

# **Coronavirus disease (COVID-19): How to Protect Yourself & Others**

**Presented by:** Elnaz Zoghi

15 Jun 2021

## **CDC recommendations last update**

- ✓ Get a COVID-19 vaccine as soon as you can.
- ✓ Wear a mask that covers your nose and mouth to help protect yourself and others.
- ✓ Stay 6 feet apart from others who don't live with you.
- ✓ Avoid crowds and poorly ventilated indoor spaces.
- ✓ Wash your hands often with soap and water. Use hand sanitizer if soap and water aren't available.

## When to wear masks

- ❖ Everyone 2 years and older
- ❖ Anytime you are indoors or outdoors with people who don't live with you.

## Do NOT wear

- × Masks with exhalation valves or vents
- × Single layer or masks made of thin fabric that don't block light



# Evaluation of Cloth Masks and Modified Procedure Masks as Personal Protective Equipment for the Public During the COVID-19 Pandemic

Phillip W. Clapp, PhD; Emily E. Sickbert-Bennett, PhD, MS; James M. Samet, PhD, MPH; Jon Berntsen, PhD; Kirby L. Zeman, PhD; Deverick J. Anderson, MD, MPH; David J. Weber, MD, MPH; William D. Bennett, PhD; for the US Centers for Disease Control and Prevention Epicenters Program

**IMPORTANCE** During the coronavirus disease 2019 (COVID-19) pandemic, the general

- A** 2-Layer nylon mask
- B** Cotton bandana
- C** Cotton bandana folded in a rectangle
- D** Single-layer polyester/nylon mask



- E** Nonwoven polypropylene mask



- F** Single-layer gaiter/neck cover balaclava bandana



- G** 3-Layer cotton mask



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← Editor's Note pa



Overall % FFE  
Mean (SD) over all tests,  
38.5% (11.2%)



Overall % FFE  
Mean (SD) over all tests,  
60.3% (11.1%)



Overall % FFE ↑  
Mean (SD) over all tests,  
74.4% (4.8%)

<b>2-Layer nylon mask with ear loops</b>	<b>FFE %</b>
Without aluminum nose bridge New	44.7 %
With aluminum nose bridge	56.3 %
With aluminum nose bridge and 1 insert	74.4 %
With aluminum nose bridge, washed (no insert)	79%

<b>Procedure mask</b>	<b>FFE %</b>
with ear loops	38.5 %
Loops tied and corners tucked in	60.3 %
23-mm Claw hair clip	64.8 %
Nylon hosiery sleeve	80.2 %

**D** Claw-type hair clip



**F** Segment of nylon hosiery



FFE; Fitted Filtration Efficiency



# Types of Masks

- Wear two masks (disposable mask underneath **AND** cloth mask on top)
- A cloth mask can be combined with a fitter or brace
- Knot and tuck ear loops of a 3-ply mask where they join the edge of the mask



## How to store cloth masks

- Store wet or dirty masks in a plastic bag
- Store masks that are not wet or dirty in a paper bag
- Wash your mask with washing machine or tap water and laundry detergent or soap.



For a better fit and additional protection

- Public transportation
- Taking care of someone who is sick with COVID-19
- Working at a job where you interact with large numbers of the public.
- If you are at increased risk for severe illness

**BE AWARE: About 60% KN95 masks in the United States are counterfeit (fake).**



**KN95**  
MULTIPLE PROTECTION

FLITRATION EFFICIENCY  
95%

 Smong	 Powder
 Talgas	 Second
 Antrodor	 Granules



## Prioritize N95 respirators for healthcare workers

NIOSH–approved N95 respirator FFE=  
98.4%

Reuse is possible in shortage according to  
OSHA (Occupational Safety and Health  
Administration) No more than five per  
device

Decontamination?

Ultraviolet germicidal irradiation, vaporous  
hydrogen peroxide, and moist heat (using  
an oven)



# **Cleaning and Disinfecting:** **Importance and guideline**

# Exaggerated risk of transmission of COVID-19 by surfaces or objects

- Although SARS-CoV-2 can persist for days on inanimate surfaces, attempts to culture the virus from these surfaces were unsuccessful.
- The CDC finally admitted it was wrong about surface transmission of COVID-19
- But don't throw away the hand gel and cleaning products just yet.



