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How Anecdotal Evidence Can Undermine Scientific Results

By Michael Shermer on August 1, 2008

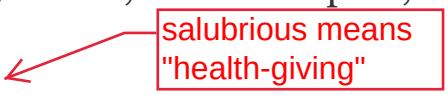
Credit: Matt Fore / New Rule Productions, 2008

The medical controversy over whether vaccinations cause autism reveals a habit of human cognition—thinking anecdotally comes naturally, whereas thinking scientifically does not.

On the one side are scientists who have been unable to find any causal link between the symptoms of autism and the vaccine preservative thimerosal, which in the body breaks down into ethylmercury, the culprit du jour for autism's cause. On the other side are parents who noticed that shortly after having their children vaccinated autistic symptoms began to appear. These anecdotal associations are so powerful that they cause people to ignore contrary evidence: ethylmercury is expelled from the body quickly (unlike its chemical cousin methylmercury) and therefore cannot accumulate in the brain long enough to cause damage. And in any case, autism continues to be diagnosed in children born after thimerosal was removed from most vaccines in 1999; today trace amounts exist in only a few.

The reason for this cognitive disconnect is that we have evolved brains that pay attention to anecdotes because false positives (believing there is a connection between A and B when there is not) are usually harmless, whereas false negatives (believing there is no connection between A and B when there is) may take you out of the gene pool. Our brains are belief engines that employ association learning to seek and find patterns. Superstition and belief in magic are millions of years old, whereas science, with its methods of controlling for intervening variables to circumvent false positives, is only a few hundred years old. So it is that any medical huckster promising that A will cure B has only to advertise a handful of successful anecdotes in the form of testimonials.

Take wheatgrass juice ... if you can stomach it. The claims for its curative powers are bottomless. According to the Natural Medicines Comprehensive Database (the "bible" of natural medicines: www.naturaldatabase.com), wheatgrass is "used therapeutically for increasing hemoglobin production, improving blood sugar disorders such as diabetes, preventing tooth decay, improving wound healing, and preventing bacterial infections." And that's not all. "It is also used orally for common cold, cough and bronchitis, fever and colds, inflammation of mouth and pharynx, tendency to infection, gout, liver disorders, ulcerative colitis, cancer, rheumatic pain, and chronic skin problems."



The alleged salubrious effects of wheatgrass were promoted in the 1940s by a Lithuanian immigrant to Boston named Ann Wigmore, a holistic health practitioner who was inspired by the biblical story of King Nebuchadnezzar, recounted in Daniel 4:33, in which "he was driven from men, and did eat grass as oxen, and his body was wet with the dew of heaven, till his hairs were grown like eagles' feathers, and his nails like birds' claws." Wigmore also

noted that dogs and cats eat grass when they are ill and feel better after regurgitation, which gave her the idea of the wheatgrass detox. Because we have fewer stomachs than cows do, she hatched the idea of blending freshly cut wheatgrass into juice form for easier digestion—through either orifice—a practice still employed today. She believed that the enzymes and chlorophyll in wheatgrass constitute its healing powers.

According to William T. Jarvis, a retired professor of public health at the Loma Linda University School of Medicine and founder of the National Council against Health Fraud (www.ncahf.org), this is all baloney: "Enzymes are complex protein molecules produced by living organisms exclusively for their own use in promoting chemical reactions. Orally ingested enzymes are digested in the stomach and have no enzymatic activity in the eater." Jarvis adds, "The fact that grass-eating animals are not spared from cancer, despite their large intake of fresh chlorophyll, seems to have been lost on Wigmore. In fact, chlorophyll cannot 'detoxify the body' because it is not absorbed."

I tried wheatgrass juice at the Oh Happy Days natural food store in Altadena, Calif., as part of an investigation for the pilot episode of *Skeptologists*, a series we hope to sell to a television network (where another biblical phrase is apropos: "Many are called, but few are chosen"). My co-stars—Kirsten Sanford, who has a Ph.D. in physiology and is now a science journalist, and Steven Novella, director of general neurology at the Yale School of Medicine—also imbibed. If a picture is worth a thousand words, I will double this essay's length by sharing the above snapshot.

Note: This article was originally printed with the title, "Wheatgrass Juice and Folk Medicine".