How the Gerson Therapy Heals
By Gar Hildenbrand

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I'm Gar Hildenbrand and I am the Executive Director of the Gerson Institute. What I want to cover are the basic scientific rationales of the Gerson Therapy. It is important that the basics go in, so that you know why you are doing what you are doing, so that things don't seem unusual or odd.

Let me begin by giving you a bit of my background. I came to this work in late 1970's and have worked side by side with Charlotte Gerson since my arrival here in California in January of 1980. When I came to work here, I came to be a communicator. I came from the professional theatre where I was a professional writer, a contract playwright. I found immediately, as I began to work with Charlotte, that she didn't need just help communicating, but help identifying and developing the nature of what was going to be communicated. And by faith and fortune I found myself a communicator who could teach me. That was Dr. Freeman Widener Cope, the father of modern Supramolecular Biology, who was a salt and water biophysicist. He was the chief of the Biochemistry Laboratory of the U.S. Naval Air Development Center, the Veterans Administration, Department of the Navy, Warminster, Pennsylvania. Dr. Cope was a medical doctor, physicist, and mathematician; a grandson of the creator of the Thorndyke Dictionary. It was Dr. Cope who spent many, many nights on the telephone with me, and sent me many new selections to read and guided my studies; and for two years of intensive tutorial studies I worked to understand the world of cell biology, and the reasons that Gerson's Therapy, as medical practice, made sense to Dr. Freeman Widener Cope.

Freeman Widener Cope

Cope was the author of an article called, A Medical Application of the Ling Association-Induction Hypothesis: The High Potassium, Low Sodium Diet of the Gerson Cancer Therapy. It was written in 1978 and published in the journal, Physiological Chemistry and Physics (Vol.10 No.5) which has an editorial college of scientists which peer reviews all articles submitted for publication. A striking aspect of the article is that Cope used the word cure five times in the abstract and first two paragraphs of the first page. He used them in this context:
The high potassium, low sodium diet of the Gerson therapy has been observed experimentally to cure many cases of advanced cancer in man.

Again and again he would state this. In fact, he italicized the word cured to make certain that this was not lost on any reader no matter skeptical or resistant the reader might be. The intent of the article was to establish that Gerson's monograph and his scientific literature were sufficient to convince Cope, a scientist who became familiar with the work nearly one and a half decades after Gerson's death, that this was indeed a valid and consistent contribution that Gerson made; that Gerson's publications were legitimate. Physiological Chemistry and Physicsis a respected medical journal.

Sine qua non to magnetic imaging

I would like to add a bit more weight to Freeman Cope's background. Magnetic Imaging is the process available now for diagnosis which avoids ionizing radiation. You don't have to have radiation shot through your body to expose film behind you any more. You can actually lie in the field of a large magnet and have a radio frequency magnetic signal beamed in at right angles and have the spin energy that is released by your hydrogen nuclei measured, and magnetic imagers will pick up that radio energy with an antenna that focuses and can actually construct a picture of the insides of your body based on the tissue chemistry which it reads electronically. This is magnetic imaging, and it is a huge industry in the world now. It is replacing cat scans. General Electric makes magnetic imagers now. Among the many other corporations are Diasonics and FONAR. The man who started FONAR, which is an anagram for Field Focused Nuclear Magnetic Resonance, is Raymond Damadian, M.D. in upstate New York.

My teacher, Freeman Cope, taught Raymond Damadian how to use magnetic resonance instruments in the laboratory. Together Cope and Damadian were the first researchers to get a potassium signal from a live bacteria culture. It was Raymond Damadian who went on, away from pure research, into practical research and development. He created the world's first magnetic imager. He has been awarded a Presidential Medal of Honor for science and discovery and is well known throughout the world now.

Without Freeman Widener Cope, who was my teacher, Damadian would never have learned how to use magnetic resonance equipment and would never have tried to measure potassium in the Dead Sea bacterium which he brought to their mutual studies. There would be no magnetic resonance imaging in the world at this time, had it not been for Freeman Widener Cope. Let me quote Dr. Damadian.

Had I never met Cope and been introduced to the NMR at his urging, I would never have had the NMR scanning idea. I comment on this to stress the imprint of the life of my dear friend on humanity and on science lest the enormity of his contributions pass unnoticed.

Also without Freeman Cope to educate me to help the Gerson Institute to communicate the nuts and bolts of current scientific implications of Gerson's clinical observations, and subsequently our own observations, we probably would have never gotten the interest of the British team which recently published in the Lancet, September 15, 1990, which is a top journal in the world, an article called, Juices, Coffee Enemas, and Cancer about this little hospital. It is an article that uses very conservative language, but guardedly positive language. I'll read a little bit of it to you because I think it is worth it:

Psychological information was obtained from the patients present at the centre by interview and by completion of visual analogue scales. Despite a wide range of socioeconomic backgrounds the patients, most of whom had very poor prognoses, tended to agree on several points, including their dissatisfaction with their conventional therapy and doctors. They all rated very highly the support they received from their families resident with them and also the other

patients, with whom many established close relationships. another striking feature was the high degree of control the patients felt they had over their health and perhaps as a consequence, their high ratings for mood and confidence. Particularly intriguing were the low pain scores and analgesic requirements for all the patients, despite the presence of extensive metastatic disease in many and the fact that several had been on opioid medication previously.

We could find little objective evidence of an antitumour effect from the Gerson therapy, although most patients were not assessable because of concomitant conventional therapy (emphasis not in original). However, in a few patients definite tumor regression was documented. In view of the poor prognosis of most of the patients, perhaps it is more important that there was a subjective benefit both to them and to their families. There is evidence that a fighting spirit response is associated with a better prognosis, and Spiegel and co-workers have shown that patients with metastatic breast carcinoma treated with psychotherapy in addition to conventional chemotherapy had a significantly improved survival. Judged in this context, the improvement in the Gerson patients' sense of well-being may take on a greater importance.

The nature of the therapy requires a positive contribution to be made by the patient to his or her health and meets a need not satisfied by conventional therapy, in which the role of the patient is essentially passive. These approaches may suggest ways forward for oncologists in the management of desperate cancer patients and their families.

The British came in with a with absolutely no positive expectations, and when they saw documented evidence of tumor regression they were astounded. And they couldn't explain the low pain scores.

