





# Vaccines and pandemics: COVID-19 is neither the last nor the worst



**Jean Monnet Support to Associations EUforUA**

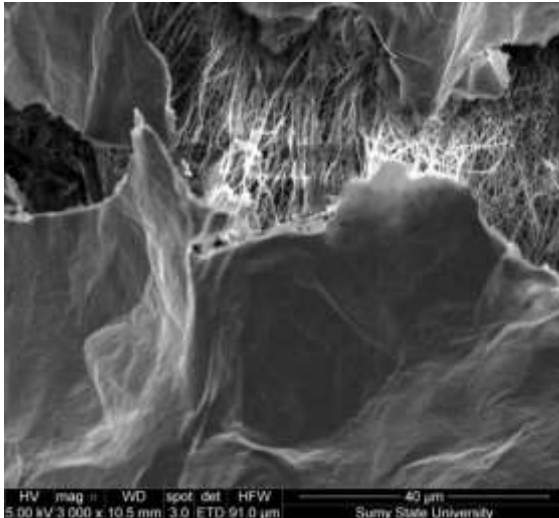


# Biomedical Research Center

## Medical Institute of Sumy State University

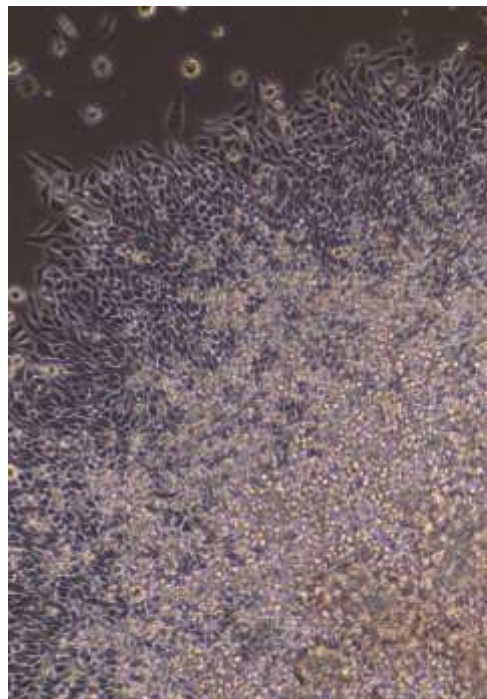
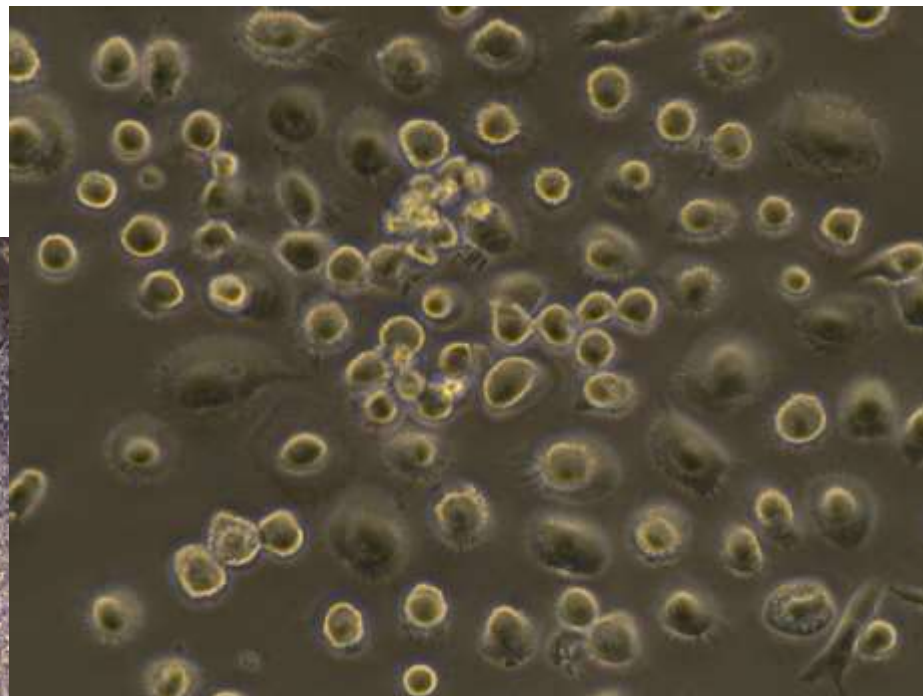


- Cell culture laboratory
- Microbiological laboratory
- ELISA laboratory
- Chemical and toxicological laboratory



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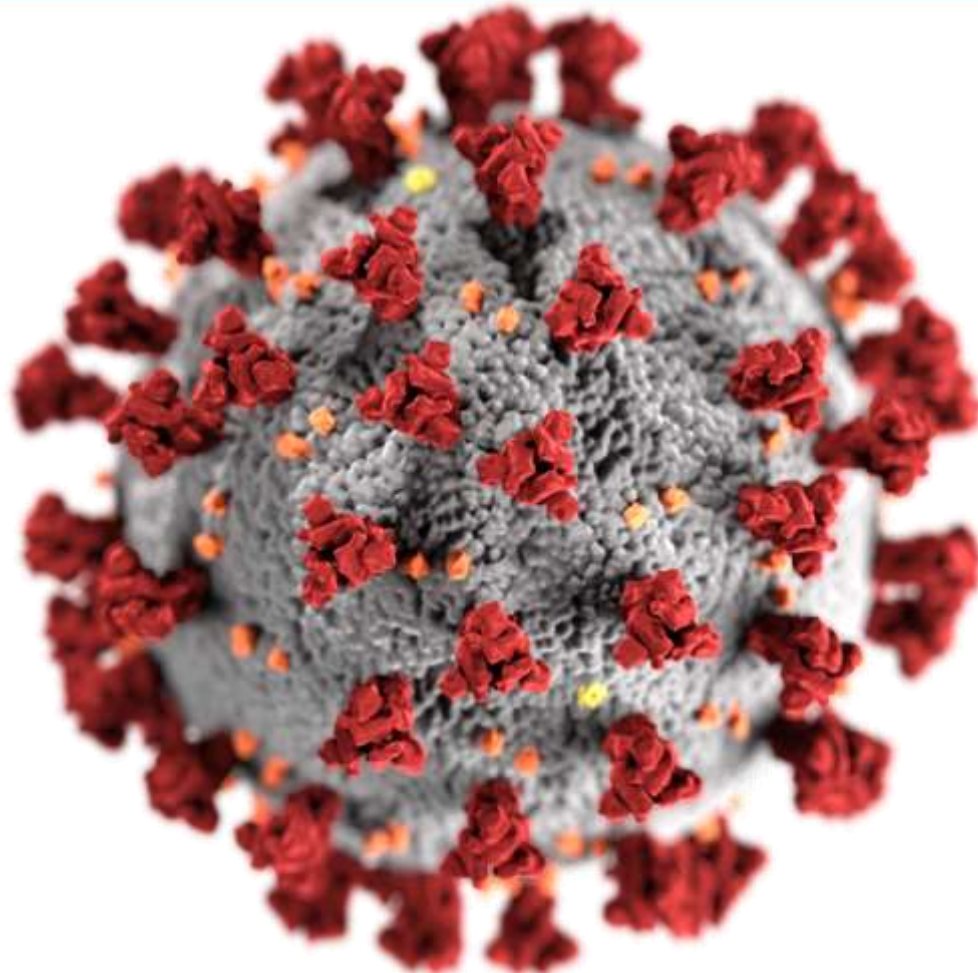




