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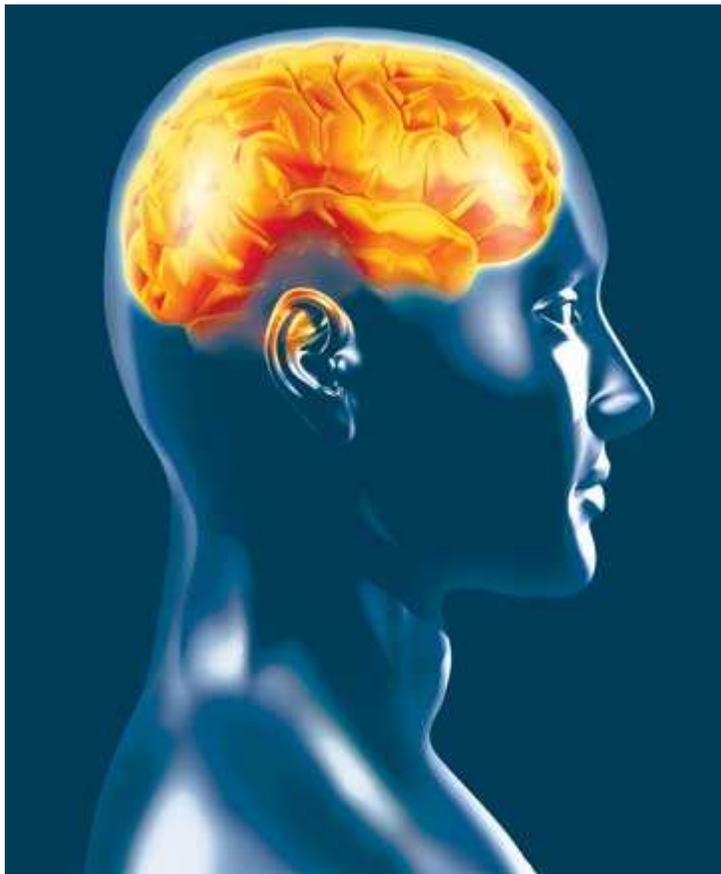
## Big-idea people

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## November/December 2008

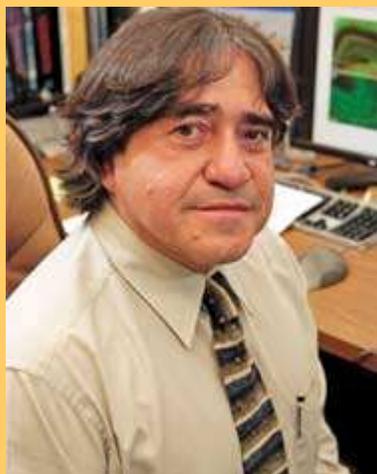
### THE NEXUS INTERVIEW

#### **Your Brain on Food** **William J. Walsh, PhD** **& Fernando Gomez-Pinilla PhD**

In 1972, William J. Walsh was working with ex-convicts, helping them return to society. While conventional wisdom of the day held that childhood influences were the main cause of behavior problems and mental illness, he learned that many of his clients were raised alongside siblings who had developed no law-breaking or criminal tendencies. In fact they were well adjusted, normal people. Walsh couldn't understand, he says, "how some of these people who did such horrible things came from nice families." He suspected that criminal behavior had a lot to do with genetics. Murderers, he suspected, likely had faulty brain chemistry. So he started testing people who had committed violent acts, ex-cons, imprisoned serial killers and mass murderers, including Charles Manson and Richard Speck. He tested their blood, urine and tissues, and compared them

## Foods for mood

Fernando Gomez-Pinilla PhD



Can we eat our way out of anxiety? Is it possible to cure depression by crafting a daily meal plan that includes certain nutrients? More evidence is pointing in that direction.

Here, Fernando Gomez-Pinilla, a UCLA professor of neurosurgery and

physiological science, presents some of the more compelling findings.

