Aristo Vojdani, PhD: Environmental Factors and Autoimmune Disease

Interview by Karen Burnett

Aristo Vojdani, PhD, *is a respected researcher, scientist, speaker and author. He has published over 120 articles in peer-reviewed scientific journals, is a multiple US patent holder for laboratory assays, and has received the Herbert J. Rinkle Award from the American Academy of Environmental Medicine for excellence in teaching the techniques of environmental medicine. He is the founder, technical director, and CEO of Immunosciences Lab, Inc, in Los Angeles, California, and serves as chief scientific advisor at CYREX Laboratories in Phoenix, Arizona. He sits on the editorial board of four scientific journals and is a guest editor of six journals.* (*Altern Ther Health Med*. 2013;19(1):70-75.)

Alternative Therapies in Health and Medicine (ATHM): Dr Vojdani, where did you grow up?

Dr Vojdani: I was born and raised in a very small town in Iran up to age 18. After high school, I went to Israel to continue my higher education with a bachelor's—then master's and doctoral degrees in the field of immunology.

ATHM: What were your early influences that fostered your interest in health?

Dr Vojdani: My father wasn't a doctor, but he was very interested in herbal medicine and, indirectly, that probably affected me. On the other hand, I was born in a Jewish family. Living in Iran, as you know, in our struggle for survival, education was the only recourse that could protect us against discrimination.

Therefore, that is why most Jewish families say, "My son should be a doctor." That's what my mother did. She named me Aristo with the hope that I would follow in the footsteps of Aristotle.

ATHM: When you went to Israel, what did you study?

Dr Vojdani: I went to Israel to earn my bachelor's degree in biochemistry and microbiology. After that came a master's degree in microbiology and immunology. Finally, I finished my PhD in the field of immunology. Again, all these three happened in Israel.

***ATHM*:** Did you have a specific experience that made you curious about wheat and gluten sensitivities and the effects of environmental chemicals and autoimmune issues?

Dr Vojdani: Yes. We are all influenced by the experiences we go through. After finishing my PhD, I did one postdoctoral study at Wiseman Institute in Israel, and then I went back to Iran, where I became an assistant professor at the university—one of the universities in Tehran. When the revolution occurred, we came to the United States, and I started another postdoctoral study at UCLA. That is where everything really started.

Recently, I was awarded a lifetime achievement award by the Carick Institute for Graduate Studies. They asked me the question, "What was the turning point in your life?" I had to say coming to America. When I started my postdoctoral studies at UCLA I became interested in the effects of toxic environmental chemicals on the immune system. That was in 1979, when a very interesting article about immigrants and disease in the United States was published in a scientific journal. They compared the rate of cancers in Japanese in Japan versus Japanese who migrated to the United States with similar comparisons for Chinese and other immigrants. The conclusion of the article revealed that Japanese in Japan suffer from stomach cancer, but when they come to America they don't end up with stomach cancer, but they develop colorectal cancer. Japanese women in Japan do not have breast cancer. However, 20 or 30 years after immigration or migration to the United States, they do develop breast cancer. The question, then, was: Is it genes or the environment?

That was the first thing that caused me to become interested in the role of environmental factors in immune disorders. When I moved from UCLA to Charles R. Drew University of Medicine and Science, I became a faculty member and I started writing my own grant application to the National Institute of Health in relation to the effect of toxic environmental chemicals and cell-mediated immunity. In 1986, I was hired as a consultant to a laboratory in Los Angeles that was very interested in testing for food sensitivity. I developed the first ELISA, enzyme-linked immunosorbent assay, for measurements of IgG antibodies against a variety of food antigens. I used this test to look for antibodies against wheat, corn, soy, or milk, and I found that a very high percentage of the population was reacting to wheat gluten.

Consequently, I also became interested in the role of diet in the induction of immune disorders.

