

# Reichstein Medal Award Ceremony 2021



**Prof. Dr. Dr. h.c. Katalin Karikó**

**BioNTech Pharmaceuticals  
& University of Pennsylvania**



**6 Sept. 2021, 19 h  
Haus der Universität Bern**



# Welcome

**Prof. Dr. Gerrit Borchard**  
**President SAPhS**  
**University of Geneva, ISPSO**



# Musica movendi

Marius Bischof (violin)  
Andreas Bättig (violin)  
Isabelle Bischof (viola)  
Sophie Benz (violoncello)

## Ouverture

Béla Bartók:  
aus Rumänische Volkstänze  
I Jocul cu bâta (Stabtanz)  
II Brâul (Rundtanz)



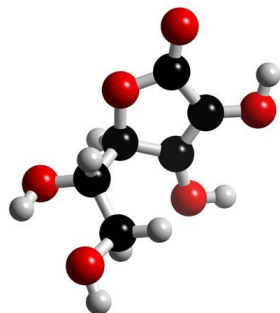
# Who was Tadeus Reichstein?

Prof. Dr. Rudolf Brenneisen  
Secretary General SAPhS



## Tadeus Reichstein

- 1897 born in Wloclawek (Poland), growing up in Zürich
- Studies in Natural Sciences ETHZ
- 1937 Professor of Special Inorganic & Physiological Chemistry ETHZ
- 1938 Professor of Pharmaceutical Chemistry University of Basel
- Special contributions to the isolation of the steroids of the adrenal cortex, such as cortisone
- For this hormone research he was awarded the Nobel Prize for Medicine in 1950
- In 1933, Reichstein found a way to extract vitamin C from glucose in five steps





## Tadeus Reichstein

- Tadeus Reichstein died on August 1, 1996, shortly after his 99th birthday
- NZZ 23 July 1997: «*My most important appreciation in Switzerland was the Marcel Benoist Prize in 1948 and the creation of the Tadeus Reichstein medal of the SGPhW for excellence in pharmaceutical sciences*»
- Former Reichstein Medal Awardees:
  - 1997 Prof. em. Dr. Rolf Zinkernagel, Nobel Prize Winner 1996
  - 2000 Prof. em. Dr. Richard R. Ernst, Nobel Prize Winner 1991
  - 2005 Jean-Pierre Lorent, Founder Swiss Tox Info Center
  - 2014 Prof. Dr. Gerd Folkers, President SWIR, Colleg. Helveticum



# Welcome Address

**Prof. Dr. Hans Leuenberger**  
University of Florida, U.S.A.  
Former President SSPhS

(see sep. video)



## Musica movendi

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## Interlude

Antonín Dvořák:  
aus Zypressen

XI Nad Krajem Védodí lehký spánek (Rings die Natur nun in Schlummer und Träumen)

XII Ty se ptáš, proč moje zpěvy (Und fragst du mich, warum mein Sang so stürmisch)





# Laudatio Handover Reichstein Medal

**Prof. Dr. Gerrit Borchard**  
**President SAPhS**  
**University of Geneva, ISPSO**



**Reichstein-Medal 2021**

**LAUDATIO**

**Prof. Dr. Dr. h.c. Katalin Karikó**  
**Adjunct Professor, University of Pennsylvania**  
**Senior Vice President, BioNTech Pharmaceuticals**

Recipient of the Reichstein Medal 2021, awarded by the Swiss Academy of Pharmaceutical Sciences (SAPhS)

On April 23, 2021, the SAPhS Senate's Board decided to appoint Prof. Dr. Dr. h.c. Katalin Karikó, Adjunct Professor, University of Pennsylvania and Senior Vice President, BioNTech Pharmaceuticals as the recipient of the Reichstein Medal 2021.

Prof. Karikó has made numerous extraordinary achievements in the field of research into the mechanism of action of mRNA and its translation into drugs and vaccines and has thus rendered special services to academic research and its translation into pharmaceutical products in the industrial environment.

The Swiss Academy of Pharmaceutical Sciences SAPhS would like to thank you, dear Professor Karikó, for your valuable commitment and outstanding achievements as a scientist. We are pleased to award you the Reichstein Medal 2021 for these impressive services in the pharmaceutical sciences and for the benefit of the public.

Congratulations!

