Acceptance speech

16 June of 2022

Katalin Karikó, awardee in the Biology and Biomedicine category (14th Edition)

I am deeply honored to accept this BBVA Foundation Award along with my colleagues, Drew Weissman and Robert Langer. It is a great privilege for us to belong to the outstanding group of scientists who received this award in the past.

This award also recognizes the fellow scientists who worked diligently over decades to help build the foundation for our work that led to the development of COVID-19 mRNA vaccines.

We did not invent mRNA, nature invented it. It is the molecule that carries the information from the DNA to the protein synthesis factory instructing it what to produce. This information flow from DNA through the mRNA to the ribosomes happens in all the cells of our body and even in all free-living creatures.

Messenger RNA was discovered in 1961 and it took 60 years to develop it into an approved medical product in the form of the first two COVID-19 vaccines. What happened during those years? Due to the hard work of thousands of scientists, the mRNA coding for any desired proteins could be produced in a tube, could be delivered into cells where the mRNA is translated into the proteins. However, for years the inflammatory response of mRNA hampered its medical use. Working shoulder-to-shoulder with fellow awardee Drew Weissman, we identified that one building block in mRNA was responsible for triggering this immune reaction. We successfully eliminated this response and improved the translational efficiency of mRNA by incorporating naturally-occurring modified nucleosides into the molecule, and inventing a purification procedure to increase translational capacity. My fellow awardee, Robert Langer's work from the 1970s was focused on developing delivery nanoparticles that can efficiently carry protein, DNA or mRNA into cells. He made tremendous advances to develop nanocarriers suitable for vaccines as well as gene therapies. By 2017 it was demonstrated in preclinical studies that nucleoside modified mRNA formulated with lipid nanoparticles can be a potent vaccine. This technology ultimately became the basis for the FDA approved anti-SARS-CoV-2 mRNA vaccines to fight the current global pandemic. Our

pioneering work fueled a number of advances and has opened the door for future therapeutics.

Our original goals as scientists were different. I wanted to develop mRNA for therapy, Drew Weissman wanted to make the best HIV vaccine, Robert Langer wanted to create the perfect nanoparticle for delivery, and at the end our work together with contributions from thousands of other scientists culminated in the development of vaccines successfully protecting millions of people from the serious effects of COVID-19. We hope to inspire the next generation of scientists.