***ATHM*:** Would you say that there are many more undiagnosed celiac cases in our society than we know about?

Dr Vojdani: Yes. For clarification, however, let's divide gluten reactivity to two subgroups. One group is celiac disease, about 1% to 2% of the population, which is a classical disorder initiated by some kind of trigger. For example, a child is completely healthy but has a rotavirus infection. The rotavirus changes the integrity of the child's mucosal immune system. Because of that, the child cannot digest wheat proteins properly—in this case gluten. If that child also has a certain genetic makeup, called HLA-DQ2, DQ8, inherited from the mother and father, a genetic susceptibility exists. Now the food, in this case gliadin peptide, is not digested properly. Some inflammation in the gut occurs, initiating an enzyme called transglutaminase to deamidate the gliadin peptide, which in the process binds to transglutaminase itself. Now the body, the immune system, will react against gliadin as well as its own enzyme, which under normal conditions should not occur. This is a classical example of gluten sensitivity resulting in celiac disease in an individual with the genetic makeup for this disorder. Again, this is initiated by a trigger—in this example, a virus.

Medication could do something like that as well. When they do tissue biopsy for celiac disease, they find abnormal tissue. So therefore, it is easy to detect, because there is laboratory testing for measuring IgG and IgE antibodies against gliadin and also IgG and IgE antibodies against transglutaminase. If the IgA antibody against transglutaminase is positive and the IgA antibody against gliadin is positive and the biopsy taken from the patient is also positive, that will confirm a diagnosis of celiac disease. In the literature, they suggest that for every single case of celiac disease there are eight undiagnosed. Why? We call this silent celiac disease, or atypical celiac disease. Therefore, we need to do laboratory testing—a blood test—in order to be able to detect the celiac disease. That is one category.

The second category is based on an article published during 2012 in a scientific journal. They started using another terminology, which is called nonceliac gluten sensitivity (NCGS). NCGS in this case is the patient who makes IgG or IgA antibodies against gliadin or other wheat proteomes but does not make the antibody against transglutaminase. When they biopsy that patient, the sample is absolutely normal. Therefore, NCGS is very difficult to detect because the classic blood test, which confirms diagnosis of celiac disease, is negative because transglutaminase IgA is negative—and they do a biopsy and the biopsy is negative. They send the patient home and tell him or her you can have any amount of gluten you would like. Unfortunately, because the body continues to react against gluten IgG and IgA, the transglutaminase can eventually turn around and cause an antibody that can attack tissue after years—5 years, 10 years, or 15 years. This undetected NCGS could eventually become autoimmune reactivity or autoimmune disease.

In my opinion, NCGS is more dangerous than celiac disease because celiac disease is detected by the gastrointestinal specialist. Based on testing, they can tell that the patient should go on a gluten-free diet. And when they go gluten-free, the majority of them improve significantly. To me, NCGS is more dangerous because if it's not detected, it could result in autoimmunity years later.

***ATHM*:** Does this lead you toward recommending that most people avoid gluten?

Dr Vojdani: I'm not saying that most people should avoid gluten. What I am saying is that individuals who have GI symptomatology—even though they go to the gastroenterologist and show a normal biopsy—should still do an array of testing for antibodies against wheat proteomes. It is not enough to measure antibodies against just one component of wheat. As I demonstrated in the article I published in the *Journal of Allergy and Clinical Immunology* about a year ago, antibodies should be measured against various wheat proteomes because, while one individual could react to component A of wheat, a second individual may react to the component B, the third individual may react to component C, and the next individual may react to A, B, and C at the same time. Therefore, we have to measure antibodies against all wheat proteomes. If negative, a person should not go on a gluten-free diet. That's my opinion. If they are positive, that will justify the gluten-free diet for those individuals.

***ATHM*:** You have said that the three environmental factors that cause complex diseases such as autism are infectious agents, toxic chemicals, and dietary proteins. Could you explain that more, please?