Without Freeman Widener Cope as a publishing scientist and his bellwethering efforts to rekindle scientific attention to the work of Gerson, we wouldn't be where we are. And without Freeman Cope, I would have had absolutely not one inkling where to start to study the medical literature, to go back into the Index Medicus to pull together the old work of Gerson and the other European researchers; and I wouldn't have the slightest idea of how to explain to you the various points I am going to explain to you today.

I guess you'd call that a Eulogy. Freeman died in 1982.

Salt and water management

One of the first things that I learned from him was that the Gerson Therapy is a salt and water management; that there is a whole chunk of the medical literature on salt and water management; and that salt and water management also means hormone manipulation, and manipulation of the energy production and the integrity of the human cell.

What that means to the average person who's trying to get his or her body to work better is that when one controls the types of salts that are found in the individual cell, the building blocks of

our lives, and when one controls the water content, how much water there is in the cell, one can effect the way that the cell functions; the health of the cell, the energy production capabilities of the cell, the ability of the cell to stay alive and to stay normal.

Physiologically, in our bodies, our best trick is to be us. We started out as a small cell, a fertilized egg, and began to divide and replicate and multiply. We became first fetus, then toddler, then adolescent, then adult, all on the strength of the programming which we have, which is to be us. That is our best trick. That is what we do better than anything else.

We have trouble being ourselves with integrity when the environment encroaches or infiltrates into us. We yield and lose the barrier between ourselves and the environment when we are poisoned, for example, when the toxic air and the toxic water are too much, or when we come into contact with industrial materials which are toxic. Those environmental factors will pollute us. The same is true with the individual cell. The best trick of the individual cell, what it knows how to do best, and what it does best, is to be whole, and to maintain itself. When the cell loses its integrity and is infiltrated by what is normally its exterior environment, the cell loses its health. Dr. Cope, wrote a paper on cell pathology, or tissue damage syndrome called Pathology of structured water and associated cations in cells (the tissue damage syndrome) and its medical treatment, which was published in Physiological Chemistry and Physics 9(6), 1977. He explained, in terms of the new salt and water biophysics, what happens when our cells are injured or hurt. He explained that there is a unifying set of occurrences. Whether the damage occurs by oxygen starvation, by trauma, by any type of insult, the same response occurs in cells throughout every part of the body, no matter what the tissue of origin. First the cell will lose potassium, second the cell will accept sodium, and third, the cell will swell with too much water. Such cell swelling is called cellular edema. No matter what tissue in the body, and no matter what the cause of injury, the unifying set of occurrences in the tissue damage syndrome are 1) loss of potassium, 2) acceptance of sodium, and 3) swelling with excess water to create cellular edema.

What happens to a cell which has swollen with too much water? Inside the cell, the environment becomes inappropriate for the manufacture of energy. You will notice when you study Gerson's book, that he talked about increasing free energy; that was one of his goals. Free energy, in a medical dictionary, translates to ATP, a compound, adenosine triphosphate, which is manufactured by all cells in the body. It is the energy storing compound of the body, the energy currency of the body.

ATP is the cellular product of burning sugar with oxygen, and it is made and broken, and remade, and re-broken in order to liberate bursts of energy. Essentially it is an adenosine molecule with three strong phosphate bonds, and the energy in those phosphate bonds is significant. It is the immediate source of energy for most energy requiring functions of the body at the cellular level. Without ATP the cell dies. Without ATP we die.

When the cell has swollen with too much water, cellular burning of sugars is inhibited, ATP production is inhibited, along with protein synthesis and lipid metabolism.

Inside every cell are small organelles, little tiny factories in the cell. They are microscopic filaments called mitochondria. I can still remember the day that Freeman first said the word to me, "Mitochondria, do you know anything about 'em?"

I said, "Well, I don't." He said, "You're going to learn." He said, "My boss, Polis, was the direct student of a Nobel laureate in mitochondrial studies, and you gotta know this. This is what I'm expert in. I know all about the cytochromes. I know all about mitochondrial functions. You gotta know this." So I learned.

In our mitochondria we have the ability to burn sugar with oxygen. You'll probably hear Charlotte mention more than once the name of Otto Warburg, who won the Nobel prize twice in medicine, his own field. He wasn't a peace laureate plus a medicine laureate. He was a medical laureate twice. I don't think anyone else has done that twice.

Otto Warburg advanced a theory of cancer which held that cancer was a fermentative disease. The Warburg generalization is probably not correct, although the observations that led Warburg to the generalization are most likely correct. What he saw, he saw. What he thought it meant, maybe it didn't mean. But most importantly, what Warburg contributed was that he was able to understand and to describe both the oxygen and the hydrogen shuttling enzyme systems of mitochondria which help our cells to burn sugar with oxygen to make our energy in the form of ATP.

Gerson's therapy is aimed at increasing free energy production; making more ATP available in the cell. In order to do that, Gerson attempted to manipulate the tissue damage syndrome which, although Cope did not describe it until 1977, was known clinically to Gerson in the 1920s; and he was active and correct in his management of it. What Gerson did was to eliminate sodium from the diet, to supplement a high potassium diet with additional potassium, and to try to find ways to remove toxins from the bloodstream which inhibit normal cellular enzyme functions, metabolism, and respiration.

Gerson was a neatly packaged genius, a low-tech genius. What he did was very low tech, but it can be measured with very high tech means to prove that it is, in fact, doing what we say it is doing. Gerson provided a way for a damaged cell to be confronted with less sodium so that it would have an opportunity to bind some potassium, to improve its hydration by lowering its water content, and to improve its mitochondrial function.

In order to insure that the mitochondria would function, Gerson gave thyroid, and he gave it in pretty high doses. Thyroid is an amino acid iodinated and oxygenated by the thyroid gland which, when administered in significant dosages, first signals cellular mitochondria to replicate, which they do independent of the cell because they have their own DNA and RNA, and second tells mitochondria to make more energy in the form of ATP by burning sugars fast.

Just as a note, if you think of the cell as a planet, the mitochondria are the industrial cities. They are the cities of industry. And when a cell has lost potassium and gained sodium and swollen with water, the sewers back up, and the industrial cities are shut down in their function. And energy cannot be made to clean out the sewers. That is the problem with tissue damage syndrome.

