Conversations With Ronald Rothenberg, MD

As a pioneer in the field of preventive and regenerative medicine, Ronald Rothenberg, MD, was among the first group of physicians to be recognized for his expertise in this rapidly emerging field. The 10th MD in the world to become fully board certified in by the American Board of Anti-Aging and Regenerative Medicine, he founded California HealthSpan Institute in Encinitas, California, in 1998. Dr Rothenberg is dedicated to the belief that the process of physical aging can be slowed, stopped, or even reversed through existing medical and scientific interventions. In this way, health, fitness, and peak performance can be optimized.

Dr Rothenberg has educated over 25,000 physicians who have attended his continuing education seminars. As the creator and director of the Postgraduate Institute for Primary and Emergency Physicians at the University of California, San Diego School of Medicine, he helped create the specialty of emergency medicine by training physicians as this field emerged. Over the past 10 years, he has lectured worldwide on preventive and regenerative medicine, hormone optimization, and stem cells. (Altern Ther Health Med. 2013;19(5):72-79.)

Alternative Therapies in Health and Medicine (ATHM): Could you describe what attracted you to the field of medicine, and were there any events early in your life that moved you in the direction of medicine as a career?

Dr Rothenberg: When I was in college I was fascinated by science and the complexity and elegance of biology. Being young and idealistic, I wanted to do something for the world, so all of a sudden these two ideas came together and practicing medicine seemed like a natural choice. So I applied to a medical school and the rest is history.

ATHM: So what path did you follow through your medical training?

Dr Rothenberg: A circuitous path. I went to medical school at the Columbia University College of Physicians and Surgeons and I did not really know exactly what field I was interested in pursuing because it all held certain fascinations for me. One of my interests was tropical medicine, and again that appealed to my idea of being able to do something for people who really needed it. During my last year in medical school I spent 6 months in Guatemala at a hospital that took care of the indigenous population—big shock from high-tech medicine in the United States to that kind of situation—then during the second 6 months I was at a Native American reservation in Arizona at a public health service hospital.

My initial training was in pediatrics. After that, I returned to tropical medicine and had the opportunity to hold clinics from a small cargo boat on the Amazon River in Peru for the next year. Around that time, the emerging field of emergency medicine was dawning on the horizon.

Back in the 1970s, the field of emergency medicine was in a similar position to where antiaging medicine is now. There was a movement supporting the creation of emergency medicine as a specialty but the conventional wisdom in the medical establishment was, “What do you need that for?” It was considered something unnecessary since its content overlapped with other specialties such as internal medicine and surgery. Once I started learning about emergency medicine, I caught the bug and thought, “This would be a great way to practice inside the United States and a skill that I could take with me if I was interested in international medical projects.” So, right at the beginning of the emergency medicine movement, I did a residency at LA County+USC Medical Center.

ATHM: How did that circuitous path affect your philosophy toward medicine as a whole?

Dr Rothenberg: Emergency medicine certainly is an exciting field and I both practiced and taught it in postgraduate courses for the University of California, San Diego (UCSD), where I became a full clinical professor of family and preventive medicine. I was the coordinator of the Postgraduate Institute of Emergency Medicine for about 20 years and over 25,000 physicians attended these seminars. Teaching postgraduate education for doctors got me in the mode of digging deep into the medical literature in terms of: “Let’s not accept conventional wisdom—let’s really see what the medical evidence is for the
things we believe and the things we do.”

That, in a way, got me ready for the new field of antiaging medicine—although I did not know it yet. I loved to dig deep into the medical literature and “digest” it and present it to my colleagues.

Of course, through years in emergency medicine, you see the results of all these chronic conditions and you are trained to intervene and treat. Eventually the idea hit me that wouldn’t it be nice to be able to prevent some of these events: from heart disease to diabetes to cancer to frailty and fractures.

This was, again, planting the seed in my mind about anti-aging medicine, although I still did not know it yet. So I was on the medical education track and putting on seminars all over the United States and different countries for emergency medicine and helped develop it and wrote some chapters in textbooks. Still, I would say that I was pretty much a conventional doctor in mindset, because that was how I had been educated. The concepts of optimizing nutrition and other variables for the best preventive medicine and quality of life were still not on my radar.

Although there were, again, seeds planted that maybe I wanted something different. Even back in medical school, where I had a great education, I was irritated that it was still the “treat the disease” model. We were going to go see the gallbladder in room 200 instead of going to see Mrs Jones who has five kids and this is her job and this is her world in room 200. It was the illness model, not the individual person model.