**RD: Your research focuses on the connection between lifestyle and mental health. What have been some of your recent findings?**

**FGP:** We've found that exercise, nutritional factors and sleep have the ability to influence processes in the brain that control behavior, learning and memory. Other research has found that these factors are also directly related to mental problems, such as depression. We've also been looking at brain-derived neurotrophic factor, or BDNF; a reduction in this chemical is strongly associated with depression in humans. We're able to measure BDNF levels in particular regions in the brain.

**RD: What about people who are pretty normal on most scales, but have anxiety problems or compulsive behaviors? Is it likely that their diet, sleep and exercise habits are having a dramatic**

to samples from normal people. After many years of such research, Walsh discovered that indeed the violent people did have distinct biochemical imbalances, compared to the general population.

This set Walsh on his life-long quest for answers regarding brain chemistry and its effect on behavior and mental illnesses such as autism, depression, schizophrenia, ADHD, bipolar disorder, Alzheimer's disease, and other illnesses. His findings have implications for most of us because nutrients in our diets, he has found, can have a profound effects on our moods, our capacity to learn, and many of our mental functions.



William J. Walsh is president of the newly-created Walsh Research Institute in Naperville Illinois. He has authored more than 200 scientific articles and reports and been invited to speak at 28 international scientific symposiums.

In the 1980's, Walsh founded the non-profit Health Research Institute (HRI) and its clinical arm, the Pfeiffer Treatment Center in Warrenville, Illinois. Walsh named the center after his long-time collaborator, the late Carl Pfeiffer, M.D., Ph.D., a physician and pharmacologist who was one of the world's leading nutritional biochemists.

Walsh's most recent work includes: a research project on Alzheimer's disease with Argonne National Laboratory and Louisiana State University; collaborations with, among others, the University of Pennsylvania Medical School, Case Western Reserve University, and Bruce Ames PhD at Children's Hospital Oakland Research Institute.

Here, William Walsh talks to Nexus publisher Ravi Dykema about nutrients, mental illness, genetic individuality, and the difficulty of getting innovative research noticed my mainstream medicine.

**effect on their mental state?**

**FGP:** Yes. Unhealthy diet, sleep, and exercise habits can be considered risk factors for exacerbating extreme behaviors and unbalancing “normal behaviors.”

**RD: Will these discoveries of yours and your colleagues change the practice of psychiatry or public health campaigns? For example, if the connection between mental health and diet becomes widely accepted, do you think people will realize that having lunch at McDonalds may produce the distress and discomfort they feel in the evening?**

**FGP:** You must have seen the movie *Supersize Me*. The problems depicted in the movie are directly associated with the brain. Until recently, poor nutrition was linked with detrimental effects on, for example, the cardiovascular system. In the last few years, however, this perception is changing. We’ve been finding a direct effect on the brain in terms of nerve cell function, the transmission of information across different regions in the brain, and the metabolism of the brain.

About your question: several studies in humans have shown that certain foods, like junk food, can promote dysfunctions in behavior. But clinicians sometimes don’t stay informed about developments in basic science. Historically, there’s a lapse of several years in the acceptance of many scientific findings. It may be slow, but this acceptance will eventually happen.

**RD: Once these findings catch on, how might doctors change their advice for maintaining good health?**

**FGP:** Family practitioners can help their patients take better advantage of their own habits. These practices – eating, sleeping, exercising – are normal daily functions. By managing these activities appropriately, we may dramatically influence our mental states. I am

**RD: You started out studying criminals’ brain chemistry. What did you discover?**

**WW:** We found that criminals – not all of them, but most of them – have distinctive chemical imbalances that have a striking impact on their behavior. We’ve now tested and treated more than 10,000 behavior disordered children and adults. We’ve published highly successful outcome studies. The frustration is that no one in the established field pays attention to this kind of research. We think we have probably the best answer for reducing crime and violence in America, yet we haven’t been able to get it into the mainstream. So now I’ve recently been collaborating with scientists at universities and publishing more articles, and I’m hoping that that will get more attention.