Around every tumor and around every arthritic joint and in most chronic viral conditions, our tissues that have lost potassium have gained sodium and have swollen with too much water. As early as 1957, Christine Waterhouse and Albert Craig working on a National Cancer Institute grant, were able to measure water retention in cancer patients, which was a general systemic edema. Not visible, not discernible clinically, but measurable. Let me quote them from the article Body-composition and changes in patients with advanced cancer which was published in the American Cancer Society's journal Cancer 11(6), November- December, 1957.
Recent communications from this laboratory have emphasized that gross-weight changes in patients with advanced cancer may be minimal, even when large amounts of body fat are being lost. Under these conditions it has been shown that there may be a great gain of total body water even though there may be no detectable edema.

In an earlier article, Waterhouse admitted to inadvertently killing a third of her advanced cancer patients in an experimental high fat, double the normal calorie intake, intravenous forced-feeding trial. I'm quoting her from an article she co-authored with A. Raymond Terepka called Metabolic observations during the forced feeding of patients with cancer which was published in the American Journal of Medicine, February, 1956.

Our data do not warrant any direct analysis of these changes but if one assumes that the calculated caloric discrepancy is approximately correct and that this is all made up by body fat stores, in every instance a gain in weight as a result of forced feeding was due almost entirely to a gain in intracellular fluid.

A great gain of total body water; a gain in intracellular fluid; cellular edema; and what Gerson did was to work against this.

Gerson started out as a tuberculosis physician, and around every tuberculous infection, around every cavern and cavity and lesion he saw a puffy malfunctioning circumference of tissue that had been damaged by toxins from the infection. Partial metabolites from the diseased tissue, materials that are not entirely metabolized, can cause problems because they are junk to the tissue around them and they damage and upset otherwise normal tissue.

Gerson saw that by restricting sodium and by giving a high potassium, low sodium, basically fruit and vegetable diet with fresh raw juices and much freshly prepared raw food, edemas could be absorbed. He saw that this could be encouraged and tuberculosis could be effected. To give Gerson a little build up, the way I did with Cope, I will use the words of Dr. Patricia Spain Ward, Historian for the University of Illinois at Chicago, a longtime medical historian. Dr. Ward

was a contractor for a report which produced by the U.S. Congress Office of Technology Assessment, entitled Unconventional Cancer Treatments, OTA-H-405 (Washington, DC:U.S. Government Printing Office, September 1990). It was a four year long study. I was an advisor to the study; I was an "expert" appointed by the US Government. That means that I am an authority now, I guess.

For 3 1/2 years I read contract reports and flew to Washington, and met in the advisory panel chamber with people from Johns Hopkins, M.D. Anderson, Sloan-Kettering, Mayo Clinic, and with others from the unconventional cancer treatments community. Dr. Ward wrote a contract paper about Dr. Max Gerson which, interestingly, was held back from us by the staff of the OTA for a period of time because one of their staff members, the project director, was actually a professionalist and regarded all unconventional treatments as quackery. I guess she was worried that any positive language would change the flavor of the report, and the course of the report to Congress. And, by golly, it did. I was the whistle blower who got the Dr. Wards report released, and I love the paper. I think it is one of the best written things I've read on Gerson. These paragraphs are from Ward's History of Gerson Therapy, June, 1988.

It is one of the least edifying facts of recent American medical history that the profession's leadership so long rejected as quackish the idea that nutrition affects health (JAMA 1946, 1949, 1977; Shimkin, 1976). Ignoring both the empirical dietary wisdom that pervaded western medicine from the pre-Christian Hippocratic era until the late nineteenth century and a persuasive body of modern research in nutritional biochemistry, the politically minded spokesmen of organized medicine in the U.S. remained long committed to surgery and radiation as the sole acceptable treatments for cancer. This commitment persisted, even after sound epidemiological data showed that early detection and removal of malignant tumors did not "cure" most kinds of cancer (Crile, 1956; updated by Cairns, 1985).

The historical record shows that progress lagged especially in cancer immunotherapy — including nutrition and hyperthermia — because power over professional affiliation and publication (and hence over practice and research) rested with men who were neither scholars nor practitioners nor researchers themselves, and who were often unequipped to grasp the rapidly evolving complexities of the sciences underlying mid-twentieth-century medicine. Nowhere is this maladaptation of professional structure to medicine's changing scientific content more tragically illustrated than in the American experience of Max B. Gerson (1881-1959), founder of the best-known nutritional treatment for cancer of the pre-macrobiotic era. A scholar's scholar and a superlative observer of clinical phenomena, Gerson was a product of the German medical education which Americans in the late 19th and early 20th centuries considered so superior to our own that all who could afford it went to Germany to perfect their training (Bonner, 1963).

As a medical graduate of the University of Freiburg in 1909, Gerson imbibed all of the latest in scientific medicine, with the emphasis on specificity which bacteriology had brought into western medical thought in the preceding decades. Gerson subsequently worked with leading

German specialists in internal medicine, in physiological chemistry, and in neurology (U.S. Congress, 1946, 98). The historical record does not tell us whether his medical education in Germany (where much of the early work in nutritional chemistry took place) included a study of diet, a subject neglected in American medical schools after the germ theory gained acceptance.

We do know that by 1919, when Gerson set up a practice in internal and nervous diseases in Bielefeld, he had devised an effective dietary treatment for the migraine headaches which frequently disabled him, despite the best efforts of his colleagues. In 1920, while treating migraine patients by this salt-free vegetarian diet, he discovered that it was also effective in lupus vulgaris (tuberculosis of the skin, then considered incurable) and, later, in arthritis as well (U.S. Congress, 1946, 98).

Trained in the theories of specific disease causation and treatment that began to dominate western medicine — for the first time in history — as bacteriological discoveries multiplied in the late nineteenth century, Gerson was at first uneasy about using a single therapy in such seemingly disparate conditions. But he was committed to the primacy of clinical evidence, which he liked to express in Kussmaul's dictum: "The result at the sick-bed is decisive" (quoted in Gerson, 1958, 212).

Dr. Pat Spain Ward was originally known for her paper about Andrew Ivy which was entitled Who will bell the cat? This was about Andrew Ivy, former vice president of the University of Illinois at Chicago, Distinguished Professor of Physiology, Chairman of the Department of Clinical Science, and a former five-year Executive Director of the National Advisory Cancer Council who had backed some researchers who developed something called Krebiozen, which may have been an early biological response modifying type of immunology. Although critics accuse her of quackbusting on the basis of that article, I found it to be mostly objective. From the current perspective, it can be seen as part of the progression of the studies of one of this country's best historians of the professions of medicine.