That frustrated me and I tried to do my little part to really get connected with the patients. I remember early on in medical school even going to a patient’s funeral after a long illness. My colleagues and professors would say, “Oh, no, you can’t do that. You can’t go to every patient’s funeral,” even though I felt like I should and I wanted to be there; I was really connected to her. Anyway, there were little seeds of that—some things I did not like about the way medicine was practiced.

My career in emergency medicine practice and teaching continued and when I was around 50 I became more interested in my own health and that of my friends and family. I was healthy and didn’t have any medical problems but I knew I was slipping or declining somewhat. It started on the periphery, but I started asking, “What about all this stuff about nutrition and supplements?”

That was back in the “carb-loading” days of nutrition. What about these 40-30-30 diets? What about supplements? And what about that news magazine cover about DHEA? Is there anything to that? So I took my skills of analyzing medical literature and digging deep, which I needed as a professor and as an educator, and started learning about this field. I did not even know the term “antiaging medicine.”

I got more and more fascinated with this and I started to change myself. I started getting a lot healthier, both in body composition and lab testing biomarkers. My colleagues would say, “What are you doing? We want some of that. What are you taking?” But really it is not like taking something; it is a whole, big picture. Around that time, in 1996 or 1997 or so, I came across different seminars in this field of antiaging medicine and I thought, “This is what I am interested in learning.”

I became an avid student and, within a few years, used my experience in education to become an educator in that field. I still had a foot in both worlds—emergency medicine and antiaging medicine—but then gradually transitioned completely to antiaging medicine, which I have been doing the past 15 years or so. My initial patients were all physicians, and even now, I would say that about one-third of my patients are physicians or other health care professionals.

ATHM: So how did all this impact your career?

Dr Rothenberg: Again, I have had a lot of great careers in medicine. I continued to do the tropical medicine type of thing for disaster relief. I was part of a disaster relief team where we would setup MASH-type hospitals after major events in Latin America, such as after the earthquakes in El Salvador, Mexico City, and Guatemala.

I really enjoyed being able to help in that way and practice medicine where the rubber meets the road and you do not worry about little details and regulation. You just do the best you can with what you have got.

I continued that and then transitioned into antiaging medicine. Now, I could really fulfill my dream of really getting to know the patient, as in knowing everything about their lives and in this way I felt I could do the best job for my patients practicing medicine.

In emergency medicine, the idea is, “You have a 5-minute encounter. Let’s try to make it seem like a lot. Do the most you
can in that brief period.” I learned from some of my great colleagues in emergency medicine, especially cardiologist colleague Antone Salel, MD. In reading his histories, no patients were “GOMERS”—even this 90-year-old guy who shot down 10 Messerschmitts in World War II, and this other 90-year-old woman, who was the captain of the cheerleaders in high school. Everyone was an individual with their own story.

These are all people who had lives and were unique and fascinating, but you have to have some time to be able to notice. Now, in antiaging medicine, I can structure my practice so I can really know things about people and, that way, do the best the job as their physician. It is a different approach, which is tremendously satisfying to me. I still get a kick out of it every day.

**ATHM:** Can you provide a simple definition for antiaging medicine and describe what differentiates it from general practice?

**Dr Rothenberg:** First, a lot of people do not like the term, “antiaging medicine” because it is “anti-.” However, it is not against aging. It is not against older people. In medicine, however, we have antibiotics and no one has a problem with that word or anticancer drugs. But, maybe other terminology would be more acceptable to some.

Preventive and regenerative medicine—how about that? It means, it is the same thing, but how do we differentiate this from conventional medicine? There is only one medicine: what works, what is safe, what keeps people healthy and happy, and what optimizes quality of life. Antiaging medicine is a different approach in that it takes preventive medicine seriously instead of simply paying lip service to prevention.

Some people have asked, “What age do you start antiaging medicine?” Prenatally. It is medicine. It is what can you do to prevent degeneration and to rectangularize the health-span curve. Visualize the concept of the health-span curve where the first 20 years of life most people are very healthy, and then from 20 to 40 their health is good. But between 40 and 60, health may be good but some clinical illnesses are developing, then between 60 and 80 these become apparent and there is degeneration.