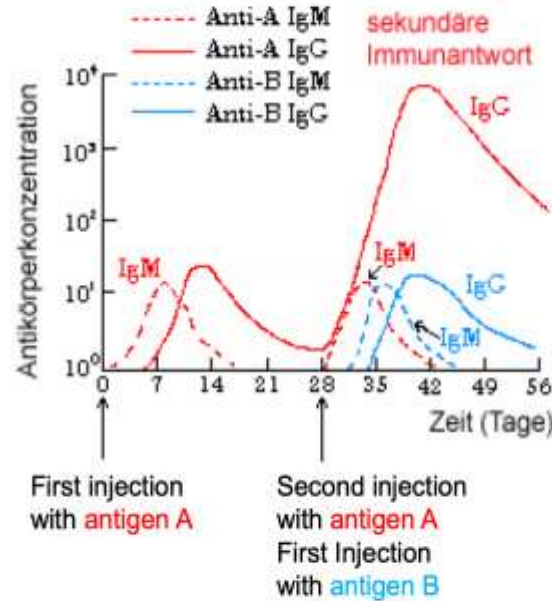
# Biomedical Research Center

## Medical Institute of Sumy State University



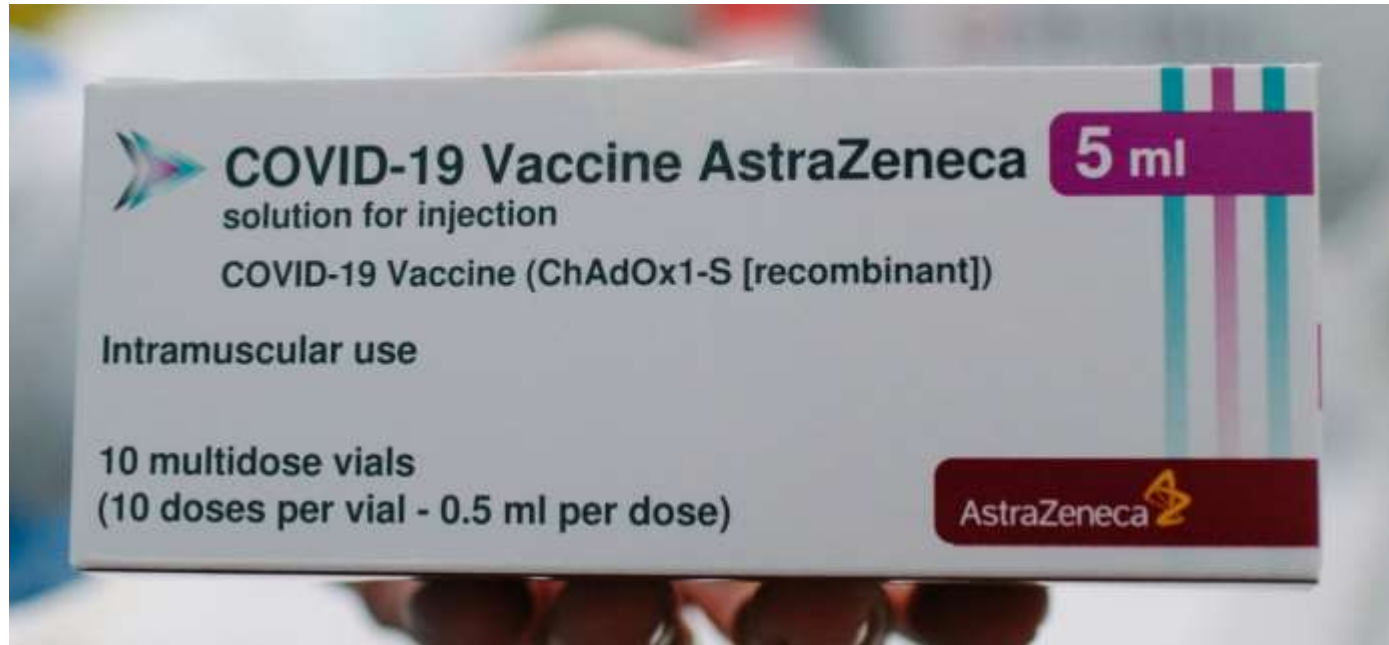


# Primary and Secondary Immune Response



Lecture of Prof. B. Singer on 18Mar2021 – BRC archives





The vaccine is marketed under the brand name **Covishield** by the [Serum Institute of India](https://en.wikipedia.org/wiki/Oxford%E2%80%93AstraZeneca_COVID-19_vaccine).



## AstraZeneca COVID-19 vaccine

Simian (chimpanzee) adenovirus vector  
Replication-deficient  
Contains the full-length [codon-optimised](#) coding sequence  
of [SARS-CoV-2](#) spike protein along with a [tissue plasminogen  
activator](#) (tPA) [leader sequence](#).

Two doses four to twelve weeks apart  
WHO : 8 to 12 weeks after the first for optimum efficacy.



The efficacy of the vaccine is 76.0% at preventing symptomatic COVID-19  
beginning at 22 days following the first dose and 81.3% after the second dose.