Dr Vojdani: Since we were talking about dietary proteins, let's continue with that, first, and then we'll get to toxic chemicals and infection. Dietary proteins such as wheat or milk or dairy—alpha casein, beta casein from dairy products—or other proteins from different foods can cause inflammation. When our mucosal immune system is not working properly, inflammation in the gut can result in leaky gut syndrome. That allows undigested food protein, such as gliadin and casein, to get to the submucosa, from submucosa to the regional lymph nodes, and from regional lymph nodes into the circulation system where our lymphocytes will attack it as a foreign material and produce an antibody against that.

Unfortunately, due to similarity between various food antigens and human tissue, now the antibodies produced against alpha gliadin and casein will attack our own tissue, resulting in autoimmunity. It is well established that wheat antibodies can attack the cerebellum, can attack neurons, can attack thyroid tissue, can attack joints, and the heart muscle, and almost every single tissue.

This is a situation where dietary proteins and peptides escape the mechanism involved in protecting us against entry of macromolecules into the circulation. If that mechanism is broken, the result could be autoimmune attacks against almost every single tissue in the body. That's why arthritis patients who begin a gluten-free diet or casein-free diet—or avoiding any other food intolerances—feel significantly better—because those foods can cause inflammation and autoimmunity. In fact, my own research showed that children with autism not only make antibodies against gliadin and casein, they also make an antibody against cerebellar tissue, resulting in gluten ataxia which is a neurologic disorder.

Another article I recently submitted for publication describes other foods that could cross-react with wheat. Among those are corn, rice, yeast, millet, and milk. If you want to be really pure, when you remove gluten from your diet you may also remove casein—meaning dairy products—rice, millet, and yeast.

Some patients put on gluten-free diets will not improve. Then, they have to go on casein-free diets. If they don't improve, then you have to put them on a corn and rice and millet and yeast-free diet. Hopefully at that level, they will see improvement. Therefore, it is a little bit more complicated than what we think. This is the mechanism behind how dietary proteins and peptides can cause autoimmunities.

The second item is toxic chemicals. Let's use the example of two medications given to patients with ulcerative colitis and inflammation in the gut. Hydralazine is one of them. There are some other medications as well. These medications try to suppress the immune system in the gut in order to prevent inflammation and autoimmunity. Unfortunately, these chemicals have the capacity to bind to human tissue and induce autoimmunity by themselves. In some individuals, medications we take for pain, like some of the painkillers, can bind to human tissue and cause autoimmunity.

Recently I've been working on environmental triggers, in particular, on toxic chemicals. I have read a lot of articles about bisphenol A in plastic. Unfortunately, everything comes in plastic bottles. We put plastic containers in the microwave. We drink coffee in a paper cup, which is coated with a layer of bisphenol A. We drink soda or open cans in the kitchen and buy all kinds of stuff from the supermarket packaged in cans lined with a layer of bisphenol A.

I believe that the American population's blood and tissue is highly loaded with bisphenol A and similar chemicals. Yes, some of those chemicals get secreted by the kidney, but 50% of this chemical gets metabolized by the liver and binds to human tissue. I was completely amazed by this article showing that bisphenol A can even get into the brain and bind to a protein called *bisphenol A binding protein*. When bisphenol A binds to myelin basic protein in the brain, isn't that a mechanism by which chemicals induce autoimmunity—in this case neuron autoimmunity?

There are many, many examples. Pesticides, herbicides, and many, many other chemicals have a similar mechanism of action; bisphenol A is not the only one. So medications and environmental toxins bind to human tissue, resulting in antibody production against our own tissue; that's a mechanism of autoimmunity.

The third item is infection. Earlier, you asked me if I had a personal experience that motivated my interest in the role of environmental factors in autoimmunities. The answer is absolutely, yes. Unfortunately, my mother developed osteoarthritis at age 43. Ten years before that, I used to accompany her to a so-called dentist. Remember, we lived in a very small town in Iran. We had dental technicians, not dentists. My mother had a severe infection of the gum. One day, I remember this technician removing three or four teeth while she had the infection.