So there is this slow curve down from 60 to 80, and conventional medicine maybe adds some years, but these are usually not quality years as they can be years with chronic illness. The concept is to rectangularize in order to make that curve stay level—to stay healthy, happy, and satisfied as long as possible. You have got to die sooner or later, but instead of just adding a few years in a nursing home and a few months in the ICU at the end of life, let’s make this curve into a rectangle and keep going till the very end. That is the concept in antiaging medicine.

What can you do? Focus on early detection and prevention of illnesses and disability and optimize quality of life. It is all the same thing but it is a different approach. It is not the disease-oriented approach. It is the quality-of-life approach.

**ATHM:** So preventive/restorative medicine takes a different approach toward managing the quality of life. Can you describe how you go about it?

**Dr Rothenberg:** What is our approach to the patient? Before the patient shows up, we try to have thorough diagnostic testing—not just of the conventional lipids and the electrolytes and blood count, but also looking at inflammation, looking at key antioxidant and vitamin levels, and looking at the hormone levels and also the free hormone levels that are actually biologically available to the patient. So there is a lot to work with in the initial meeting.

From this basis we can branch off and get whatever additional diagnostics that we need. Then sit down with the patient and find out what they want to accomplish; what are their goals? Some patients might be sick and have some serious diseases and of course that would be the first on the list. Some patients are in optimal health and fitness and want a plan to stay that way. Then try to work with the patient and their goals and their philosophy, again, to optimize their quality of life—not just to treat a disease.

This includes nutrition and that is a key component of this program. We have a wonderful full-time nutritionist to tailor nutrition to each individual patient. Exercise is an essential component, of course, and we must consider what form of exercise—not just lip service: “Go out and get some exercise”—but “What is your program?” Our patient programs include stress reduction, determining what supplements are useful for the patient, and organizing supplements into different tiers, drawing from scientific evidence. Then, we consider the concept of optimal hormones, as well. That is the process we use instead of just asking, “What is the acute emergency?” Regular medicine has a term that I hate. They talk about the “worried well” and that is often used in a derogatory way, like the patient is coming for an office visit but is really okay.

What is wrong with wanting to be well? I think that is a wonderful thing, but it is a totally different approach. We do not say, “Oh, no, this patient does not have a life-threatening emergency today. What is he doing here?” We ask, “What can we do to keep her healthy and happy as long as possible?”

**ATHM:** In the practice of preventive/regenerative medicine, the panel of tests that you use for diagnostics may not be quite the same as what a general practitioner who is treating from a disease or acute perspective would choose to use, and so the standard of practice might be different. How do you operate within a medical system that is so keenly attuned to operating within a particular, narrow standard of practice?

**Dr Rothenberg:** You have to take a look at what the standard of practice means. Certainly, patient safety and “First, do no harm” always come first, but just because this is the way things have been going on for the past 20 years does not mean this is the best thing to do today. There is always the consideration of: What is the best I can do for this patient?

I do not think that getting extra diagnostic tests is a prob-
lem or a controversy. Usually, we can negotiate some with the labs to get more cost-effective, extensive panels for our patients, and that is a good investment because you can pick up some things on these that you might not know otherwise.

Maybe some more conventional doctors might just roll their eyes at the testing, but there is nothing wrong with having more information. You do have to make some decisions. Testing is limitless, and it is always a compromise. You cannot test every imaginable thing. You decide what basics you want to see on every patient and then, according to their situation, what further directions do you want to go in? I think it really helps our patients.

ATHM: How does the perspective of treating to increase quality of life change perspective on reading lab results?

Dr Rothenberg: That is a great question because with the standard medical model, you are either high, low, or WNl. You know the joke about what WNl means? … “We never looked.” Seriously, it refers to being “within normal limits,” of course. That is the old model. There are only three possibilities. For example, in terms of cortisol, we have got Cushing’s disease on one hand—extremely excessive—then we have got Addison’s disease on the other side of the spectrum—extreme deficiency. Everybody else, “Hey, you are normal.” But in this vast normal range is a tremendous spectrum and there is an optimal point in “normal.”

For the majority of patients, optimizing within this “normal range” can produce a tremendous change in quality of life and that is where the excitement is. Again, it is clinical medicine. But when patients and lab tests do not agree, I vote for the patient. We can use this information as a clue and then correlate it with the patient’s actual situation.