Back to the subject of our interest, Gerson's answer to tissue damage syndrome were the most logical answers that have been contributed to medicine to date. There is nothing better in medicine for salt and water problems, for the edemas that surround tumors, there is no better answer.

Essentially, salt and water therapy means creating a situation in which the cell will tend to return to normal. Many medical doctors do not understand why potassium will function in this way, and why a low sodium, high potassium diet is therapeutic. That is because our medical schools are in, and hopefully coming out of, a period of ossification in cellular biology. Not much progress has been made for a long period of time. We have accepted theories of the pumping enzymes, called sodium pumps, magnesium pumps; many, many postulated pumping systems that are supposed to exist in human cells, that have never been observed or proven in human cells. Chapter three of Guyton's Medical Physiology, and the first part of every textbook on cellular

biology and medical physiology, will describe sodium pumps which have never ever been observed in human cells.

It is on that basis that a theory of cell metabolism is taught in medical school which does not, and cannot, predict that a low sodium, high potassium diet is good for you or will have any beneficial effect.

However, slowly gaining acceptance throughout the world is the work of Dr. Gilbert Ning Ling who will be one day recognized as being the father of a new cellular biology which is based in physics rather than wet chemistry. In medical school, we learn chemistry. In physics, we learn math. In Medical school, when we try to see what is happening in the body as described in the language of physics we hit a wall of mathematics which is impenetrable because we didn't learn it.

What happens in the human cell is not what we are able to read in our medical textbooks. Essentially we are still reading in medical textbooks, and students are still being taught, that the cell is a bag of water with solutes in the water of the cell. According to Dr. Ling's theory — which brought Dr. Cope into Gerson's work because, essentially, Cope went looking for something that would prove that Ling's theory correctly predicted the value of high potassium, low sodium diets and he found Gerson, and he found the Mexican cardiologist Dr. Sodi-Pallares — without getting too complex, our cells, human cells are more like a solid state electronic device. They are more like ion exchange granules in a water softener. They are not bags of water.
There is throughout the cytoplasm of our cells, water that is structured. You can see this through magnetic resonance measurements. The water in our cells is not free liquid. We are more than 55% water, most of us, and the water in our cells is structured. It's not like ice, it's not that structured, but it's much more structured than free liquid water. The reason that it is structured is that there are dynamic energies in cells that hold water in an organized pattern. It is the work of Ling that describes this.

I am going to try to interpret Cope, who interpreted Ling to me; Ling a physicist, Cope a physicist, M.D., and me a playwright. Imagine, if you will, inside the membranes, or the outer skin, of the cell, a ball of steel wool. The ball of steel wool is, more or less, one long molecule; a big, long strand that wraps around and around. It is like a skeleton inside the cell. It is a protein and lipid macromolecule, and there is an electronic current that flows through it. As the electron current flows through it, a force is created which causes paramagnetic ions in the water molecule, and that's the hydrogen — anything with an uneven atomic number is paramagnetic — it attracts hydrogen. You've got an H2O molecule: say the "O" is my fist, and the "Hs" are my extended fingers. [shows a victory sign] These things turn towards the macro-molecule. They all point toward it, one after the other, all lined up. And you've got a layer of polarized water around that filament, and a second layer on top of the first layer, so that you've got two layers, one on top of the other on top of this long lipid molecule. And there are layers on top of the layers. There is virtually no free water in the cell, it's all multiple polarized structured layers of water inside the cell. It is the water structuring itself that controls the water content in the cell.

The hook to Gerson's therapy is that if potassium is on the sites to which it may bind on this macro-molecule, the cell will organize water. If potassium is lost from those association sites, and sodium is bound, the cell will lose much of its ability to structure water and it will swell with much more water.

As Dr. Ling describes it in the Association-Induction Hypothesis, for every molecule of ATP that is complexed with the macromolecule, association sites for potassium are formed; twenty association sites for potassium for every one molecule of ATP that complexes to the macro-molecule, which is this big ball of steel wool inside of the cell .

The mitochondria are inside of the steel wool, stuck in here. You've got this ball of steel wool, and the little mitochondria are taking sugars that have been funneled, by activities within the cell, to the mitochondria. They burn the sugar, they make ATP, and the ATP complexes with the macromolecule, which contributes to the binding of potassium at association sites, which contributes to the structuring of water and the control of water content. Ling proved that even when you kill the ATP manufacturing portions of the cell, the cell can hold its water structuring and its water content normally for hours, meaning it is not energy from ATP that actually controls ion content in the cell.

What this means, from Gerson's point of view, is that when you are sick, when your tissues are damaged, when your cells have lost potassium and taken on sodium and extra water, we must reduce the challenge of sodium and load potassium into the system. Taking supplemental potassium in addition to a low sodium diet helps potassium to compete for association sites in the cell. When you do this, you create a situation in which potassium may be once again bound. This big ball of steel wool, this macromolecule can exist in one of two configuration states, normal or damaged. If you insult the cell, if you poison it, if you starve it, if you take away its oxygen, that macromolecule will flip over to a damaged configuration state. The macromolecule jumbles its proteins and lipids; and it no longer can complex ATP well, and it cannot control potassium binding.

Anybody who has taken chemistry will ask, "What is the difference between potassium and sodium? They have the same valence. Why can't they be interchangeable?" They are not interchangeable in the biosystem. The cell actually has a preference for potassium, which Ling has demonstrated. This is something that Ling has done experiments with since 1949.
A little bit about Ling: he is the developer of the intracellular microelectrode on which the whole field of microelectrophysiology is based. He is a genius from China who won the Boxer Award in 1949. He is now a senior Chinese scientist, the head of the molecular biology laboratory for Pennsylvania Hospital in Philadelphia.

What happens when you create a high potassium environment for a damaged cell, is that you can get potassium to hook on to one or more association sites because those sites will take whatever's there, sodium or potassium, when the cell is damaged. When the protein-lipid macromolecule is in a damaged state, if you can get potassium to bind at one site, a marvelous

phenomenon occurs which Ling calls cooperative interactivity — it's like what we need more of in the world of humans — and that is when potassium is bound at one site, the adjoining site will bind potassium: cooperative interactivity. If potassium can be bound, other sites will, as well, accept potassium. So if you can just start it going, the cell will flip back, like dominoes, to a high potassium load. At the same time that happens, the water organizes, the water content of the cell shrinks, and ATP production increases.

