, 86% of all patients who came to The Center were physician referred. At that time, The Center consisted of four people: Dr. Riordan, a secretary, a nurse, and one lab technician. The patients whom Dr. Riordan saw at The Center during this time were the

people whom other doctors did not want to see anymore. In other words, these patients represented the worst, most hopeless cases, for whom standard medical treatments had not been successful. By sharp contrast, however, The Center's orthomolecular approach attained very positive results in treating these people. The results were so positive, in fact, that it was not long before The Center began to branch out into the treatment of a wide range of other illnesses, not only those of a psychiatric nature.

Now, 30 years later, The Center continues to thrive under the leadership of the only president and director it has ever known, Dr. Riordan. Collaborating with him today are over 70 employees, consultants, and volunteers, including a full time staff of 50 dedicated individuals in The Center's various clinical, laboratory, research, and educational divisions, all of which are integrated together into one cohesive whole.

The Center has seen patients from all 50 states, the District of Columbia, and 47 foreign countries, at last count. While many patients still continue to come to The Center in search of treatment for psychiatric disorders, another focus of The Center's clinical and research programs in recent years has been on cancer treatment. In this arena, Center researchers have developed novel treatments, and The Center's clinical success in helping patients with these treatments has been published in the scientific and medical literature. Sadly, The Center has also seen an increase of children with autism and related maladies in recent years. But even in these instances, the orthomolecular approach to treatment has been able to attain

very positive results where standard medical treatments have not.

Standard medicine is very effective in acute care. In other words, if someone is bleeding or broken, that person needs immediate, lifesaving attention – not a vitamin or a mineral. In these types of situations, as Dr. Riordan points out, standard medicine is “an absolute marvel to behold.” He continues,

“If a patient needs acute medicine, we in the West have the best medical system imaginable for acute problems. But when it comes to sustained illness, the results are far less positive for far too many people. This is because the major cause of degenerative, chronic disease is dietary, due to nutritional inadequacies.”

This is where standard medical treatments are inadequate, because medical schools do not educate doctors of standard medicine in nutritional principles. Consequently, the medical status quo is not always receptive to strange new ideas such as nutritional medicine.

In the early days of Dr. Riordan’s practice, there were times when the orthomolecular concept got him into trouble. This was especially true prior to the creation of The Center but also even after its founding. At the hospital where Dr. Riordan consulted, it was not uncommon to have a three-bed ward in a psychiatric unit. Dr. Riordan would usually have one patient in these wards, while other doctors would have the two other patients, all of whom were schizophrenic. Dr. Riordan’s patient would

usually improve and be released in a relatively short period of time, while the other two patients would remain in the hospital for longer periods of time. This would often raise questions amongst the relatives, who would become agitated with the other doctors.

In December of 1983, Dr. Riordan received a registered letter from a local hospital psychiatric committee, in which the members of the committee stated that within three days they wanted him to cease prescribing vitamins and minerals to his hospitalized patients. They also insisted that he cease making dietary adjustments, which would even forbid him from treating a diabetic patient appropriately. In response to these strange demands, eleven doctors agreed to testify on Dr. Riordan's behalf before the psychiatric committee. One such physician was Dr. Carl Pfeiffer, who was still located in Princeton, New Jersey. (Dr. Poling had by this time died). But when Dr. Riordan called a particular friend of his, an attorney, the matter was quickly settled. This attorney's daughter, while a student in college, had suffered schizophrenic episodes triggered by adverse food reactions. Dr. Riordan had successfully discovered the cause of the girl's problems, and successfully treated her. When Dr. Riordan asked this particular attorney if he'd like to be of help in this latest matter with the psychiatric committee, the grateful attorney answered, "Sure! I've always wanted to sue those bastards! I'll do it for free!" The attorney then wrote a single page letter to the psychiatric committee, in which he stated that if they wished to appear in court and maintain that the standard of care in Wichita, Kansas, is to shock, sedate, and restrain, then he would be happy to appear in court with them to address

such a view. Two weeks later, suddenly there were no objections anymore to Dr. Riordan prescribing vitamins and minerals for his patients. Shortly thereafter, the man who was at that time the section chief of psychiatry at the same hospital suffered two serious setbacks. One of his patients left the hospital before being released, jumped in front of a truck and was killed, and two weeks later his wife committed suicide. After this unfortunate series of events, Dr. Riordan's colleagues no longer seemed to be preoccupied with whether or not he was administering vitamins and minerals to his patients.

One of his success stories from the three-bed ward involved a lady Marine who would become psychotic on a regular basis, usually while on the motor pool, when she would get up early in the mornings and have coffee with large amounts of sugar. Dr. Riordan found that her cytotoxic tests were positive for both coffee and sugar, so he took her off them. After removing these substances from her diet, she no longer had any problems.

During these years, Dr. Riordan had a sense that there were a few other doctors scattered about, here and there, who were practicing orthomolecular principles in a clandestine fashion. Occasionally, other physicians would approach him at parties and whisper into his ear something such as, "I give my patients vitamin B!" Such startling confessions were always revealed as though they constituted some type of illegal act.

After The Center for the Improvement of Human Functioning International came into being, Dr. Riordan had another life changing experience which drove his interest

in vitamins even further. His nutrient levels had been monitored quarterly, and his plasma vitamin C level had always been normal. The day before he was to have one of his quarterly checks of nutrient blood levels, a spider bit him on his left thigh. This was not the ominous brown spider or some other dreaded bite – it was simply an uninteresting, ordinary spider. The next morning, when his plasma level was checked, there was no detectable vitamin C at all. His first thought was that the lab must have made an error. But there was no error. So Dr. Riordan had a nurse give him 15 grams (15,000 mg) of vitamin C intravenously. The next morning his plasma vitamin C level was re-measured, with the expectation that it would be normal. But it wasn't. Once again, no vitamin C was detectable in his plasma. Even though he continued to receive 15 grams of vitamin C intravenously each day thereafter, his plasma vitamin C did not become measurable until the fifth day, when it finally reached the scurvy level. These few days forever changed Dr. Riordan's consciousness about vitamin C.

Now, after more than 40 years of medical observations, practice and implementation, Dr. Riordan has found orthomolecular based therapies to be effective in a wide variety of ailments, whether of a psychiatric and psychosomatic nature, or of a physical nature. Dr. Riordan found that most "chronic" illnesses are in reality *sustained* illnesses – illnesses that are sustained by a lack of sufficient nutrients, or by a lack of understanding of specific needs that the ailing and hurting person may have. Based upon the concept of "biochemical individuality," as developed by Dr. Roger Williams, The Center's approach treats each patient as unique. Since its founding in 1975, ap-

proximately 17,000 patients have come to The Center, seeking its leading-edge medical approach. Indeed, patients often come to The Center specifically seeking Dr. Riordan's expertise, as he personally sees every new patient for their initial evaluation.

The recipient of numerous distinctions and awards, The Center for The Improvement of Human Functioning International continues to lead medical science at the forefront of research and discovery. After 30 years, it remains unique among orthomolecular organizations. As Dr. Don Ardell has stated, "His Center is a model for innovation in alternative therapies and the promotion of personal responsibility." The Center is also a haven for independent thought and freedom of study. Part of the reason for its innovation and autonomy is that The Center has never received, nor does it solicit, tax derived dollars. From the moment of its inception, 100% of its funding has come from private sources. Clearly, such an operation would not be sustainable for 30 years without tangible, palpable, and positive results.

Eight geodesic domes, as designed by Buckminster Fuller, as well as a pyramid, some ponds, a certified organic garden, and a nature reserve occupy the grounds of The Center. Built on 92 acres, with more than 40,000 square feet of internal space, The Center is unique in every way. Its very design and concept are a vivid testament to the pioneering vision of its founding president and director.

Perhaps of greatest personal significance to Dr. Riordan, however, is the "co-learner" concept that is employed at

The Center. Patients are regarded not as “patients” but as “co-learners,” since they are encouraged (and indeed expected) to learn and to take active, responsible roles in the restoration and maintenance of their health. Dr. Riordan’s inspiration for this concept stems directly from his childhood, and from his father’s active role in learning about sulfa. Even though the doctors of the day had never heard of sulfa, Dr. Riordan’s father had – and he encouraged the doctors to find some. They did, and were able to use it to cure Lee Riordan, Dr. Hugh Riordan’s elder brother, when he suffered from streptococcal throat infections as a child.

