

Connaught and the Defeat of Diphtheria

Seventy years ago Connaught Laboratories led the world's public health war against one of the most dreaded diseases ever known: Diphtheria. Until the mid-1920s diphtheria, often called "the strangler," was the scourge of childhood, ranking first as a cause of death for children under 14. Despite the introduction and free distribution in Canada of Connaught's diphtheria antitoxin after 1914, incidence remained stubbornly high. The key to its defeat was diphtheria toxoid, discovered by **Gaston Ramon** of the Pasteur Institute in 1924. Connaught was the first to produce the new toxoid on a large scale and scientifically test its effectiveness during a series of Canadian field trials between 1926 and 1931.

In 1996, as we celebrate the 200th anniversary of the first vaccine, **Jenner's** smallpox vaccine, it is important to recognize diphtheria toxoid, the second major immunization advance, and highlight Connaught's major role in its development. Yet, despite such celebrations, complacency towards diphtheria must be avoided, especially in light of its rising incidence in many parts of the world.

Central to this effort was Connaught's founder, **Dr. John G. FitzGerald**, who was determined to stamp out diphtheria.

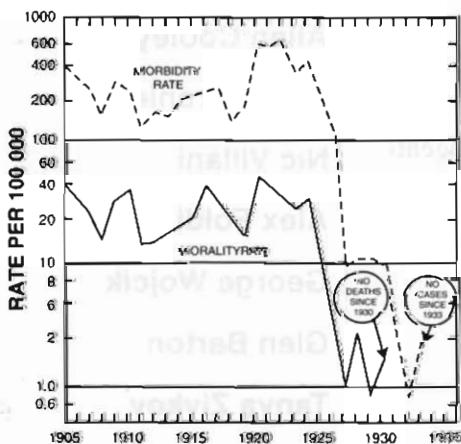
Indeed, Connaught was born out of his obsession with providing diphtheria antitoxin at a cost that was "within reach of everyone." In 1924, a few months after **Ramon's** discovery, during one of his many visits to the Pasteur Institute in Paris, **FitzGerald** became so impressed by the new toxoid that he immediately called **Dr. Peter J Moloney** at Connaught. **FitzGerald** described **Ramon's** methods to **Moloney** and asked him to drop everything and immediately begin preparing the toxoid. Despite a few early problems, **Moloney** was quickly able to produce a safe, potent and plentiful supply that was ready to be tested in children. In 1925 **Moloney** also made a major contribution to the wide acceptance of the toxoid by developing a "reaction test" to identify those who would likely react to a full dose of toxoid. Such reactors would then receive a diluted toxoid shot, but with the same immunizing effect.

After preliminary studies at Connaught and the School of Hygiene, by October 1925 the new toxoid was ready to be given to children in six provinces, primarily in Ontario, where a total of 15,000 Hamilton, Brantford and Windsor area school and pre-school children were targeted with two doses. Based on the success of this experience, **FitzGerald's**

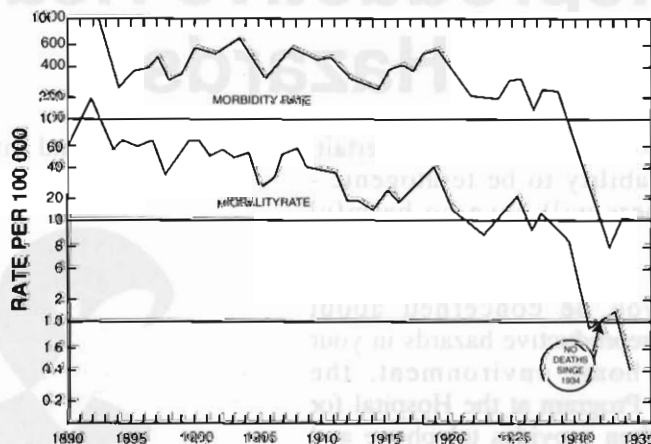
team focused next on Toronto with an unprecedented scientific, statistical and public health attack on diphtheria. Some 36,000 children were involved in this controlled study between 1926 and 1930, which conclusively proved that the toxoid reduced diphtheria incidence by at least 90% among those given three doses.

This rate of effectiveness was maintained in Toronto and elsewhere in Canada into the 1930s, but the Americans and British were not yet as enthusiastic. The Canadian results were not well known outside of the country until **FitzGerald** and others from Connaught presented them personally. **Moloney's** "reaction test" eased most American concerns by the mid-1930s, but the British resisted introducing the toxoid until World War II. Politics, a powerful medical profession, and the lack of a stable and inexpensive toxoid supply were the main obstacles there. However, by the early 1940s the British billboards boldly stressed the possibilities of diphtheria toxoid: "If Canada can do it, why can't we?" Subsequently, such a refrain would be heard often around the world and reflected Connaught's pioneering work with many vaccines.

• **Christopher J. Rutty, Ph.D.**



Morbidity and mortality from diphtheria in Hamilton, 1905-36.



Morbidity and mortality from diphtheria in Toronto, 1905-36.

Incidence graphs illustrating the dramatic declines in diphtheria incidence in Hamilton and Toronto after the introduction of Connaught's diphtheria toxoid after 1925. Note the years with no cases and no deaths in Hamilton.