## Coronavirus disease (COVID-19): Vaccines

Serum - Protection from birth onwards

PRODUCTS SUPPLIED OVERSEAS | **PRODUCTS SUPPLIED IN INDIA** | PRODUCT LIST | PRODUCT PIPELINE

### ChAdOx1 nCoV- 19 Corona Virus Vaccine (Recombinant) COVISHIELD™

BACK

#### PRODUCT INSERT

SI

For the use only of a Registered Medical Practitioner or a Hospital or a Laboratory

#### ChAdOx1 nCoV- 19 Corona Virus Vaccine (Recombinant)

**COVISHIELD™**

##### 1 NAME OF THE MEDICINAL PRODUCT

**COVISHIELD™**

ChAdOx1 nCoV- 19 Corona Virus Vaccine (Recombinant)

##### 2 QUALITATIVE AND QUANTITATIVE COMPOSITION

One dose (0.5 ml) contains:

ChAdOx1 nCoV- 19 Corona Virus Vaccine (Recombinant) 5 × 10<sup>8</sup> viral particles (vg)

\*Recombinant, replication deficient chimpanzee adenovirus vector encoding the SARS-CoV-2 Spike

(S) glycoprotein. Produced in genetically modified human embryonic kidney (HEK 293 cells)

This product contains genetically modified organisms (GMOs)

For the full list of excipients, see section 6.1

Both COVISHIELD™ (manufactured by Serum Institute of India Pvt Ltd) and COVID-19 Vaccine

AstraZeneca (manufactured by AstraZeneca) are ChAdOx1 nCoV- 19 Corona Virus Vaccines

(Recombinant)



**COVISHIELD™**

[click HERE for detailed product insert information \(PDF\)](#)

#### FACT SHEET

SI

#### FACT SHEET FOR VACCINE RECIPIENT

APPROVED FOR RESTRICTED USE IN EMERGENCY SITUATION OF  
ChAdOx1 nCoV- 19 Corona Virus Vaccine (Recombinant)

**COVISHIELD™**

IN PREVENTION OF (COVID-19) DISEASE  
IN INDIVIDUALS 18 YEARS OF AGE AND OLDER

[click HERE for detailed Fact Sheet \(PDF\)](#)

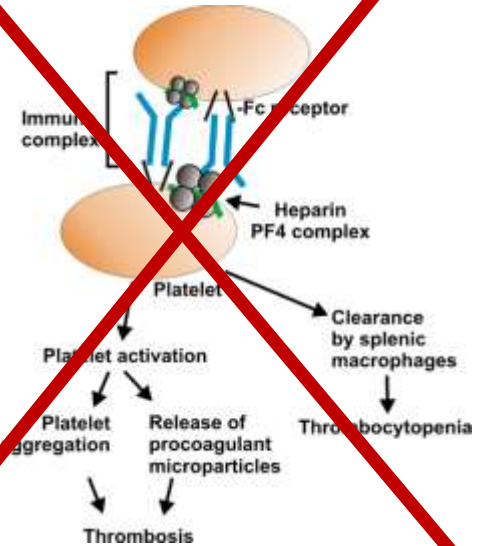


# Thromboembolic events

The estimated number of doses of vaccine administered in the UK by 31st March was 20.2 million giving an overall case incidence of **4.4** per million doses



**Autoimmune Heparin-induced thrombocytopenia (aHIT)** is caused by antibodies that bind to complexes of **heparin** and platelet factor 4 (PF4), activating the platelets and promoting a prothrombotic state.





## **VAXZEVRIA/COVID-19 Vaccine AstraZeneca: link between the vaccine and the occurrence of thrombosis in combination with thrombocytopenia**



Dear Healthcare Professional,

AstraZeneca AB in agreement with the European Medicines Agency and the <National Competent Authority > would like to inform you of the following:

### ***Summary***

- **A causal relationship between the vaccination with Vaxzevria and the occurrence of thrombosis in combination with thrombocytopenia is considered plausible.**
- **Although such adverse reactions are very rare, they exceeded what would be expected in the general population.**
- **No specific risk factors have been identified at this stage.**
- **Healthcare professionals should be alert to the signs and symptoms of thromboembolism and or thrombocytopenia and inform vaccinees accordingly.**
- **The use of this vaccine should be in accordance with official national recommendations.**



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# Johnson & Johnson COVID-19 vaccine



[Ad26.COV2.S](#)

- requires only one dose
- does not need to be stored frozen

# Convidecia



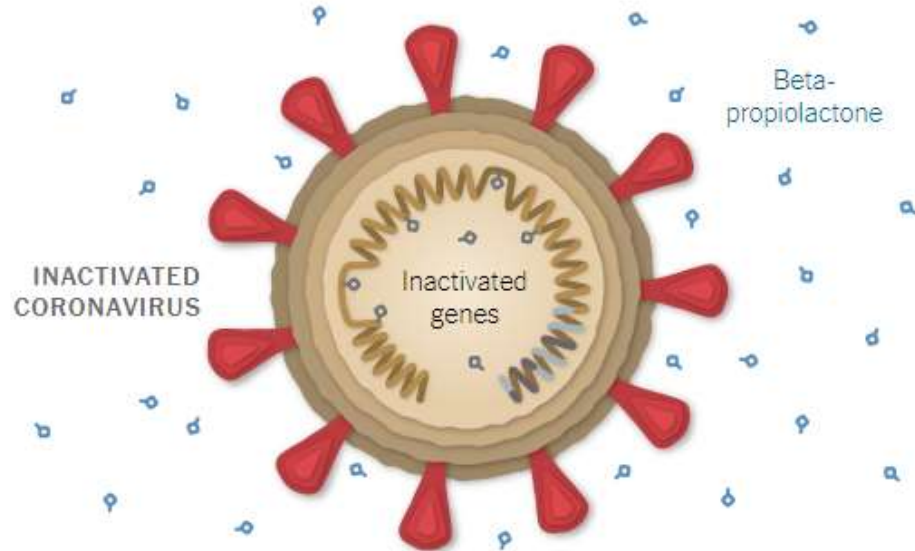
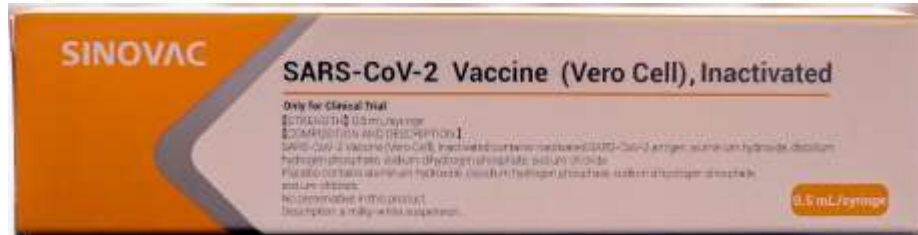
**AD5-nCOV**