**RD: What intervention are you using with people who have imbalances in biochemistry?**

**WW:** The weapons we use are strictly nutrients. Vitamins, minerals, amino acids, and what I call natural biochemicals.

**RD: Could you give us an example of what a typical regimen would look like?**

**WW:** Let’s say you are deficient in vitamin B6 because of a genetic disorder. You need B6 in your brain because it is involved in the last synthesis step that creates serotonin, an important neurotransmitter. If you have this genetic disorder, you will be low in serotonin and prone to depression, anxiety or obsessive-compulsive tendencies. You could take Prozac or Paxil and get some benefits, but a more scientific approach is to simply normalize the B6 levels. We’ve done this hundreds and hundreds of times with great success.

This treatment works really well in conjunction with psychiatric medication and counseling. It’s another weapon in the arsenal of a mental health practitioner.

I get a lot of calls from doctors, who say “I’ve got this patient I’ve been working with for a long time. They went to your clinic, and now they’re better. Can you tell me what you did?” When I explain the testing and the use of

not saying that we can fully replace medication. But any pharmacological intervention should be in conjunction with appropriate lifestyle changes.

**RD: You co-wrote a research paper about high fat and refined sugar diets reducing BDNF in the hippocampus (a portion of the brain that helps regulate emotion and memory). Why did you focus on those particular foods?**

**FGP:** Because that particular diet is closest to what people eat in fast food restaurants, or in junk food. We found striking results in terms of effects on learning. In the study, animals who ate a diet high in fat and sugar had more difficulty learning. In separate studies, we evaluated how this kind of diet can affect the capacity of the brain to deal with challenge, such as a traumatic injury – the kind that happens in typical traffic accidents. We found the animals who had eaten this diet had a reduced capacity to heal. We also found that the effects were progressive; In other words, the longer the animal ate this diet, the worse the effects. Human studies have found similar results.

**RD: One of your articles, published in the journal Nature, makes a link between diabetes and certain mental states. I think you present it as an illustration of the link between the gut – that is, visceral function – and the brain.**

**FGP:** Diabetes is an interesting disease; it's a physical illness that involves insulin regulation, but it can also affect mental health. It's starting to look like many other diseases that are associated with the metabolism of food can have some effects on the brain. It appears that eating too many calories is not good for the brain, for example.

**RD: Have you yourself eliminated certain foods because of your discoveries?**

**FGP:** Certainly. But the foods I try to eliminate are difficult because the things that taste really good are some of the worst. Like sugar. Everyone likes

nutrients, about 2/3 of them lose interest. Some of them say things like, "How can a vitamin or amino acid possibly help somebody with schizophrenia or autism? Don't they really need a drug?"

The answer is "no." Scientists have figured out, step by step, how neurotransmitters are formed in the brain, and they know that the raw materials, the only ingredients for this synthesis, are nutrients: amino acids, vitamins and minerals. Many people have genetic aberrations that result in deficient or excessive levels of these chemical raw materials, and it shouldn't be a surprise that they have mental health problems.

We've also learned that the greatest mischief in the brain is caused by nutrients that are in overload. You might get a typical input from your diet, but because of a genetic abnormality something goes wrong and you wind up with overloads of key nutrients. That's why multiple vitamins don't work; it's not just a matter of treating deficiencies, but also of coping with overloads.

**RD: What's one nutrient that may be in overload because of a genetic abnormality?**

**WW:** Copper. There's a protein in the body that has the job of getting rid of excess copper. Imbalances in copper can cause dramatic imbalances in two key neurotransmitters, and lead to enormous problems. For example, 68 percent of all ADHD kids have a tendency for very high levels of copper. Excess copper causes inattention, distractibility, anxiety and hyperactivity. It's associated with sleep problems. This is all well known in brain science.

