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Test first, treat later

Dr. Fernando Miranda thinks many brain disorders are misdiagnosed and overmedicated while the real problem goes untreated.

BY JILL KRAMER

Dr. Fernando Miranda is a great believer in testing. When his son was 4 years old, he had a neuropsychologist friend of his perform a battery of tests on the boy, so he'd know how to direct his education. Perhaps he wanted to avoid the mistake his own father had made about him when he discouraged him from following in his footsteps to become a physician. Miranda defied his father and became a neurologist. His son, now 28, is an EEG technician and works with him at his Bright Minds Institute.



Miranda founded the institute to take the guesswork out of diagnosing brain disorders in children. Too often, he maintains, children are labeled with attention deficit disorder and given medications by pediatricians on the basis of observable behavior only. As a result, some children are misdiagnosed and overmedicated while the real problem goes untreated. At the Bright Minds Institute, Miranda uses the latest MRI and EEG technologies to pinpoint the part of the brain that's affected, diagnose the problem and devise appropriate therapy for attention problems, learning disabilities, autism and sleep disorders. He also provides guidance for high achievers.

Originally from Chile, Miranda traveled extensively as he was growing up, visiting his father, an epidemiologist for the World Health Organization, in far-flung places around the globe. He came to the United States in the early '70s to do an internship and residency at University of Maryland. He co-founded the Maryland Regional Sleep Disorders Center at Johns Hopkins Hospital and taught neurology at the Hopkins medical school. He was later recruited to chair the neurology department at the Lovelace Clinic in Albuquerque, where the early astronauts were trained. That led to his work with NASA, helping to solve the problem of space motion sickness.

He established a private practice in San Francisco in 1989 and lived in Pacific Heights until the breakup of his first marriage nine years later, when he sold his house to Don Johnson. He now lives in Tiburon with his second wife and their 3-year-old daughter. He opened the Bright Minds Institute earlier this year, with one office in Los Angeles and another in the Presidio.

Miranda greets me in the waiting room of the institute, housed in one of the old Victorians—which used to serve as homes for officers and their families—on the converted military base. A short man with a friendly and energetic manner, he bounds into the room and shakes my hand. He has a round face with a ruddy complexion, blue eyes and red hair. Although his family has lived in South America for 450 years, he tells me later that he inherited his coloring from ancestors in northern Italy and northern Spain. Before leading me up to the second floor, he pauses to speak animatedly in Spanish with two men, also in the waiting room, apparently a father and son. We climb a narrow stairway and enter his office, a spacious but low-ceilinged room. He sits at his desk and talks with me about his work.

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You say that ADHD is often misdiagnosed and mistreated. What other disorders might be mistaken for ADHD?

Attention may be affected by sleep problems, for one thing. Twenty to 30 percent of children—and adults—that have attention problems have sleep problems. And if you don't ask about that, you don't find out. If you do not sleep well during the night, you will have frequent small attacks of sleep during the day which can be anywhere from a second to a minute to several minutes. You also will become fidgety in order to stay awake. Frequently when children with this sort of problem come in here and we guide them to become quiet, they fall asleep.

So their fidgetiness can look like ADHD when it's only exhaustion. What else might produce attention problems?

Medications. Many children, just because they are hyperkinetic, are placed on stimulants to see if it quiets them down. And if you do not make the diagnosis of what causes the hyperkinesis to start with, that may exacerbate

the condition. A child that has specific language disorders might also produce an attention-like problem. If I misunderstand phonemes and words—if I'm not getting proper feedback from the social group—I will not be able to interact well with others.

Give me an example.

I might not be able to differentiate between "bat" and "pat." If I misunderstand the word, I'll misunderstand the concept.

So someone with this kind of problem would probably be classified as having a learning disability?

Yes.

It doesn't sound like an attention problem.

It will become an attention problem. If you cannot perceive what I am saying correctly, how are you going to pay attention?

I see. OK, so what would cause this?

Phonemic perceptual problems.

Is that a brain disorder?

Oh, yeah! There are children that have trouble identifying phonemes, which usually take between 60 and 80 milliseconds to utter. Others have trouble with word recognition, which takes between 80 and 290 milliseconds. Or the problem could be with semantics, which is 290 to 400 milliseconds. We can tell at which stage the problem occurs.

