



Dr. Huizenga



There are some big problems with brain-scan lie detectors

By Julia Calderone | April 19, 2016



Imagine what might happen if someone could figure out if you were lying by simply scanning your brain.

Scientists have been exploring this very proposition for years. And while such a technique would revolutionize the legal system, scientific evidence says it's probably too good to be true.

That didn't stop **Dr. Robert Huizenga** from showcasing this unproven technology on a recent segment of The Dr. Oz Show, which has come under fire before for touting pseudoscience.

As Stanford psychology professor Russ Poldrack pointed out on Twitter, the idea is not quite ready for prime time:

Dr. Huizenga, a celebrity doctor known as Dr. H on The Biggest Loser and the physician who treated Charlie Sheen after he announced he had HIV, said that you could use a brain scanning technique called functional magnetic resonance imaging, or fMRI, to detect lies. (As The Dr. Oz show noted, Huizenga is an investor in No Lie MRI, a company that markets this technology. His brother, Joel Huizenga, is the CEO.)

An fMRI reveals active regions of the brain by tracking blood flow. Researchers and doctors have been using it for the past 20 years to study things like Alzheimer's disease, pain, and memory, as Dr. Oz pointed out at the top of the segment. Even with those conditions, however, what an fMRI can truly reveal is often overblown.

During the segment, Huizenga noted that while the fMRI lie detector is indeed still in the "experimental" phase, it's much more reliable than current lie detector technology, such as the polygraph test.

"It's the first unbiased, scientifically-backed way to differentiate a lie from truth telling," Huizenga said during the segment. "It's very robust scientifically — this is not some fly-by-gimmick."



Unlike the polygraph test (which purports to detect dishonesty by measuring outward changes in respiration, pulse, and blood pressure, though it's not backed by science), Huizenga said during the segment that an fMRI can more effectively expose the truth by looking inward at the brain: "This is a paradigm shift in how we analyze truth telling."

Since lying takes more effort than being honest, Huizenga continued, a brain showing many specific regions of activity is more likely to be lying than one that appears more calm.

But is that true? Can an fMRI *really* sniff out the truth-tellers from the cheats? Probably not, according to Poldrack, several peer-reviewed meta-analyses, and other notable scientists. (Neither Dr. Huizenga nor The Dr. Oz show responded to a request for comment.)

The studies that have touted the technique as a possible tool for lie detection have some problems, scientists argued in this meta-analysis published in 2014 in *Nature Reviews Neuroscience*, and in this one published in *Frontiers in Human Neuroscience* in 2013.

A glaring issue is that many of the subjects of past studies don't represent the type of person you'd scan in real life. Most are cooperative participants, rather than unwilling defendants undergoing rigorous questioning. For an fMRI test to be accurate, a participant must follow instructions to a T. Even just a slight head movement can throw off the results — which someone could easily do on purpose (and which is probably likelier behavior in a defendant than in a research participant).

There's also the problem of causation. When someone is telling a lie, blood tends to flow to particular regions of the brain, such as the prefrontal cortex. But for a brain-scanning lie detector test to be valid, scientists would have to prove that this *always* happens during a lie, and that it *only* happens during a lie.

This isn't realistic, however. Most brain regions perform more than just one function. Lying, recalling a memory, and all kinds of higher order thinking involve activity in the prefrontal cortex. That makes it virtually impossible to draw any kind of conclusion about what's going on based only on where blood is flowing.



Traditional lie detection does not work.

There's also the issue that many, though not all, of these studies have analyzed groups, rather than individuals. For lie detection to be a useful tool, it has to work correctly all the time — not just more than half the time. Furthermore, many of these studies haven't been replicated.

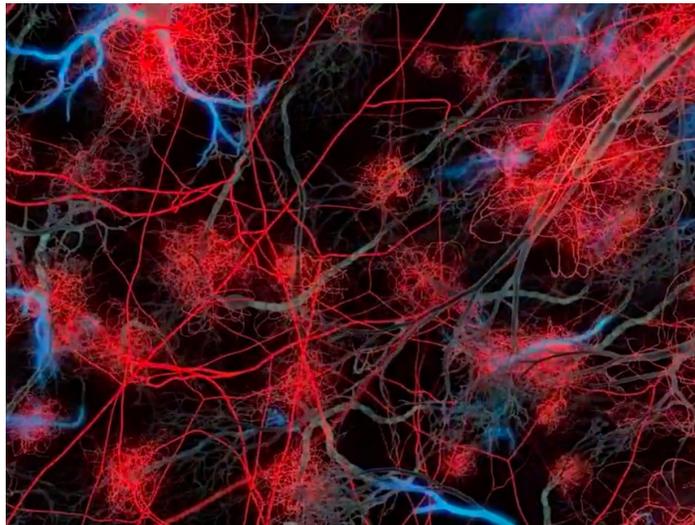
We also can't objectively define what a lie *is*. What constitutes a lie can vary from person to person, so it's exceedingly hard to know if a particular pattern of neural activity is associated with a lie. Imagine how differently you might think about a low-stakes lie a researcher tells you to focus on and a high-stakes lie you're telling to keep yourself out of jail. Those are hardly comparable circumstances.

Despite the dearth of scientific evidence backing this technique, two companies — No Lie MRI and Cephos — began offering fMRI-based lie detection services to the public in 2006. Cephos discontinued that service, its CEO told Tech Insider, after a federal court ruled in 2010 that the technology cannot be validated and therefore is not permissible in a court of law.

Both companies have claimed that their lie detection tests can be up to 90% accurate (a big jump from the purported 70% accuracy of polygraph tests). But other researchers have struggled to get those kinds of results. And the accuracy rate of these scanners is only testable when the truth is known to the people administering the fMRI — something that would almost never be true in a real use case.

As the federal judge wrote in 2010: "There are no known error rates for fMRI-based lie detection outside the laboratory setting, i.e, in the 'real-world' or 'real-life' setting." And in 2013, the scientist whose research served as the basis for No Lie MRI wrote that the court's conclusion that "the 'real life' error rate of fMRI-based lie detection [is] still unknown" was "a point with which we concur."

"Such potentially powerful testimony as fMRI lie detection should not be admissible without better proof of validity and reliability," the scientist added.



Don't be fooled by pretty pictures. They don't reveal much.

Still, the Huizenga brothers and others believe that the technology is an unbiased, scientifically proven means of getting at the truth.

In an interview with Tech Insider, No Lie MRI CEO Joel Huizenga said that he believes that the scientists and government shunning the technology are doing so with a political agenda rather than a scientific one. His theory is that they are keeping the technology out of the courts to keep power in their own hands, and that the justice system is inherently anti-science.

According to most scientists, however, it's unlikely that fMRI lie detection will become so good at distinguishing fact from fiction that it will be a useful tool in the courtroom any time soon, if ever.

As the researchers wrote in their 2013 review, "fMRI research, processes, and technology are insufficiently developed and understood for gatekeepers to even consider introducing [them] into criminal courts ... for the purpose of determining the veracity of statements made."

They conclude that "the current status of fMRI studies on lie detection meets neither basic legal nor scientific standards."

Now, if only we had a lie detector that worked on TV doctors.

<http://www.techinsider.io/dr-oz-huizenga-fmri-brain-lie-detector-2016-4>