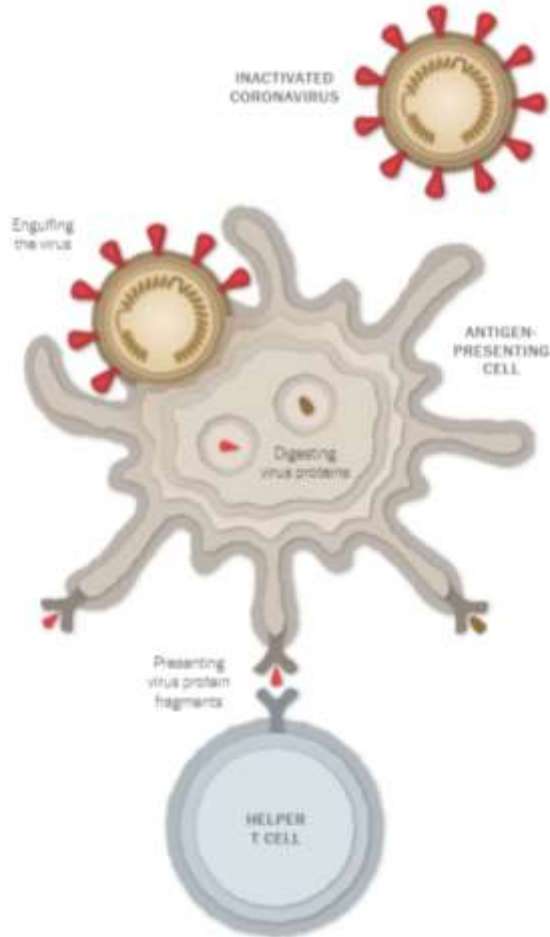
Україна отримала ще пів мільйона доз вакцини CoronaVac (Фото: REUTERS/Valentyn Ogirenko)

**В Україну прибули ще пів мільйона доз вакцини CoronaVac виробництва китайської фармацевтичної компанії Sinovac Biotech.**

... Україна уклала контракт на поставку 1,9 млн доз цього препарату, із яких отримала вже 1,215 млн.







> Curr Med Chem. 2011;18(17):2630-7. doi: 10.2174/092986711795933740.

## Aluminum vaccine adjuvants: are they safe?

L Tomljenovic<sup>1</sup>, C A Shaw

Affiliations + expand

PMID: 21568886 DOI: 10.2174/092986711795933740

### Abstract

Aluminum is an experimentally demonstrated neurotoxin and the most commonly used vaccine adjuvant. Despite almost 90 years of widespread use of aluminum adjuvants, medical science's understanding about their mechanisms of action is still remarkably poor. There is also a concerning scarcity of data on toxicology and pharmacokinetics of these compounds. In spite of this, the notion that aluminum in vaccines is safe appears to be widely accepted. Experimental research, however, clearly shows that aluminum adjuvants have a potential to induce serious immunological disorders in humans. In particular, aluminum in adjuvant form carries a risk for autoimmunity, long-term brain inflammation and associated neurological complications and may thus have profound and widespread adverse health consequences. In our opinion, the possibility that vaccine benefits may have been overrated and the risk of potential adverse effects underestimated, has not been rigorously evaluated in the medical and scientific community. We hope that the present paper will provide a framework for a much needed and long overdue assessment of this highly contentious medical issue





## mRNA vaccines – a new era in vaccinology

Norbert Pardi, Michael J. Hogan, Frederick W. Porter & Drew Weissman 

*Nature Reviews Drug Discovery* **17**, 261–279(2018) | [Cite this article](#)

**1.64m** Accesses | **524** Citations | **4714** Altmetric | [Metrics](#)

### Key Points

- Recent improvements in mRNA vaccines act to increase protein translation, modulate innate and adaptive immunogenicity and improve delivery.
- mRNA vaccines have elicited potent immunity against infectious disease targets in animal models of influenza virus, Zika virus, rabies virus and others, especially in recent years, using lipid-encapsulated or naked forms of sequence-optimized mRNA.
- Diverse approaches to mRNA cancer vaccines, including dendritic cell vaccines and various types of directly injectable mRNA, have been employed in numerous cancer clinical trials, with some promising results showing antigen-specific T cell responses and prolonged disease-free survival in some cases.
- Therapeutic considerations and challenges include scaling up good manufacturing practice (GMP) production, establishing regulations, further documenting safety and increasing efficacy.
- Important future directions of research will be to compare and elucidate the immune pathways activated by various mRNA vaccine platforms, to improve current approaches based on these mechanisms and to initiate new clinical trials against additional disease targets.





# mRNA is an endogenous ligand for Toll-like receptor 3

Katalin Karikó<sup>1</sup>, Houping Ni, John Capodici, Marc Lamphier, Drew Weissman

Affiliations + expand

PMID: 14729660 DOI: 10.1074/jbc.M310175200

**Free article**

<https://pubmed.ncbi.nlm.nih.gov/14729660/>

## Abstract

Toll-like receptors (TLRs) are the basic signaling receptors of the innate immune system. They are activated by molecules associated with pathogens or injured host cells and tissue. TLR3 has been shown to respond to double stranded (ds) RNA, a replication intermediary for many viruses. Here we present evidence that heterologous RNA released from or associated with necrotic cells or generated by in vitro transcription also stimulates TLR3 and induces immune activation. To assess RNA-mediated TLR3 activation, human embryonic kidney 293 cells stably expressing TLR3 and containing a nuclear factor-kappaB-dependent luciferase reporter were generated. Exposing these cells to in vitro transcribed RNA resulted in a TLR3-dependent induction of luciferase activity and interleukin-8 secretion. Treatment with in vitro transcribed mRNA activated nuclear factor-kappaB via TLR3 through a process that was dose-dependent and involved tyrosine phosphorylation. Furthermore, in vitro



Katalin Karikó, a senior vice president at BioNTech overseeing its mRNA work, in her home office in Rydal, Penn.  
JESSICA KOUSSER/PHOTO FOR THE EDITION CLUBE