**RD: What other problems can be caused by excess copper?**

**WW:** We've found that nearly all women with a history of postpartum depression have a tendency for very high copper levels in their blood. It is especially problematic for women, because estrogen and copper are proportionately related. If you're high in estrogen, you'll be high in copper. Copper is also associated with an increased tendency for cancer; that may very well be why high estrogen levels have been

chocolate and ice cream. But both have too much sugar and too many calories. Hamburgers and other fast foods are high in saturated fats, and chips contains trans fats. Some foods have a good reputation for enhancing mental health, like fish. My idea is not to get completely paranoid about this, but to be mindful of what I eat.

**RD: Are there any foods that you make sure you eat every week, or any supplements you take regularly?**

**FGP:** Eating a wide variety of foods, especially fruits and vegetables, is a good idea, since many have important nutrients for the brain. Berries, for example, are known to have lots of antioxidants and several components that can heal the brain. Fish is much better than beef, because it provides better protein and omega 3 essential fatty acids. As for supplements, you can get most of the vitamins you need and antioxidants through a diverse, nutritionally dense diet. People who don't eat fish can take essential fatty acid supplements.

**RD: What is it in fish that's so important?**

**FGP:** They're rich in omega 3 fatty acids, which are a structural component of cell membranes; they're like the bricks in the cell wall. When we don't have enough of these in the diet, the cells replace them with other components, which aren't good. For example, let's say you buy a cheap part for your car to replace a broken part, but it doesn't work quite right. Eventually, there will be problems. The same thing happens in the brain; if the right parts aren't there, you'll eventually experience some effects on your mental health that affect your moods and a wide range of other brain functions. Your body can't produce these fatty acids on its own. You must get them in your diet – ideally every day, or at a minimum, three times a week.

**RD: Any last thoughts?**

shown to increase the likelihood of hormonal cancers in females.

**RD: How would you treat excess copper?**

**WW:** By normalizing a protein that removes excess copper from the body. We slowly, gradually introduce the nutrients that stimulate the synthesis and the functioning of that protein. People who are high in copper invariably are zinc deficient as well, so we also slowly and gradually normalize their zinc levels. Then the protein begins to function and, in most cases, the copper levels return to normal. It's about a two-month procedure for most people. If we did it very suddenly, and we gave them high doses of everything, the excess copper would be dumped from tissues and the blood levels would go even higher. You could see a decline in health before the patient got better, as all the excess copper is exiting the body. So you have to be somewhat careful with overloads.

**RD: What nutrients do you use to enable the genetic synthesis of this protein?**

**WW:** Glutathione is helpful; also, selenium, vitamin C and vitamin E. I did patent this therapy for autism. It seems to benefit quite a few of the autistic kids we've seen.

**RD: This is quite an involved protocol; how much would it cost a patient or an insurance company to learn the diagnosis and undergo treatment?**

**WW:** The cost for initial evaluation at the Pfeiffer Treatment Center is around \$1,000; it might be a couple of hundred dollars more for an autistic patient or a schizophrenic, because there's more work involved.

There are a few places from which any doctor can order the key labs and get them done for about \$200. The challenge, however, is interpreting the lab work, putting that together with a medical history and a review of symptoms, and then coming up with an accurate diagnosis of the chemical imbalance and the design of the treatment program.

But there's a tremendous amount of interest in this protocol,

**FGP:** I think the big message here is that a combination of all these factors – diet, exercise and sleep – is vital. The type of food you eat is important, but you are also affected by getting enough exercise. You need all three for optimal mental health.

and more doctors are getting trained in performing it. I was just in Australia in April, where we trained 26 doctors, including a couple of psychiatrists. Hundreds and hundreds of Australians are now receiving these kinds of therapies, and I'm getting a lot of great reports. I'm scheduled to go to Norway in November to train 30 to 35 practitioners, then to Tokyo in January. My goal is to train 1,000 doctors in the next 10 years.