Now imagine what happened. Let's say she had infection with *Porphyromonas gingivalis* or *Streptococcus sanguis*. These are two oral bacteria causing infection. Each of these bacteria strains releases a toxin. He removed the teeth, the barriers were broken, and these toxins got into her blood immediately. She started making antibodies against the toxins and, because of the similarly between the toxin and her joints, her own cells started attacking her joints. After 5 or 10 years, she started having symptoms of rheumatoid arthritis. After another 5 or 10 years, this resulted in complete osteoarthritis, which required total knee replacement. At that time, I was a student in Israel, where my mother came to have the procedure. Because I had just started my master's degree, I wanted to see whether or not the experience she had with the dental technician years before had something to do with her arthritis. I took a blood sample from her and also made an antigen from the bacteria. When I tested her blood against those two bacteria, *Porphyromonas gingivalis* and *Streptococcus sanguis*, in comparison to healthy individuals, she had 10 times more antibodies against those two bacteria. At that time, actually, I did connect her illness from her rheumatoid arthritis to oral infection. Now after 40 years, there is an article in a journal called *Mucosal Immunology*, March 2012. The title of this article is "Periodontitis,

Porphyromonas, and the Pathogenesis of Rheumatoid Arthritis."

"The process of citrullination, a post-transitional protein modification, has been highlighted as a process common to both diseases. The evidence for a relationship between the diseases is explored and its potential mechanisms discussed." What happens is that the toxin from the bacteria changes the protein of our body, causing our body to react against our own protein. This results in autoimmunity, such as rheumatoid arthritis. Many other bacteria, whether it's chlamydia, mycoplasma, *Klebsiella*, and many others, can be involved in rheumatoid arthritis, cardiovascular disease, and many autoimmune disorders.

Let me give you another example because this is November and we are getting closer to Thanksgiving. We are going to cook our turkey. There is a bacterium called *Campylobacter jejuni*. This bacterium causes food poisoning similar to *Salmonella*. A small percentage of turkeys or chickens carry this bacteria strain. Unfortunately, it infects the skin of turkeys and chickens during processing. If we don't cook the chicken or turkey properly, this bacteria gets into our GI tract, causing diarrhea—severe diarrhea, opening the tight junction of the gut. Bacterial toxins get into the blood. The immune system then reacts against the toxins. In 95% of the cases, the antibodies produced against the bacterial toxin get neutralized and the body gets rid of that infection in a week or so. That's why 95% have no problem. The other 5% of the population, due to genetic makeup and being sensitive to this kind of toxin, makes the antibodies. The antibody attacks their gangliosides in the peripheral nerve as well as the central nervous system, resulting in the disease called Guillain-Barre syndrome. Here we have another example of infection releasing a toxin—our immune system reacting against the toxin—a cross reaction between the toxin and our nerves, and the result is a neuroautoimmune disorder.

***ATHM*:** Considering all of these factors that act as triggers, do vaccines also play a role in these diseases?

Dr Vojdani: Without being political, just being a scientist, what do we have in the vaccine out of those three factors? We talked about dietary proteins, infection, and toxic chemicals. Did you know that most probably we have all three of these in the vaccine?

Most of the time they grow a vaccine in the egg, so there are components of egg proteins in the vaccine. That's number one. Number two, what is vaccine? We vaccinate against what? Against measles, mumps, rubella—what are measles, mumps, and rubella? Viruses. That's an infectious agent. Right? That's the second item. The third item in the vaccine is a toxic chemical. Can you name a chemical more toxic than mercury?

You have all three components, or if they don't grow in egg, at least we have two major components. The virus and the toxic chemical together, within an individual who has genetic susceptibility to that infectious agent plus the presence of the toxic chemical, can result in immune disorders and possibly autism, ADD, ADHD, and also autoimmunities.

Personally, I'm not against vaccination. Let's make that clear. I'm a father of three children. I proudly say that, yes, when they were young we had them vaccinated, but we did not allow their vaccination in a rush like is recommended by pediatricians—to do it right away in the first 3 months. We waited for 6 months and we gave them one vaccination. We waited another 3 months; we gave them the second vaccination. We waited 3 more months and then completed all the vaccinations. We were not in a rush to do those vaccinations. We waited and divided them. That way, I believe that my children were safe.