# Surface survival

Porous surfaces: within minutes to hours

Non-porous surfaces: more

- ❑ Copper: 4 hours
- ❑ Paper: 3 hours, Paper money for up to 4 days
- ❑ Cardboard: 24 hours
- ❑ Wood: 2 days
- ❑ Glass: 4 days
- ❑ Plastic NEJM: 3 days, Lancet: 7 days
- ❑ Metal NEJM: 3 days, Lancet: 7 days

This doesn't mean that people are catching it from surfaces

Example: Human exposure studies of other respiratory pathogens

Dick, E. C. *et al. J. Infect. Dis.* **156**, 442–448 (1987).

# Environmental disinfection

Step 1: Check that your product is EPA<sup>1</sup>-approved

<https://cfpub.epa.gov/wizards/disinfectants/>

Step 2: Read the directions

Step 3: Pre-clean the surface

Step 4: Follow the contact time

Step 5: Wear gloves and wash your hands

Step 6: Lock it up

**× Don't mix bleach with ammonia, acids, or other cleaners.**

1. United States Environmental Protection Agency (EPA)

## Hypochlorite-based products

Sodium hypochlorite; 0.1% (1000 ppm)

For blood and body fluids large spills; 0.5% (5000 ppm)

Commercial sodium hypochlorite products in Iran: 5-8%

### Calculation of sodium hypochlorite concentrations

$[\% \text{ chlorine in liquid sodium hypochlorite} / \% \text{ chlorine desired}] - 1 = \text{Total parts of water for each part sodium hypochlorite.}$

Ex:  $[5\% \text{ in liquid sodium hypochlorite} / 0.5\% \text{ chlorine desired}] - 1 = 9$  parts of water for each part sodium hypochlorite





# Other products

- ✓ Ethanol: 62-95%
- ✓ Isopropanol: 70-100%
- ✓ Formaldehyde: 0.7-1%
- ✓ Povidone iodine: 0.23-7.5%
- ✓ Hydrogen peroxide:  $\geq 0.5\%$  for at least one minute

In asthmatic patients Limit use of chemicals that can trigger asthma attacks to hydrogen peroxide (no stronger than 3%) or ethanol

**Washing hands with soap and water** whenever possible and:

## Hand rub products

Ethanol 60% or more

Isopropanol 70% or more

Benzalkonium chloride has less reliable activity.

In Iran IRC of products obtainable at:

[13abanpharmacy.tums.ac.ir/ZVtK](http://13abanpharmacy.tums.ac.ir/ZVtK)

And List of unauthorized products:

<https://ifdana.fda.gov.ir/fa/News/17158>

✘Forbidden agents: 1-propanol and methanol

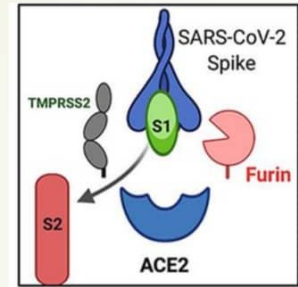
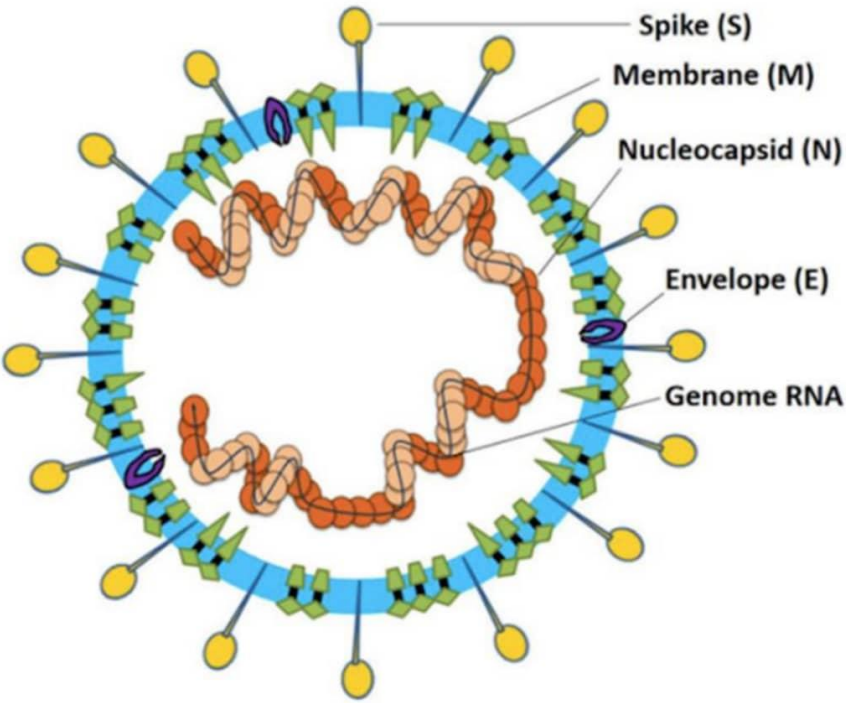
# An overview of current COVID-19 vaccine platforms