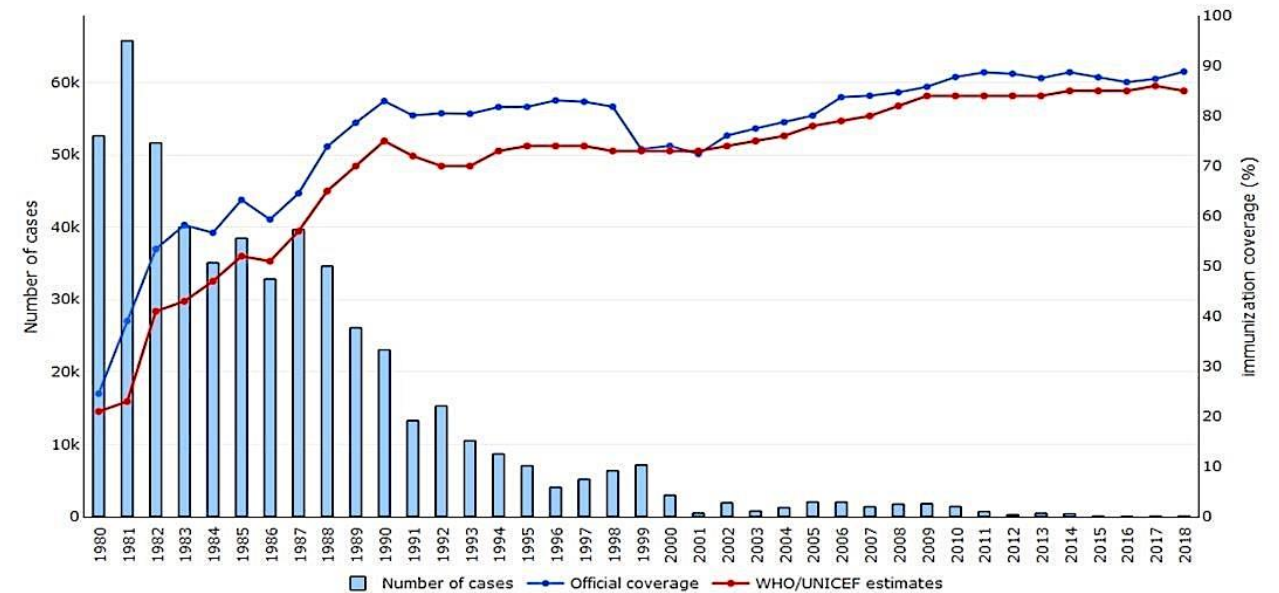
Prof. Dr. Gerrit Borchard  
Präsident SAPhS