***ATHM*:** Have you found a connection between autistic children and cerebellar peptides? Is that something you've researched?

Dr Vojdani: I published an article in *Nutritional Neurosciences* about the cross-reaction between the antibody against gliadin and the cerebellum. In fact, I found the exact amino acid in gliadin as well as in the cerebellum, which are 50% identical. So, children with autism, if their systems produce antibodies against alpha gliadin, those antibodies my cross the blood-brain barrier, or BBB. The normally selective BBB can be opened by many factors, such as infection and disease, so that large gluten molecules can slip through. The antibodies against alpaha gliadin will recognize these molecules, but because of that 50% correspondence with cerebellar tissue, the antibodies will also attach the cerebellum; that is why more cerebellar-associated abnormalities are seen in children with autism.

***ATHM*:** You have studied the effects of treating veterans with Gulf War illness with doxycycline. Could you please describe the study and the conclusions you drew from it?

Dr Vojdani: I was one of the laboratories funded by the Department of Defense; I believe it was in early 2000, 2002, or 2003. This was a multicenter study. The center was, I believe, the University of Texas. They took blood samples from patients with Gulf War syndrome, sending them to four or five different laboratories, including university laboratories and Immunosciences Lab. Then, we used PCR, polymerase chain reaction, to detect mycoplasma fermentans in their blood. If they were positive with mycoplasma fermentans, they were given doxycycline in order to get rid of that mycoplasma and improve the clinical condition of our soldiers with Gulf War syndrome. Unfortunately, the study was designed in such a way that they didn't reach a final, final conclusion. The results were not promising and I don't know what happened in the end. They discontinued the study. Overall, some patients with arthritis and Gulf War syndrome who took doxycycline showed improvement in clinical symptomatology. Why? There are two reasons: the doxycycline, on one hand, is anti-mycoplasma and antibacterial. On the other hand, it is an anti-inflammatory. Patients were taking it, showing some ben-

efit, and therefore, they liked to take it forever. Again, we should not forget that medication is a chemical and taking chemicals for a long period of time is going to affect our immune system. It can possibly induce immune reactivities and autoimmunities. No synthetic chemical medication is good for taking forever.

***ATHM*:** You testified before the US Senate Committee on Veteran Affairs in 1993 regarding immunological studies on blood samples of Persian Gulf War veterans and controls stating that some of the veterans who had been exposed to chemical agents while serving in that war had neuro-immunological disorders. This helped pass a law to provide free medical care to Persian Gulf War veterans. What was that experience like?

Dr Vojdani: It was one of the most important experiences in my life because that was where I could put 30 years of my experience into action. At the same time, it was an opportunity to give back to America. Remember, in the beginning of this conversation I said the turning point of my life was coming to America. I was attending the American Academy of Environmental Medicine in 1992. A major from the US Army came to the Immunosciences Lab booth. At that time, he knew that I was studying the effects of toxic chemicals on the immune system. He asked me several questions, and at the end of an hour of conversation he said, "Ari, are you ready to help our soldiers from the US Army who are sick?" Of course, my answer was yes. He said, "I'm going to take this back to my command and most probably I'll get back to you next week, but I would like you to offer free testing for our soldiers." Remember, these tests were about $1000 per person because it was an immune system evaluation—antibody testing against the nervous system, antibody testing against different tissue bodies, antigens and so forth.

My answer was yes but I have one condition. He said, "What is your condition?" I said, "The condition is that you cannot conduct research with individuals who are sick if you don't have proper controls."

"That's easy to do," he said. "Write to me exactly what you want." I said, "If you want to do this study, send me 50 blood samples from patients with Gulf War syndrome and another 50 blood samples from soldiers who are part of the US Army but did not participate in the Gulf War."