At The Center, a new “co-learner’s” first evaluation is so thorough that it typically takes the better part of two days. Center physicians view themselves as akin to Sherlock Holmes, as they conduct intensive medical investigations on each patient in a manner that is unique and personalized to that patient. The Center’s library, a lunch and lecture series, extensive audiovisual archives, and a newsletter which The Center publishes ten times a year, entitled *Health Hunter*, all contribute to the educational resources which The Center provides to the public, for anyone who may be interested to learn.

The Biomedical Synergistics Institute, which is the educational division of The Center, has for many years been the branch through which Dr. Riordan organized International Conferences on Human Functioning. The Conferences have drawn a prestigious lineup of speakers from around the world and from a variety of bio-medically related fields. Such speakers have included, among others, Moshe Feldenkrais, Johan Bjorksten, Christiane

Northrup, the musician Steven Halpern, John Ott (the father of photobiology, and a consultant to Disney), Charles Berry (physician for NASA), James Gordon, and Norman Shealy. Most recently, the 15th International Conference on Human Functioning, which was held in 2000, featured a strong and vibrant, 86-year-young Jack LaLanne.

At the opening of the Fourth International Conference on Human Functioning, held in 1980, one of The Center's consultants, Dr. Charles Berry of NASA, gave the opening address:

“Good morning and welcome to all you crew members of spaceship ‘Earth’ who have come to this Fourth International Conference on Human Functioning, to be stimulated by new ideas of ways to understand more about human functioning and thus how it might be improved. I have had a unique opportunity in my life to ‘not follow where the path may lead, but to go instead where there is no path and leave a trail.’ In 1958 I was asked to help select the original seven astronauts who would later be asked to function at their peak capability in the hostile environment of space. My assigned task was to get men into space and have them return safely. This opportunity and experience has convinced me of the overriding importance of promoting health and preventing disease if we are to reduce illness and thus ‘health’ care costs and increase our productivity. This is my second Conference on Human Functioning, and I know you will be impressed as I have been by the blend

of new approaches to the treatment of old problems with methods of discovery about the functions and untapped capabilities of the wonderful human machine, the body with its mind. My association with The Center for the Improvement of Human Functioning has convinced me that The Center staff are willing to dare to explore the new and unusual with an open and scientifically inquiring mind. I am grateful for this association, and I know you will be. We all are crew members of spaceship 'Earth,' and we have responsibilities to ourselves and to each other to learn all that we can about optimal human functioning. The future of this spaceship Earth, the world, depends upon it. This Conference is a good place to start. Good interplanetary sailing, and keep your eyes on the stars!"

Speakers as well as audience members who have attended these International Conferences on Human Functioning over the years have tended to agree with Dr. Berry. The Conferences, and indeed The Center itself, have been excellent "launching pads" for exploration into brand new worlds of discovery. As part of its mission to stimulate and promote such exploration and discovery, the Biomedical Synergistics Institute, through each Conference, has invited college students "to compete for awards by submitting papers related to the enhancement of human functioning." The papers were written by young men and women preparing for professions in the medical and health care fields, and entrants from universities around the world have participated. Among others, winners have included students from the NYU School of

Medicine, Oxford University, the Texas College of Osteopathic Medicine, and the University of Southern California. In many cases, students who had submitted such papers, which reflected their original thought and work, would, years later, report that the experience had influenced the direction of their careers.

In the 1990s, one of The Center's patient/co-learners who had been successfully treated referred to this pioneering organization as a "Bright Spot for Health." The new nickname was enthusiastically received by the public and was quickly adopted. Since then, the name has also become the official website address of The Center: www.brightspot.org. To countless people from around the world, The Center for the Improvement of Human Functioning International is literally a "Bright Spot" on this earth – a radiant, shining beacon of hope, offering a humane means of achieving health, vigor, and a higher quality of life for all.

Dr. Robert Cathcart, another early pioneer in orthomolecular medicine, once wrote,

"To my surprise, I missed completely the extreme usefulness of massive doses of intravenous sodium ascorbate in cancer. The definitive use of this substance in cancer is being described by Hugh Riordan. He says that the high doses of intravenous ascorbate cause the formation of peroxide in every cell of the body and that cancer cells have a relative deficiency of catalase, so that the ascorbate selectively kills the cancer cells."

Indeed, a highly fertile period of discovery, innovation and publication for The Center was during its *RECNAC* Project. The acronym is “cancer” spelled backwards, and it stands for “Research Encompassing Comprehensive Novel Approaches to Cancer.” Lasting more than a decade, the first phase of the Project was completed in the year 2000. During this phase, The Center’s research scientists focused on reversing the mechanisms of cancer by means that are nontoxic to normal cells. The extensive research and clinical collaborations during this time resulted in new patents for The Center’s inventions in this field, as well as the establishment of new clinical protocols. “Intravenous Ascorbate as a Chemotherapeutic and Biologic Response Modifying Agent,” as one of The Center’s publications is entitled, describes the major thrust of the *RECNAC* research. Building upon its achievements from the first phase, The Center is currently engaged in the next phase, *RECNAC II*, with researchers in Puerto Rico.

Additionally, while continuing their pioneering work in antigen research, The Center’s scientists have most recently begun new studies in gene expression, demonstrating the profound relationship between even single nutrients and extensive genetic activity. For example, simply by withholding one nutrient, vitamin B1, from the chow of laboratory mice for several days, Center researchers have discovered that more than 600 genes are up-regulated, and more than 1,000 genes are down-regulated, in each laboratory mouse. Clearly, nutrition plays a fundamentally significant role in gene expression, and The Center’s scientists are on the cutting edge of discovery in this field.

Simultaneously, The Center's Bio-Communications Research Institute also leads the less-understood fields of electromagnetics, paramagnetics, subtle energies, and psychoacoustics, as Center scientists are studying the effects of such energies on biological systems.

At The Center, The Bio-Center Laboratory (www.biocenterlab.org) not only provides direct services for Center patient/co-learners, but it also provides diagnostic services for physicians and hospitals throughout the country. Through specific analyses, such testing helps to reveal, monitor, and correct underlying biochemical imbalances which might otherwise go undetected. Computerized atomic absorption spectrometry, plasma spectrometry, gas chromatography, high pressure liquid chromatography, spectrophotometry, spectrofluorometry, and gamma counter analyzers are part of the instrumentation which the Bio-Center Laboratory utilizes in its advanced testing procedures.

In numerous ways such as these, The Center remains a world leader for a new emphasis in personal health and medicine – an emphasis which Dr. Riordan hopes might become standard practice in the 21st century. As the original creator of every division within The Center, he has played a central role in the global realization of such a goal.

Dr. Riordan remembers another experience from his medical school years that left a profound and lasting impression upon him – and this book is the result. He recalls with great fondness both his class in the history of

medicine and his professor for the class. The fact that such classes are rarely if ever taught in medical schools anymore is a sad commentary on our modern times. Newly graduating doctors today lack the broad historical perspective of their profession that Dr. Riordan and his colleagues enjoyed when they were studying for their M.D. degrees. As Dr. Riordan stated,

“Looking at medical history gives one a very good perspective and a level of equanimity that you cannot have simply by being embroiled in the activities we face every day. By looking at history, you can see, for example, that William Harvey could not get his colleagues to believe that blood circulated in the body because another doctor, Gallen, had said that it did not. So why get upset when you can’t get people to understand that they need to take vitamins, when for years they wouldn’t even believe that blood circulates. The typical response in Harvey’s day to his theory of circulation of the blood was that it was ‘paradoxical, harmful,’ etc.”

Dr. Riordan’s long-time friend and colleague, Dr. Abram Hoffer, also laments the modern absence of medical school courses in the history of medicine. As Dr. Hoffer says,

“I really think that medical students should be forced to learn the history of medicine. It should be compulsory, when the medical student is most impressionable, which is in the first year. We need that very badly.”

When addressing audiences who may be unfamiliar with orthomolecular concepts, Dr. Riordan often tells them, “I don’t expect skeptics just to take my word for what I say. I expect you to be very protective of your own belief systems.”

After all, history has repeatedly proven the words of Arthur Schopenhauer, who observed that,

“All truth passes through three stages: first, it is ridiculed; second, it is violently opposed; third, it is accepted as being self-evident.”

Currently, orthomolecular medicine is somewhere between the second and third stages.

Today, Dr. Riordan views himself as “a grateful disciple.” Although he is certainly considered by those who know and work with him to be a medical maverick, he thinks of himself as “just a physician who puts into practice what I have learned.”

Once, several years after The Center had come into being, Dr. Riordan contacted 70 of his former medical school classmates. All of them were, occasionally, applying some form of nutritional therapy to their patients, if they encountered a case of anemia or alcoholism or some such malady. But other than these specific instances, only one person besides Dr. Riordan was actually engaged in the regular application of nutritional medicine to his patients in general. However, every one of Dr. Riordan’s former classmates could remember the

experiment with the rats and withholding nutrients. They simply had not made the connection in applying these principles to people.