Prof. Dr. Rudolf Brenneisen  
Secretary general SAPhS

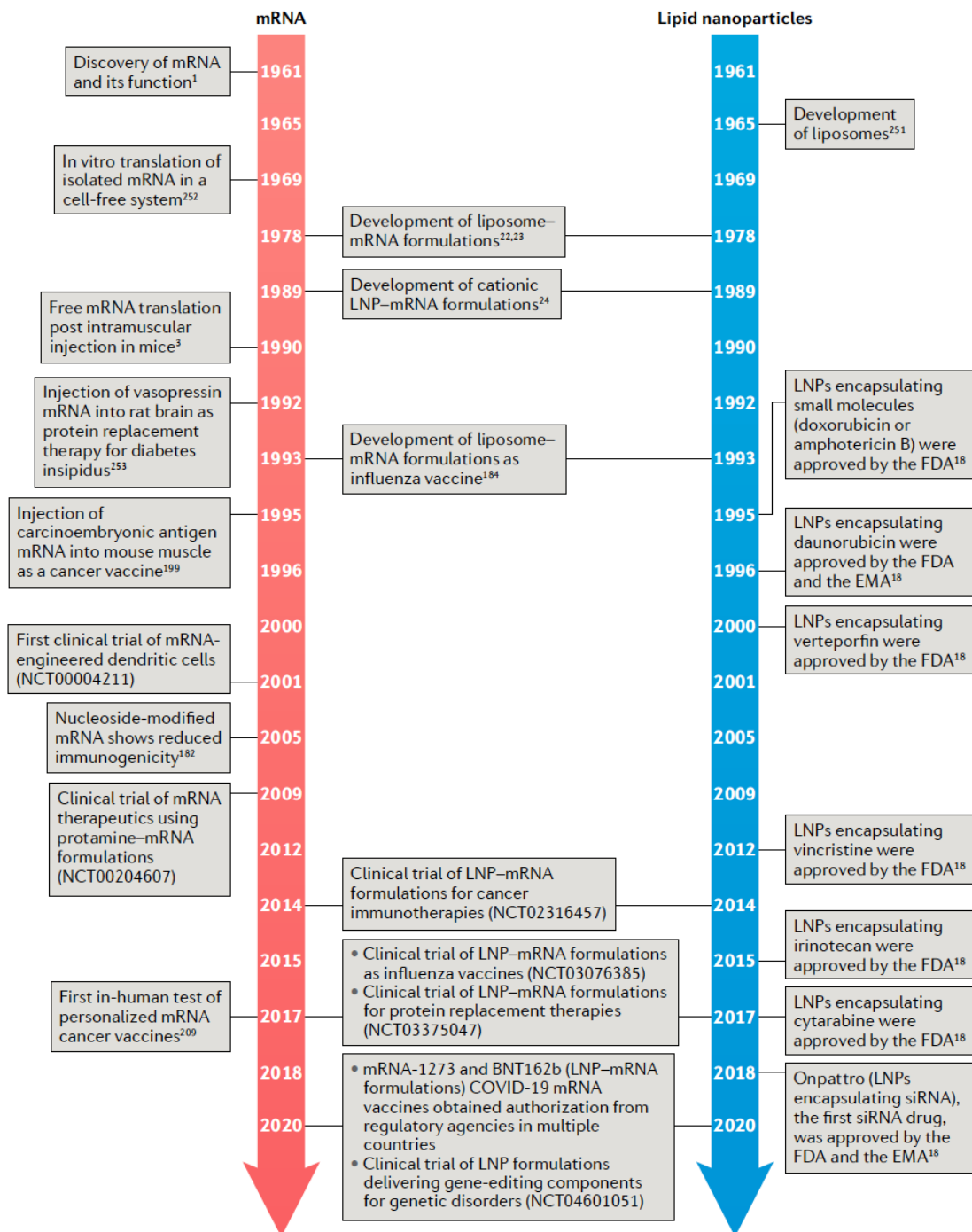
Bern, September 6, 2021



## Poliomyelitis Global annual reported cases and Pol3 coverage 1980-2018



Source: WHO/UNICEF coverage estimates 2018 revision, July 2019 and Cases of vaccine preventable diseases and Official Estimates reported by Member States through the WHO/UNICEF Joint Reporting Form as at 01 July 2019.  
Immunization Vaccines and Biologicals (IVB), World Health Organization.  
194 WHO Member States. Date of slide: 08 July 2019



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# 60 years of mRNA... ...and its delivery.

Hou, X., Zaks, T., Langer, R., Dong, Y.  
Lipid nanoparticles for mRNA delivery. *Nat Rev Mater* (2021).  
<https://doi.org/10.1038/s41578-021-00358-0>



## corona < > anoroc

«Anorak» /'ænəræk/ is a British slang term which refers to a person who has a very strong interest, perhaps obsessive, in something most people would either find boring or is very complex.



«She was, in a positive sense, kind  
of obsessed with the concept of  
messenger RNA»

Dr. Anthony Fauci  
Director  
National Institutes of Allergy and infectious Diseases



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Kisújszállás



University of Szeged

1973 - 1978 BSc, Biology  
1978 - 1982 PhD, Biochemistry  
1982 - 1985 Post-doc, Biochemistry