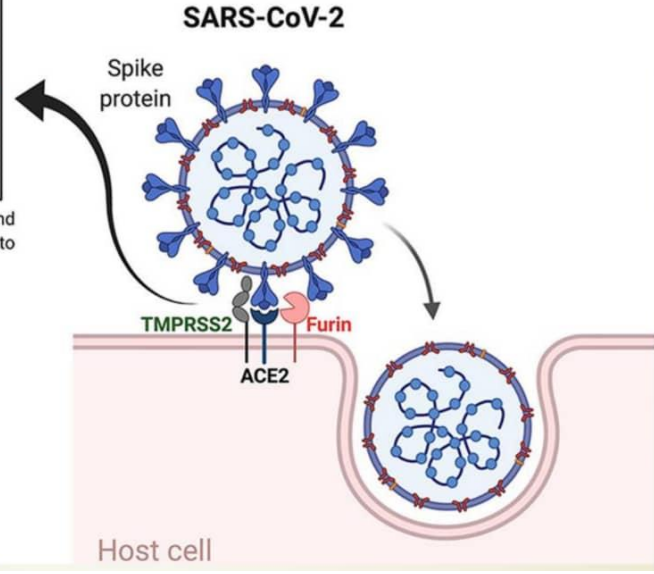
# Virus structure

# Viral entry

COVID-19  
VACCINE



S1/S2 subunits cleavage by furin and SARS-CoV-2 genomes penetrate into the host cell