After a week, I received 100 blood samples: 50 controls and 50 soldiers with Gulf War syndrome. I immediately started doing those tests, because it's important to do them while the blood is fresh, first the immune evaluation, and then the antibodies later on. I was amazed to see that these individuals had abnormality at the cellular level. At the humoral level they were making antibodies against their own myelin sheath. They were making antibodies against their own joints and striated muscle and so forth. After three months, I wrote a summary. Based on that, I was invited to go before the US Senate and present this to the committee. At that time, based on my finding, yes, I did testify that our soldiers are not suffering from PTSD. Every soldier was sick—they called PTSD, post traumatic stress syndrome—but I said they were suffering from neuro-immune disorders due to exposure to environmental factors. That was a fantastic experience.

When I came back to LA, I was interviewed by several TV stations. They asked my opinion: What are the environmental factors you believe are involved in this neuro-immune disorder you described in our soldiers? My answer to that was, number one, they were given pyridostigmine bromide to protect them against the supposed use of nerve gas, damaging agents, and chemical agents. They were given this medication in order to protect neurons against chemical attack. Unfortunately, this chemical, by itself, caused damage to the neurons of our soldiers. That was my opinion at that time.

These soldiers were also affected by their situation. War is not an easy environment to exist in. You are stressed. You do not sleep. You don't eat properly. Maybe there are some infectious agents in the sand. You breathe sand. All of that can affect your lung function and your immune function. These conditions, plus the chemicals, can affect your nervous system resulting in neuro-autoimmunity, which I described in our soldiers. To summarize, it really was incredible that the US Senate accepted their illness to be war-related and provided them with free medical care. It wasn't only me—there were several other doctors who testified—but I was one of those who contributed to this and I'm very proud of that.

***ATHM*:** As a top immuno-neurologist with an interest in reducing the number of environmental toxins we expose our immune systems to, what kind of support have you found in the medical community for your work?

Dr Vojdani: Thank you for asking that. I had the honor of working with Andrew Campbell, MD. In fact, I had many blood samples from patients exposed to various toxic chemicals. In one instance a train, which was loaded with toxic chemicals, derailed and toxic chemicals very similar to the one used in Bhopal, India, were released into the Sacramento River and people living on the river banks became very sick. Other exposures included MTBE, which is a gasoline additive; patients with silicone breast implants; and many, many, many others. I handled thousands of blood samples from patients exposed to various toxic chemicals. I found that these patients had many immune abnormalities very similar to our soldiers with Gulf War syndrome. When we presented this in different medical conventions, the doctors looked at us as if we came from a completely different world.

Therefore, your answer depends upon the definition of *medical community*. If you are asking about complementary and alternative medicine, absolutely, yes. If you are talking about functional medicine, they absolutely recognize these types of abnormalities. There are thousands and thousands of articles in scientific journals beginning 40 years ago and continuing on through today. Unfortunately, the medical doctors who are practicing medicine do not have time to read these scientific journal articles. Therefore, they are not educated in

the field and do not recognize that environmental toxins and infectious agents and dietary proteins and peptides can induce autoimmunities.

They accept that medication can induce autoimmunity. There are chapters in medical textbooks about different medications causing autoimmunities. Three to 6 months after they remove these medications from the environment of the patient, the autoimmunity in the patient is reversed. So, they accept that. When you change the name of that toxic chemical from medication to formaldehyde or isocyanide or bisphenol A, they cannot accept that—even though the mechanism of action is exactly identical. That's very, very unfortunate.

In fact, one day I conducted some informal research for myself. As I sat in the UCLA cafeteria, very close to the cashier, I found myself looking at the drinks chosen by the doctors and surgeons who came to have lunch. I would say 60% to 70% of those hundreds I was observing chose either Diet Pepsi or Diet Coke. The other 20% to 30% chose either water in a plastic bottle or orange juice in a plastic bottle. Remember, the pH of Diet Pepsi and Coke is about 3.5—very acidic. The pH of orange juice is about 3.5, maybe 3.0. Imagine that these canned or bottled liquids have been in storage for months until they got to the cafeteria. Don't you think that all that bisphenol A in the bottle is also mixed in with the orange juice and water, as well as in the Pepsi or Coke? If our doctors and professors at prestigious universities are using Diet Coke and Diet Pepsi and orange juice in plastic bottles, what do you expect from the rest of the population?