Dr. Riordan's friends, colleagues, employees, the nearly 17,000 patients who have already come to The Center and the numerous patients who are still coming to The Center in search of Dr. Riordan's expertise and healing, are certainly grateful that he, apparently unlike the majority of medical school graduates, is "just a physician" who puts into practice what he has learned, and who practices what he says is "just good medicine."

- - -

Addendum:

On the morning of Friday, January 7, 2005, Dr. Riordan was at work in his office at his beloved Center which he had founded and directed for 30 years. Although this third volume of his *Medical Mavericks* trilogy had just been completed the previous week, it had not yet been sent to the publisher. After jotting down some new ideas about the book, Dr. Riordan collapsed on the floor of his office. Within a matter of minutes, he had been pronounced dead.

The following week, on Tuesday, January 11th, at one of Dr. Riordan's funeral services, the chief operating officer of The Center, and Dr. Riordan's colleague for over 28

years, Laura Benson, read the following poem by Hal Young:

“Let me die working
Still tackling plans unfinished
Tasks undone
Cling to its end
Swift may my race be won
No laggard steps
No faltering
No shirking
Let me die working.

Let me die thinking
Let me fare forth still
With an open mind
Fresh secrets to unfold
New truths to find
My soul undimmed
Alert
No question blinking
Let me die thinking.

Let me die giving
The substance of life for life’s enriching
Time, things and self
On good converging
No selfish thought
Loving
Redeeming
Living
Let me die giving.”

The same poem had been read at Dr. Carl Pfeiffer's Memorial Service, on November 23, 1988, outside of Princeton, New Jersey.

Like his mentor, Dr. Pfeiffer, Dr. Riordan had also continued working, thinking, and giving, still at the unique medical center that he had founded, created, nurtured, and directed, still in his office, like Dr. Pfeiffer, actively engaged with others, busily planning for the future, still eagerly writing down his new ideas, literally until his last breath, until the final moment of his life on this earth.

From his extremely full, fruitful, and productive life, Dr. Riordan has left an enormous legacy to medical science; and by his death he has left an equally enormous void in the lives of those who knew him. His countless pioneering achievements live on, at the unique medical center which he founded and directed in Wichita, Kansas, in the orthomolecular medical community throughout the world, and in the hearts and minds of his family members, colleagues, patient/co-learners, and friends who may be found in all corners of the globe.

Dr. Riordan's death came in the midst of one of the worst ice storms in recorded history for the entire Midwest. Debris from broken tree limbs suddenly littered city streets from Kansas City to Chicago, and 200,000 homes and businesses throughout Kansas and Missouri lost electrical power. In Wichita alone, nearly 70,000 homes and businesses were without heat or electricity for days. During Dr. Riordan's funeral services, a dense fog so impenetrable fell upon the city that one could barely see across the street. Local airports were shut down, first due

to the ice and then due to the fog. In a land renowned for its wide open vistas, where normally even a single, solitary cloud cannot be seen in the sky, from horizon to horizon, this was highly unusual weather. At the second of Dr. Riordan's funeral services, one of his friends and colleagues, Dr. Jeanne Drisko of the University of Kansas School of Medicine, remarked that the widespread destruction, darkness, bitter cold, and blinding fog that had suddenly gripped the city were "appropriate metaphors" for how all of us, left behind in Dr. Riordan's absence, now felt. The outer world seemed to be a perfect reflection of our inner world. As in a Shakespearean tragedy, all of Nature appeared to be in mourning, reeling in visible pain over the loss of such a monumental figure as Dr. Riordan.

During the same funeral service, one of Dr. Riordan's sons, Neil, recalled an event from the early days of The Center. A 70-year-old man with kidney cancer that had metastasized to his liver and lungs came to The Center specifically seeking Dr. Riordan's help. Since no treatment was available from standard doctors for this type of cancer, the man had been given a very short time in which to live. Dr. Riordan treated the man, twice a week, in his own office, with the high dose intravenous vitamin C protocol that he developed at The Center, which was based upon the work of Dr. Linus Pauling. After six weeks, the man was seen by his radiologist who reported that the tumors had shrunk. After twelve weeks, the tumors were almost undetectable, and six months later the man was cancer-free. The man went on to live a healthy and normal life for many years thereafter. When members of the standard medical community learned of this,

however, some doctors were furious. One oncologist in particular sent a letter to Dr. Riordan in which he wrote, “How dare you treat that man with vitamin C when it’s not a proven treatment for renal cell carcinoma.” In other words, what the oncologist was really saying was, “How dare you save this man’s life, when we had given him a death sentence.” Dr. Riordan responded by writing a letter back to the oncologist, in which he wrote, “How dare I not.”

Few people have ever had to summon the extraordinary courage which typified an ordinary day in the life of Dr. Hugh Riordan. Indeed, as former Wichita Mayor Bob Knight pointed out in his eulogy, any mere mortal would have quickly perished under the fierce affronts and injustices which Dr. Riordan willingly, without complaint, withstood throughout his career. And yet, as his colleague of 17 years, Dr. Ron Hunninghake stated in his eulogy, “Dr. Hugh never attacked conventional medicine; he challenged conventional thinking. He was not afraid to defy convention, not for the sake of defiance, but for the sake of the advancement of medical care. Dr. Hugh was guilty in the first degree of thinking outside the medical box.”

The year 2005 marks the 30th anniversary of The Center for the Improvement of Human Functioning International, which Dr. Riordan founded and directed until his death. In his role as the leader of this pioneering, unique organization, his path was often a lonely one. Thirty years is longer than most people would be willing or able to endure, single-handedly, the constant criticism and harassment by less open-minded individuals. Yet Dr.

Riordan faced such slings and arrows fearlessly, tirelessly, light-heartedly, without complaint, secure in the conviction and solid knowledge that his methods are scientifically correct. The scientific research which he directed, through The Center's Bio-Communications Research Institute, is so thorough and convincing, in fact, that it has become a major force behind the paradigm shift that is now transpiring in health care. As Dr. Riordan would jokingly comment, his work is now "almost in danger of becoming mainstream." His good natured and joyful, even playful spirit were such hallmarks of his character that most people were entirely unaware of the enormous burdens that came with his responsibilities. Indeed, those of us who knew him and worked with him will never forget his consistently joyful spirit and fun-loving sense of humor.

Dr. Riordan personified all of the features which a leader of orthomolecular medicine must possess, beyond merely a thorough understanding of medicine. Unlike many physicians, Dr. Riordan had achieved a rigorous understanding of "the scientific method" and of the exacting detail required in scientific research. Although he was first and foremost a doctor, he was very much a scientist as well. Furthermore, his humane and compassionate concern for the well-being of his fellow human beings impressed everyone who met him. Perhaps most important, however, were his courage and his personal sense of integrity in defending, throughout his life, what he knew to be true and right, often in the face of intense criticism. Perhaps this is the real reason why orthomolecular medicine has not yet become mainstream: it demands courage and integrity of its practitioners. Despite its inherent

logic, its undeniable, scientifically sound basis, its healthful side benefits instead of detrimental side effects, and its inexpensive, extraordinary affordability, orthomolecular medicine may nonetheless still appear unpalatable to many because of one reason: it demands of its practitioners a backbone strong enough with which to act upon and defend the Truth, even against harsh personal criticism. Throughout history, such a trait, in any field, has seldom if ever been widely popular.

Dr. Riordan intuitively, instinctively understood the highest ideals of medicine, and he devoted his life to upholding these lofty and noble standards. The nearly 17,000 patients who have come to The Center, every one of whom was seen personally by Dr. Riordan, have each had their lives touched by this one man who gave the full-time creative energies of his life to helping others. When this new type of medicine, known as “orthomolecular medicine” someday becomes the widespread treatment of choice for thinking, informed individuals, it will be in no small part because of the trails that Dr. Riordan blazed with his vision, with his heartfelt kindness, and above all with his courage. Our lives – and even the lives of his critics – today and throughout the future, may be healthier, more productive and more fulfilled because Dr. Riordan lived, and also died, vigorously, tirelessly, joyously working, thinking, and giving.

To quote Dr. Ron Hunninghake once again,

“Dr. Hugh Riordan wrote *Medical Mavericks* because he recognized himself as a medical maverick. History has shown that medical mavericks are

necessary for medical progress. He knew that, as a maverick, he would be shunned by those who misunderstood his message. He was willing to bear that. He was willing to be viewed as an irritant to conventional medicine. But irritants, inside oysters, become pearls.”

