

The taming of polio and the challenge of the flu

May 6 2019, by John Bergeron



Credit: Pixabay from Pexels

The now nearly global eradication of polio through vaccination is a testimonial to the enlightenment of humans dedicated to the alleviation of human disease. In the early 20th century, hundreds of thousands of

people are estimated to have been [paralysed by polio](#) annually. Even Franklin Delano Roosevelt was [diagnosed with polio in 1921](#) —more than a decade before he became president of the United States.

Although some Canadian families may wrestle with the benefits and potential secondary reactions to vaccination, today polio is eradicated in Canada because of the past [widespread acceptance of vaccination](#).

Discovering the polio vaccine

In 1954, American scientists John Enders, Thomas Weller and Frederick Robbins were recognized with a Nobel Prize for their [breakthrough in how to grow the polio virus in the laboratory](#). Through this discovery, virologist Jonas Salk was able to make the [first polio vaccine](#) in 1955; he received funds from the National Foundation for Infantile Paralysis, which had been founded by Roosevelt to combat polio.

The same year as Salk's discovery, Albert Sabin independently reported a successful [polio vaccine](#). Iron lungs, which were used to help patients breathe when muscle contractions ceased due to polio, once very common, became [historical relics](#).

However, there is still no treatment for polio other than preventive vaccination. If infected, most patients recover, but a significant proportion (one to five patients per 1,000 infected) will suffer from paralytic poliomyelitis or spinal polio. About [10 per cent of those affected will die](#).

Polio's devastation

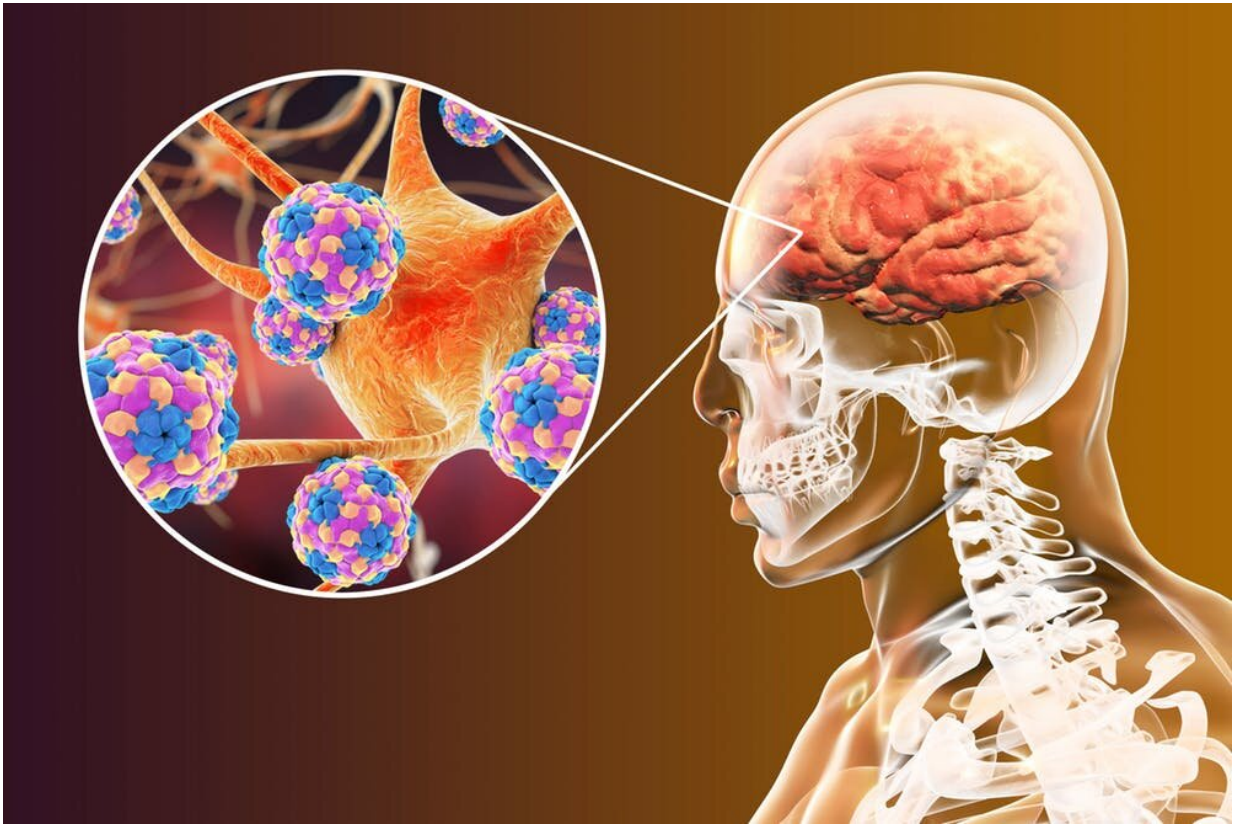
The late John Colter created one of Canada's foremost departments of [biochemistry at the University of Alberta in Edmonton](#). As a young scientist in 1957 —along with Ray Brown at American Cyanamid