You are asking me a very interesting question. Unfortunately, no, there is complete denial. Hopefully, they will read the articles.

Unfortunately, it isn't until some of these individuals have children with autism or ADD or ADHD that they find time to go to the library and check the evidence. Then, they turn around and say, "Now I believe in all of this." In fact, they join the autism societies. Again, why must we go through these types of experiences in order to become believers? The evidence is overwhelming. It takes people to read it, understand it, and apply it. I don't know how many years it will take until our leaders will become knowledgeable about some of these environmental factors and not use plastic bottles and all the chemicals in our environment, which cause so many problems in our body, and just remember that estrogenic compounds in plastic act like estrogen or even testosterones in males and females.

***ATHM*:** What will you be working on in the near future?

Dr Vojdani: First of all, to develop more methods to detect triggers. Right now, we have a limited number of methods for detection of triggers as a cause of autoimmune disorders. Let me quote a couple paragraphs from one of the articles I wrote in a journal called *Expert Opinion in Medical Diagnostics*, in 2008. Molecules called *predictive autoantibodies* appear in the blood years before people show symptoms of various disorders. Predictive antibodies, for example, are antibodies that can detect issues with bisphenol A. If those antibodies are elevated, then the patient should not use plastic. Let's go one step further: I don't think you even need a blood test in order to say you should not drink from plastic—again, at least when one has the antibody against it, meaning one's body is reacting to it. Tests that detect it—these molecules—could warn of the need to take preventive actions.

Then, another quote is researchers and clinicians should ask the question: Why does the human body react to its own antigens—why do I react to my own joints, my own thyroid, my own cerebellum? The cause may be due to environmental factors such as bacterial or viral infections or haptenic toxic chemicals binding to human tissue and causing modification of cells, antigens, and subsequent production of autoantibodies, which attack and destroy our tissue, causing autoimmunities.

Finally, considering the fact that the evolution of autoimmune response in using new antigens occurs over time, more diverse autoreactive antibodies will be detected. Therefore, only inclusion of antibody assays against a panel of antigens, some of which are tissue-specific and others related to the etiologic agents, may enhance clinical sensitivity, specificity, and predictive value in future studies. My future studies are going to be related to predicting antibodies for early detection of chronic illnesses. I have few of them right now, but I'm going to expand the list of the predictive antibodies for detection of chronic illnesses.

When a patient visits a doctor and orders some of the specialized testing developed by me at either Immunosciences Lab or Cyrex Laboratories in Phoenix, Arizona, antibodies against various wheat proteomes, or antibodies against myelin basic protein, or ganglioside, or other tissue antigens are detected.

Imagine this triangle: You detect, remove, and repair. *Detect* uses the most accurate biomarkers, which I'm in the process of developing. *Remove* the triggers. If the triggers are in the body, inflammation will continue. Continuous inflammation in the body can cause autoimmunities. You have to remove environmental toxins. You have to minimize the use of drugs and medication—of course, consulting your doctor. You have to minimize infection, in general, and also pay attention to your gut immune function. Unfortunately, the ratio of good to the bad bacteria has changed. You have to restore that to more good bacteria and less bad bacteria. Finally, Repair. How can we repair the barriers and improve your regular T-cell function? Vitamin A; vitamin D; omega-3 fish oil; EPA; DHA; coconut oil; green tea EGCG; resveratrol; probiotics; prebiotics, such as inulin from artichokes; vegetables such as the Cruciferous family, which contains 3-indole-carbinol; and finally, anti-inflammatories such as curcumin, *Boswellia*, and do not forget fermented foods, of which our ancestors used to eat a lot—an example is organic kimchi, which is fermented cabbage.

Detect, remove, and repair. That's my final message.