“The Pearl” was another nickname given to The Center, since it had begun as an irritant to the conventional medical establishment, yet grew into a thing of lasting beauty. Throughout the years, Dr. Riordan bestowed “Pearl Maker Awards” to individuals and organizations who embodied the same mission and ideals as The Center. As Dr. Ron Hunninghake concluded in his eulogy, “Thank God for the Pearl Makers of the world.”

In his nearly 50 years of medical practice, Dr. Riordan had received numerous honors and distinctions, both related and unrelated to his role at The Center. These included, among other professional memberships, being elected as a Fellow into the Royal Society of Medicine. Yet beyond his titles and official appointments, however, “Dr. Hugh” was first and foremost a treasured friend to a countless many. As Dr. Richard Kunin, President of the Society for Orthomolecular Health-Medicine, wrote in a letter addressed to The Center, “We join you in mourning the loss of this great physician and extraordinary human being.”

Stephen Lawson, the Administrative Officer of the Linus Pauling Institute at Oregon State University, offered these recollections of Dr. Riordan:

“He was one of the brightest beacons in the firmament of orthomolecular medicine. It was always wonderful to see him. Hugh was a very genuine, compassionate man whose sensitivity, intellect, knowledge, and humor shone through. I know that Linus Pauling held him in high regard and would have been immensely pleased that Hugh was the driving force behind the use of intravenous vitamin C in cancer. I share the grief at losing him with all his friends, colleagues, patients, and family.”

Dr. Bernard Rimland, founding Director of the Autism Research Institute in San Diego, also offered his thoughts:

“I learned of the sudden and unexpected death of our esteemed friend Hugh with astonishment and dismay. It is hard to believe that this vibrant, generous, talented, good-humored, and always helpful man is no longer with us. Hugh’s untimely death is a terrible loss to all of us. He had an enormous positive impact on the lives of tens of thousands of people worldwide. I am grateful that I had the opportunity to know him, and to work with him. My sincerest condolences to Hugh’s lovely wife Jan, and his colleagues at the Center. I share your grief.”

One of The Center’s co-learners, Phil Ray, felt so strongly compelled to express his feelings about Dr. Riordan that he had his views published in the *Wichita Eagle* newspaper:

“As a patient of The Center for the Improvement of Human Functioning, I am saddened by the loss of Dr. Hugh Riordan. There are thousands like me who have chronic illnesses and have come to a dead end with conventional medicine, only to find hope, education, and wellness from Dr. Riordan and the staff of The Center. From the moment you enter the facility, Dr. Riordan’s presence could be felt. What made Dr. Riordan so very special was the way that he took interest in every patient as an individual, working, teaching, coaching us back to health, instead of giving us only a five-minute visit and a prescription pad. I laugh when people tell me about the strange looking buildings and what they think goes on there. I tell you the truth: you can look long and hard only to find very few medical facilities that work with and love their patients like Dr. Riordan and his Center for the Improvement of Human Functioning. Thank you, Dr. Riordan, for all you’ve taught us. You will be greatly missed.”

We end this chapter on Dr. Hugh Riordan – one of the great titans of modern medical science, the quintessential maverick, and human being extraordinaire – with another poem from Dr. Carl Pfeiffer’s Memorial Service, by May Sarton, entitled “*Now, Voyager*”:

“Now, Voyager, lay here your dazzled head –
Come back to earth from air, be nourish-ed
Not with that light on light but with this bread.

Here close to earth be cherished, mortal heart –
Hold your way deep as roots push rocks apart
To bring the spurt of green up from the dark.

Where music thundered let the mind be still –
Where the will triumphed, let there be no will –
What light revealed let the dark now fulfill.

Here close to earth, the deeper pulse is stirred,
Here where no wings rush and no sudden bird
But only heartbeat upon beat is heard.

Here let the fiery burden be all spilled –
The passionate voice at last be calmed and stilled
And the long yearning of the blood fulfilled.

Now, Voyager, come home to rest,
Here on the long lost country of earth's breast
Lay down the fiery vision and be blest, be blest."

Roger J. Williams, Ph.D.

1893 – 1988



In the New York Times bestseller, *How to Live Longer And Feel Better*, the author, Dr. Linus Pauling describes the work of Dr. Ruth Harrell, et al., and their double-blind studies with children who were considered to be mentally retarded. Dr. Harrell was able, simply by administering vitamin and mineral supplements, to achieve improvement in every child who participated in the study. She attained such dramatic improvements, in fact, that by the end of her study the children could no longer be classified as mentally retarded. As Dr. Pauling then points out,

“Harrell had been inspired by having read the suggestions by Professor Roger J. Williams of the University of Texas ... that an increased intake of important nutrients might help control some genetic diseases (Williams, 1956).” (p. 251)

Here is but one of numerous examples illustrating the very broad and far-reaching influence of Dr. Roger Williams and his work. The full range and extent of his impact on science, and upon other scientists, shall always be felt but may never fully be known. His research influ-

enced not only Dr. Harrell, but also Linus Pauling, Abram Hoffer, Carl Pfeiffer, Hugh Riordan, and Wayne Jonas (former director, Office of Alternative Medicine, National Institutes of Health), among others. A pioneer in biochemistry, in nutrition, and in public education, Roger Williams also coined and defined the central orthomolecular concepts of “biochemical individuality” and “genetotrophic” disease. Throughout the last five decades of his life, he turned much of his attention to educating the medical profession as well as the lay public about the importance of nutrition in our daily lives.

Roger John Williams was born on August 14, 1893, in Ootacumund, India, to American Baptist missionary parents. The family returned to the U.S. when Roger was two years old, and he grew up in Kansas and California. The youngest of four brothers and a sister who were 5 to 10 years older than he, he later wrote, at the age of 81, that,

“This age gap tended to make me a ‘loner,’ and more inclined toward self-reliance and independence than I might have been.... [It] probably contributed toward making me the kind of scientist I have become.”

Both Roger and his eldest brother, Robert, would each go on to make lasting contributions in the field of biochemistry, especially in regard to B vitamins.

As Dr. Linus Pauling recalled:

“Robert R. Williams worked for many years as director of chemical research for Bell Telephone Laboratories in New York City on problems such as improving the electrical insulation on submarine cables. He set up a laboratory in his home and devoted his spare time to trying to isolate the substance in rice hulls that protects against beriberi. After years of work, he and his collaborators, R.R. Waterman (his son-in-law) and E.R. Buchman, succeeded in isolating the substance, vitamin B1, which they named thiamine. They determined its chemical constitution and devised ways of synthesizing it, thereby making it available at a low price for improving the health of people all over the world.” (From *How to Live Longer and Feel Better*, p. 72).

Not bad, for work done in one’s spare time, out of one’s home.

Roger’s accomplishments, however, would surpass even those of his brother.

As his friend and colleague, Donald R. Davis, Ph.D., wrote,

“Roger received his B.S. from the University of the Redlands in 1914 and a high school teacher’s certificate in 1915 from the University of California at Berkeley. There he earned his room and board by waiting on tables at a fraternity house and by cleaning his landlady’s home. His studies in organic chemistry left him discouraged about his

potential as a chemist. However, after teaching high school chemistry and physics for two years ... he decided to resume graduate work in chemistry at the University of Chicago, where his three brothers had graduated. A professor there, Julius Stieglitz, 'lifted organic chemistry out of the hopeless state of being merely something to memorize.' He received his M.S. degree in 1918 and his Ph.D. in 1919 (magna cum laude), writing his thesis on *The Vitamin Requirements of Yeast*. The goal of this work and a subsequent year with the Fleischmann (Yeast) Co. was to learn what yeast cells need in order to grow." (From "In Memoriam," 1988).

One of the substances that yeast cells need for growth is pantothenic acid. Revealing this substance to be another one of the B vitamins, B5, Roger discovered, isolated, and named this nutrient in 1933. He was still a professor of chemistry at Oregon State University at the time. Later, at the Clayton Institute in Texas, he would lead further work in the synthesis of this vitamin over a period of more than 20 years. An important substance not only for yeast, pantothenic acid was found to be "an essential cog in the biochemical machinery of all living things," as Dr. Davis has described it. The structure of pantothenic acid was announced jointly by the University of Texas and Merck Laboratories in 1940.

Roger's early work with the yeast cells would prove to have a long-term influence upon his research and interests. His further use of microorganisms in nutrition and biochemistry can be traced directly to his early laboratory

studies on yeast. Additionally, “This work helped shift the interest of biochemists toward microbiology and its rich harvest of knowledge about enzymology, genetics, and molecular biology.” (Dr. D.R. Davis, from “In Memoriam,” 1988).