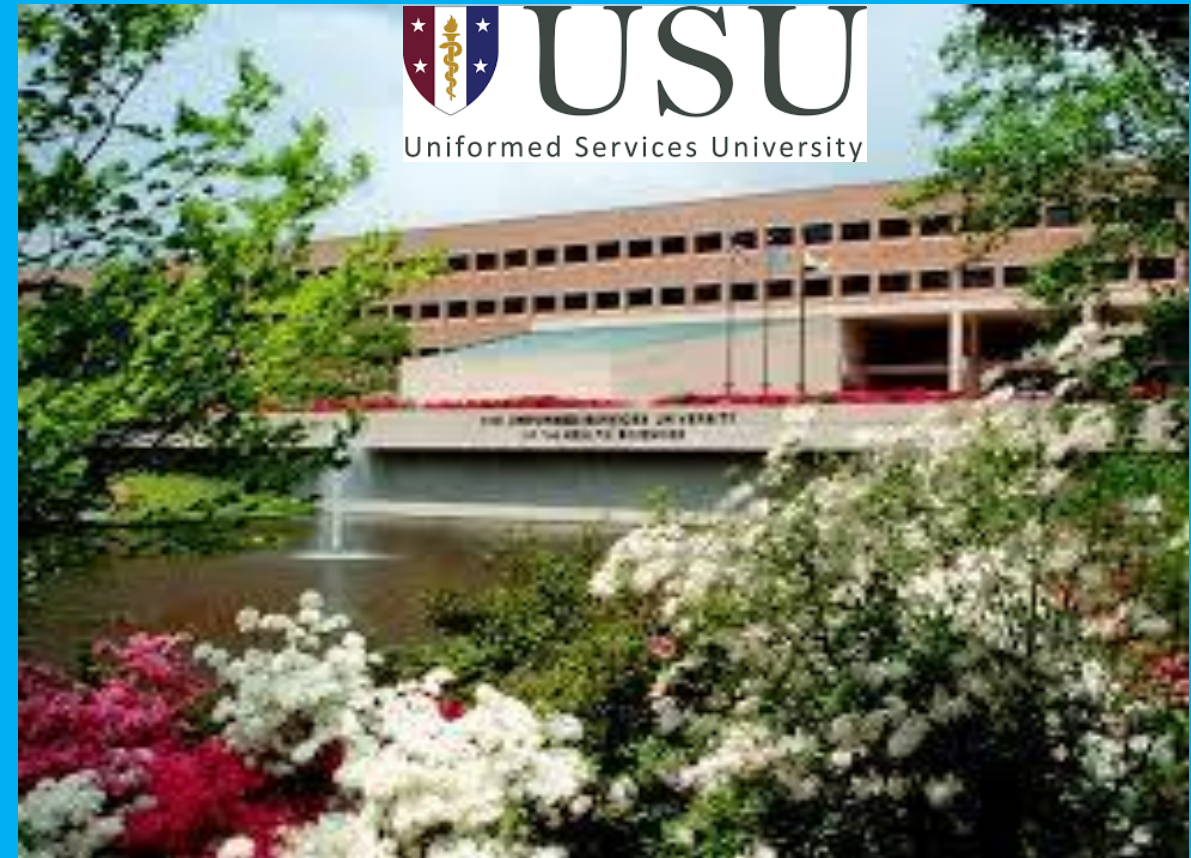
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1985-1988 Post-doc, Department of Biochemistry



1988-1989 Post-doc, Department of Pathology



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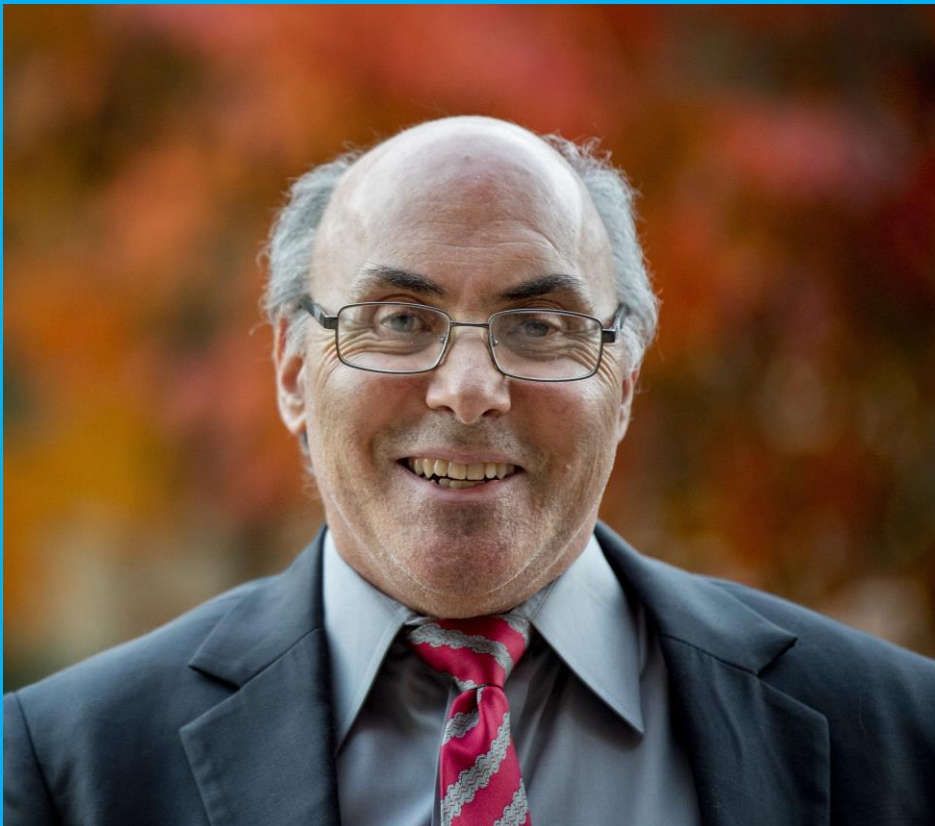
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1989-2009 Ass. Prof., Sr. Researcher  
Since 2009 Adjunct Prof.

