

Acceptance Speech by Rino Rappuoli

[Check against delivery.]

I am deeply honored and humbled to receive the Koch award 2019. I am particularly happy that in 2019 the award is given for work on vaccines. This reminds me that in 1962 the second Koch award ever given went to Albert Sabin, Jonas Salk and John Enders also for their work on vaccines. At that time poliomyelitis was a global emergency, and the work recognized by the award nearly eliminated the disease from our planet. Today we also face an emergency. Many people have lost their confidence in vaccines and some of the diseases that had been eliminated by vaccination such as measles and diphtheria are coming back. This vaccine hesitancy is jeopardizing a century of progress in healthcare in the Western world. At the same time, the absence of a sustainable market is making it difficult to develop life-saving vaccines needed in low-income countries. For this reason, today it is important to talk about vaccines and educate the new generations that vaccines are one of the most important conquests of civilization, because they allowed to eliminate the infectious diseases that just a century ago, used to kill hundreds of millions of people. In 1900 when my grandfather was born, his life-expectancy was less than 50 years. This was because half of the children died from infectious diseases. That period today seems to be so far away, because thanks to vaccines, clean water and antibiotics most people live at least up to 85 years. As scientists we have the social responsibility to better communicate to the new generations that we live longer because our children do not die any more from infectious diseases such as diphtheria, smallpox, poliomyelitis, pertussis, tetanus, measles.

I feel lucky because I had the possibility to spend most of my professional life developing vaccines. This job is one of the best you can dream of, because you can enjoy every day the fun of doing science and discover new secrets of nature, while at the same you can use the science to develop vaccines that have such profound impact on people's health globally.

I was born in Siena, a medieval city of Tuscany where a small institute had made vaccines for the Italian population for a century. There I was fortunate to learn about the power of vaccines from a lecture of Albert Sabin who had visited Siena to teach how to make his vaccine against poliomyelitis. His lecture describing how a simple vaccine could eliminate a devastating disease such as poliomyelitis triggered my passion for vaccines. After graduation, I spent a period at the Rockefeller University with Emil Gotschlich and at Harvard Medical School with Jack Murphy and Alvin Pappenheimer where I learned about microbiology, immunology, and the emerging power of molecular biology. Then, I returned to Siena to work on vaccines, with the idea of using the most modern technologies to conquer the remaining infectious diseases. I have been fortunate, because during this period the incredible progress in science and technology allowed to develop vaccines that were previously impossible.

Perhaps the one I am most proud of is the vaccine against meningococcus B. In spite of the urgency to develop a vaccine against this devastating disease, and the passion of many scientists, in the mid-1990s we were all frustrated by multiple failures and the vaccine remained a dream. Clearly, we needed a new, possibly revolutionary technology to come out of this *cul de sac*. When in 1995 Craig Venter published for the first time the sequence of a genome, it was clear to me that this was a new revolutionary technology that had the power to make the dream come true. I visited Craig Venter in his laboratory in Rockville and we agreed to sequence the genome of meningococcus B. In a few years, thanks to the collaboration of Richard Moxon in Oxford we were able to use the data of the genome to discover the antigens to make the meningococcus B vaccine. Today the vaccine is licensed in many countries and is saving lives of children and adolescents. Given that the vaccine was designed starting from the data we named this new approach to make vaccines “reverse vaccinology”. Reverse vaccinology, together with novel adjuvants and new technologies to discover and design antigens, today is increasing the number of diseases that can be prevented and cured by vaccination. I am firmly convinced that vaccines will continue to be one of the most exciting scientific areas and will be essential to address the needs of modern society such as keeping healthy the aging population, addressing the emerging threat of antibiotic resistant bacteria, emerging and re-emerging infections such as Ebola, and poverty in low-income countries.

I would like to mention that the work that is being recognized today was only possible thanks to the contribution of many people from my team, that for many years have been working hard and with passion to push the boundaries of science and transform the scientific discoveries into vaccines that protect people from diseases. I have been lucky to have great people in my team. I also want to thank my wife, my two children and their families that have been supporting my busy life for all these years. Finally, I would like to thank the scientific board of the Robert Koch Foundation for selecting me for this award. The Koch award will increase my motivation to do more and better science to develop new vaccines and to make sure that we can properly use the vaccines that we have by communicating the value of vaccines and the importance they have for the health of people.