We think, “Even if the lab test is normal, can we modify something to make a positive impact on her life?” That is the different model about looking at lab tests from preventive and regenerative medicine to conventional medicine. Thyroid is a good example, where patients can be clinically hypothyroid yet their lab tests are within the reference range. I’ll ask “How are you doing in terms of your thyroid?” The patient says, “My doctor says my thyroid is normal.” But I’ll ask, “What do you think?” Then she will say, “Gee, my hands are cold, I can’t get out of bed in the morning, etc” and she lists every symptom of hypothyroidism. Hmm. Do we treat the patient or treat the lab? That is why the vast middle range is where the action is.

ATHM: Let’s talk about hormone replacement therapy (HRT). This subject can be very controversial in the medical community. It seems that preventive/regenerative medicine embraces this concept as an important tool for promoting health and vitality. What do preventive/regenerative medicine doctors know about HRT that everybody else does not?

Dr Rothenberg: We are aware of the data in the current medical literature and are not stuck in a paradigm based on myths that never were true. We can discuss testosterone for men and women, bio-identical estrogen and progesterone replacement for women, as well as thyroid and cortisol optimization. First we want to establish the safety of controversial treatments.

This goes into, of course, the concept of first, do no harm. We certainly do not want to do anything that could possibly hurt our patients. But in terms of safety we can go through male and female hormones and there has been a tremendous amount of bad information and myths that have caused great harm to patients over the past several decades.

In women’s hormones, there is the famous Women’s Health Initiative Study, which studied equine estrogen and medroxyprogesterone acetate (MPA), brand names Premarin and Provera. The conclusion of the study was that hormone replacement with these substances (they are of course not human hormones) was dangerous because there was an increase breast cancer, cardiovascular disease, and stroke risk—even though there were some benefits. In terms of women’s hormones, this study implied that hormones will kill you; hormones are dangerous. Every woman knew it. Their doctors said, “Hey, stop taking your hormones.”

This was such a tragedy because everything was wrong with the study and now, even in the conventional medical literature, we are seeing article after article that backs up the problems with this study. Actually, arguably you can say they did not even really use a hormone if you define a hormone as a compound made in the human body by an endocrine gland that travels to remote sites and has physiological actions.

Equine estrogen is not produced in the human body. MPA, a progestin, is chemically similar to progesterone but similar is not equal and the enzymes in the body that have evolved over millions of years to deal with the hormones that are part of human physiology do not metabolize artificial progestins in the same way as natural progesterone.

All this misinformation created a situation where decades of women did not have the benefit of having youthful hormone levels and depriving them of a treatment that improves quality of life enormously. If we look at the current medical literature on bio-identical—which simply means the same substance that is in the human body, atom for atom—estrogen and progesterone, there is no increased breast cancer risk. There is no increased cardiovascular risk and a definite decrease in cardiovascular risk if started at menopause. So in the study, the conclusions they had did not apply to treating patients in the right way, but it became part of the medical culture.

For men, of course, the myth was that testosterone is dangerous; testosterone causes prostate cancer to grow. In the medical literature, especially in the articles of Abraham Morgentaler, MD, from Harvard over the past 5 years, research has shown that this myth never was true and still is not true.

We are following the medical literature and I feel that you have to keep following it. If we learn something new that shows something we are doing is dangerous—that some hormone therapy that we are applying is not optimal—let’s stop it and do the right thing. As of now, we have got the quality of life issue, we have got the medical literature to guide us, and the safety of these treatments has been established.
ATHM: In the past you have compared hormone replacement to vision correction. Can you explain this analogy?

Dr Rothenberg: I might have gotten the idea from one of Dr Morgentaler’s articles or lectures, so if I have pirated the concept, I am footnoting it. Once again, this goes back to testing and how to treat people. The concept in conventional medicine is if you are normal for age, then you are fine and a lot of the lab reference ranges are based on that.

Here is the vision analogy: If you had an 80-year-old who you are prescribing glasses for, would you decide to give him vision normal for 80 years old or normal for 20? This is a silly question because the answer is obvious. The same thing applies to hormones. If you are 100 years old, getting the hormone levels normal for that age might not be doing you any good. We want to replicate the healthiest physiological stage of the human organism.

ATHM: Vitamin D supplementation has become a much more accepted therapy in recent years, but there is still debate over where the optimal and safe levels lie even though a lot more doctors are willing to suggest 1000 IU for their patients. What is the perspective on vitamin D from preventive/regenerative medicine?

Dr Rothenberg: Many concepts in preventive/regenerative medicine have moved over to the other side and become conventional over that past years and that is a great thing. For example, I see primary care docs ordering vitamin D levels all the time now. Ten years ago, this was one of those crazy exotic things that we did that created arguments in the doctor’s lounge such as, “Oh, you guys, I cannot believe you check vitamin D levels.” So hopefully medicine is moving in the right direction.