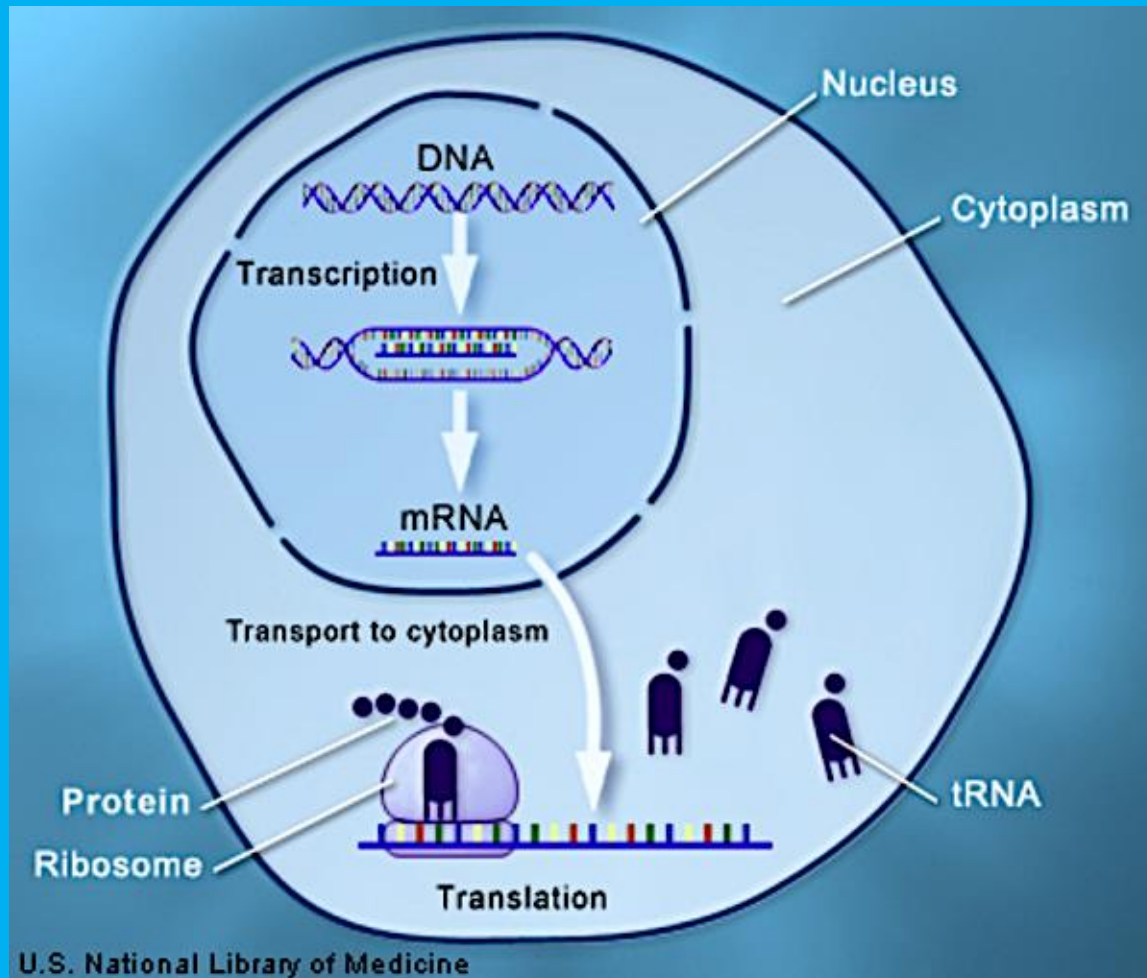


2013 Sr. Vice President

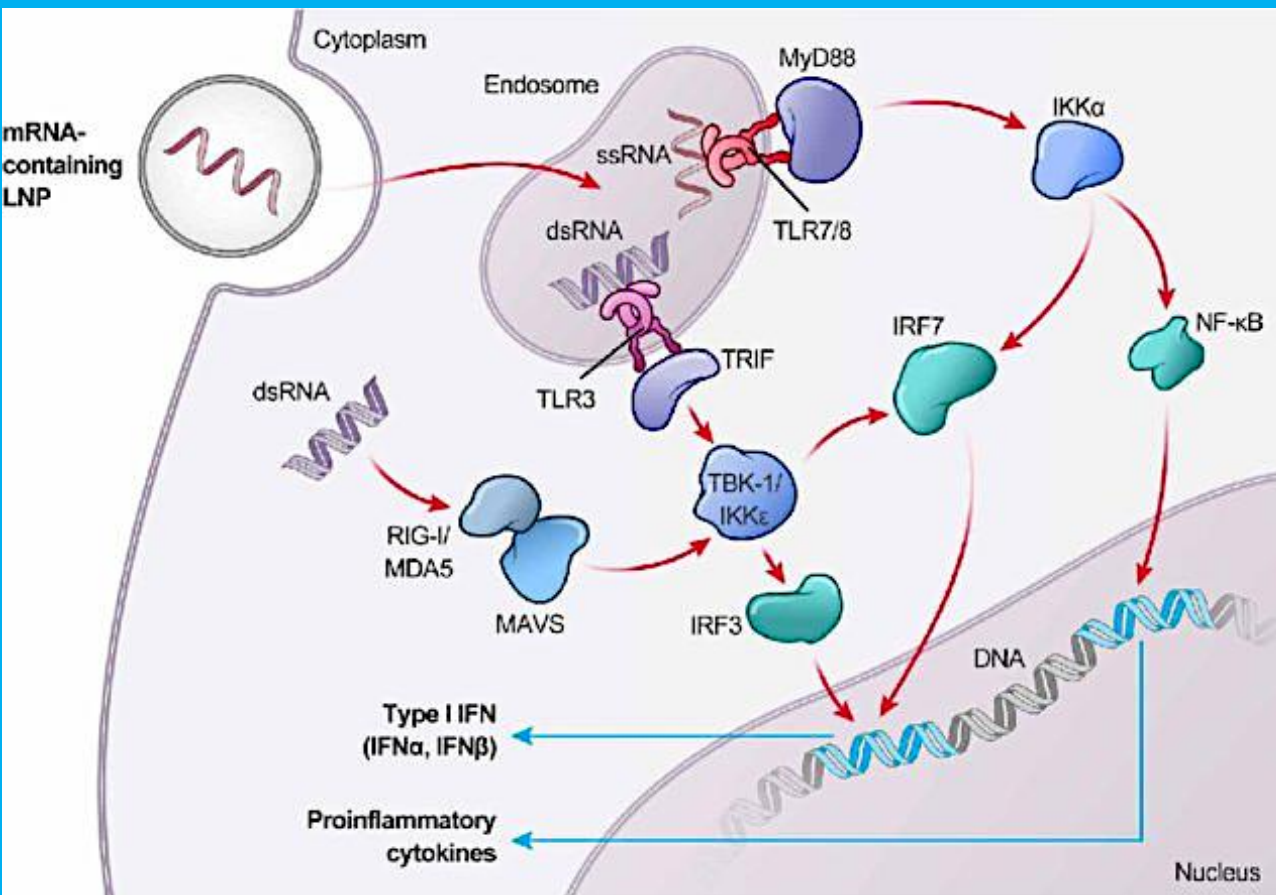


**Drew Weissman, MD, Ph.D.**  
Prof. Internal Medicine  
Perelman School of Medicine  
UPenn

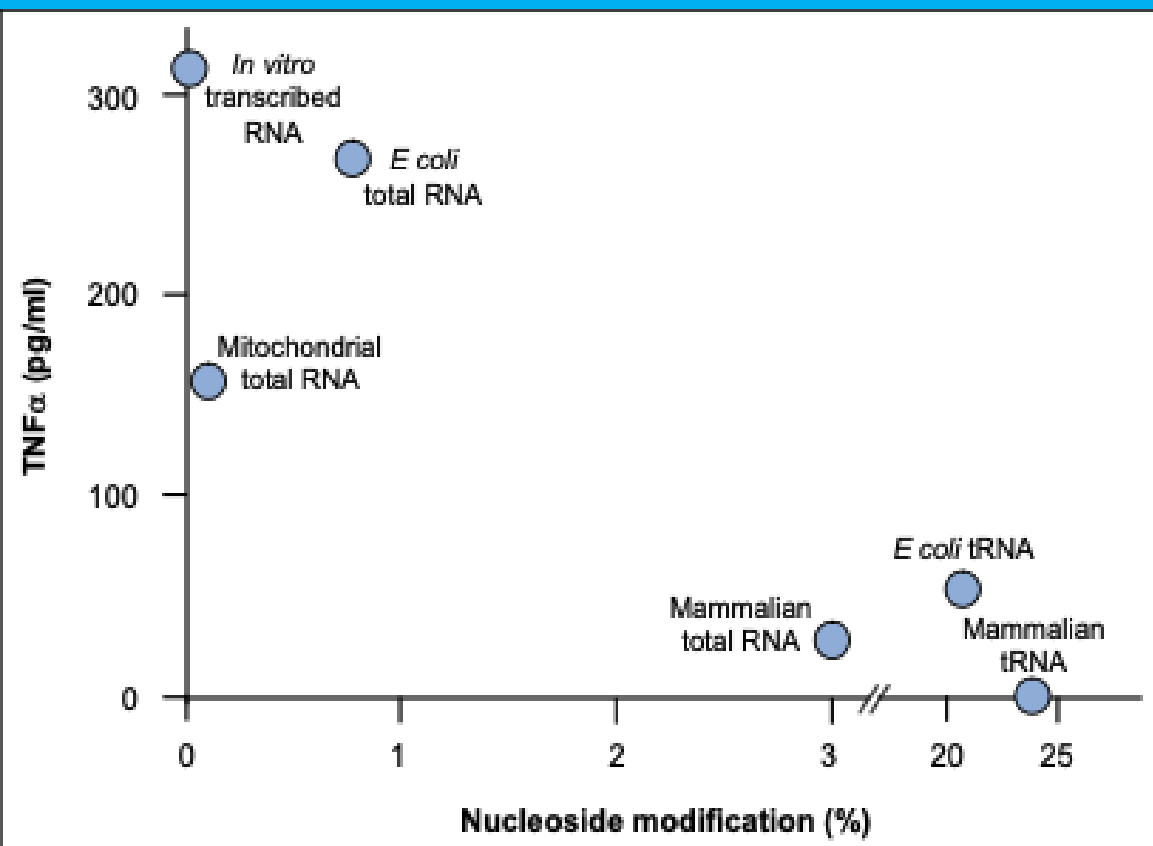




# The Central Dogma of Life



**mRNA interacts with  
innate immune receptors,  
causing inflammation**



**Naturally occurring nucleoside modifications suppress the immunostimulatory activity of RNA**



# **Incorporation of Pseudouridine Into mRNA Yields Superior Nonimmunogenic Vector With Increased Translational Capacity and Biological Stability**

Katalin Karikó<sup>1</sup>, Hiromi Muramatsu<sup>1</sup>, Frank A Welsh<sup>1</sup>, János Ludwig<sup>2</sup>, Hiroki Kato<sup>3</sup>, Shizuo Akira<sup>3</sup> and Drew Weissman<sup>4</sup>

<sup>1</sup>Department of Neurosurgery, University of Pennsylvania, Philadelphia, Pennsylvania, USA; <sup>2</sup>Laboratory of RNA Molecular Biology, The Rockefeller University, New York, New York, USA; <sup>3</sup>Department of Host Defense, Research Institute for Microbial Diseases, Osaka University, Osaka, Japan; <sup>4</sup>Department of Medicine, University of Pennsylvania, Philadelphia, Pennsylvania, USA

«I felt like a God!»

