

Autism and MMR Vaccination or Thimerosal Exposure: An Urban Legend?

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An 'urban legend' is an apocryphal story often told in the form of a cautionary tale that is related or transmitted as if true.¹ The tale is plausible enough to be believable and indeed is a type of modern folklore that represents the beliefs of ordinary people. Frequently, the legend addresses a vexing aspect of modern life and carries the moral message that new technologies may ultimately prove to be a hazard. Mass media, including the internet, may serve to propagate and establish an urban legend as "truth", however careful examination of the legend's origin and its contents ultimately reveals it to be false and without basis.

The belief that either MMR vaccination or excessive thimerosal exposure may be causally linked to the occurrence of an autistic spectrum disorder has many of the features of an urban legend. For MMR vaccination it originates in a single small study of 12 children published in the *Lancet* in 1998,² whose essential conclusion was later retracted by ten of its co-authors.³ This article serves as the core of the 'vaccination and autism' legend that is now believed to be true by a majority of parents surveyed.⁴ For thimerosal, the legend's origin lies not in a scientific article per se, but in a theoretical proposal published in *Medical Hypothesis* in 2001.⁵ However, as systematically surveyed by Doja and Roberts⁶ in this issue of the *Canadian Journal of Neurological Sciences*, the vast preponderance of epidemiological data subsequently collected in a variety of geographic settings, utilizing a number of investigative approaches, refutes any causal link between autism and either prior MMR vaccination or excessive thimerosal exposure.

Particularly impressive are the results obtained from large datasets in Denmark,⁷ the United Kingdom,⁸⁻¹⁰ Finland,¹¹ Sweden,¹² United States,¹³ Japan¹⁴ and most recently Canada itself¹⁵ that each independently have refuted any MMR vaccination and autism causal association. Other systematic reviews, to which that of Doja and Roberts can be appended, have supported these conclusions.¹⁶⁻¹⁸ Furthermore, recent rigorous and independent molecular biologic investigations of one corollary hypothesis, that of the persistence of the measles virus in autistic children, have yielded negative results and unmasked more methodological flaws in the original work.^{19,20} Similarly, epidemiologic studies have refuted, utilizing varying approaches and analyses (cohort and ecological), convincingly any link between excessive thimerosal exposure and later autism.^{15,21-26} Biological studies have also not validated any thimerosal and autism link.^{27,28}

Yet despite the overwhelming scientific epidemiologic evidence and the lack of any plausible scientific hypothesis as to why the MMR vaccine or thimerosal should cause autism, the

belief stubbornly persists. A question is why? Perhaps the answer lies in the nature of an autistic spectrum disorder and our present lack of understanding of its precise biological basis.

Originally described by Kanner in the 1940's, autistic spectrum disorders are a heterogeneous group of neurodevelopmental disabilities that share an early age of onset and qualitative, as well as quantitative, impairments in language development and reciprocal social interactions.²⁹ Often the disorder is heralded by the loss of previously acquired skills and frequently the affected children are emotionally unaware or inappropriate, prone to repetitive and at times self-injurious behaviours (stereotypies) and an obsessive desire for sameness or routine.³⁰ Rarely does a detailed medical evaluation reveal a cause for the child's autism which is a source of tremendous frustration for both families and physicians.³¹ Adding to the parent's frustration is the frequent lack of any reciprocal love they receive from their child despite their own parental devotion and pre-occupation with the child's disability. In addition, many parents have incorporated guilt for their child's condition that can be traced to the early misconception (also stubbornly persistent) that related this perplexing neurobehavioral syndrome to parental child rearing practices.³²

For frustrated often guilt ridden parents, vaccines given coincidentally at a time that is related to their recall of the onset of symptoms in their child, offers a plausible causal attribution. Though a modern technological innovation that collectively represents the single greatest advance in 20th Century pediatric practice, vaccines have been viewed with suspicion for years by a scientifically naïve subset of the general population.³³ Indeed, much of the MMR-thimerosal and autism story resembles that previously encountered in the putative link between cellular pertussis vaccine and infantile spasms/childhood encephalopathy.³⁴ This link was also found to be patently untrue.

Urban legends are usually harmless and indeed amusing to both storyteller and listener. However, a sad outcome of the autism and vaccination urban legend is the consequence of declining vaccination rate as the scourge of vaccine preventable infectious diseases have faded from the collective memory of the general population.³⁵ The result of this have been well-documented outbreaks of vaccine preventable diseases, resulting unfortunately in some deaths.³⁵ Beliefs in the "mercury poisoning" hypothesis in autism has led to the uncontrolled use of chelation therapies that are not indicated, of unproven efficacy, and potentially dangerous as illustrated by the recent death of a young boy.³⁶ Furthermore, another sad outcome is the diversion of scarce expertise and research dollars to refuting a

legend based on fallacy and innuendo. Parents of autistic children deserve answers to the question; "Why their child?" The answers to such a question lies not in chasing phantoms and legends, but rather pursuing early promising leads offered by recent advances in molecular genetics³⁷ and neuro-imaging.³⁸

*Michael Shevell, Eric Fombonne
Montreal, Quebec, Canada*

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