

# Neurological Complications after Pertussis Vaccine. The Enigma Is Still Here

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## Mini Review

The significance of regular childhood vaccinations is universally accepted. However these vaccinations were reported to potentially have a long list of complications. This list includes disorders such as autism (measles vaccine), multiple sclerosis (hepatitis B vaccine) meningo encephalitis (Japanese encephalitis vaccine), Guillaine-Barre and giant cell arteritis (influenza vaccine), and more. Seizures and hypotonic/hypo responsive episodes following pertussis vaccination [1]. On the other side, public tolerance to adverse reactions is minimal. In the past, adverse reactions to vaccination drew significant public attention. A unique example to the problematic situation of such adverse events is the pertussis vaccine, which was along many years and still is a subject for many legal suits. Handicapped patients claimed that their medical difficulties, especially in the neurological field, are the result of the immunization, and thus they claim for an appropriate compensation. There were several phases in this process. Phase I may be represented by the article of Aicardi & Chevrie [2].

They described in 1975 twenty cases of acute neurological complications occurring within 7 days of pertussis immunization. Convulsions were present in every case and status epilepticus was observed in 5 infants. They concluded that the clustering of neurological complications in the 24 hours following immunizations is not consistent with the hypothesis of a mere temporal coincidence, but rather point towards the immunization as the cause. A debate took place for and against the vaccination as being the cause of potential neurological damage [3], sometimes with some background feeling that interest of major pharmaceutical companies to some degree involved in this debate, taking the "against" position. At this stage, the vaccination was of "whole cell" type, meaning that all the cell component of the Bordetella Pertussis were included in the vaccination. Phase II took place when it was decided to leave the former whole-cell pertussis vaccine, due to the consideration that cellular components of the Bordetella were responsible to the adverse events, mainly cell proteins. The vaccination was changed to an acellular form. It was found then that the acellular form lead to lower amount of complications although not eliminating them [4].

A 3<sup>rd</sup> phase was defined when it was found that the pertussis vaccine in children with mutation in SCN1A gene, can lead them to present earlier than usually expected, with the epilepsy dictated by this gene Verbeek et al. [5] retrospectively analyzed data of children with Dravet syndrome and the pathogenic SCN1A mutation. They defined seizures within 24 hours after infant whole cell, acellular as "vaccination associated". The risk of subsequent "vaccination associated" seizures was significantly lower for acellular pertussis 9% than whole-cell pertussis (37%). They conclude that subsequent vaccination associated seizures is probably vaccine-specific. Yet, the only factor by which any adverse event is considered as vaccination-related is the close time frame between its appearance and the immunization. And this time frame is not universally agreed upon. While Aicardi and Chevrie consider it to be 24 hours, others included in this category also children with much larger timeframes Huynh et al. [6] reviewed the appearance of acute disseminated encephalomyelitis (ADEM) as a post-vaccination phenomenon, which can appear after many vaccines including rabies, diphtheria-tetanus-polio, smallpox and more, including pertussis. They described a patient presenting with bilateral optic neuropathies within 3 weeks of inactivated influenza vaccination followed by delayed onset of ADEM 3 months post vaccination. It is clear from the above noted description that in spite of the universally accepted significance of childhood vaccinations in preventing serious diseases, one may not ignore the possibility that a small percentage of the vaccines will suffer from life-long disabilities caused by adverse events that were caused by these vaccinations. We have recently examined a 27-year-old young adult who is suffering from hemiparesis.

This started in infancy through a disease defined by a head CT scan as ADEM, which appeared in close relationship to the 4<sup>th</sup> pertussis vaccination. And now the dilemma is whether this can be related to the pertussis vaccination. If the answer is yes, the next consideration can be as follows: Young infants are getting vaccinated according to their country policy of childhood vaccinations. A very small proportion of the infants can be expected to develop neurological complications in close proximity to the vaccination

injection. This morbidity seems to be directly associated with the recent vaccination. And the health authorities may be claimed to take responsibility for adverse events of the dictated vaccinations. It seems thus that the saga of vaccinations, side-effects and responsibility to that is still here.

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