It turns out that vitamin D is probably at the top of the list of supplements. I try to organize supplements for patients, in terms of what do we know the most about and where do you get the most bang for your buck in terms of preventive medicine?

The history of vitamin D is fascinating and the current recommendation by the Institute of Medicine is 600 IU per day. This is if you are a newborn or a 300-pound pregnant woman. Where did this come from? Why this minimal dose? It turns out you do not need much vitamin D to prevent rickets and that was where the initial push about vitamin D came from.

That is why there are 100 IU in a glass of milk, enough to prevent rickets. Over the past 5 years, however, there has been astounding data on the benefits of vitamin D. For everything from cancer prevention, cardiovascular disease prevention, prevention of falls in women, and prevention of influenza. There is a fascinating chart here that I use in lectures which shows what serum level of vitamin D would prevent what percent of various illnesses. These are all based on individual studies—for example, breast cancer. Pink ribbons are nice, but a serum level of 51 ng/dl would prevent 83% of breast cancer. Is that not astounding?

How about falls in women? We know vitamin D is necessarily to prevent osteoporosis and prevent fractures, but it does something for neuromuscular coordination. A vitamin D level of 30 ng/dl can prevent 70% of falls. Acute myocardial infarction (AMI): A vitamin D level of 35 ng/dl could prevent maybe 30%. For autoimmune disease, a study in Finland, where there is a very high incidence of type 1 diabetes—presumably because there is not too much ultraviolet there, so close to the Arctic Circle, and there is a high occurrence of autoimmune disease—gave 2000 IU to children from newborn to teenagers and 90% of type 1 diabetes was prevented. Amazing!

We are going on and on—so what is the sweet spot? It is hard to get toxic levels of vitamin D. The reference range is, let’s say, 35 to about 100 ng/dl, but a lot of studies include people who have accidentally taken millions of IU and maybe had some symptoms but these cleared up.

Based on the current literature, I think the sweet spot is 60 to 80 ng/dL. What dose of vitamin D do you need? Everyone is a little different. Of course, you can make 20 000 IU of vitamin D on your own, and the formula for that is to play volleyball in a bikini in Maui for an hour at noon and do not take a shower until dinner. Therefore, 20 000 units really cannot be too toxic. You can grow your own.

You have got to sweat in the sun, without sunscreen of course, to make it. What also produces this level of 60 to 80 ng/dL is somewhere between 5000 and 10 000 IU per day. Sometimes it is low as 3000 to 4000 IU per day. Sometimes it is as high as 15 000 IU per day, because everyone metabolizes a little bit differently.

Wouldn’t it be nice if everyone in the United States could have adequate vitamin D? There are different estimates, but that could produce billions of dollars of health care savings and there is no way to calculate the prevention of suffering that it could produce.

ATHM: Getting back to thyroid, since traditional lab tests define such a wide range as within normal limits, this has been an area where integrative practitioners traditionally have had quite a bit of success in improving patient health. In what ways can HRT affect patients’ quality of life through thyroid optimization?

Dr Rothenberg: Tremendously. Remember my thyroid example; again, this is clinical medicine. Have you heard the bad joke? “When all else fails, look at the patient.” If the patient is clinically hypothyroid, she needs thyroid replacement, or more thyroid replacement. So the trouble with traditional medicine has been just that: looking at the numbers, not the patient. Physicians must realize that—and this is what we have been talking about—this vast middle range is where the action is.

Again, this is a situation where quality of life can be improved tremendously in terms of energy and enthusiasm. You can monitor and prevent the theoretical adverse effects of too much thyroid. You do not want to produce hyperthyroidism, of course.

So when pushing the envelope with thyroid, even treating patients who are within the normal range but still keeping
them at the optimal point within the normal range, what would be the possible problems? One could be bone loss, theoretically—osteoporosis. But fortunately, we can monitor the day-to-day bone status with urine N-telopeptide tests, which tell us whether there is gain or loss in a particular day. The other theoretical problem that you could produce is atrial fibrillation. Again, we are not going to produce hyperthyroidism, but we monitor the EKGs and document that we haven’t produced it.