Protein restriction

Toward the end of getting more sodium out of the body, out of the cells, Gerson not only eliminated sodium from the diet, he also eliminated protein from the diet for a period of time. Because in his experiments, and as Dr. Ward noted, he had extraordinary laboratory support in the best equipped medical and scientific community in the world at the time, he showed, once you take somebody and put them on a high potassium – low sodium diet, the first thing that happens when you cut out the sodium is that tons of sodium comes out in the urine.
Where does it come from? It's coming from inside the cell. It's coming from inside individual cells. All the tissues in the body are dumping sodium. If you want to increase that effect and prolong it, Gerson found that if you eliminate dietary protein, you can cause even more of what he called "Natrium Ausschuss", sodium outpouring or flooding, out in the urine, more and more and more.

The problem of protein restriction is that you can't do it too long. Because then you begin to compromise immunity, and this has been observed for a long time. People have known that protein is necessary for good immunity, so that it has been assumed that we should have lots of it, and that we should always have it.

Gerson, however, said the opposite. He said you must stop dietary proteins for a period of 6 to 8 weeks in order to cause the sodium to leave the body and in order to cause the edemas to be absorbed. In his mind, it seemed clear that sodium is trapped in the body with protein; it is trapped in deposits of protein and sodium complexed. This is accurate. It is accurate within the context of Ling's work, and Ling's work is modern day physics and biology wed.
We know now, from the work of Robert Good, that protein restriction, which is something that you're all doing, can actually stimulate cell-mediated immunity. T-lymphocyte activity can be stimulated by protein restriction in the diet.

Robert Good was the Chairman of Pathology for the University Minnesota at Minneapolis when I was there as an undergrad. He left to become the Chief of Memorial Sloan-Kettering Cancer Research Programs, and the head of the Institute itself. On his way to Sloan-Kettering from Minneapolis, he went to Egypt. He visited a friend in Cairo, who had been working with malnourished children. He took a deep interest in the immune profiles of these long malnourished children. He asked his friend why certain panels of the immune profile were disturbed, why they were off, and his friend said we don't know. We just know that they are, but we don't know which dietary deficiency is causing what immune abnormality. Good, as a

scientist, decided it was high time, in basic research, to answer some of these questions regarding which is doing what.

When he got to Sloan-Kettering, he set up a guinea pig experiment, a very simple experiment. He built a laboratory chow with no protein. He took normal lab chow and this no-protein lab chow and fed it to group A and group B. Group A received no protein. Group B was what is called the control group, the putatively well-fed guinea pig. Good had expected to see deterioration of serum and cell-mediated immunity. What serum immunity is anti-body production, viral immunity, the ability to fight virus. Cell mediated immunity is the large white cells, the macrophages, lymphocytes, these are the ones that fight bacteria in infections, and also fight tumors.

Good predicted at least failure of serum immunity. What Good saw was something he was unprepared for. Not only did serum immunity remain stable, but lymphocyte activity, specifically T-lymphocytes, the thymus lymphocytes, became tremendously active, non-specifically active, and remained aggressively and non- specifically active for a long period of time, several days in fact.

And at that point, Good realized, and wrote, that he had stimulated immunity by dietary restriction of protein. This led to a long series of many experiments in many laboratories all related to Robert Good, who is known as the most published pathologist in the western medical literature. His experiments have shown, in one animal model after another, diseases which are called long term or degenerative diseases of, man and their counterpoints in mice, guinea pigs, and other animals, can be affected by protein and calorie restriction.

Calorie restriction is another thing that is happening here. How can that be? Because the fats are gone from the diet. A tablespoon of carbohydrate and a tablespoon of protein yield approximately the same number of calories. A tablespoon of fat provides double that number of calories. Fats are everywhere, especially in the western diet, in our civilized diet; bakery goods, cakes, candies, rolls, meats, cheeses, everything you like, nuts, seeds. But not in this diet. In this diet the only fats are the 1.5% of the calories of the oatmeal, which is why it congeals when it gets cool, and individual fatty acids through some of the vegetables and fruits — individual and a small number of them I might add — aromatic fatty acids in the citrus, mostly in the rind, and the flax oil. About 90 calories a day in fats.

It is surprising and unfortunate that American troops sent to Saudi Arabia, are receiving a diet that may kill them; up to 9,000 calories a day in hamburger and candies and so on; 9,000 calories a day. That's how much you give to burn patients to try to get them to heal. What is the logic in that?

This nation created the Recommended Dietary Allowances (RDAs), which is a world wide set of standards for nutritional values. It is not widely known, but the reason the RDAs were created here was because the U.S. felt its troops did not match the troops that were seen in Germany.

German troops seemed to have better stamina, better physiques, they were trimmer, they could go on much longer.

Our answer to that was to convene the Food and Nutrition Council of the National Academy of Sciences, and to try to discover a way to get better nutrition to our troops. Thus were born the RDAs. The reason for their existence is that we knew that food supplies would be different, they would change. Foods would come in that we hadn't planned on, foods wouldn't come that we had planned on, and large groups of people would be aggregated in places where there had not been large groups of people. The game was then that we had to find new food sources in large quantities to feed the large groups of people. RDAs were designed to find markers in the foods, vitamins, minerals, things that were associated with high nutrient content, and to identify foods with those markers, and to use those foods to create super soldiers. That's why we have RDAs. How in the world we got from that to stuffing our troops with 9,000 calories in fat and trash I don't know.

What we mean when we say we have a protein-calorie restrictive diet here is that we have a better diet. We don't keep people off of protein for too long. Six to eight weeks is all we can do without compromising immunity to some extent. However, it is entirely safe as we use it. Because we give you dairy, non-fat dairy, after 6-8 weeks, you'll get much more protein than you need.

In this dietary, even as you receive it now, you have enough protein input from the highly bio-available protein content of potatoes to offset your obligatory protein loss. You lose about 40 grams of protein a day through entrails — obligatory protein loss — but you mostly replace that through this basic vegan diet already before adding the dairy protein. When you add the dairy protein, you will have 30-40 grams more than you require. You're kept in what's called positive nitrogen balance.

Robert Good and his coworkers established that protein and calorie restriction would do some really quite remarkable things with animal models. The first mouse that was studied extensively was the (NZB X NZW)F1(B/W) mouse, called NZB for short. This mouse is a very rare, direct analog mouse. The disease it has is systemic lupus erythematosus, a direct human analog. That means that it is the same disease in the mouse and the human, and if you can cure it in the mouse, you can cure it in the human. Most animal models are not human analogs. I don't know of a single cancer mouse or cancer rat that is a direct human analog.