During his enormously productive, long life, and beginning at an early age, Roger was legally blind. His two eyes “did not work together well,” and he described the process of reading as “dragging a log up a hill.” As Dr. Davis wrote, “Eyeglasses, exercises, and an operation failed to help much, and for some years he read with one eye at a time.” (From “In Memoriam”). Nevertheless, this did not prevent him from living a full life, nor, apparently, did it slow his prolific writing. In 1916 he married a former college classmate, Hazel E. Wood, with whom he had three children. A year after her death in 1952, he married Mabel Hobson. He taught at the University of Oregon, and at Oregon State University. In 1939, with a research grant from the Rockefeller Foundation, he became a professor of chemistry at the University of Texas at Austin. He taught in this capacity for nearly the next half century, until 1986. He was appointed Emeritus Professor of Chemistry in 1971 and retired from that post in 1986 at the age of 92. He continued his writing, however, into the final months of his life.

At the University of Texas at Austin, Dr. Williams founded the Clayton Foundation Biochemical Institute in 1940, with a grant from Benjamin Clayton of Houston. He directed this organization from the year of its founding until his “retirement” in 1963 at the age of 70. More vitamins and their variants had been discovered in this

laboratory under Dr. Roger Williams' directorship than at any other time or in any other laboratory in the world. As the Institute was integrated with the University's Department of Chemistry, patented processes for the synthesis of these substances brought substantial funding to the University. The Institute conducted pioneering work with riboflavin, pantothenic acid, biotin, nicotinic acid, pyridoxal, and pyridoxamine (two of the three forms of vitamin B6), inositol, thiamine, folic acid, folinic acid, vitamin B12, lipoic acid, and avidin (a protein in raw egg white, named by Dr. Williams).

Throughout his tenure, Dr. Williams authored several widely used textbooks and laboratory manuals on organic chemistry and biochemistry. He edited *The Encyclopedia of Biochemistry* and *A Physician's Handbook on Orthomolecular Medicine*. He wrote his first of several books for the lay public after the age of 70. By the time of his death in 1988 at the age of 94, Dr. Williams had written 21 books and nearly 300 articles. One can only imagine what he might have accomplished in his lifetime had he had the full use of his eyesight.

Under Dr. Williams' leadership, important laboratory techniques were developed at the Clayton Institute. These included microbiological assays for vitamins and amino acids, and ascending paper chromatography. Such techniques are now commonly utilized in laboratories worldwide. Dr. Williams would also study a factor in extracts from yeast and liver that had been reported in 1931 and 1938 by other investigators, to be effective in controlling anemia in animals. In 1941, he and his students had determined that it was a vitamin, which they named

folic acid. For this, Dr. Williams received the Chandler Medal from Columbia University (shared jointly with his brother, Robert), and the Mead Johnson Award of the American Institute of Nutrition.

Many of his greatest contributions, however, involved not merely the discovery of new substances but the formulation of new ideas. His concept of “biochemical individuality” was certainly one such example. His interest in this was personal, initially prompted by a surgical operation that he had undergone relatively early in his life. After the surgery, his doctor gave him a shot of morphine to alleviate the pain and to help him sleep. It did stop the pain, but instead of helping him sleep, it had the opposite effect, making his mind race frantically. He was then given an even larger dose of morphine. As a result, “there was hell to pay,” he would later recall. “All night long, my mind raced faster and faster. I was suffering continuous mental torture.” His doctor assured him that this was merely an “idiosyncrasy,” and tried again to help him sleep by giving him scopolamine hydrobromide. This did allow Roger to sleep – in between hallucinations, that is. Here again was another “idiosyncrasy.” None of the doctors expected these reactions to these medications. Neither his doctors nor the medical literature could explain why Roger had reacted so differently from “everyone else.” “I clearly wasn’t just like everyone else,” he later wrote. “The experience aroused my scientific curiosity. There must be a reason for my reaction. However, I was not able to make sense of the puzzle until many years later.” (From *The Wonderful World Within You*, chapter 6). But make sense of this puzzle he did, in intricate detail. In his book, *Biochemical Indi-*

viduality, he would devote an entire chapter to “Pharmacological Manifestations.”

Over 20 years after this post-surgical experience, Dr. Williams began noticing that each of our internal organs vary considerably from person to person. In size, in shape and in function, there is anything but uniformity. Stomachs, for example, differ not only in size and in shape but also in the structure and placement of the upper and lower valves. The valves, in turn, also function differently from person to person. The composition of stomach juices varies even more than stomach size, with the pepsin content of gastric juice varying “at least a thousand-fold” among adults. “The hydrochloric acid content of gastric juices also varies widely.” Dr. Williams compiled examples of gross variations in livers, bile ducts, pancreatic ducts, paranasal sinuses, accessory manual muscles, facial nerves, subcutaneous tissue, the transverse and pelvic sections of the colon, and just about every other possible aspect of human anatomy and physiology. In hearts, “approximately 65% of people have three arteries branching off the aorta, the large vessel delivering blood from the heart. The remaining 35% have one, two, four, five, or six branches.” (From *The Wonderful World Within You*, chapter 6). As he also pointed out, “Newborn healthy infants vary in their total leukocyte counts from 9,000 to 30,000 per cubic millimeter.” The variation among segmented neutrophils in healthy newborns ranges between 38% and 70%. (From *Biochemical Individuality*, chapter 3).

Dr. Williams catalogued both structural and functional differences that have been found in organs, the endocrine

system, the neurological system, the cardiovascular system, and even the skeleto-muscular system. In his book, *Biochemical Individuality*, he also explains the significance of such variations. Some differences are dramatic while others are more subtle. Yet no two people are anatomically, physiologically, or biochemically exactly alike. This fact demands a reevaluation of the meaning of “normal.” The “average” person may exist in statistics, but not in flesh and blood.

Dr. Williams had been aware of the laboratory observation “that although creatine was described by Beilstein as a bitter biting substance, it was found to be absolutely tasteless to many.” He also noted that “some otherwise normal individuals were unable to detect skunk odor.” Dr. Williams, therefore, “began to be convinced ... that differences between human beings (as well as their similarities) needed to be brought to light because they are crucially important factors which must be taken into account if many human problems are to be solved.” (From *Biochemical Individuality*, p. 16).

Certainly we are all aware of differences in personalities among individuals. Yet gross morphological differences in anatomy reflect cellular differences, which reflect molecular differences. Hence, we are all “biocemically” unique. Dr. Williams pointed out that even identical twins can have different needs for optimal health. Although identical twins share the same genes, their developmental environments can, and usually do, differ. This results in different expressions of their genes throughout their lives.

The Human Genome project, with the sequencing of the genome, has now confirmed that our genetic structure is not “rigid,” as previously thought. “Genetic polymorphism” is now the term used to describe variability among people in the expression of a specific genetic trait. However, when Dr. Williams first introduced the idea half a century ago, it represented a revolutionary way of thinking.

Another idea that was ahead of its time was his recognition that nutritional status can influence gene expression. As early as 1976, Dr. Williams and his colleague, Dr. Donald R. Davis, coauthored a paper in which they discussed this topic, providing observations on how nutritional status can influence gene expression. (Davis, D.R., Williams, R.J., “Potentially Useful Criteria for Judging Nutritional Adequacy,” *American Journal of Clinical Nutrition*, 1976; 29:710-715). As Dr. Jeffrey Bland wrote in the introduction to the new 1998 edition of *Biochemical Individuality*,

“They pointed out that phenotypic characteristics such as voluntary consumption of food, sleeping time after anesthesia, weight gains after surgery, healing time after surgery, hair growth after clipping, voluntary sugar consumption, and recovery time after poisoning could all be influenced by nutritional influence on gene expression.” (p. ix)

Geneticists now understand that phenotype is not the pure expression of genotype, but is instead the result of genotype plus environmental influences. Among such influences, lifestyle and nutritional factors play key roles.

Roger Williams understood this point more than 50 years ago.

From the idea of “biochemical individuality,” Dr. Williams also coined and defined the “genetotrophic” concept. He stated this principle as follows:

“Every individual organism that has a distinctive genetic background has distinctive nutritional needs which must be met for optimal well being.”
(From *Biochemical Individuality*, p. 190).

In other words, genetotrophic diseases are:

“ ... diseases in which the genetic pattern of the afflicted individual requires an augmented supply of one or more nutrients such that when these nutrients are adequately supplied the disease is ameliorated.” (Ruth L. Harrell, et al., *Proceedings of the National Academy of Sciences*, “Can Nutritional Supplements Help Mentally Retarded Children? An Exploratory Study,” 78(1): 574-578).