How?

By testing. It's similar to an EEG. It's called Event-Related Potential. There are auditory and visual event-related potentials. We measure at what time the perception takes place and what is the difference between the group and the individual at these different levels.

So you measure the time it takes for a particular part of the brain to fire when the perception takes place?

Correct. And the problem at 60-80 milliseconds is different from the problem at 80-290 milliseconds or at 290-400 milliseconds. You can't treat them all the same. For children who have trouble hearing phonemes, there's a program called Fast For Word. It uses a computer to process sounds and prolong the consonant sound. So the "b" in "bat" is more pronounced and easier to differentiate from the "p" in "pat." Some children have incredible improvements with this. [We hear a piercing scream from another room] That's one of our patients.

Being tortured?

Actually, he has no language. So he expresses himself in nonverbal ways. He's autistic.

Tell me more about how you treat the various disorders.

It depends on which part of the brain is affected. You need completely different medications for different parts of the brain. There's the reptilian brain, which has to do with sleep and circadian rhythms. There's the basal ganglia, sort of in the center of the brain, where you use sensory input to focus your attention—for example, when children assume all kinds of weird positions when they're studying. Or they've got heavy metal music playing at the same time. The extra stimuli helps them focus their attention. That's a function of the basal ganglia.

You're saying this is normal?

This is normal. For an adult, these things would be a distraction, but for a youngster, it helps them focus. As long as they're getting good grades, don't interfere! The third area is the frontal region of the brain—the big CEOs of the brain. If you have a problem in this area, you might get stuck on something I mentioned an hour ago and you would not be absorbing what I'm telling you now.

When you say "stuck," you mean I'm still pondering that one idea.

Yes. And these are all different sorts of pathologies, different neurotransmitters. Unless you identify which one is which, how are you going to treat them properly?

So when a child comes to you with an attention problem, what are some tests you'll do?

We'll want to know if the parts of the brain are formed the right way. And if there are any changes in neuronal pattern migration. There can be all kinds of aberrations. And autistic children, we now know, have a problem here. The nerve cells did not go to the layer of the brain that was appropriate, so they cannot perceive language properly. And when nerve cells do not communicate, the nerve cell that's not receiving the impulse becomes hypersensitive. That's why children with autism are hyperacoustic—they react to sound abnormally. Sounds disturb

them because they are hypersensitive to sound. They can't filter them properly. And in 70-80 percent of children with autism, their EEGs will have epileptogenic-like discharges. They will look just like small episodes of epilepsy—even though they have never had a seizure, and may never have one. So we get an MRI scan of the brain and we see if the parts are well-formed. Are there neuronal pattern migrations—is one side of the brain bigger than the other? Or are there cysts pressing somewhere? We may see a big cyst over the temporal region in the dominant hemisphere—no wonder they're not getting speech properly!

So if that child was just brought to a pediatrician who did not do any of these brain scans, that doctor might prescribe medication—and meanwhile, this cyst is growing.

Exactly right. Or the pediatrician might say, "Oh, he'll grow out of it." Well, what if the child doesn't? We've lost two to three years—or four years, or more. And if you scan the population of children that have problems, 5-10 percent will have some sort of abnormality in the EEG or MRI and/or the neurological testing that we do.

What percentage of your patients have been misdiagnosed previously?

The people who come to us are the ones who have failed in other avenues of looking for an answer. But I can tell you that 8-10 percent of the pediatric population will have attention/learning problems. That's a huge number!

What percentage of your patients do you prescribe medications for?

In the past year, I have not written one prescription for any of the stimulants. When we have children that get stuck, it's because they either don't produce enough serotonin, or they don't have enough receptors. Most of them will react to SSRIs, drugs like Zoloft or Paxil or Prozac. These medications are nonaddictive and will replace the neurotransmitter of need. And by repairing the substrate, the brain rewires. Children up to age 13 are producing between 20,000 and 25,000 new brain cells every month. If you don't challenge those new cells to connect properly, they're wasted.

So if a child has a serotonin deficit and you prescribe Prozac, that helps their brains rewire correctly?

Correct.