# Variants of Concern

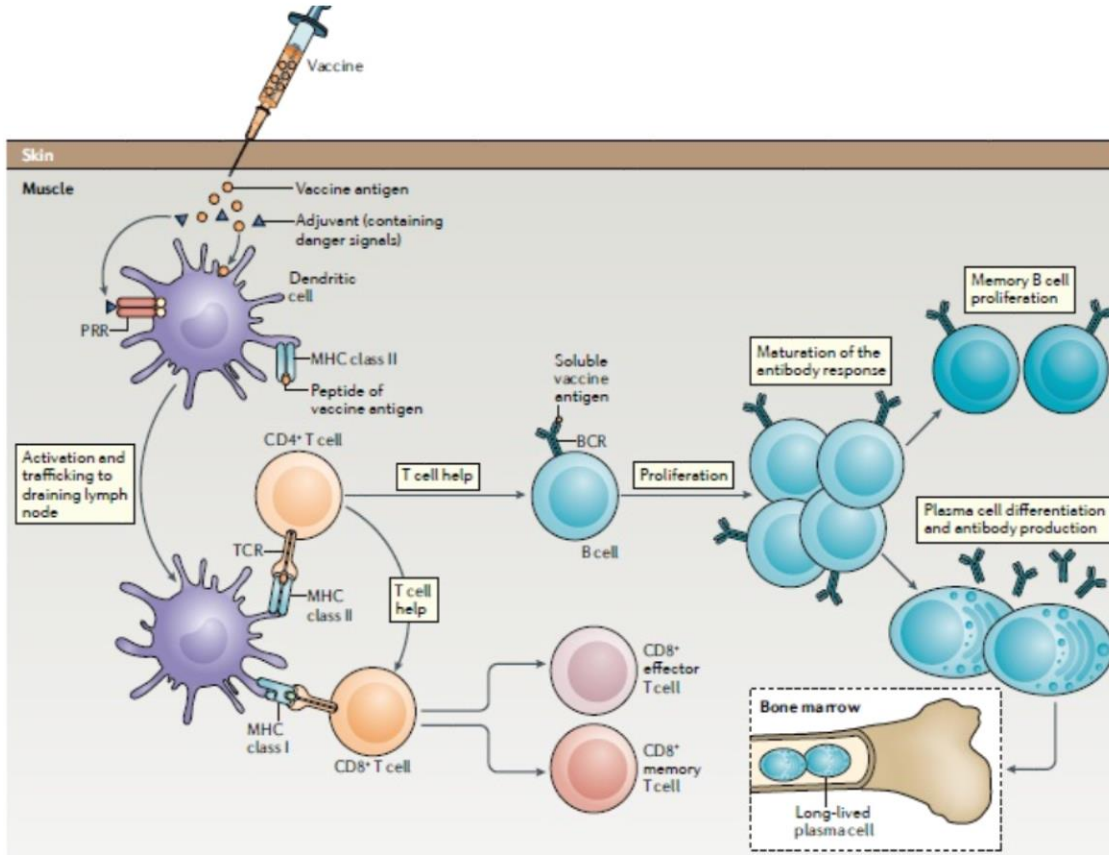


COVID-19  
VACCINE

- Increased transmissibility
- Reduced post-vaccination neutralization

Pango lineage	WHO label	Earliest documented samples
B.1.1.7	Alpha	United Kingdom, Sep-2020
B.1.351	Beta	South Africa, May-2020
P.1	Gamma	Brazil, Nov-2020
B.1.617.2	Delta	India, Oct-2020

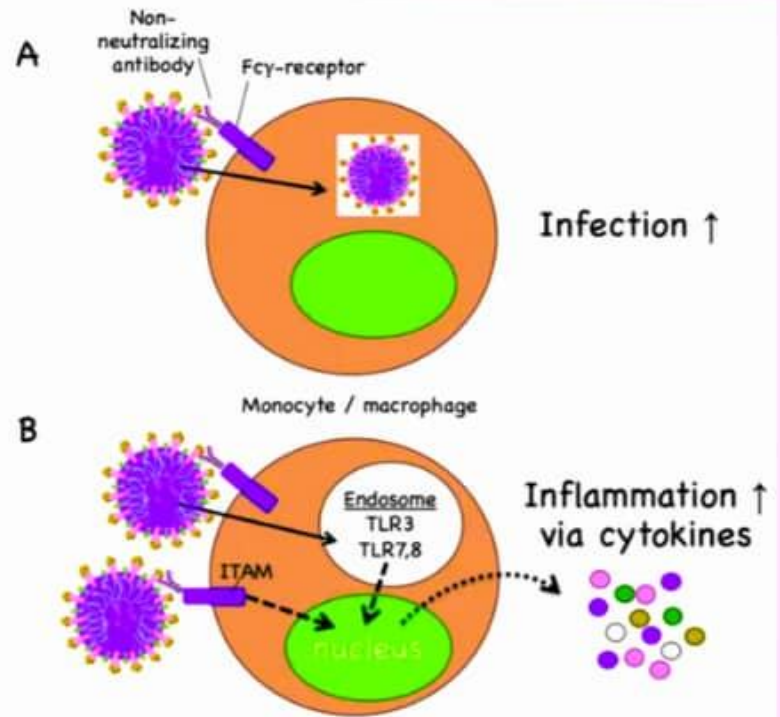
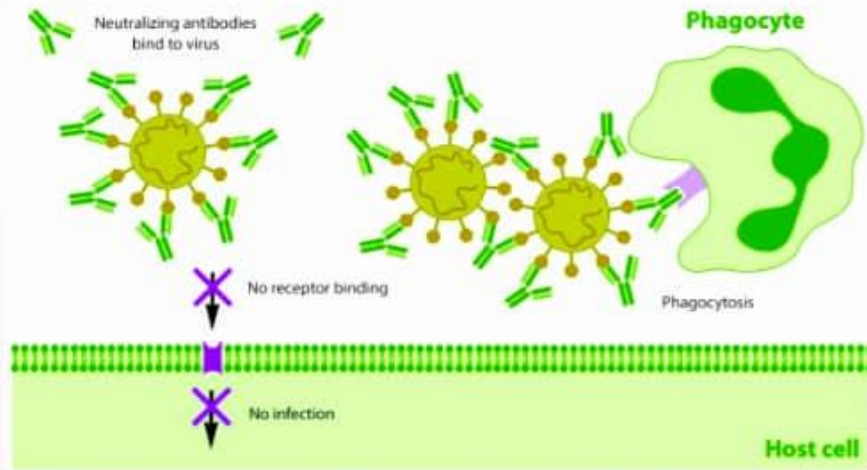
# What is in a vaccine?