# Purification of mRNA Encoding Chimeric Antigen Receptor Is Critical for Generation of a Robust T-Cell Response

Jessica B Foster <sup>1 2</sup>, Namrata Choudhari <sup>3 4</sup>, Jessica Perazzelli <sup>1</sup>, Julie Storm <sup>1</sup>, Ted J Hofmann <sup>1</sup>, Payal Jain <sup>3 4</sup>, Phillip B Storm <sup>2 3 4 5</sup>, Norbert Pardi <sup>6</sup>, Drew Weissman <sup>6</sup>, Angela J Waanders <sup>1 2 4</sup>, Stephan A Grupp <sup>1 2</sup>, Katalin Karikó <sup>7</sup>, Adam C Resnick <sup>2 3 4 8</sup>, David M Barrett <sup>1 2</sup>

Affiliations + expand

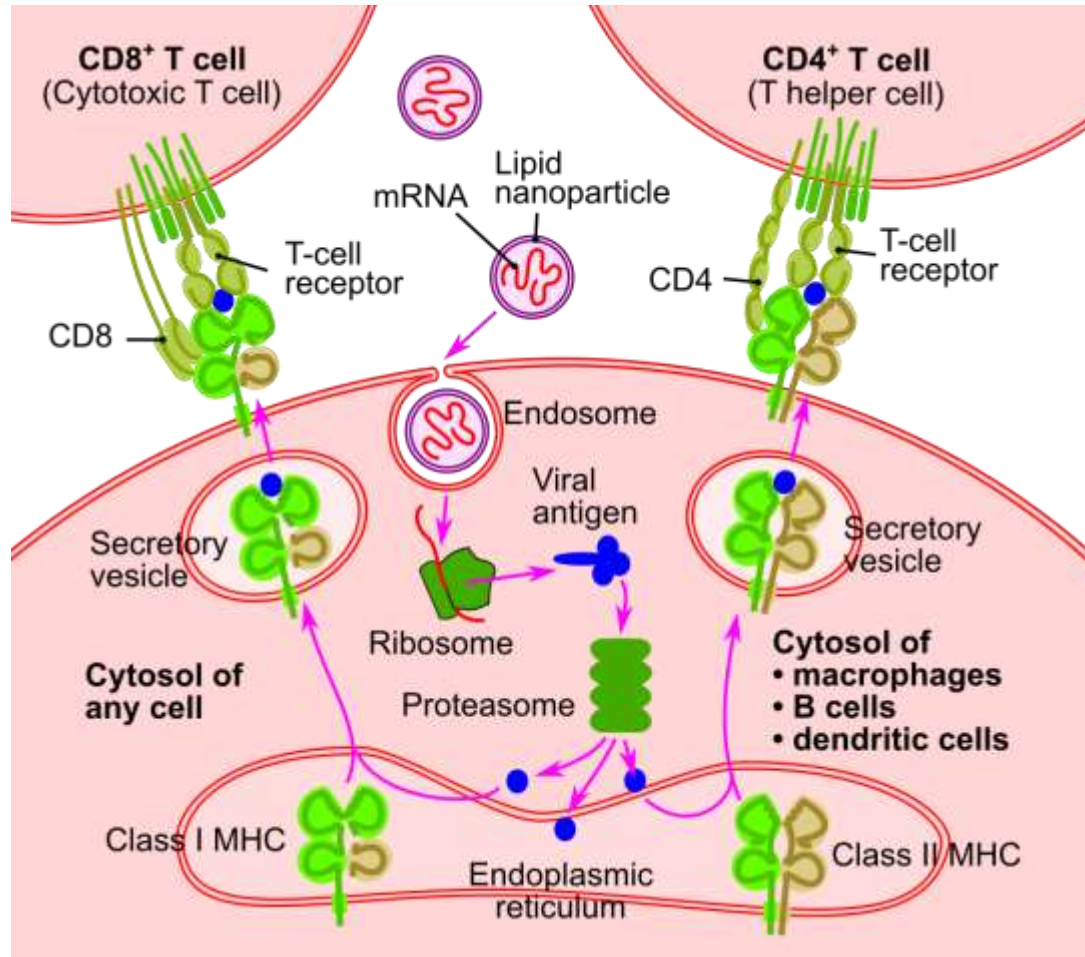
PMID: 30024272 PMCID: [PMC6383579](#) DOI: [10.1089/hum.2018.145](#)

<https://pubmed.ncbi.nlm.nih.gov/30024272/>

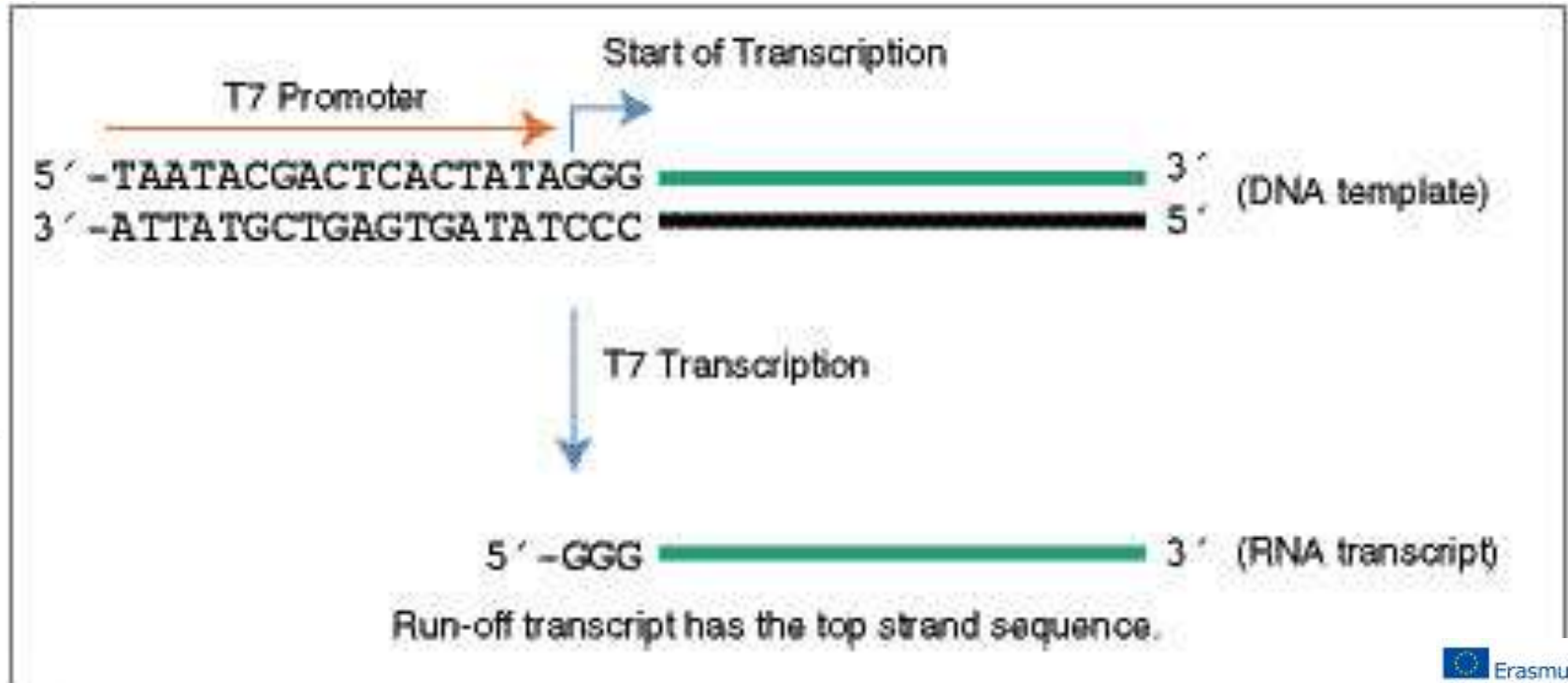
[Free PMC article](#)

