

First Semi-Synthetic Vaccine Targets Haemophilus Influenza Type B

University of Havana

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Together with a team of researchers at the University of Havana, Dr. René Roy, a former professor in the Department of Chemistry at the University of Ottawa, developed the world's first semi-synthetic vaccine. There is evidence that a new generation of vaccines is emerging that could save many lives.

Haemophilus influenza type b (Hib) is a bacterium that mainly affects children under five years of age by causing pneumonia or meningitis, and causes more than half a million deaths every year worldwide.

Prior to 1994, there was a Hib vaccine obtained by a complex process using fermentation of bacterial cultures which was very expensive to produce, which massively limited the purchase of Hib by developing countries. As a result, most of the deaths caused by Hib were found in these countries, including Cuba.

Cuba, whose annual bill exceeded \$3 million to import the vaccine, decided to look into the development of a synthetic version of the vaccine as early as 1989. But it was not until 1994 when Cuban scientists collaborated with Dr. Roy when he was a professor in the Department of Chemistry at the University of Ottawa that they succeeded in breaking the secrets behind the production of synthetic vaccines.

The semi-synthetic vaccine that the researchers developed consists of two entities: an artificial fragment of bacterial origin and a carrier protein. This revolutionary nature of the vaccine has several notable advantages. Firstly, this new vaccine has the advantage of being able to be produced at low cost and on a large scale. Moreover, unlike existing vaccines against Hib infections, the synthetic nature of this vaccine makes it completely safe and greatly reduces possible side effects. Since 2005, all Cuban babies are given a dose, immunizing them against diseases caused by Hib.

The revolutionary nature of this discovery drew much attention to these researchers and was even certified by the World Health Organization. Tech Museum Awards awarded them \$50,000. In addition, the World Intellectual Property Organization awarded them the gold medal for this technological advance.

"We are targeting developing countries. We want to give them the opportunity to use these products at a lower cost," says Dr. Roy.

The vaccine is now available at minimal cost in several developing countries such as Vietnam, Syria, Brazil, Venezuela,

and Angola. Even today, the humanitarian part of this discovery persists: the main objective of the vaccine is to reduce the infant mortality rate. To this end, the University of Ottawa and the University of Havana have agreed to waive any royalties from the sale of Quimi-Hib either to Cuba or any other developing country suffering from an epidemic of diseases caused by Hib.

“The most important part of this project is that we’re contributing to the health of children,” said Dr. Vincente Verez Bencomo, head of the University of Havana’s Synthetic Antigens Laboratory, during a keynote address at an international biotechnology congress.

This inspiring story reminds us that the commercialisation process can span decades and is a testament to the efforts that have revolutionized the science behind the creation of a vaccine to save millions of lives. Today, the Quimi-Hib vaccine is affordable and is mass-produced by Heber Biotec S.A. The vaccine is trying to make its way into several international markets to minimize the infant mortality rate associated with Hib infection.

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