The NZB mouse, when protein calorie-restriction is implemented, will not develop lupus. This is a mouse genetically preprogrammed to develop lupus. Protein calorie restriction initiated at weaning will prevent the development of an otherwise inevitable disease. Even if the disease is allowed to develop, it can be caused to regress by initiating protein-calorie restriction after the disease has presented.

Another mouse, the kdkd mouse, gets vascular lesions and has a tendency toward nephropyosis, kidney deterioration. These mice, if protein-calorie restriction is initiated at weaning, will not develop blood vessel lesions, and plaque, and kidney problems. Kidney problems mostly develop because blood vessel supplies are pinched off. Same with heart. You cut off the blood supply and organs get into trouble, and muscles get into trouble. Kdkd mice, even if they are allowed to develop the disease, can be regressed if protein-calorie restriction is initiated after the disease presents.

Another mouse, the C3H mouse, these last two mice are not direct analogs, gets mammary tumors, always mammary tumors. At weaning, protein-calorie restriction will prevent, in a large percentage of those mice, the development of tumors. Even if the diet is initiated after they develop tumors, outcroppings of tumors can be kept to a minimum, and extension of survival of the mice is established as being marked over the controls.

Let me read you a paragraph written by Dr. Good and David Jose. This is from Quantitative effects of nutritional essential amino acid deficiency upon immune responses to tumors in mice, which was published in The Journal of Experimental Medicine 137, in 1973:

Protein-calorie malnutrition may produce profound and sometimes paradoxical changes in the immune defense mechanisms against infection and malignancy. Depression of host resistance to some viral infections and malignant tumors have been reported in nutritionally deprived animals. Our previous studies have demonstrated that animals fed limiting amounts of a casein (milk protein – ed.) diet showed intact cytotoxic cell-mediated immune responses to tumor antigens at a protein intake that resulted in profound depression of specific humoral antibody responses, including serum "blocking antibody". These findings suggested that specific cell-mediated cytotoxic immunity may operate more effectively against tumor cells in the moderately protein- deficient animal, because of the absence of serum inhibiting factors. Further reduction in the level of protein in the diets of tumor-bearing animals resulted in depression of both humoral and cellular responses. In addition, a persistent defect in cytotoxic cell-mediated function was found in animals after nutritional protein deprivation at a young age. Thus the animal's immune resistance could be either increased or depressed, depending on the timing and the severity of the nutritional deprivation. Similar inhibitory effects upon the incidence and growth of malignant tumors have been reported in animals fed diets imbalanced or deficient in the essential amino acids.

Normal mice with protein-calorie restriction initiated at weaning have double the normal life span. They will not grow to full size. They grow to somewhat smaller than full size, remain tremendously active, with sleek coats, and live twice as long.

Maybe we have been killing ourselves with this high protein attitude, "Eat lots of protein, its good for you". That's what Good said back in the 1970s when he first published this stuff. High protein diets can cause cancer and heart disease, he said. When he left Sloan-Kettering to go to the University of South Florida at Tampa, Good was out of good stead with the cancer industry

in the U.S. because he had rattled some cages and rocked some boats. But he tremendously advanced the understanding of the influence of isolated dietary factors, and that helps us to understand what we are doing.

Gerson saw this immune stimulating effect of protein restriction in people in his clinics in the 1930s. He published, through well-known medical publisher Franz Deuticke a book called,Diaettherapie der Lungentuberkulose and this was dietary treatment for lung tuberculosis. In that book, which Charlotte and Beata Bishop and myself, with dictionaries in hand, translated chunks of, Gerson described the same kind of changes which Good saw when he noted that his protein-restricted patients showed increased white cell counts with a shift to the left in the differential. That doesn't mean they had car trouble. It's the old German notation for increased lymphocyte activity, non- specific immune activity. Gerson repeated this observation in a number of later publications, including the monograph you are all familiar with, A Cancer Therapy: Results of Fifty Cases.

To refresh our memories, let's review what we have discussed; potassium supplementation, sodium restriction, calorie restriction, protein restriction, and thyroid supplementation.

When you provide a high potassium, low sodium environment, even badly damaged cells are able to structure their water somewhat. When water is structured, the cell is able to control its water content because its water is approaching the kind of molecular organization seen in crystals. You can't pour water into ice.

When you have the basics in place, you have something to work with. Tissue that's functioning can be pushed to greater function. Gerson saw a depressed cellular metabolism, depressed tissue function, in cancer and other diseases. Gerson's attitude toward metabolism was a bit like that of the makers of the old Volkswagen bug's heater. Those heaters had two positions, on and off. If you wanted to regulate the cabin heat, you had to do it yourself, manually. It was, "If you want heat, you've got heat. If you want it off, shut it off." Gerson wanted metabolism, so he turned it on with large loading dosages, five grains in many patients, of thyroid.
Thyroid hormone signals mitochondria to multiply and increase production of ATP. This gives your little planets, the cells, more industrial cities producing more energy.

Protein restriction turns on T-lymphocytes which are important because they are a big part of tumor immunity, capable of infiltrating tumors and killing tumor cells. They also help orchestrate larger and more general systemic responses from the greater immune system.

Damaged tissues and neoplastic tissues will generate junk which will not be well tolerated by normal tissue. Take for example a melanoma tumor. It's easy to talk about this because there are magnetic imaging studies of these things. A melanoma tumor will spread damage outward in a sphere maybe several times the volume of the tumor which is comprised of tissue that doesn't work well, tissue that is water logged, that is insulted and damaged by tumor toxins, metabolic waste from the tumor. And that tissue will sit there, stewing in its own juices, without good

resistance and without good immunity; without good circulation and without good drainage. When you take out that tumor and look at it with an imager that gives good t-2 measurements, you can still see that circumference, that sphere, of water-logged tissue for months after the tumor is gone; months, if the patient is not otherwise provided a way to correct that tissue damage. With Gerson's therapy, that sodium ring around tumors will disappear within weeks, because that's how effective Gerson's measures are against the kind of tissue damage syndrome that is seen around tumors.

Coffee enemas

Now, the coffee enema is capable to remove circulating toxins and partial metabolites for one specific reason, and that is that the coffee enema not only dilates bile ducts — which Gerson knew — we now know, from the work of Wattenberg, Sparnins, and Lam at the University of Minnesota, Department of Pathology, Minneapolis, that coffee stimulates an enzyme system in the liver which has a five dollar name, glutathione-S-transferase, which enzyme system is capable to remove from the bloodstream a vast variety of electrophiles.