## Abstract

T cells made with messenger RNA (mRNA) encoding chimeric antigen receptor (CAR) offer a safe alternative to those transduced with viral CARs by mitigating the side effects of constitutively active T cells. Previous studies have shown that mRNA CAR T cells are transiently effective but lack persistence and potency across tumor types. It was hypothesized that the efficacy of mRNA CARs could be









PRESS RELEASE

March 4, 2021

## CureVac and Novartis Sign Initial Agreement on Manufacturing of COVID-19 Vaccine Candidate, CVnCoV



- Novartis plans to start manufacturing of the mRNA and bulk drug product of CureVac's COVID-19 vaccine candidate, CVnCoV, in Q2 2021
- Anticipated production of up to 50 million doses by the end of 2021 and up to a further 300 million doses in 2022 at the Novartis manufacturing site in Kundl, Austria
- Further expansion of CureVac's European manufacturing network expected to increase capacity

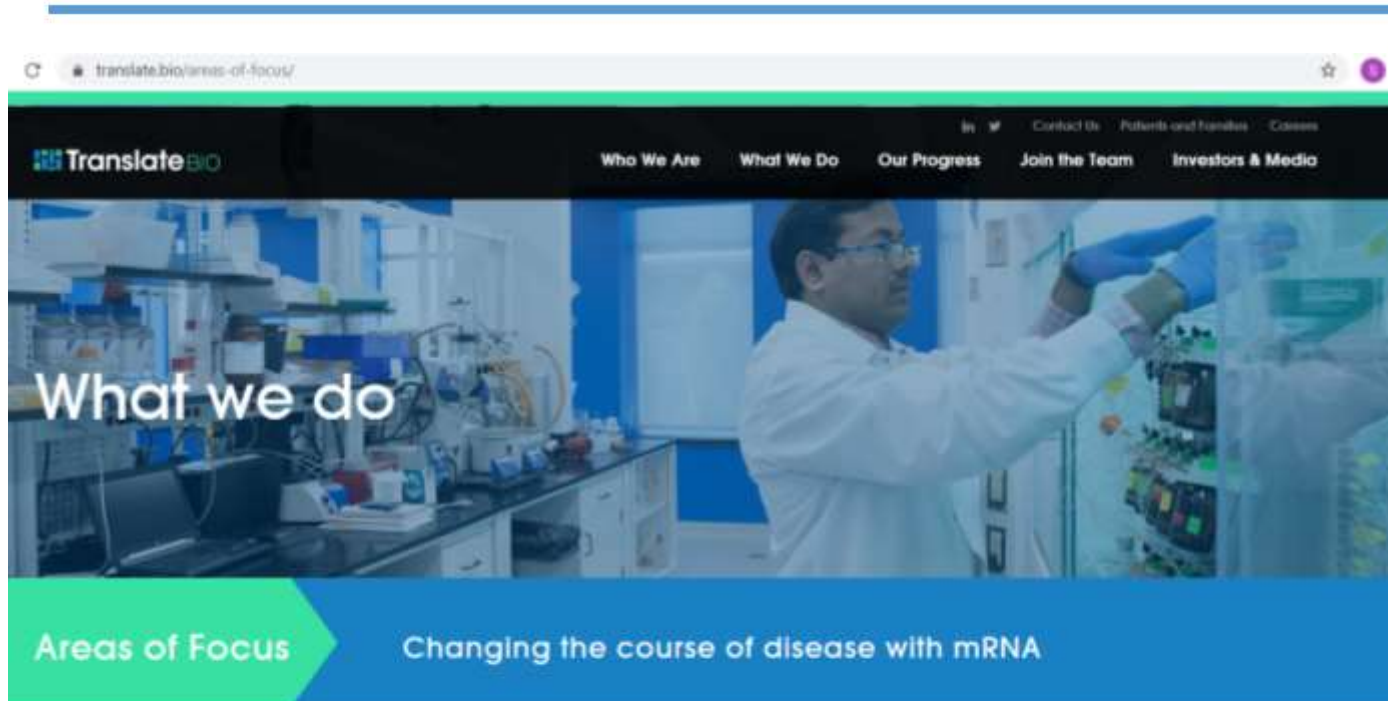


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<https://img.etimg.com/thumb/msid-79242981,width-640,resizemode-4,imgsize-97807/vaccine-trials.jpg>

<https://encrypted-tbn0.gstatic.com/images?q=tbn:ANd9GcSoimNyGVJu7-4d91yURgQVVMKeeh2AOKOUg&usqp=CAU>



The screenshot shows the Translate Bio website. The browser address bar displays 'translate.bio/areas-of-focus/'. The website has a dark navigation bar with the Translate Bio logo and links: 'Who We Are', 'What We Do', 'Our Progress', 'Join the Team', and 'Investors & Media'. A secondary navigation bar includes links for 'In', 'Contact Us', 'Patients and Families', and 'Careers'. The main content area features a large image of a scientist in a lab coat working in a laboratory, with the text 'What we do' overlaid. Below this, a blue banner contains the text 'Areas of Focus' and 'Changing the course of disease with mRNA'.