This inexpensive intervention and inexpensive optimization can really help quality of life. Here is another issue with thyroid. Most integrative medicine, antiaging—whatever we want to call it—practitioners prefer to use desiccated porcine thyroid brands like Armour Thyroid or Nature Thyroid. The condescending attitude of conventional endocrinology is, “How can you use that old-fashioned stuff? Modern science knows better. We’ll just use T4.” T4 is a prohormone, however, not the active hormone and conversion to the active hormone T3 is affected by many variables. But gratifyingly, in the past few months there has been a study published in the flagship journal of endocrinology, the Journal of Endocrinology and Metabolism, comparing desiccated porcine thyroid to L4 or levothyroxine. Half the patients said they felt better on the desiccated porcine thyroid and there was significant weight loss compared to the conventional treatment. It is gratifying to see that in the medical literature.

We are following our patients and they say they feel better this way. So okay, there is no harm in it; let’s begin to optimize quality of life.

**ATHM:** As long as we are discussing thyroid, what is your opinion about supplementation with iodine?

**Dr Rothenberg:** There are lots of reasons we need adequate iodine, but how much and how do you tell? I have learned a lot about iodine from David Brownstein, MD. First, it is hard to test for because a random serum iodine reading does not really tell us about the body stores. If you wanted to do testing, you would have to do a challenge test where you give a dose of iodine and iodide at 50 mg and then get a 24-hour urine collection and see how much comes out. If the tank is full, it all comes out. If it is empty, it does not.

That is a little labor intensive, so I usually can get a good idea from dietary history. If the patient eats fish several times a week—and sushi certainly in San Diego where there is a sushi bar on every block—there are a lot of sushi eaters and it is the seaweed in the sushi that has good iodine content. So when the patient does not eat fish and sushi, then I will go ahead and replace iodine for multiple benefits, and I want to replace with one of the products that has 12.5 mg of iodine and iodide, which happens to be the iodine dose of the traditional Japanese diet.

It is interesting to consider the RDA, and of course RDA is laughably low—it is barely enough to keep you alive. The recommended daily intake of 150 mcg is almost 1000 times less.

**ATHM:** So you are saying that if iodine supplementation is recommended, that these products at 12.5 mg are a good starting point?

**Dr Rothenberg:** If you feel clinically that the patient is iodine deficient in terms of dietary history, yes. Certainly, again, the culture of San Diego—where most people are big seafood eaters—is one story, but in the Midwest there are people who do not eat any seafood who would all benefit from having adequate iodine. Certainly, you cannot make thyroid hormone without iodine because that is what the numbers in T3 and T4 represent: how many iodine atoms are on the thyroid molecule.

**ATHM:** Specifically, how can treating thyroid function through HRT address cardiovascular issues?

**Dr Rothenberg:** This is really exciting because the mindset in medicine is that we all learned, appropriately so, that if a patient presents an atrial fibrillation you check thyroid function to see if the patient is hyperthyroid. That is one of the causes. Because of that, there is a concept that I call thyrophobia that has developed in medical culture.

The conventional idea is that somehow thyroid supplementation and optimization is dangerous for the heart, but there are studies in the medical literature that show amazing benefits. I will just list a few of them: lowering C-reactive protein (CRP), an inflammatory marker. We know that CRP is a risk factor for acute myocardial infarction. Lowering homocysteine: Elevated homocysteine is associated with cardiovascular disease. Dilating coronary arteries: Thyroid hormone actually opens up the arteries. Counter intuitively, thyroid is antiarrhythmic. Ventricular tachycardia (VT), which is a lethal dysrhythmia, is associated with low T3 levels.

Here is another counter intuitive effect: low free T3 predicts atrial fibrillation, not high free T3. And after coronary artery bypass, low free T3 predicts atrial fibrillation. Reverse T3—that is the stereoisomer, the mirror-image molecule that blocks the receptor sides. High reverse T3 is a strong predictor of mortality after AMI. In fact, the higher the free T3, the greater the survival post-MI.

The heart has receptors for thyroid. It is necessary for proper cardiac function and saves the cardiac geometry after AMI. It is a really big factor. In fact, a lot of patients in the ICU have very low free T3 and that is a risk factor for everything bad happening, so you have got to pay attention—not make someone hyperthyroid—but the patient must have adequate thyroid in the cardiovascular scenario.