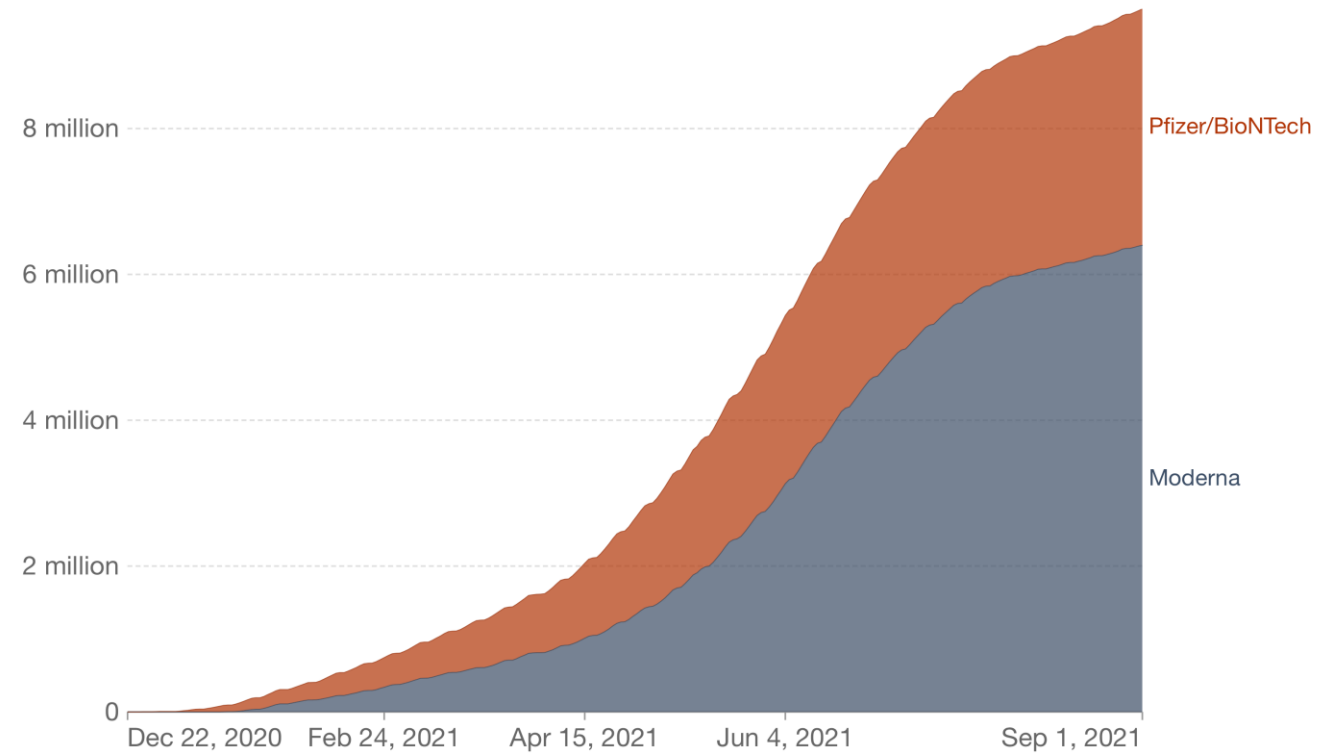




## COVID-19 vaccine doses administered by manufacturer, Switzerland

For vaccines that require multiple doses, each individual dose is counted. As the same person may receive more than one dose, the number of doses can be higher than the number of people in the population.

Our World  
in Data



Source: Official data collated by Our World in Data

[OurWorldInData.org/covid-vaccinations](https://ourworldindata.org/covid-vaccinations) • CC BY



# What's next?

## Oncology

Drug Class	Platform	Product Candidate	Indication (Targets)	Pre-clinical	Phase 1	Phase 2	Phase 3	Rights/Collaborator
<b>Other</b>								
mRNA	Infectious Disease Immunotherapies	BNT161	Influenza	■				Pfizer
		BNT162	COVID-19	■	■	■	■	Fosun Pharma (China), Pfizer (Global, except China)
		To be selected	Up to 10 indications	■				Penn <sup>6</sup>
		To be selected	HIV and tuberculosis	■				Bill & Melinda Gates Foundation
	Rare Disease PRT <sup>7</sup>	BNT171	Not disclosed	■				Genevant (global 50:50 profit/loss share)
		To be selected	4 more rare disease indications	■				
	antibodies)	BNT142	Multiple solid tumors (CD3+CLDN6)	■				Global
	RiboCytokines (mRNA-encoded cytokines)	BNT151	Multiple solid tumors (Optimized IL-2)	■				Global
		BNT152, BNT153	Multiple solid tumors (IL-7, IL-2)	■				Global



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**SWISS ACADEMY OF  
PHARMACEUTICAL SCIENCES**

*Prof. Dr. Dr. h.c. Katalin Karikó*

*BioNTech Pharmaceuticals  
& University of Pennsylvania*



**REICHSTEIN MEDAL 2021**

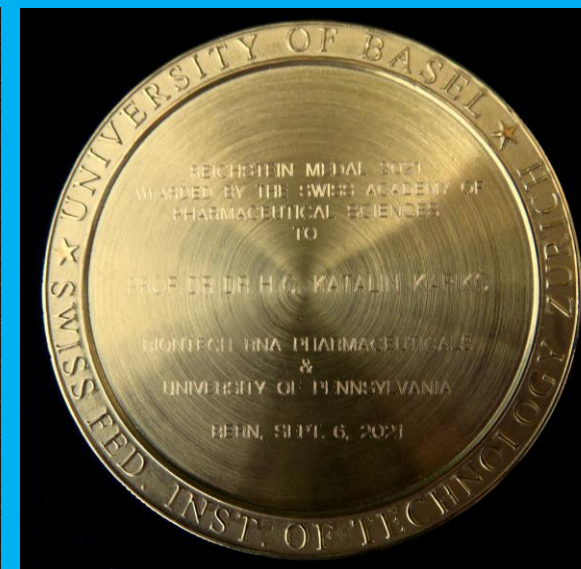
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Prof. Dr. Gerrit Borchard, President

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# Musica movendi

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## Finale

Béla Bartók:  
aus Rumänische Volkstänze  
V Poarga românesca (Rumänische Polka)  
VI Mâruntel (Zwei Schnelltänze)