### Cystic Fibrosis

Cystic fibrosis (CF) is the most common fatal inherited disease in the United States. CF results in mucus buildup in the lungs, pancreas and other organs, and mortality is primarily driven by a progressive decline in lung function. There is no cure for CF.

Research Highlight | [Published: 12 January 2021](#)

AUTOIMMUNITY

# mRNA vaccine shows promise in autoimmunity

Alexandra Flemming 

*Nature Reviews Immunology* **21**, 72(2021) | [Cite this article](#)

**11k** Accesses | **108** Altmetric | [Metrics](#)



## Indian doctors warn against cow dung as COVID cure







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April 22, 2021  
9:00 PM EEST

Americas

## Brazil health regulator rejects Russia's Sputnik vaccine

3 minute read

Reuters, Ricardo Brito, Polina Ivanova



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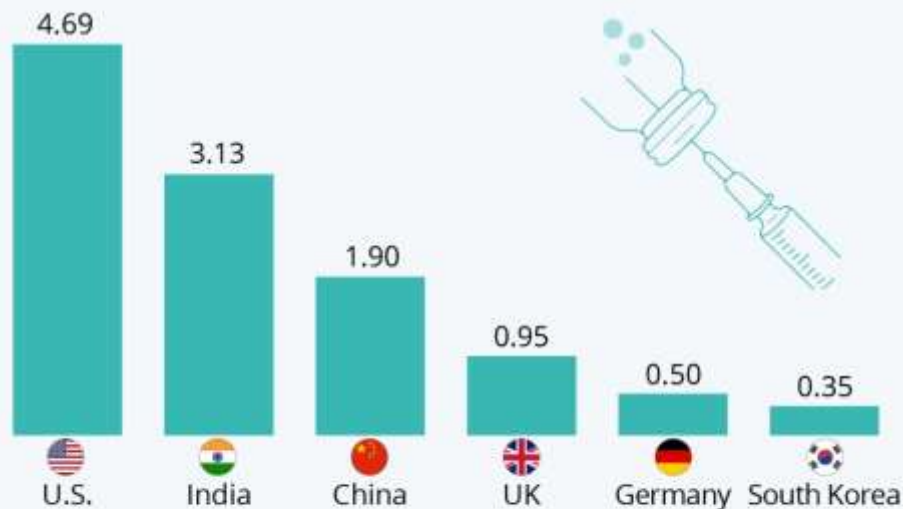


<https://www.reuters.com/world/americas/brazil-health-regulator-anvisa-technical-staff-recommends-against-importing-2021-04-26/>  
<https://images.moneycontrol.com/static-mcnews/2020/11/Sputnik-V-vaccine-770x433.jpg?impolicy=website&width=770&height=431>  
<https://i.pinimg.com/236x/96/53/50/9653507aad03cd3077fe1aa4d9105c2a--tato-danger.jpg>



## Where Coronavirus Vaccines Will Be Produced

Estimated coronavirus vaccine production capabilities in 2020 and 2021 by country (in billion doses)



Source: Airfinity via DW



statista



# COVID-19 Vaccines Global Access - COVAX

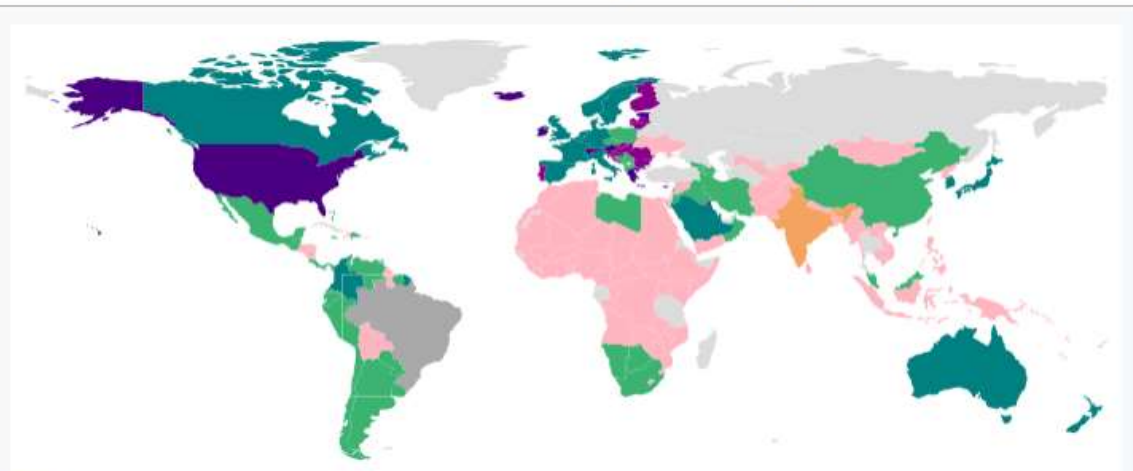


Interim Distribution Forecast as of 3 February 2021 (doses)<sup>(17)</sup>  
 AMC: Advance Market Commitment; SFP: Self-Financing Participants

Participant	SFP/AMC	AstraZeneca SII	AstraZeneca SK Bioscience	Pfizer-BioNTech	Total
India	AMC	97,164,000	-	-	97,164,000
Pakistan	AMC	17,160,000	-	-	17,160,000
Nigeria	AMC	16,008,000	-	-	16,008,000
Indonesia	AMC	-	13,708,800	-	13,708,800
Bangladesh	AMC	12,792,000	-	-	12,792,000
Brazil	SFP	-	10,672,800	-	10,672,800
Ethiopia	AMC	8,928,000	-	-	8,928,000
Congo, Dem. Rep.	AMC	6,948,000	-	-	6,948,000
Mexico	SFP	-	6,472,800	-	6,472,800
Philippines	AMC	-	5,500,800	117,000	5,617,800
Egypt	AMC	-	5,138,400	-	5,138,400
Vietnam	AMC	-	4,886,400	-	4,886,400
Myanmar	AMC	4,224,000	-	-	4,224,000
Iran	SFP	-	4,216,800	-	4,216,800
Kenya	AMC	4,176,000	-	-	4,176,000
Uganda	AMC	3,552,000	-	-	3,552,000
Sudan	AMC	3,396,000	-	-	3,396,000
South Africa	SFP	-	2,976,000	117,000	3,093,000
Afghanistan	AMC	3,024,000	-	-	3,024,000
South Korea	SFP	-	2,996,800	117,000	2,713,800
Colombia	SFP	-	2,553,600	117,000	2,670,600
Uzbekistan	AMC	2,540,000	-	-	2,540,000
Angola	AMC	2,544,000	-	-	2,544,000
Mozambique	AMC	2,424,000	-	-	2,424,000
Ukraine	AMC	-	2,215,200	117,000	2,332,200
Poland	AMC	2,316,000	-	-	2,316,000