**RD: Once you have the initial diagnosis, how much does the treatment regimen cost?**

**WW:** It varies with each person. A typical program would cost between \$60 and \$100 per month, certainly a small fraction of what it would cost for typical medications. At the high end, treatment for autistic children can be as much as \$100 to \$150 per month.

**RD: You said earlier that medical professionals don't seem to pay attention to this protocol, or your results. Why?**

**WW:** It has to do with the history of understanding and treating mental illness in the United States. Before the 1960s, if you had clinical depression, you would find yourself lying on a couch with a caring psychiatrist delving into your background, trying to find out what traumatic events or circumstances in your childhood may have caused this depression. The feeling was, at that time, that depression was a result of life circumstances and negative events that had happened to you.

The big revolution in mental health happened in the mid-'60s, when scientists discovered that people with clinical depression are born with these tendencies. It didn't take long to realize that it had to do with brain chemistry and neurotransmitters. In the middle '70s, neuroscientists got all excited about this, and they began focusing on neurotransmitters like serotonin and dopamine. But if you were a psychiatrist, this was a terrible thing. You had spent 10 years learning how to help your patients, and then your profession comes to you and says "Sorry, everything we taught you was wrong. These people actually have some kind of a genetically caused chemical imbalance in their

brains.”

Once this was discovered, the entire medical and scientific community shifted its focus toward drug therapy. At that time, the medications used were things like Thorazine and Haldol and other heavy-duty drugs. Now, more modern and effective medications with fewer side effects are available. But the approach is still drug based, and most studies are focused on improving drugs – finding newer and better medications.

I think a hundred years from now, people will look back on this and will belittle the medication-based treatment approach to mental illness. The real key to treating mentally ill people is to find out what’s gone wrong, genetically or biochemically. What’s different in the molecular biology of the brain? I think that researchers will find that, in most cases, it’s a biochemical abnormality caused by differences in genetics, and those differences can be corrected without drugs.

We’re not at that point yet, because our knowledge is not great enough. For example, with schizophrenics, my colleagues and I urge them to stay on medication and to also do our treatment. After 6 months or a year, most of them say that they’ve been able to function far better with a combination of the two. We have hundreds of schizophrenics who are now living normal lives, but most of them still need some medication support, because we haven’t learned how to do it with just nutrients alone. However, other issues may be treated by nutrients alone. For example, when we treat clinical depression, behavior disorders, autism and ADHD, 80 percent of the families we see tell us that they’ve been able to completely eliminate their medication after our protocol.

We are not opposed to psychiatric medications; we think they’re a godsend for millions of people. However there’s a more scientifically accurate and effective way to treat people.

**RD: How prevalent are some of these disorders?**

**WW:** More than 1 percent of all Americans are

schizophrenics, and 2 to 4 percent experience psychiatric psychosis episodes at least once in their lifetime. So that's 1 out of 25 Americans right there with severe brain chemistry imbalances. With respect to behavior disorders, the incidence of ADHD, according to NIH, is 4.75 percent, although now they're thinking that number may be closer to 8 percent. Roughly 1 in 12 Americans have a biochemical brain chemistry problem called ADHD. Some studies say as many as 20 percent of all Americans suffer from clinical depression at some point in their lifetime, and most of these cases are caused by a genetic predisposition.

**RD: What about mental illnesses that aren't caused by genetics?**

**WW:** We've met people who have had head injuries that cause psychiatric problems; that's not a biochemistry problem. Once in a while we've met a person who's had such a traumatic event in their lives that they've not been able to get over it; their chemistry is normal, yet they're depressed. One woman we saw said she had plenty of friends, a happy marriage, a job that she loved, and still she was horribly depressed and had been for 8 years. Well, we found out that 8 years ago, her only child died of leukemia. That explained why she was depressed; it was such a terrible event for her, she couldn't get over it, even though she had normal chemistry.

But that's the exception, not the norm. I've done a lot of forensic studies on people like Charles Manson and Richard Speck. I have data on more than 800 people in prisons, and roughly 95 percent of them suffer from distinctive chemical imbalances that have an impact on their brain function.