The same disease might manifest in different people in different ways, for example, requiring different treatments as the result of different nutritional needs. Or a substance which causes a certain response in one person might not cause the same response in another person. Or a substance which causes the same response in a thousand people might cause the exact opposite response in only one individual. Dr. Williams certainly discovered this to be true upon suffering through his post-surgical medication. One man’s medicine may be another man’s

poison, because of biochemical individuality and genetrophism.

Another example is alcoholism, which has been induced in laboratory animals by withholding vitamins B1, B5, and B6, singly and in combination. As Dr. Williams wrote,

“When the missing nutrient was supplied, their consumption of alcohol dropped dramatically. These findings eventually led to trials of nutritional supplements in alcoholic humans.” (From *The Wonderful World Within You*, chapter 11).

In this example, when due to one or more missing nutrients, alcoholism in such individuals is of genetotrophic origin. Dr. Williams wrote about this in detail in his books, *Nutrition and Alcoholism* (1951) and *Alcoholism: The Nutritional Approach* (1959). As Dr. Ruth Harrell demonstrated over her many years of research, mental retardation in many instances is also a disease of genetotrophic origin. In other words, it too can be successfully ameliorated by meeting the individual’s unique nutritional needs.

A person might carry a gene for a particular disease, but never actually suffer from that disease. Whether or not a gene gets “switched on” (and then back off again) will be determined by a variety of factors, which include nutritional factors. Most, if not all, diseases, therefore, have a genetotrophic component which can be modulated with nutrition.

Roger Williams wrote one of his most popular books, *The Wonderful World Within You*, in 1977 when he was 84 years old. The book was reissued in 1998 and again in 2004 by the Bio-Communications Press, a division of The Center for the Improvement of Human Functioning International, in Wichita, Kansas. These new editions have been updated to include an expanded section on the “NutriCircle” diagrams. Developed by Dr. Davis in collaboration with Dr. Williams, the NutriCircles offer a succinct visual representation of the nutritional content of foods. In the new editions of the book, the NutriCircles now include omega-3-fatty-acid nutrients (alpha-linolenic acid and its progeny EPA and DHA), the new amino acid histidine, and dietary fiber. In the preface to the new editions, Dr. Davis, who was involved in the publication of the original, offers these words about his friend and mentor:

“I am pleased to introduce this updated edition of a wonderful book whose birth I watched and assisted. Its gestation began about 1975, soon after I joined the author’s research group here at the University of Texas. I marveled at Professor Williams’ amazing ability, in his early eighties, to appear each morning with drafts of new sections, beautifully written in simple, clear words. I savored, as I think you will, his broad knowledge, his philosophical spirit, and his enthusiastic, yet scientific, vision for the advancement of nutrition. And I was struck by how much each of us may differ from the mythical ‘average person’ – in our physical bodies, in our biochemistry and nutrition, and in our minds and abilities. Williams helps us ap-

preciate the truly wonderful world within ourselves and within others. ... We are fortunate to have this new edition. It neatly summarizes Williams' lifetime of wisdom about many topics: nutrition, wholesome foods, nutritional supplements, our marvelous individual differences, preventing alcoholism, and finding a healthy and satisfying life. What more could we ask of one book?"

In 1956, Roger Williams authored one of his most groundbreaking books, *Biochemical Individuality: The Key to Understanding What Shapes Your Health, and The Basis for the Genetotropic Concept*. In the preface, he explained that he wrote this book to fill what he saw was a "need in human biology and medicine for more attention to variability and individuality at the physiological and biochemical levels." However, his concept of "biochemical individuality" quickly expanded to include applications in social dynamics. Two of his other books, *The Human Frontier* (1946) and *Free and Unequal* (1953, 1979), both of which actually preceded *Biochemical Individuality*, address these matters more directly. He grew to realize that biochemical individuality "has important implications not only for biology and medicine, but also for anthropology, psychology, child development, education, and even religion, business, law, and politics." (From the preface to *Biochemical Individuality*). Although he had originally viewed such topics to be "considerably divergent from my chosen field of research interest, biochemistry," his views would change. "... As time has gone on and results have accumulated, it has become clearer to me that individuality and applied biochemistry are inextricably intertwined. I no longer re-

gard my interest in individuality as a departure from biochemistry.” (Ibid.) In his writings, he explored a view that regards human social and philosophical fields not as isolated constructs but as relevant extensions of “applied biochemistry.” For more than 40 years, Dr. Williams expounded upon such themes as “humanics – the science of humankind, the senses and social behavior, metabolism in relation to character traits, education, heredity and environment, marriage, tolerance for others, criminology, psychology and medicine, religion, and international relations.” (Dr. Donald R. Davis, from “In Memoriam,” 1988).

In his book, *Rethinking Education: The Coming Age of Enlightenment*, Dr. Williams wrote:

“People need to raise their sights and get away from the idea that material needs are the ultimate in importance. People need proper food and shelter but they also need, if they are to be healthy, knowledge, hope, love, friendship, and many other things of a non-material nature.”

Such non-material, very human qualities are, he argued, an integral part of our fundamental biochemistry, and even our DNA.

On February 20, 1988, at the age of 94, Roger Williams succumbed to pneumonia, the “old man’s friend,” in an Austin nursing home. Two days prior to his death, he had been reviewing his latest book manuscript. He is buried in Austin Memorial Park. His papers live on in the University of Texas archives.

“His writings remain popular today because of his deep insight into basic principles, his originality, and his clear writing,” Dr. Davis explains. His underlying message of biochemical individuality resonates throughout each of his works, and his book by that very title continues to be translated into numerous languages.

Dr. Donald R. Davis especially remembers the “restless, prolific intellect” that Dr. Williams enjoyed even until his final day. He adds,

“Beyond these extraordinary scientific accomplishments, Williams was a deep and independent thinker, a visionary, and a gifted writer. He took seriously, in a practical way, the idea that the highest purpose of science and all human striving is to benefit humankind in one way or another. Through his writings, he inspired new generations of professionals and laypersons who form the avant-garde of a dynamic movement. I and many others well remember the profound impact on our thinking and work of his books such as *Nutrition in a Nutshell*, *Biochemical Individuality*, *You are Extraordinary*, and *Nutrition Against Disease*.”

“Inevitably, Williams’ maverick ideas faced resistance, especially from some physicians, old-line nutritionists, and social scientists whose established beliefs conflicted too much with his ideas. He was probably seldom content with the pace at which his campaigns advanced. Some failed, like his attempts to interest universities and scientific

bodies in studying human diversity as a way to help society foster human development and to advance social and international harmony.” (From “In Memoriam,” 1988).

The point that Roger Williams hoped to make is not entirely lost. Although “universities and scientific bodies” may not have been interested in his message, many individuals are. Through the legacy of his “biochemical individuality” and other pioneering ideas, there might be hope yet for a more enlightened future society. We now know, in the same way that everyone has a unique fingerprint, that every aspect of human “individuality” is a scientific fact. From the microscopic to the macroscopic levels, we are all unique. Therefore, at the social level, it would seem logical to respect and even treasure our differences, recognizing them for the manifestation of complex molecular interactions that they are.

When we understand the underlying, biochemical bases for our visible differences, who cannot be inspired with a deep sense of awe for “the wonderful world within”?

The first biochemist to be elected president of the American Chemical Society (1957), Dr. Williams was a member of the National Academy of Sciences, and the recipient of numerous awards and degrees, including honorary D.Sc. degrees from Columbia, from Oregon State University, and from the University of the Redlands, his Alma Mater. In 1983 he received the Nutrition Award from the Arthur M. Sackler Foundation, and in 1972 he served as a member of the President’s Advisory Panel on Heart Disease.

Chronological List

| | |
|--|----------------|
| Roger J. Williams, Ph.D. | 1893 – 1988 |
| Ruth Flinn Harrell, Ph.D. | 1900 – 1991 |
| Linus C. Pauling, Ph.D. | 1901 – 1994 |
| Carl C. Pfeiffer, M.D., Ph.D. | 1908 – 1988 |
| Fowler Border Poling, M.D. | 1914 – 1963 |
| Emanuel Cheraskin, M.D., D.M.D. | 1916 – 2001 |
| Abram Hoffer, M.D., Ph.D., F.R.C.P.(C) | 1917 – present |
| Carl Ebnother, M.D. | 1924 – present |
| Bernard Rimland, Ph.D. | 1928 – present |
| Hugh Desaix Riordan, M.D. | 1932 – 2005 |
| Robert F. Cathcart III, M.D. | 1932 – present |
| Masatoshi Kaneko, Ph.D. | 1935 – present |

Appendix

The following additional resources are provided for further information on the following individuals:

Emanuel Cheraskin, M.D., D.M.D.:

Books:

Diet and Disease (1968)

New Hope for Incurable Disease (1971)

Predictive Medicine, A Study in Strategy (1973)

*Psychodietetics: Food as the Key to
Emotional Health* (1974)

The Vitamin C Connection (with Sisley, 1983)

*The Vitamin C Controversy: Questions and
Answers* (1988)

Abram Hoffer, M.D., Ph.D.:

www.orthomolecular.org

Bernard Rimland, Ph.D.:

To receive by fax a free 20-page compilation of articles on the autism-vaccine connection, fax a request for the “Autism/vaccine package” to: (619) 563-6840.

