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News Letter

Autism vs. Vaccines: The Power of Observation

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NEWS LETTER

The hand of Sarah Nelms; cowpox lesions taken from her hand were used by Edward Jenner to inoculate the first recipient of Jenner's vaccine, 8-year-old James Phipps, in 1796. (*Photo courtesy of National Library of Medicine).*

Historians often revel in the serendipity and brilliance of Edward Jenner's seminal observation of milkmaids with clear skin at a time when most people lucky enough to survive smallpox bore the ugly pock-marked vestiges of the disease on their faces: "We milkmaids never get smallpox, because we've all had cowpox…" Simple words, a simple observation and a worldwide revolution in healthcare. While we may enjoy reminiscing on the great accomplishments derived from simple observations in the history of science (remember relativity?) it seems that, in the wake of new and powerful technological advances, simple observation as a cornerstone of scientific discovery may be on its way to the dustbin of history. Take, for example, the case of autism. We have all heard stories of parents who claim they have witnessed a dramatic cognitive and social regression- often accompanied by epileptic seizures- in the hours and days following early childhood vaccinations. Desperate for answers, they are often rebuffed by the medical community as "mistaken", "uninformed", and even "hysterical", especially when these parents go the media for validation. As a consequence, some parents of children who have experienced sudden onset autism following vaccination have made strident accusations against the medical profession that have spiraled into a spreading, pervasive fear of vaccination among new parents that could have devastating public health repercussions.

So, what does the science say? "The truth will set you free" is an old adage that especially applies here. Not so long ago, an editorial published by the eminent journal *Vaccine* proclaimed, "There is no connection between autism and vaccines", based on conclusions drawn from worldwide epidemiological data [1]. Case closed. Well, maybe, not so fast. Given what's at stake here, the case certainly deserves a second look. Let's take a closer look at the little boy playing on the swing set in the park after a trip to the pediatrician for routine vaccinations. Suddenly, he falls off the swing. His mother rushes over only to find him writhing from a seizure. Frantic, she calls the doctor. "Nothing to worry about- it will go away," she is told. But it doesn't go away. In the days and weeks to follow, he loses speech, his gait is unsteady, the seizures continue. The parents conclude that this is the result of the vaccine. The doctors say "nonsense". Stalemate.

Let's take a closer look: inside the child's brain there is microglial activation, inflammation and neural damage. We learn that the family has risk factors linked to autism that may affect how the body responds to vaccination. We expand our horizon to view autism as a multifactorial disorder, in which genetic differences related to immune system function combined with environmental risk factors may occasionally produce a scenario in which the vaccine is the tipping point. The complex interrelated neural and immune system network designed to craft and protect central nervous system functions breaks down. Inflammation induces neural damage and hyper excitability. The result is plainly observable. The child falls off the swing and a lifetime of disability begins.

Fast forward. The observation itself is the clue that identifies a previously undetected link between vaccines and autism. But it is just the tip of the iceberg. Dig a little deeper and you find that it is not just the vaccine- it is the sum total of risk factors taken together that triggers the avalanche. A rational rather than merely reductionist approach prevails. Our greater understanding of the importance of the immune system in the regulation of brain development, the early innate immune system responses to the antigens and adjuvants in vaccines, and recent research identifying immune system genes linked to both autism and vaccine triggered immune responses has given us a roadmap to explore the relationship between vaccines and regressive autism. I have defined a new syndrome; vaccine associated regressive autism (VARA) (Figure 1), in which the symptoms of autism first become apparent in the hours and days following early childhood vaccine administration. This is only the first step toward the development of prenatal and infant biomarker assessments of autism risk. Let's take a closer

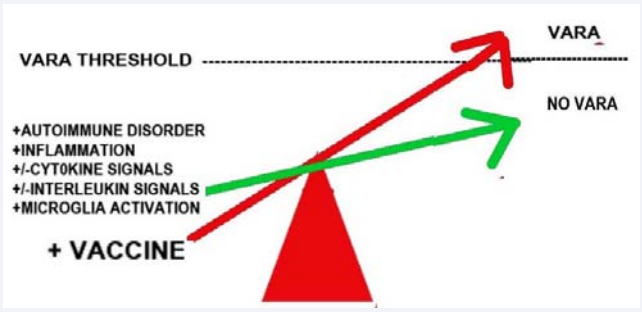

Figure 1 Application of the Quantitative Threshold Exposure (QTE) Model to the role of vaccines in the multifactorial causation of vaccine associated regressive autism (VARA).

look at those children who have developed autism associated with vaccination to define more specifically the risk factors-both genetic and environmental- shared by these children that may make them vulnerable to VARA. Once this door is opened, it may become easier to determine whether a child is at risk for VARA and allay the fears of parents whose children are not at risk for developing this vaccine associated disorder.

The early observations of 13-year-old Edward Jenner, of the clear, unmarked skin of milkmaids, evolved to a lifelong quest to eliminate smallpox, a scourge of mankind since antiquity, and a disease that now no longer exists as a result of vaccination. To paraphrase Shakespeare, the fault lies not in the vaccine, but in our failure to understand its potential consequences in individuals who are at risk for the development of autism.

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