This is such exciting information; I've known for so many years how to help these people. I've given presentations in many places, to senators, to heads of corrections departments. Everyone seems very interested and excited about this news, but nobody ever seems to have money to pursue it. If I had a dangerous drug that would help behavior, I think I'd have no trouble getting support. But people have difficulty believing that nutrients can be powerful.

**RD: If nutrients have such a huge impact on our brains, perhaps the average American diet is having an impact on behavior.**

**WW:** That's absolutely true. For example, a person who tends toward clinical depression may have low serotonin levels. These people would do very well on a high-protein diet, because almost all of these people have a disposition toward being what we call under-methylated. Methyl comes from methionine, which is a protein in food. Methionine has a powerful effect on the amount of serotonin that's produced in the brain. We've also learned that these same people tend to be very low in calcium and magnesium, so a diet rich in calcium and magnesium, as well as protein, would really help them.

Then there are people with anxiety conditions who have the opposite problem: they have too much methyl in their systems. These people thrive on a vegetarian diet. They're also very low in folate, so they'd do very well by eating foods that are rich in folates, such as leafy greens and salads. Some people have to avoid certain things; for example, a woman with a history of postpartum depression needs to avoid any supplements containing copper, because almost all such women have high blood levels of copper because of genetics. They should drink bottled water, since there's an increasing amount of copper in the water supply in the United States.

But you have to get an accurate metabolic analysis to find out what you need to emphasize in your diet and what you need to avoid. The best diet for one person may be the worst diet for the next person. I think that's going to be the next major advance in nutrition and diet – formulating specialized, individualized diets for people. You're not going to get a one-size-fits-all diet, because of the genetic differences in human beings.

**RD: We've been talking about some severe cases, like people in prison or those with significant behavior issues. What about the average person who may have a higher level of anxiety than is justified by their past experiences or current lifestyle? Let's say that person is reading this and can't get a sophisticated diagnostic**

**process for one reason or another. Do you have any general suggestions for a healthy diet and lifestyle?**

**WW:** I spent a few years looking at the general population, not people who might have a horrible problem like schizophrenia or autism. About 10 years ago, I developed a system whereby the average person, at a cost of less than \$100, would be able to identify what their biochemical type was. Every one of these chemical imbalances—such as methylation problems, folic acid deficiencies or toxic metal overload – has symptoms associated with it. If you do a careful medical history and ask the right questions, you can be quite accurate in identifying what a person’s basic biochemistry is.

We found that there were 26 sub-groups, named from A to Z. For example, I’m a type L, which means I’m a bit obsessive/compulsive, and tend to be a perfectionist; for example, when I play sports, I get overly competitive. I was playing racquetball yesterday and in the heat of the battle, I got whacked in the eye with a racket that left me with a big black eye. That type L behavior is associated with under-methylation.

There are classic symptoms associated with each one of these sub-groups of chemical imbalances. I’m hoping to include a questionnaire in my upcoming book, so that a reader can score him or herself to get a good idea of what nutrients he or she needs to emphasize and which ones he or she would be better off avoiding.

**RD: Let’s say someone has been eating a terrible American diet of fast food containing predominantly white flour, meat, corn, sugar and trans fats, and switches to a really healthy diet. What changes in mental health would you expect to see?**

**WW:** I would expect that for people who are biochemically intact, there would be very little change—maybe a third of the population. But another two thirds would see a significant change after a few months.

**RD: Does diet and nutrition have that kind of dramatic impact on children’s behavior?**

**WW:** Yes, diet has a lot to do with a child's ability to learn. There's no doubt about that. I have seen more than 6,000 children with ADD, hyperactivity or learning disabilities, and we've seen a lot of benefit just by straightening out their diets. Many of them also have genetic imbalances, where they might need supplement or nutrient therapy to normalize rather massive chemical imbalance tendencies, but the nutrition piece is critical.