So the brain will actually heal? And you can take them off Prozac and they're OK?

You got it. That's exactly what we do.

Do you have any concerns about the reports linking Prozac and suicide?

Yes, we all do. You've got to watch your patient. Digitalis can kill someone. It stops the heart. Or if you take a diuretic that significantly lowers your sodium and potassium, you can have cardiac arrest. It can happen any time we use medications if we don't follow the patient correctly.

Let's talk about autism. What do you think of the theory that autism may be caused by the mercury in vaccinations?

There is nothing in the literature to indicate that. There's no question that mercury affects the brain. But now we know the neuropathology of autism, we know the changes that occur in the brain that are responsible for autism.

And could those changes in the brain be caused by too much mercury consumed by the mother while she was pregnant? We know now that a lot of people are walking around with way too much mercury in their bodies from eating tuna fish.

Yes. But we don't know if this can cause autism. What we do know is that children with autism have a neuronal migration pattern in which the nerve cells do not go to the layers of the brain that they're supposed to. When you look at the child's brain with the electron microscope, you see that the nerve cells are not connected.

But we don't know why.

Right. Is it from mercury? Is it from noise? Is it from stress? Don't know. But I can tell you that behavior guides neuronal growth. So if I practice playing the piano I'm going to learn patterns of movement that will be ingrained in me and nerve cell growth will be created to facilitate that. This is how we regenerate. By fixing the substrate you allow the connections to be formed. Nerve cells remember. We have known that from epileptology since the 1970s, when John Freeman at [Johns] Hopkins started treating children that had had their first seizure and put them on medications that normalized them for five years. When he stopped the medication, 75-80 percent of those children no longer needed any medicines from then on! Isn't that cool? Now, if a child with autism is having frequent interruptions of seizure-like activity 10-20 times per minute, he's not going to learn. So we're starting to treat these children with anti-epileptic medications to see if language flourishes. And we're being very successful.

These are not the same type of interruptions you were talking about earlier, that have to do with sleep deprivation.

Right. These are interruptions of nerve cells that are hypersensitive and they produce little short-circuits in the brain. Autistics have epileptogenic manifestations because when the nerve cells do not receive the proper input from other nerve cells, they become hypersensitive. That's why they respond to anti-epileptic medications.

I assume that not all autistic people have these seizure-like interruptions.

Right—70-80 percent.

So if that's what's going on and you put them on the anti-epileptic medication, that's just the first step, right?

Right. Then there's speech therapy, behavioral therapy, social groups, teaching them how to interact with other children. We teach them to recognize facial expressions. And we videotape them when they're interacting with other children so they can observe themselves. This is great for adolescents.

Is this part of the therapy any different from the traditional therapy that's used for autistic kids? Applied behavioral analysis? Or the Lovaas method?

ABA. We all do ABA. The Lovaas method, however, uses a series of positive and negative reinforcement and some of them are sort of 14th-century. It can be like torture for the child. I remember observing one child who was reacting quite negatively the majority of the time. That's not helpful!

I've heard from some parents who weren't happy with Lovaas that they prefer the Floor Time therapy because it doesn't force the child to conform. It's more responsive to the child.

Right. With Lovaas, everyone gets the same routine. And we're all different.

So do you approve of Floor Time?

Oh, absolutely. We use it all the time. All children want to communicate. And you have to identify the things that they can be rewarded with in order to achieve what you want them to achieve. That requires a lot of observation and a lot of feedback from you to the child—You're doing the right thing, Johnny. "Biting is not the right thing, but you can touch my face. Look at me."

Let's talk about your background. Where are you from originally?

Chile.

Were you in Chile during the coup?

I was there a little bit before the coup. I was there when Salvador Allende was president. He was my father's classmate in medical school. My family had been in South America for the last 450 years—as I usually tell the story, raping and pillaging South Americans. The old families all know each other.

You must know Isabel Allende, then.

I don't know Isabel. But I grew up with my father and Salvador Allende being very good friends. As a matter of fact, Salvador Allende brought my father back from the World Health Organization to be the second man on health in Chile. My father was an epidemiologist and infectious diseases expert.

So that time must have been frightening for you.