There is currently a study going on now called the THIRST study that includes patients with an ST elevation MI (STEMI) and they have got borderline—borderline means within that reference range—or reduced T3 and they are treated with T3 when stable for 6 months. T3 versus placebo. The end points being studied are death, reinfarction, or other adverse events. It will be exciting to see the results of this study.
Also, T3 is an experimental treatment for congestive heart failure, which is another counter-intuitive situation. Conventional wisdom is that the T3 might cause tachycardia and be dangerous. But in all the studies with T3 for heart failure, the outcome is significantly improved and the mortality is decreased and heart rate and systemic vascular resistance decrease.

**ATHM:** Testosterone is another area where there seems to be some fear about addressing deficiency. How important is maintaining testosterone levels to wellness and vitality?

**Dr Rothenberg:** “Come with me if you want to live.” You remember that line from *The Terminator?* Low testosterone is a lethal disease that we can prevent in terms of every negative outcome. Again, the studies on testosterone over the past few years have been astounding. We know that when looking at endogenous testosterone, low testosterone is associated with everything bad: with all-cause mortality, with cardiovascular mortality, with higher cancer rates.

The idea that testosterone causes prostate cancer to grow comes from one paper by Huggins and Hodges in 1941. Over the past 10 years numerous studies have shown this to be a myth. The whole history of this is all detailed in Dr Morgentaler’s papers. There have been treatment studies now with testosterone replacement associated with less all-cause mortality, less cardiovascular mortality, and less cancer mortality. Again, talking about how conventional medicine is catching up to preventive and regenerative medicine, well, you certainly know that testosterone replacement is now advertised on television and many primary doctors are checking testosterone now but it takes some experience and skill—like everything in medicine—to replace it the right way.

The apparent paradox concerning testosterone and prostate cancer can be explained by a “saturation model.” Metastatic prostate cancer will regress if treated by pharmacologic or physical castration. This would get the total testosterone level down to close to zero. However all it takes is a total testosterone of about 100 (which is extremely low) to saturate receptors for prostate cancer growth. Therefore treating a man who has a very low testosterone of say 200 with testosterone replacement and raising his level to a youthful range of say 800 would not have any effect on prostate cancer growth. There are current studies of treating men with testosterone replacement in the setting of prostate cancer treated with radical prostatectomy, and brachytherapy and “observation” with no recurrence or exacerbation. Testosterone replacement therapy is safe and results in less cardiovascular disease, less dementia and Alzheimer’s, less diabetes, better sexual function and body composition, and results in a tremendous quality of life improvement.

**ATHM:** You have talked about the impact of HRT in traumatic brain injury (TBI) and recovery from TBI; what aspects of HRT can affect the recovery from brain injury?

**Dr Rothenberg:** There is a landmark study in the emergency medicine literature on progesterone for TBI. Initially you think of progesterone as just a female hormone, but of course, men and women both have progesterone. Progesterone via its metabolite allopregnanolone does a lot of good things for the brain. It turns on the neural stem cells and so maybe that is why women are so much smarter because they have that allopregnanolone pumping all the time.

There are some basic science studies showing that allopregnanolone and progesterone actually are useful for brain regeneration in different settings. In TBI, perhaps in dementia, perhaps in Alzheimer’s, perhaps post-CVA. This “Protect” study that was published in the *Annals of Emergency Medicine* was a beautiful randomized placebo-controlled study giving progesterone intravenously with TBI.

There were dramatic effects in the moderate brain injury group: The patients with a Glasgow coma scale that was 9 to 12 had a significant benefit in terms of their cognitive function. It is important to stress that this is with progesterone, not progestin. Other hormones, such as melatonin now are showing great potential for brain resuscitation post-TBI.

**ATHM:** Are progesterone and progestin often confused?

**Dr Rothenberg:** I thought you would never ask. Yes, and that is the problem. Many well-trained physicians seem to think they are synonyms. If you look at the two molecules side-by-side they are not exactly alike. They look kind of similar but progestin has got an extra branch chain on it. Again, let’s go back to philosophy and science: Why would you even think of putting something that is only sort of like a hormone in a human body?

Why not use the hormone that belongs there? Maybe there are economic reasons, in terms of being able to patent a substance that is not endogenous. It seems that this is the basic problem with the HRT studies. We talked about the equine estrogen, but the problem is really the progestin. It serves some progesterone functions in terms of preventing endometrial cancer, but it is a progesterone blocker in other settings.

We can look at the Fournier study in terms of breast cancer, where you compare bio-identical estrogen and progesterone to estrogen plus progestin. In the bio-identical estrogen and progestin group there was no increased risk of breast cancer in 80 000 French women—teachers. When progestin was used, there was about a 60% increase in risk of breast cancer.