Company in Pearl River, New York —Colter discovered that the [polio virus used ribonucleic acid \(RNA\) to infect brain and spinal cord cells](#). At the time, deoxyribonucleic acid (DNA) was regarded as the repository of genetic information, and discovering that the polio virus used RNA was astonishing.

DNA harbors genes. RNA is traditionally the message which is derived from the genetic information in DNA. A cell machine (ribosomes) then translates the message (RNA) into protein. From the transformative work of John Colter, we now know that the polio virus uses the same RNA to store all its genetic information and also to generate its own protein.

The next transformative discovery was from molecular biologist Nahum Sonenberg at McGill University. Sonenberg made the revolutionary discovery that the [polio virus functioned by hijacking infected cells](#). The [polio virus](#) then made the cells produce the viral protein and prevented infected cells from making their own proteins.

These basic science discoveries are a stepping stone to attempts to address human disease caused by viruses such as polio. Where vaccines are available, they remain a first line of defence.



A 3D illustration of a brain infection caused by the polio virus. Credit: Shutterstock

It is this struggle between benefit and drawback to vaccination that [India is currently navigating for its own attempt to eradicate polio.](#)

The danger of flu

As is true for most viruses, there remains no cure after a polio infection. We rely on prevention through vaccination for the eradication of polio. Other common viral infections remain problematic and potentially devastating, even with vaccines. A century ago the [Spanish flu virus killed up to 100 million people.](#)

Like polio, there is no cure for the flu. Yearly vaccinations are key in order to keep the flu virus under manageable control. However, acceptance today is far less successful than for the generation that eradicated [polio](#) in North America. [Should a highly lethal strain of flu return](#), a dire scenario predicts 250 million deaths today. The time taken to identify the viral strain and attempt to make the vaccine may be six months or more after the pandemic. A hoped-for universal [vaccine](#) for the flu has been attempted for decades but without success.

Basic science offers hope

One hundred years after the Spanish flu pandemic, the [USFDA has approved drugs targeted to "cap" snatching to treat patients infected with the flu](#). It will be five years or more before we know if such drugs can protect against a devastatingly lethal flu viral strain for which we have no defence today. [The chances of another pandemic are overwhelming](#).

A [recent poll](#) has indicated Canadian citizens are eager to embrace the pursuit of research as a priority. Never has there been a greater need for discovery research in Canada—to address global health and well-being.

More information: Jerry Pelletier et al. Internal initiation of translation of eukaryotic mRNA directed by a sequence derived from poliovirus RNA, *Nature* (2003). [DOI: 10.1038/334320a0](#)

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Provided by The Conversation

Citation: The taming of polio and the challenge of the flu (2019, May 6) retrieved 26 April 2024

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