The California report cited in his chapter is available at:

www.DDS.CA.GOV/AUTISM

More information on Dr. Rimland and his work is also available at:

www.DANCONFERENCE.com

www.AutismResearchInstitute.com

www.autism.com/ari

DVD and VHS recordings of the 14th DAN! Conference, including interviews with children who have “recovered” from autism, are available for \$25 from the ARI.

Hugh D. Riordan, M.D.:

Information on Dr. Riordan, and on The Center for the Improvement of Human Functioning International, Inc., is available at:

www.brightspot.org and www.biocenterlab.org

Additional information on Dr. Riordan is also available at www.orthomolecular.org, a website built and maintained by The Center for the Improvement of Human Functioning International, Inc., in Wichita, Kansas.

Roger J. Williams, Ph.D.:

<http://neon.cm.utexas.edu/williams>

More information on the individuals featured herein may also be found at:

www.doctoryourself.com

Select Bibliography

Ardell, Donald B., “A Toast And A Bit Of A Roast In Honor Of A Medical Maverick,” www.seekwellness.com September, 2001.

Challem, Jack, “Nutritional Medicine vs. Toxic Medicine; An Exclusive Interview with Dr. Bernard Rimland,” *Let’s Live*, March, 1979.

Cheraskin, Emanuel, “Vitamin C Symptoms and Respiratory Symptoms,” *Journal of Orthomolecular Medicine*, 2001; 16, (4): 218-224.

Cheraskin, Emanuel, *The Vitamin C Controversy: Questions and Answers*, Bio-Communications Press, Wichita, KS, 1988.

Chowka, P.B., *Linus Pauling, Ph.D.: The Last Interview*, 2004.

Harrell, Ruth, “Can Nutritional Supplements Help Mentally Retarded Children? An Exploratory Study,” *International Conference on Human Functioning*, Wichita, Kansas, 1981.

Harrell, R.F., et. al., “Can Nutritional Supplements Help Mentally Retarded Children? An Exploratory Study,” *Proceedings, National Academy of Sciences*, January 1981; 78(1): 574-578.

Hickey, S. and Roberts, H., *Ascorbate: The Science of Vitamin C*, 2004, www.lulu.com/ascorbate.

Hoffer, Abram, *Healing Schizophrenia*, CCNM Press, Ontario, Canada, 2004.

Hoffer, Abram, "Side Effects of Over-the-Counter Drugs," *Journal of Orthomolecular Medicine*, 2003; 18(3 & 4): 168-172.

Hoffer, Abram, "Editorial: Closing The Centenary of Linus Pauling," *Journal of Orthomolecular Medicine*, 2001; 16(4): 195-196.

Hoffer, Abram, "In Memoriam: Emanuel Cheraskin, M.D., D.M.D.," *Journal of Orthomolecular Medicine*, 2001; 16(2): 134.

Hoffer, Abram, *Dr. Hoffer's ABC of Natural Nutrition for Children*, Quarry Press, Ontario, Canada, 1999, 2001.

Hoffer, Abram, *Hoffer's Laws of Natural Nutrition, A Guide to Eating Well For Pure Health*, Quarry Press, Ontario, Canada, 1996, 2001.

Hoffer, A. and Walker, M., *Smart Nutrients*, Avery Publishing Group, Garden City Park, NY, 1994.

Hoffer, A. and Osmond, H., *How to Live With Schizophrenia*, Carol Publishing Group, New York, 1966, 1992.

Hoffer, Abram, *Orthomolecular Medicine for Physicians*, Keats Publishing, Inc., New Canaan, CT, 1989.

Hoffer, Abram, "In Memoriam: Carl C. Pfeiffer, M.D., Ph.D.," *Journal of Orthomolecular Medicine*, 1989; 4(1).

Hoffer, Abram, *Common Questions on Schizophrenia and Their Answers*, Keats Publishing, Inc., New Canaan, CT, 1988.

Hoffer, Abram, "Linus Pauling Honours the Canadian Schizophrenia Foundation," *Journal of Orthomolecular Medicine*, 1987; 2(3): 183-184.

Hoffer, Abram, "Is There a Conspiracy," *Journal of Orthomolecular Medicine*, 1987; 2(3): 158-165.

Hoffer, A. and Walker, M., *Nutrients to Age Without Senility*, Keats Publishing, Inc., New Canaan, CT., 1980.

Hoffer, A. and Walker, M., *Orthomolecular Nutrition*, Keats Publishing, Inc., New Canaan, CT., 1978.

Hoffer A. and Osmond, H., *The Hallucinogens*, Academic Press, New York, 1967.

Hoffer, A. and Osmond, H., *New Hope for Alcoholics*, University Books, Inc., New Hyde Park, NY, 1966.

Hoffer, A. and Osmond, H., *Niacin Therapy in Psychiatry*, Charles C. Thomas, Springfield, IL, 1962.

Huemer, Richard, *The Roots of Molecular Medicine: A Tribute to Linus Pauling*, foreword by Bernard Rimland, 1986.

Levy, T.E., *Vitamin C, Infectious Diseases, & Toxins – Curing The Incurable*, Xlibris, 2002, www.Xlibris.com.

Pauling, Linus C., *How to Live Longer and Feel Better*, Harper Collins, New York, 1986.

Pauling, Linus C., “Orthomolecular Psychiatry,” *Science*, 19 April 1968.

Pfeiffer, C., et al., “Excess Copper as a Factor in Human Diseases,” *Journal of Orthomolecular Medicine*, 1987; 2(3): 171-182.

Pfeiffer, Carl, *Nutrition and Mental Illness – An Orthomolecular Approach to Balancing Body Chemistry*, Healing Arts Press, VT, 1987.

Pfeiffer, Carl, *Mental and Elemental Nutrients*, Keats Publishing, New Canaan, CT, 1975.

Rimland, Bernard, “Recovered Autistic Children!” *Autism Research Review International*, 2004; 18(3): 2004.

Rimland, Bernard, “The Danish Data Revisited: New Study Links MMR Vaccine to Elevated Risk of Autism,” *Autism Research Review International*, 2004; 18(3).

Rimland, Bernard, “HAPI: ‘Mercury-free’ Vaccines Still Contain Mercury,” *Autism Research Review International*, 2004; 18(3).

Rimland, Bernard, "The 14th DAN ! Conference: An Historic Event," *Autism Research Review International*, 2004; 18(3).

Rimland, Bernard, "What I Have Learned: Four and a Half Decades as a Parent and Researcher," *Autism Research Review International*, 2001; 15(3).

Rimland, Bernard, "The MMR/Autism Controversy: Should We Believe The IOM?" *Autism Research Review International*, 2001; 15(2).

Rimland, Bernard, "'Garbage Science,' Brick Walls, Crossword Puzzles, and Mercury," *Autism Research Review International*, 2000; 14(4).

Rimland, Bernard, "The Most Air-Tight Study in Psychiatry? Vitamin B6 in Autism," *Autism Research Review International*, 2000; 14(3).

Rimland, Bernard, "The Autism Increase: Research Needed on the Vaccine Connection," *Autism Research Review International*, 2000; 14(1).

Rimland, Bernard, "Vaccinations: The Overlooked Factors," *Autism Research Review International*, 1998; 12(1).

Rimland, Bernard, "Our Children: Victims of Both Autism and Dogma," *Autism Research Review International*, 1997; 11(3).

Rimland, Bernard, *Vitamin and Mineral Supplementation as a Treatment for Autistic and Mentally Retarded Persons*, presented to the President's Committee on Mental Retardation, Washington, D.C., 1984.

Rimland, Bernard, *Infantile Autism: The Syndrome and Its Implications for a Neural Theory of Behavior*, Appleton-Century-Crofts, New York, 1964.

Riordan, H.D., Gonzalez, MJ, et al., "Vitamin C and Oxidative DNA Damage Revisited," *Journal of Orthomolecular Medicine*, 2002; 17(4): 225-228.