## Involvement by country



- AMC donor
- Member of the EC (AMC donor)
- Self-financing participant
- Self-financing participant and AMC donor
- AMC recipient
- AMC recipient and donor
- Not involved





## Statistics

### Vaccinations by location

From [Our World in Data](#) · Last updated: 1 day ago



Worldwide ▾

Doses given

**1.3B**

+12.4M

Fully vaccinated

**314M**

+2.78M

% of population fully vaccinated

**4.0%**

Location

Doses  
given ↓

Fully  
vaccinated

% of population fully  
vaccinated



**Ukraine**

**863K**

**446**

-



**China (Mainland)**

324M

-

-



**United States**

260M

114M

34.8%



**India**

168M

34.5M

2.5%



**United Kingdom**

53M

17.7M

26.5%

This data shows the total number of doses given in each location. Since some vaccines require more than one dose, the number of fully vaccinated people is likely to be lower. '+' shows data reported yesterday · [About this data](#)



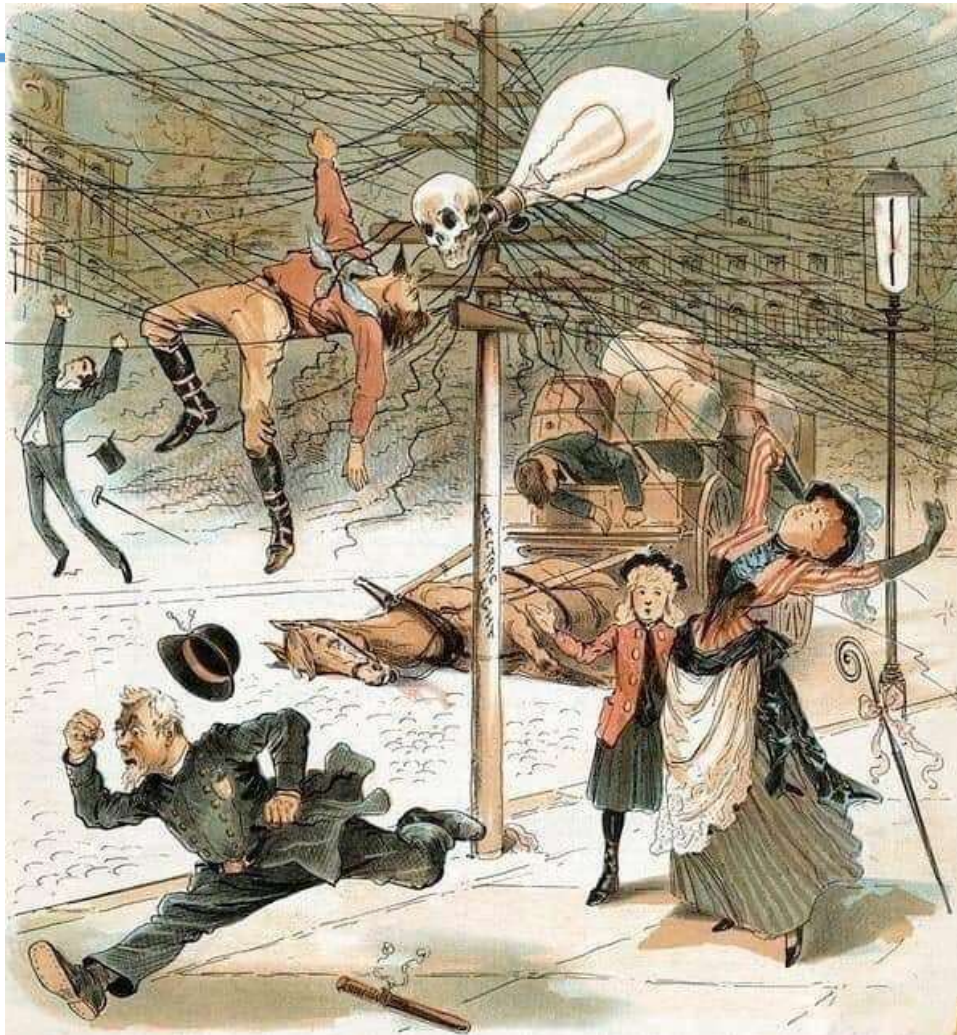
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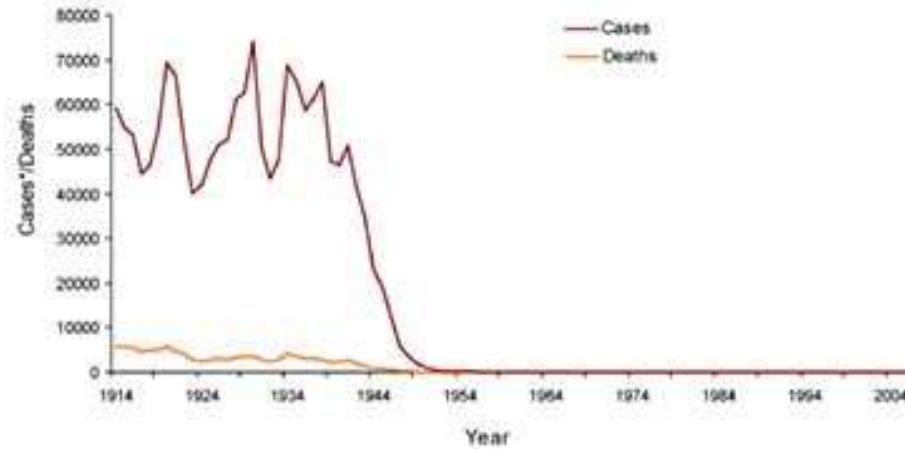








### Diphtheria cases\* and deaths, England and Wales, 1914 - 2008





# Stay healthy!

## And get a COVID19 shot!!!



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СПАСИБО  
THANK YOU  
DANKE SCHÖN  
MUITO OBRIGADO

