

# **Oral Public Comments**

**IACC Full Committee  
Meeting**

**January 18, 2011**

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## Caroline Rodgers

January 18, 2011

*Subject: Complex or just counterintuitive? Elusive answers often turn out to be simple*

Autism is thought to be caused by a complex interaction of genetics and environmental factors.

This makes intuitive sense to us.

We perceive ourselves as victims of exposure to an increasingly large number of toxins that have become a daily part of the food we eat, the air we breathe, the fabrics we wear and the products we use.

Yet time after time, when new public health issues have emerged, the cause has turned out to be simple, not complex.

- Childbed fever, which claimed the lives of up to one-third of women delivering in maternity hospitals in the mid-19th century, was virtually eliminated at one hospital when Dr. Emil Semmelweis ordered his interns to wash their hands.<sup>2 3 4</sup>
- Rickets, which causes bone deformations, was blamed on everything from gland secretions to infections, bad diet, lack of exercise and even “domestication,” a term that embraced the collective slum conditions of confinement, foul air and lack of hygiene. Rickets was accurately described in a scientific paper in 1650, and although in 1861 one scientist suggested that rickets was caused by a lack of sunshine and could be treated with cod liver oil, it wasn’t until the 1920s that scientists discovered it was caused by a simple vitamin deficiency.<sup>5 6</sup>
- In 1951, British epidemiologist Alice Stewart set out to find out why more children between the ages of 2 and 4 were getting leukemia in England than in Ireland and Scotland, which did not have as good medical care. She created a comprehensive survey asking mothers about their medical histories, prenatal care and exposure to various foods, animals and potential environmental toxins. To her surprise, Dr. Stewart discovered that a single low-dose fetal x-ray doubled a child’s chance of pediatric cancer.<sup>7</sup>

These are just three examples of how unexplained deaths, deformities and cancer were an effect that could be traced to a simple cause. The remedies could not have been easier, yet they were counterintuitive according to the thinking at the time.

Is autism any different?

In the case of childbed fever, Dr. Semmelweis noticed that women who gave birth in the streets had better survival rates than women who delivered in maternity hospitals. That didn’t make sense to him, which is what led to his speculation about hand washing – a counterintuitive conjecture, since the Germ Theory had not yet been proposed.

Today, mothers who do not get first trimester prenatal care have children with lower autism rates than women who make sure they do.<sup>8</sup> This also does not make sense, according to our understanding of the benefits of prenatal care, suggesting that the answer is counterintuitive.

In the case of rickets, early on some investigators observed that fresh air helped prevent the bone-softening disease, which would have made sense in the context of the times since the importance of oxygen was well established. It would have been far less logical to suggest that sunlight itself, rather than the air we breathe could be the operative factor, since neither vitamin D nor the unique process by which the skin uses sunshine to manufacture it had been discovered.

Today, parents who have observed their children regress into autism after vaccinations believe that the vaccinations themselves – whether via the preservative, the number delivered in a single injection or the total number of required vaccinations – are causing autism. Yet virtually all of the small percentage of vaccinated children who regress into autism had prolonged high fevers before regressing. Could it be that fevers, not the vaccinations, sometimes cause autism?

Blaming fevers seems counterintuitive – after all, childhood fevers long predated the emergence of autism. Yet if regressive autism is not caused by vaccines – and the scientific literature does not support that they are at fault – the role that fevers may play in regressive autism deserves a closer look. Interestingly, a 2007 study found that 80% of children with autism had a reduction of symptoms during fevers, with some becoming much more socially engaged – another counterintuitive finding.<sup>9</sup> What could cause two such different fever responses – one possibly causing the initiation of autism, the other temporarily alleviating it? Could the thermal effects of prenatal ultrasound – which has become increasingly common in pregnancies just as vaccines have become increasingly common in well baby visits – cause fever-response changes in a small percentage of fetuses?

The link between low-dose fetal x-rays and pediatric cancer is a reminder that diagnostic imaging that penetrates the body, albeit bloodless and painless, is a biological intrusion and necessarily has consequences; the only questions are, how well does each individual recover from the consequences and is it reasonable to expect that everyone fully recovers?

In a world governed by cause and effect, why would anyone think that prenatal ultrasound, which has several bioeffects, would not sometimes affect fetal development? Perhaps autism is caused by a “perfect storm” scenario that depends upon the combination of gestational timing, amount of heat generated by the sound waves and genetic predisposition. If this were the case, it would be fair to say that any genetic predisposition would be inconsequential if the fetus were not exposed to an ultrasound beam.

Scientists know that experiments don’t always turn out the way they expect and some results seem counterintuitive, yet make sense when more information becomes available. The cancer risk caused by low-dose fetal x-rays is a case in point. Back in the 1950s, when Dr. Stewart discovered that low-dose fetal x-rays increased pediatric cancer risk, she attributed it to the fact that low-dose x-rays could cause mutations, but the scientific community at large did not buy it – or it would not have taken nearly 30 years for the major medical associations to recommend against fetal x-rays.

Today we have more information: a recent study proved that double-strand DNA damage caused by low-dose ionizing radiation took weeks to repair, whereas the same type of damage caused by high-dose radiation was repaired in mere hours.<sup>10</sup> Suddenly, risk posed by low-dose fetal x-rays no longer seems surprising.

It is natural to want to believe that autism is caused by a complex interaction of environmental and genetic factors, yet the answer may not be complex at all, only counterintuitive. Facts that don’t seem to

make sense could actually be the best clues we have; as inconvenient as they may be, upsetting our preconceived ideas, they deserve further investigation.

<sup>1</sup> IACC 2010 Strategic Plan <http://iacc.hhs.gov/strategic-plan/2010/index.shtml> Accessed 1-10-2011.

<sup>2</sup> Semmelweis Society International <http://semmelweis.org/about/dr-semmelweis-biography> Accessed 1-10-2011.

<sup>3</sup> Lienhard JH. Ignaz Philipp Semmelweiss. *Engines of Our ingenuity*. No. 622. <http://www.uh.edu/engines/epi622.htm> Accessed 1-9-2011.

<sup>4</sup> Cohn, DV. Semmelweis. <http://pyramid.spd.louisville.edu/~eri/fos/semmelweis.html> Accessed 1-9- 2011.

<sup>5</sup> Kajakumar K. Vitamin D, Cod-Liver Oil, Sunlight & Rickets: A Historical Perspective. *Pediatrics*. 2003 112(2): e132-e135.

<sup>6</sup> Tisdall FF. The Etiology of Rickets. *Can Med Assoc J*. 1921 11(12): 34-943.

<sup>7</sup> Gayle Greene, *The Woman Who Knew Too Much: Alice Stewart and the secrets of radiation*. University of Michigan Press, 1999. 78-92.

<sup>8</sup> This reference relies on integrating information found in the following sources:

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<sup>9</sup> Curran LK, Newschaffer CJ, Lee LC, et al. Behaviors associated with fever in children with autism spectrum disorders. *Pediatrics*. 2007 120(6)e1386-92.

<sup>10</sup> Grudzenski S, Raths A, Conrad S, et al. Inducible response required for repair of low-dose radiation damage in human fibroblasts. *Proc Natl Acad Sci U S A*. 2010 107(32):14205-10. Epub 2010 Jul 26.