It was, in so many different ways. But I actually left before the coup, so it wasn't a problem for me. In those days, I was very nonpolitical and so was my father, with serious tendencies to being more Christian Democrats than anything else. The presidents before Allende were Christian Democrats.

How is medical training different in Chile from the United States?

In Chile, you're trained as a generalist. So when I came to the United States, I had never been in charge of an ICU because that's post-graduate training for Chileans, although I had taken gall bladders out, I had done several appendectomies, I delivered at least 100 babies and done at least 25 Cesarean sections. The majority of medical students here don't even touch one unless they're in surgical training. As part of my internship in Chile I had to spend two months being the only medical provider for about 9,000 or 10,000 people in an area maybe 100 miles away from anything. I was in a village of fishermen and miners in the northern part of the country. It was interesting to see how very different the fishermen and the miners were psychologically. The fishermen were happy. The miners were resolute with tendencies to depression. It was clear-cut. The fishermen were exposed to repetitive movement and sound, which stimulate REM sleep. I didn't know this at the time but I was able to make the connection later on. There are many things that disturb REM sleep—like alcohol and narcotics—but few things that stimulate it. If you live close to the ocean, it's a very good thing. And if you live on a boat, it's even better.

Did your father want you to be a doctor like him?

No, exactly the opposite. He wanted me to be a mathematician and when I didn't want to do that, he wanted me to be an engineer. And I applied to medical school when he was out of the country and got admitted and he was extremely disappointed.

Why?

Because he wasn't sure if I had the dedication and the strength to be a physician. Fathers are judgmental. That doesn't mean they're right or wrong. But I wanted to be a physician so I did it anyway. My brother also wanted to

be a physician and my father convinced him to go to engineering school instead and he's been unhappy all his life.

And why did you want to be a physician?

I think it was mainly to beat out my dad in one way or another. My father was an incredibly smart man. Although my CV is not small by any means, his was eight to 10 times bigger. He wrote more than I have, he was just brilliant.

How did you become involved with NASA?

When I was at Hopkins, I was asked to chair a neurology department at the Lovelace Clinic, a huge medical institution in Albuquerque. And the Lovelace Clinic was involved in space research for years. That's where the first group of astronauts went through testing—remember the movie, *The Right Stuff*, when they're pushing around those poles with IVs? That's the Lovelace Clinic. So we were involved in research on toxicology and epilepsy and effects of radiation on cognition. At the time, the biggest problem was space motion sickness. Everyone thought that it was caused by problems in the inner ear because the astronauts had vertigo. So they had a lot of ear, nose and throat doctors and physiologists and psychologists and gastroenterologists, but I was the first neurologist. And my expertise was in sleep disorders. I had put together the sleep laboratory at Hopkins, which was the third one in the country. The first was at Stanford. So I brought in a colleague from Stanford to work with me on this. Interestingly, the Russians did not have as much space motion sickness as the Americans did, not by any stretch. Only 15-20 percent of the Russians got it, as opposed to almost 90 percent of the Americans.

How strange!

The Americans got it and the monkeys got it, too. At first they tried cutting off the acoustic nerves in the monkeys, thinking it was an inner ear problem, but they would still get motion sickness. But one of the things they had observed was that sleeping was impossible while floating in space. In order to sleep, they had to be gathered up in a contraption that would anchor them to a bunk. And that was a clue. The second thing is that we get vertigo when we don't have a sense of stability, which makes us nauseous.

So why didn't the Russians get it?

Because most Russians were gymnasts.

[laughing] Amazing!

Yes, the Russians were very accustomed to pitching forward and backward. You have to condition yourself to get used to it. So we started training the astronauts in gymnastics and the problem went away. That's how we solved it. And I didn't get to go!

You wanted to go into space?

Oh, I wanted so badly to go! And I was scheduled—but then we solved the problem and it wasn't necessary any more!

What other dreams do you have? What else would you like to do before you die?

As a father, I would like to see my baby girl grow up. I would love to someday finish my Ph.D. in philosophy if I had the time. But, professionally, I'm really into what we're doing right now. We're offering something that no one else has at this point. Maybe two or three years from now, there may be others who have all these approaches under one roof. This is something that I would like to see grow and expand.