

Remember When...

Connaught & the History of Modern Pertussis Vaccines

In 1996, PMC Canada's "Five Component Pertussis" (whooping cough) vaccine was licensed for general use in Sweden and for use in Canada as a booster dose for young children. These celebrated events were actually the final steps in a long process of complex scientific research that began over a decade ago. It was prompted by an industry-wide need to modernize the standard "whole cell" pertussis vaccine that had been used with minimal change since the late 1930s.

Enhanced technology energized research efforts to improve this important vaccine. The goal was to include only those components of the *Bordetella Pertussis* bacterium responsible for provoking a protective immune response in an "acellular" vaccine, while eliminating other elements that may cause reactions. It was evident there were several components that were antigenic, still, it was unclear how many and what proportions would make the best vaccine. A number of Japanese firms first introduced acellular pertussis vaccines in 1981, although their effectiveness in infants remains unclear.

Acellular pertussis vaccine research work began at PMC Canada in the early 1980's with a primary team focusing on adapting the Japanese production methods. The project, also known as the Acellular Pertussis Project, was managed by former employee, **Lance Gordon**. **Bill Cwyk**, who now works at PMC USA was responsible for clinical lot manufacturing and **Kim Phillips**, **Pele Chong** and **Gail Jackson** were also involved with the work.

Another group explored the promising new technology of genetic engineering to clone and detoxify the major antigenic component of the bacterium, the pertussis toxin (PT). This aspect of the modern pertussis vaccine work was under the leadership of **Sheena Loosmore**, who worked closely with **Gavin Zealey**, **Stephen Cockle**, **Pele Chong**, and **Reza Yacoob** among others. Meanwhile, efforts to adapt and improve the Japanese-based acellular methods proved quite frustrating. This complex and costly method only produced about a 10% yield. It was based on physically and chemically separating out the desired components, which were of variable purity, just prior to final inactivation.

In early 1987, the Acellular Pertussis Project was cancelled and replaced with the Component Pertussis Project, which was led by **John Vose**. Several key developments occurred which changed the direction of PMC Canada's acellular pertussis project into developing more efficient methods of isolation, production and purification of the key antigenic component proteins:

PT, FHA (filamentous hemagglutinin) and 69kDa (also known as Pertactin). **Pele Chong** discovered a simple method to precipitate and partially purify the 69kDa component directly from the concentrated pertussis culture medium using chromatographic separation.

During the spring of 1988, a second key advance came when **Larry Tan** discovered that FHA and PT could be efficiently isolated from the culture medium using the filter aid known as "Perlite." Simultaneously **Gail Jackson** and **Raafat Fahim** worked on methods to purify PT and FHA using hydroxyapatite. The final process is a combination of these two methods. Methods for final chemical detoxification of PT and FHA were worked out by **Gail Jackson** and **Larry Tan**. **Gail Jackson** and **Raafat Fahim** worked closely with **Larry Tan** to standardize and scale-up these methods. This team developed processes for the purification of the 69kDa protein and agglutinogens. This completed the final process of Connaught's "Five Component" Pertussis Vaccine. Many others have contributed to the more recent work of product development, clinical trials and marketing, particularly **Andy Herbert** of Development, and **Luis Barreto** and **John Thippawong** of Clinical & Medical Affairs and **Irene Clement** of Regulatory Affairs. They expedited the manufacturing evaluation, licensing and delivering of a modern component pertussis vaccine to protect children from the dangers of pertussis.

Over the last decade, PMC Canada's research and development efforts to modernize the pertussis vaccine involved a large number of dedicated scientists, technicians and support staff. Other than those already mentioned, key contributors to the pertussis projects during its early research phase include: **Michel Klein**, Vice President of Research; **Lucy Gisonni-Lex** and **Yan-Ping Yang** in Research, **Tony Wu**, **Dave McEachran** and **Joan Bevilacqua** in Quality Control; **Jake Ceschiutti** and **Betty Arcon** in Quality Assurance, and **Marie Minchella** in Regulatory Affairs.

Former employees who played a key role in all pertussis projects—included **Heather Boux**, **Les Boux**, and **Gloria Zobrist**.

A better understanding of the early history of this important project places recent events in a better perspective, and, in particular, highlights how dedicated individuals can have a major impact on vaccine development.

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