Glutathione-*S*-transferase

- binds bilirubin and its glucoronides so that they can be eliminated from the hepatocytes.
- blocks and detoxifies carcinogens which require oxidation or reduction to be activated. Its catalytic function produces a protective effect against many chemical carcinogens.
- forms a co-valent bond with nearly all highly electrophilic substances, the so-called free radicals, which is the precodition of their elimination. The intermediate products of potentially hepatotoxic cytostatics also belong to this category.

— From Lechner, *Aktuelle Ernaehrungsmedizin*, 1990

Electrophiles are referred to in popular literature as free radicals. Electrophiles are atomic particles with one or more electrons in unpaired spins. They have an affinity for electrons and they want to get involved where they should not get involved. They are charged particles, and they will damage membranes of cells and they will inflict disturbances in cellular metabolism. Under the influence of a coffee enema, the glutathione-S-transferase enzyme system — which as part of the ligandine enzyme system which accounts for about 3% of all enzymes in the liver is responsible for removing electrophiles from the blood stream — will be increased in activity from 600-700% above normal. No materials other than coffee are known to stimulate it as much. That's why people are known to get a buzz off of a cup of coffee in the morning, and why some people are too grouchy to do anything but read the newspaper until they've had their coffee,

and why coffee is so effective in clearing heads. It also opens bile ducts, and that is why some people use it as a laxative in the mornings.

The coffee enema stimulates the glutathione-S-transferase system by 700%. During the time that the coffee enema is being held in the gut, all the blood in the body passes through the liver at least five times. Every three minutes, all the blood in your body goes through your liver. In addition to stimulating that enzyme system, the theobromine, theophylline, and the caffeine in coffee all have physiological effects among which are the dilation of blood vessels and bile ducts, the relaxation of smooth muscles, and the increase of bile flow, which also is caused by the palmitates which are the part of the coffee which actually stimulates glutathione-S-transferase.

In addition to that, the quart of water in your gut stimulates what is called the visceral nervous system. The viscera are the guts. The visceral nervous system is the nervous system that orchestrates what is called peristalsis, the weak force that moves materials through the intestines. The visceral nervous system is stimulated by a quart of water in the gut. Additionally, at least part of that quart of water passes through the wall of the gut and dilutes the hemorrhoidal and then the portal blood which goes into the liver, socks the liver, actually dilutes the bile, and causes more readily increased bile flow. Also, the net effect of the coffee enema is to cause a flushing of toxic bile, or bile that has been loaded with toxins by the glutathione-S-transferase, system out of the intestines.

Glutathione-S-transferase shuttles; it's an enzyme catalyst. It's out there catching free radicals, like an outfielder on a baseball team, and throwing them to the glutathione molecule of the bile. The glutathione molecule has a branch called the sulfhydryl part that adsorbs many electrophiles. It makes them inert in the same way that a clay slough can make atomic waste inert because it has great adsorptive capabilities.

What then happens is that these things become bile salts. The bile salts are then flushed in the bile out of the gallbladder and the liver, and into the duodenum, and peristalsis carries this, then, through the small intestine and through the colon and out the rectum.
That is effective dialysis. The coffee enema is the only pharmaceutically effective choleretic in the medical literature that is repeatable many times daily; choleretic, like diuretic. Diuretics cause urination. Choleretics cause bile flow.

The coffee enema is safe and effective when used as a part of this program, as we use it.
Dr. Peter Lechner at the Landeskrankenhaus of Graz, Austria, has been, for six years now, working to study a very modified Gerson therapy. He has been using the coffee enemas as part of the post-surgical programs of the second surgery department of the Landeskrankenhaus. He did some rat experiments in which palmitates were extracted from coffee, the cafestol palmitates, and in which they were seen to increase bile flow in the rats. Lechner became convinced, and wrote in a journal called Aktuelle Ernaehrungsmedizin (Contemporary Nutritional Medicine), 2 Band 15, April 1990, that these palmitic acid salts could be very

powerful liver protective drugs if they would be developed by a pharmaceutical corporation. But until that time, as he said, "we use the awkward coffee enemas". Nothing else works. In the Zweiter Chirurgischen Abteilung am a.o. Landeskrankenhaus in Graz, he has a bunch of very normal colleagues who are, none of them, enthusiastic about alternative therapies. But none of them are willing to argue with scientific fact, as well. This is a six year long program. This is the second time it's published.

So now you have coffee enemas cleansing the blood. What is the coffee enemas removing? Ammonia products, toxic-bound nitrogen, protein derivatives that are often times charged particles, polyamines, amino acids, clumps, complexes.

When I first talked to Dr. William Donald Regelson — who is in the news now in a big way over the so-called French abortion pill, RD486, as a proponent of the material because it shows promise in treatment of various diseases — when I first talked to Regelson, in 1981, he asked me if the coffee enemas had been studied in the field of Ammoniapathophysiology. I said I didn't know what he was talking about.

He said, "The name is Visik, the father of Ammoniapathophysiology. You probably haven't been taught about it because it is veterinary medicine." I said, "Oh, enlighten me please." He said that it was very simple.

Visik proposed and proved that if you antibios feedlot animals, you'll cut down on the amount of urea-splitting bacteria in their guts, lower their tissue and serum ammonia levels, and they will gain more carcass weight. You can get bigger, stronger, more muscle-loaded feedlot animals for more beef if you give them antibiotics. That is why we give antibiotics to beef.

We could give coffee enemas to animals and have the same effect. That's why Regelson wanted to know if we had studied this in the field of Ammoniapathophysiology; that's where the coffee enemas belong. We are actually altering the level of tissue ammonias; and if it can help cattle to gain carcass weight in a feed lot, eating those ridiculous high-grain diets which cause the bacterial problems in the first place — cattle are not designed to eat a lot of grain — if that can happen, certainly, coffee enemas, having similar effect in people who are not being subjected to high-grain diets, can improve tissue resistance. And they do.

When you improve the sodium ring around tumors and diseased tissue, the first thing that happens is that tissue gets better drainage and better circulation. And the cells begin to function normally. And when cells begin to function normally, they do what's normal for cells; they behave like themselves. And that means our tissues are now themselves again. They bring, with normal function, requisite behavior for health, which is resistance to disease, and immunity against extant disease. That's where tissue immunity comes from. That's where tumor immunities come from: the health of the normal tissue.