Riordan, H.D., Cheraskin, E., et al., "Another Look at Renal Function and the EDTA Treatment Process," *Journal of Orthomolecular Medicine*, 1987; 2(3): 185-187.

Riordan, H.D., et al., "Case From The Center: Three Patients, Three Medical Conditions, Three Successful Outcomes," *Journal of Orthomolecular Medicine*, 2001; 16(4): 238-240.

Saul, A.W., "The Pioneering Work of Ruth Flinn Harrell: Champion of Children," *Journal of Orthomolecular Medicine*, 2003; 19(1): 21-26.

Saul, A.W., www.doctoryourself.com.

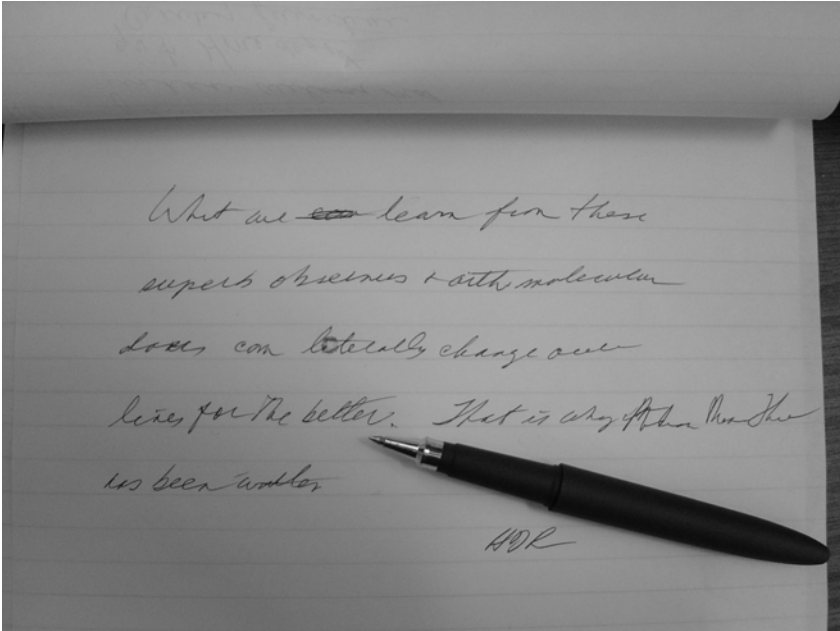
Turkel, Henry, *New Hope for the Retarded*, foreword by Bernard Rimland, 1975.

Williams, Roger, *The Wonderful World Within You*, Bio-Communications Press, Wichita, KS, 1998, 2004.

Williams, Roger, *Biochemical Individuality – The Key To Understanding What Shapes Your Health, and The Basis for the Genetotrophic Concept*, Keats Publishing, New Canaan, CT, 1998.

Williams, Roger, *The Clayton Foundation Biochemical Institute, A Short History*, 1965.

Postscript



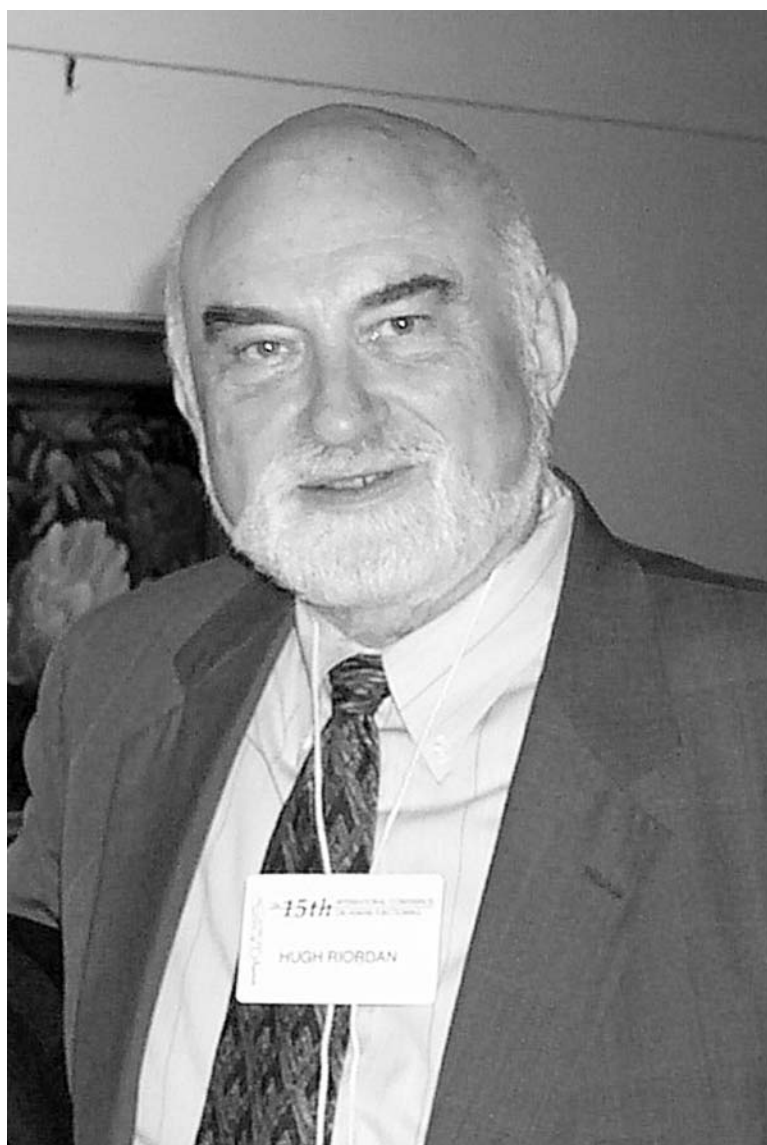
On the cold and wintry morning of Friday, January 7, 2005, Dr. Riordan was at work in his office at his beloved Center which he had founded and directed for 30 years. Shortly before noon, he penned what would later be discovered to be his final thoughts. Even in the very last moments of his life, he was still actively thinking and writing about this latest volume of his Medical Mavericks trilogy.

The notepad, as pictured above, bears his final inscription:

“What we learn from these superb observers and orthomolecular doers can literally change our lives for the better. That is why Medical Mavericks Three has been written.”
HDR

Immediately after writing these words, Dr. Hugh Desaix Riordan collapsed. Within a matter of minutes, he would be pronounced dead. Having braved the elements to come to work during one of the worst ice storms in Wichita's recorded history, he literally still had his boots on.

Dr. Riordan had often referred to death as a "transition from life as we know it." With the publication of his third volume of *Medical Mavericks*, and with his final message to the world as captured above, his transition is now complete.



Dr. Hugh D. Riordan
15th International Conference on Human Functioning
Wichita, Kansas, September 2000

NOTES

NOTES

NOTES

What they said about *Medical Mavericks*, Volumes One and Two:

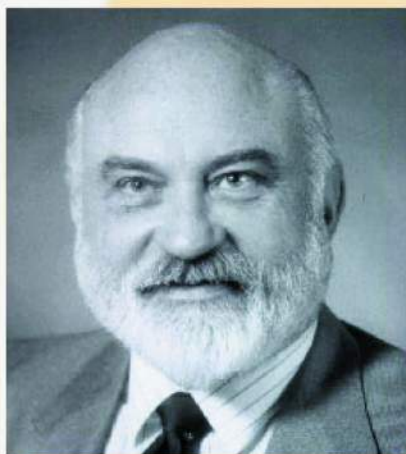
“I recommend it for its wealth of knowledge and its experiential delight.”
C. Norman Shealy, M.D., Ph.D.

“Dr. Riordan’s book is a gift to us all ... The information may surprise many physicians as medical history is neglected in almost all medical schools.”

Abram Hoffer, M.D., Ph.D.

Readers will think the same about Volume Three.

Prior to his unexpected and sudden death in January of 2005, Dr. Riordan had practiced clinical medicine for nearly 50 years. Having served as a consultant to the Executive Vice President of the American Medical Association for more than five years, and as President of the American Holistic Medical Association for two years, he brought a unique perspective to the world of medicine. A graduate of the University of Wisconsin and The University of Wisconsin Medical School, Dr. Riordan believed that his *Medical Mavericks* books fill a significant



void in what we need to know about those who have blazed the trail of scientific and medical progress.

Medical Mavericks, Volume Three, is the third volume in Dr. Riordan’s trilogy of vignettes about these fascinating trailblazers. It also marks Dr. Riordan’s final publication.

The Author

Hugh Desaix Riordan, M.D.

U.S.A. \$14.95

Canadian \$18.50

ISBN 0-942333-13-6