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Julius Youngner 1920–2017

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Without Julius Youngner, the world would not be on the verge of eradicating poliomyelitis. It is true that Jonas Salk and Albert Sabin developed the vaccines against poliovirus. However, behind every great scientific achievement are those who made it possible.

Salk was working on developing the inactivated vaccine against poliovirus when he heard that a young scientist was looking for ways to use cell culture to study viruses. Youngner had worked on cell culture at the National Institutes of Health and wanted to combine his knowledge with the study of virology. After receiving Salk's invitation, he arrived at the University of Pittsburgh in 1949.

Salk's group had been using monkeys to conduct neutralization assays to determine the number of poliovirus serotypes. Youngner rightly thought the method too tedious and set out to replace it. He learned from pathologists to use trypsin to disperse the cells of monkey kidneys, and by 1951 he had made beautiful cell monolayers on glass Petri dishes. After being infected, they produced high yields of poliovirus and were essential for completion of the poliovirus-typing study. Salk's group went on to use Youngner's monkey-kidney cell cultures to manufacture a vaccine against poliovirus.

The use of trypsin to produce monolayers of cells quickly became the standard practice for cell culture and remains in use to this day. In the 1960s, Youngner's paper describing this technique was among the most highly cited papers in biomedical research.

Youngner lived in Manhattan in New York City for the first 18 years of his life. He majored in English at New York University, but upon graduating he realized the folly of a career in that field. He entered the PhD program in bacteriology at the University of Michigan, a move spurred by being a sickly child: he had contracted every imaginable childhood infectious disease. There he did research on pneumococcus, a bacterium that had nearly taken his life.

With the outbreak of World War II, Youngner was drafted into the US Army, for which he worked on the Manhattan Project, testing the toxicity of uranium salts on laboratory animals. Only when the first atomic bomb was dropped on Japan did he realize the nature of his work. That experience, together with his role in the development of Salk's vaccine against poliovirus, led him to say that in the 20th century, he was involved in a project to kill people and a project to save lives.

After leaving the army, Youngner finished his research at the University of Michigan, then went to the National Institutes of Health, where he worked on the effects of blood supply on tumors. Soon John Enders published his landmark paper showing that it was possible to propagate poliovirus in cell cultures. Youngner became fascinated with the idea of using cell cultures to study viruses, an interest that lead him to Pittsburgh to work with Salk on an inactivated vaccine against poliovirus.

The efficacy of Salk's vaccine against poliovirus was tested in a phase III clinical trial in 1954, the largest ever done, involving 1.8 million children. Within months after licensure of the vaccine in April 1955, children began to develop paralysis that was traced to batches of incompletely inactivated vaccine produced by Cutter Laboratories. Youngner recalled that he had traveled to the company early in April 1955 and found that scientists there were having difficulty with the procedure for inactivating the virus with formalin. He told Salk that the company should not be permitted to make the vaccine. Salk promised to write a letter to the US Bureau of Biologics on this matter, but Youngner says he never followed through. For the rest of his life, Youngner was haunted by the memory of the 250 children who died from the faulty vaccine. The incident destroyed his relationship with Salk.

A year later, Youngner moved to another department at the University of Pittsburgh, where he continued to work on viruses. At a meeting, he heard of the discovery of an antiviral protein produced by infected cells. He began to work on interferons and was the first to discover what is known today as 'interferon-γ'. He also discovered the first viral interferon antagonist, a poxvirus protein that antagonizes the antiviral activity of PKR, the double-stranded RNA–activated protein kinase.

Having developed a stable, heat-resistant strain of poliovirus, he called Sabin and suggested incorporating this marker into his attenuated vaccine strains; that way, one could always distinguish a vaccine strain from a wild-type strain. However, Sabin, in characteristic vitriolic style, rebuffed Youngner, saying that his vaccines did not need improvement.

Youngner closed his laboratory at the University of Pittsburgh in 1990 but was given an office so that he could be a resource for young faculty. Note to medical schools: retired faculty are worth keeping around!

I had the honor of interviewing Youngner in January 2016 (http://www.microbe.tv/twiv/twiv-373/). When I asked him who was the one person he would like to have dinner with, he replied, without hesitation: President Obama.

During my visit with Julius, a snowstorm was brewing, and I was advised to leave on Friday instead of Saturday. However, I did not want to miss my Friday evening dinner with Julius, and I will never regret the 12-hour return trip home the next day. It was the last time I saw him, and he gave me a big hug.

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