Hyperalimentation: the medication of the Gerson therapy

The juices and the foods are the medications of the therapy. They are profoundly effective, extremely complex, chemically exquisite materials. We are only beginning to understand the value of foods from a medical point of view. What we know now, is that we tamper with foods at our own risk; that we distill foods at our own risk; that we cannot appropriately sustain both life and health from generation to generation to generation on all the identified nutrients alone. If we attempt to sustain life on only the known macro- and micronutrients, we do a fair to piddling job of it; and after generations we see deterioration.

If, however, we use the whole foods that are proven for their life-sustaining capabilities as part of the ecosystem in which we evolved, we have much better success at not only sustaining life, but also at encouraging normalcy of tissue; normal function. The carrot juice, the green leaf juice, the apples that are in each of these, have so much going for them that we cannot begin to elaborate all of their medical functions.

There was a time, back during the 1880s, when Baron Justus von Liebig and a Frenchman by the name of Magendie were very big. And Magendie was into gelatin made from bone marrow that you boiled down to get the gelatin. Justus von Liebig was into protein, carbohydrates, and ash. He sold artificial fertilizer that didn't work. But he also revolutionized the way people thought about food, and the popular concepts of diet. People began to eat ridiculous amounts of protein, and gelatin which never sustained life. These were ideas that were very sexy at the time; very telling.

Then came along Casimir Funk, and E.V. McCollum with vitamins. Funk discovered the first pure vitamin, then came McCollum with fat soluble A, and then Albert Szent-Gyorgyi with vitamin C. And then were discovered the D vitamins, and we went all the way to vitamin K. And now at last we knew it all. We had become very smart.

But immediately beyond that came mineral metabolism which really surprised us all, the value of minerals. You probably remember that, at first, Wonderbread built bodies eight ways, and then twelve ways, and then Wonderbread was not accepted as building strong bodies at all. Canada passed a law against calling it bread; said you have to call it "Wonder Loaf", because all it had was individual nutrients that didn't really work to sustain life and health. But by the time we had mineral metabolism we knew it all didn't we? Right?

Except that we didn't. And now we're back into nutrition research as a basic, because we've been forced into it. We're in a cul-de-sac. There may not be that many more drugs discovered in the near future. We are at our wits end for basic health improvement. So now we're back to nutrition because it's the only fertile field left untilled.

It's easy to see the continuing enlightenment of nutrition research. What seemed like logical ideas become outmoded rapidly.

We thought until recently that our epidemiological studies of cabbage family, broccoli, Brussels sprouts, cabbage and so on, which are associated with lower cancer incidence, proved that vitamin D or vitamin A must be doing that. But we found out that it wasn't the vitamins at all. Now there's a new group of chemicals being researched, the indole group. And now we know it's those that are stimulating mono-oxygenase oxydase in the cells. That's an enzyme system that spits out chemical carcinogens. Now we know it all, right?

No. Because we're going to go on discovering and discovering and discovering. But if we tamper with the foods, take them apart, denature them, break them down, we don't have everything anymore. We lose basic values when we tamper with foods, so we don't do that anymore.

The low-tech genius of Gerson was to use the whole food, and only occasionally to use refined nutrients in the form of supplements for specific medical purposes, like niacin which Warburg thought would prevent cancer.

Those foods have to be organic, and that's real simple to understand. Organically grown foods: it is a numbers game. The safe levels of pesticides are established on consumption tables that were created by the U.S. Department of Agriculture and employed by the Food and Drug Administration. When the consumption tables were evaluated by the U.S. General Accounting Office (GAO), it was found that they are antiquated, they are outdated.

The dietary habits of Americans have changed. I eat more than one salad a week, which is what the pesticide safety levels are established upon, a salad a week. I eat more than a couple pounds of melon a year, which is what those USDA tables and FDA tables say I eat.
The safe levels of pesticides are not known. The Delaney Clause, which is a law that says we may not have any cancer causing materials added to our foods, is being invoked. There are big battles in Washington right now to try to figure out whether or not there are safe levels of pesticides.

Consumers want organics for very simple reasons. The parts per billion and parts per million at which cancer causing pesticides are added to food materials are based on consumption tables that do not accurately reflect what we consume in a normal dietary. But boy, when you're here and you are taking 7 to 10 kilos per day of fruits and vegetables — I use kilos because it is easier to think in parts per million when you think in kilos — if you take 10 kilos of food and convert it into juices, soups, and salads per day, parts per million become parts per thousand.

Parts per thousand, milligrams, are what we use to measure the most potent medicines we use. When we get pesticides in that quantity into ourselves — sometimes there are many pesticides on one crop — we're playing with fire. We're playing a numbers game. And there is no assurance in the system that pesticides are applied only in low enough amounts that they will degrade enough that by the time they get to the table these fruits and vegetables will not have

enough pesticides in them, that if we juice them down and take them in large quantities we will not affect our health negatively. There are no safeguards in the system.

Organically grown foods are available. A federal law was passed two weeks ago establishing organic growing guidelines and protection for the name organic, which allows certification programs to thrive, and which will add teeth to efforts by the industry to self-enforce to prevent others from labeling commercially grown, inexpensive materials as the more premium-priced organics. Federal law is now in place in the United States. Organics are now defined by federal law, and there is enforcement by federal law. There is no reason to not be able to get organics anywhere in the United States, or virtually any other country in the world.
Sometimes innovation is required. I think also in Germany, the International Federation of Organic Agricultural Movements (IFOAM) was headquartered and still may have strong representation there. It is a must. It is a numbers game. It is Russian roulette. If you play a numbers game, one day you lose. One day you get milligrams of a pesticide, and the neurotoxic effects are too much.

So now you have many rationales for the basic Gerson Therapy: sodium restriction, potassium supplementation, protein restriction, calorie restriction through avoidance of fat, dialysis of the blood stream for electrophiles, macronutrient hyperalimentation (hyperalimentation means super-feeding), salt and water management, accelerated metabolism. I bet you had no idea. It just looked like a couple of juices and enemas, right? But it has such strong scientific foundations. And I take none of this out of the air. It all comes out of the literature. It all comes out of broad interdisciplinary scientific studies. This is all very solid stuff.
You've been a very attentive group. Thank you, that's all for today.