And exercise and sleep are important and well, especially exercise. If you have the right diet and you exercise, your sleep will, in most cases, be fine. Again, there are people with genetic abnormalities who will still have sleep problems, but for most people, many issues can be corrected by the right balance of nutrition and exercise.

**RD: So in terms of public health and treating disease, it sounds like we're presently barking up the wrong tree.**

**WW:** Yes, the medical system in America is allopathic. That's the number one problem. Doctors basically sit in their offices and wait for somebody to come to them with a problem. There's not enough preventative medicine going on, and that's what's missing. A person shows up with a heart attack, cancer or diabetes, and the medical profession is trained to do a beautiful job of coping with that disaster. But they don't know how to prevent these disorders.

Medical science has spectacularly improved outcomes in the case of physical problems, like heart disease or broken bones. But this doesn't hold true for mental problems; that's still a black art trying to emerge into a science.

**RD: Why do you think that is? And why is it that preventive medicine and nutrition are so foreign to our medical system?**

**WW:** It's not how our system is set up. We have a medical system that doesn't respect and value nutrition. Doctors today might spend two or three days in all their years of medical training on nutrition. Research isn't focusing on prevention; it's aimed at finding a better drug, a psychiatric medication, a foreign molecule that can help somebody. There's nothing sinister or collaborative in this. It's just a

market-driven event. Look in any university's medical school: where does most of their funding come from? Where do they get their research grants? Where do they get their endowed chairs? Most of them come from pharmaceutical companies, so they tend toward research that would please the benefactors. Nutrient therapy is something that might actually anger or upset their benefactors.

If you look at the medical journals, almost all of the advertising is for pharmaceuticals, psychiatric medications. It can be hard for these editors to accept articles that will tend to harm that industry. But eventually, people are going to learn that nutrients and a better diet can improve their lives.

**RD: What about insurance companies? How do they factor in?**

**WW:** Insurance companies are a natural ally of preventive medicine, and they're getting more and more powerful in dictating what kind of medicine is given to people. Their interest is in keeping people healthy, and not having to pay for treating disorders or problems. So on one hand you have a very powerful natural ally, and the other sort of a natural enemy.

**RD: How does this affect the research you're doing, and your attempts to make it public?**

**WW:** If the work that my colleagues around the world and I are doing ever got enough attention, if we started showing alternatives to psychiatric medications, you can imagine what would happen to us. We're hoping to get enough solidarity and collaborations with universities and powerful people so they won't kill us off. I guess we haven't succeeded enough to get their attention, but eventually, it will happen. When it does, they'll trot out experts to say that what we're doing is hokum, because their bottom line depends on it.

**RD: They'll challenge your research.**

**WW:** I recently developed an exploratory treatment for



Alzheimer's disease. After testing 65 people on this therapy, many of them reported part of their memory coming back, and we have people who have stabilized for many years. Now, there's a medication called Aricept for Alzheimer's. Alzheimer's is a disease where your brain cells just start dying off at a rapid rate. Aricept does nothing to stop or slow the death of brain cells. It enables whatever's left of the surviving brain to function better for a while. So you typically get 4 to 8 months of better functioning while the brain is dying.

When we present our Alzheimer's research at a medical meeting, if it gets any kind of publicity, I'm sure we will be attacked by the company that produces Aricept. So far, I have not had a problem, and I'm doing everything I can to build partnerships in the traditional medical community, such as in universities and medical schools.

That was the mistake I made in the past. I worked with a relatively small, unknown organization that wasn't likely to get publicized. Once, I went to the American Psychiatric Association and presented data on what I thought was a key understanding for autism. A number of media people came to me afterward; someone from Reuter's asked "What university are you associated with?" When I told him we weren't associated with a university, he said, "Well, I'm not going to be able to publish this. It will raise too much hope, and we don't know who you are. We can't have confidence that your results are really legitimate."

Now I'm doing everything I can to collaborate with well-known, widely accepted, high-quality people. The main thing is to get this out there and get people to pay attention.