CHEMISTRY PRIZE RECOGNIZES mRNA PIONEER

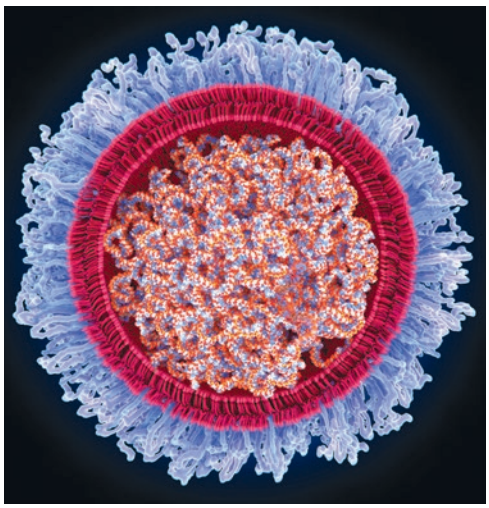
THE SOLVAY PRIZE acknowledges innovative work that has a major social impact.

Her ground-breaking work on RNA led to an entirely new type of vaccine, yet Katalin Karikó spent most of her career in obscurity, searching for funding to support her research. Without a faculty position or a lab group, she had to do most of the benchwork herself, even defrosting the lab freezer.

However, she describes those times of quietly getting on with work as a joy. "It was only from the outside that it seems like a struggle," she says. "I had a lot of fun in the lab."

Now an adjunct professor at the University of Pennsylvania, and Senior Vice President at BioNTech, Karikó is feted as one of the heroes of the COVID-19 pandemic. Her decades of research into messenger RNA (mRNA) paved the way for the vaccines developed by BioNTech/Pfizer and Moderna.

Karikó's contribution has now been recognized by the 2022 Solvay Prize. The prize is awarded every two years for major scientific discoveries — those with the potential to shape tomorrow's chemistry and enhance human progress. Past winners include the biochemist Carolyn Bertozzi, for inventing 'bioorthogonal' chemical reactions that can be performed in living cells, and Nobel laureate Ben Feringa, for creating molecular motors that could power nanorobots. "When I look at the people who previously won the Solvay Prize, I feel very humbled," says Karikó.



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▲ **Katalin Karikó's decades of work on mRNA led to the development of some of the first COVID-19 vaccines.**

A QUIET BREAKTHROUGH

In vitro-transcribed (IVT) mRNA encoding therapeutic proteins, or viral antigens, had great potential for treating or preventing various diseases, but for years the body's inflammatory response to mRNA hampered its medical use. In 2005, while collaborating with Drew Weissman, also at UPenn, Karikó discovered that swapping out uridine for pseudouridine, a nucleoside naturally found in RNA, not only thwarted the immune reaction to mRNA, but also improved its translational efficiency, opening the door for future therapeutics.

Despite the importance this discovery would later have, there was initially little response from other scientists. "Nobody really contacted us; I had two invitations to give lectures, but that was about it," Karikó recalls.

Over time, RNA became increasingly popular for vaccine developers building on Karikó's research. Although no RNA vaccines had been approved when COVID-19 first struck, candidates based on the viral sequence were ready within weeks and were quickly produced for clinical trials.

'MY HOBBY IS SCIENCE'

This year's prize coincides with the 100th anniversary of the first Solvay Conference for Chemistry, which brought together many leading figures to discuss the key problems of the day. The conference, along with its counterpart in physics, was created by Ernest Solvay, who wanted to support fundamental science after making his fortune through industrial production of sodium carbonate for use in glass manufacturing. He created Solvay in 1863, and the company continues to develop and support innovative science for solving some of the world's most pressing challenges.

"With the Solvay Prize, we want to highlight the originality of the chemistry and its potential impact," says Patrick Maestro, Scientific Director of Solvay. "Karikó's work has already had a significant impact, and there is even more to come in other areas of medicine."

Karikó says that she will spend the €300,000 prize money on furthering research into mRNA therapeutics: "I am 67 years old; I won't start changing my hobbies. My hobby is science." ■

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