They are not the same. Even if you look in the women’s health initiative, now back to the equine estrogen, the breast cancer rate was actually slightly less—although with no statistical significance—when just equine estrogen was used. When combined with the progestin MPA the rate increased, so this is one of the major problems with Premarin/Provera HRT. Progesterone and these substances are not synonyms.

**ATHM:** There may also be some appropriate indications to use progesterone for women who have undergone a hysterectomy, correct?
**Dr Rothenberg:** Correct. Again in traditional medicine, the only use for progesterone is when a woman is getting estrogen replacement, and she has a uterus, in order to prevent endometrial cancer. Let's come back to the idea that every cell in the body has a progesterone receptor and that there is tremendous clinical benefit. Progesterone produces natural sleep in women. It is a natural mood stabilizer, a GABA agonist, and, again, it gets into the brain and turns on stem cells.

We are looking at tremendous quality of life improvement. Progesterone also balances estrogen in terms of reducing breast cancer risk. Any woman who is progesterone deficient should have progesterone replacement. It is a tremendous benefit.

**ATHM:** What is on the horizon for preventive and regenerative medicine at this point? What are you watching? What has really captured your interest?

**Dr Rothenberg:** There are a lot of fascinating things certainly going on. Telomere optimization is big. Telomeres are the end-caps on the DNA, the analogy of the plastic shoelace tip that stops the shoelace from unraveling and it is a counter for how many DNA replications are possible. After you run out of telomeres you get bad copies of DNA, which produce poor cellular function of whatever that cell is supposed to do—or worse yet, lead to mutations that can become cancer.

All the healthy things we are doing for lifestyle in terms of nutrition, stress reduction, and moderate exercise all help to slow telomere loss. But now the concept is that there are potential ways to increase telomere length. If enough scientific studies come through to truly validate this, it will be a tremendous advance.

Stem cells, of course, are the future tools of medicine. We are involved with stem cells in the setting of banking adult stem cells from patients by apheresis technique from peripheral blood. If a patient wants their stem cells stored, we can do this. It is like having your clone in the freezer. There are conventional FDA-approved uses for stem cells, such as bone marrow transplants and the setting of multiple myeloma, or radiation poisoning, but there are exciting future uses that have not been proven to be effective as yet. But maybe if you bank your stem cells, at whatever age and replace them at certain intervals, you will have younger stem cells swimming around and repairing things. Of course, using stem cells to treat all kinds of situations from orthopedics to dementia and cardiovascular applications to diabetes are all being studied now. Endothelial progenitor cells (EPC) are the built-in repair system for the cardiovascular system. The lifestyle and hormone optimization treatments can increase the quantity and quality of our EPCs. Measuring these stem cells will be a near future biomarker of wellness.

The concept of 3D printers is using stem cells to print 3-dimensional organs. Wouldn't that be cool to just have it on your desktop next to your laser printer? "Hey, what do you need? We'll grab some of your stem cells and print you one." It sounds like science fiction but a lot of science fiction, more often than not, becomes reality. A 3D printer can take all the atoms and assemble them in any way. You can make anything from food to technical items to organs. It is absolutely amazing. I think there are 3D printers making women's shoes now, so you have got a ways to go.

**Genomic medicine:** Having our little nanorobots scurry around and repair damage and replace things, keep arteries open, and perform immune and oxygen transport functions. It sounds like science fiction but there are ongoing studies.

**Nutritional medicine:** Having a complete genome printout for every patient and knowing what medicines would work for them, predicting what medical problems they are going to have in the future, and intervening early—even repairing the DNA so the genomic deficit is not there. All these are coming fast and furiously.

**ATHM:** Is there anything else you would like to touch on before we conclude?

**Dr Rothenberg:** We go back to the idea that there is one medicine and preventive and regenerative medicine should be available to everyone. In the big picture it would save untold billions in health care by preventing illness. The dream is certainly a model of medicine like this—starting out with everyone in the United States. Then, let's dream bigger. Why not everyone in the world? Why not let everyone in the world be able to live to their maximum potential of health and be free from as many diseases as possible? Of course, there are tremendous economic and political situations and you have to take care of basic stuff like having enough food and water, first. But that is the dream: having this type of medicine as a standard that everyone can benefit from and be as happy and healthy as possible.

For additional reading and research recommended by Dr Rothenberg, please visit http://www.alternative-therapies.com/Rothenberg.