Pollard AJ. A guide to vaccinology: from basic principles to new developments. *Nature Reviews Immunology*. 2020 Dec 22:1-8.



# Neutralizing Antibodies & Antibody Dependent Enhancement



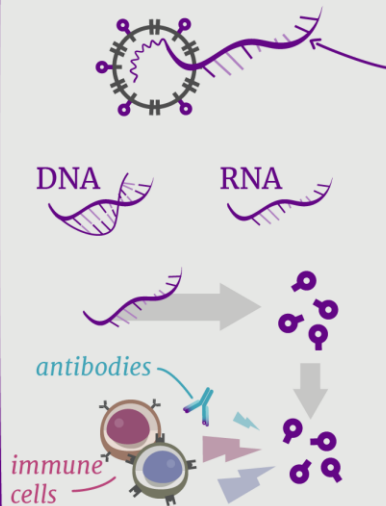
# Covid-19 vaccines platform

COVID-19  
VACCINE

Types of SARS-CoV-2 vaccines for COVID-19

## Genetic vaccines (nucleic acid vaccines)

British Society for  
**immunology**  
www.immunology.org



Contain a segment of **SARS-CoV-2 virus genetic material** that codes for a specific protein. Can be DNA or RNA.

Our cells use the genetic material to make the SARS-CoV-2 protein, which is recognised by the immune system to trigger a response.

This response builds immune memory, so your body can fight off SARS-CoV-2 in future.

### Considerations

Low cost and fast to develop.

May need to be stored at specific low temperatures.



### Approved in the UK for COVID-19

Pfizer/BioNTech & Moderna

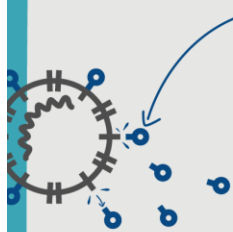
### In clinical trials for COVID-19

CureVac, Inovio Pharmaceuticals

Types of SARS-CoV-2 vaccines for COVID-19

## Protein vaccines

British Society for  
**immunology**  
www.immunology.org

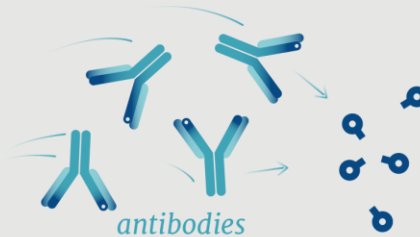
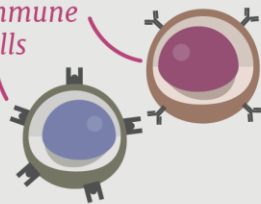


Contain **proteins** from the SARS-CoV-2 virus, which are recognised by the immune system to trigger a response.

Can be whole proteins, protein fragments, or many protein molecules packed into nanoparticles.

This response builds immune memory, so your body can fight off SARS-CoV-2 in future.

immune cells



### Considerations

Have good previous safety records.

Usually administered with an adjuvant to boost immune response.



### Examples in human use for other diseases

Hepatitis B vaccine

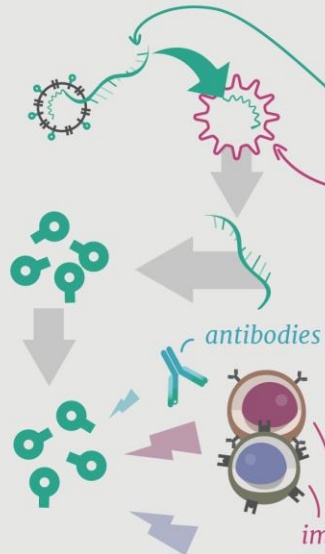
### In clinical trials for COVID-19

Novavax, Sanofi/GSK

Types of SARS-CoV-2 vaccines for COVID-19

## Viral vector vaccines

British Society for  
**immunology**  
www.immunology.org



Use an unrelated harmless virus, modified to deliver **SARS-CoV-2 genetic material**. The delivery virus is known as a **viral vector**.

Our cells use the genetic material to make a specific SARS-CoV-2 protein, which is recognised by the immune system to trigger a response.

This response builds immune memory, so your body can fight off SARS-CoV-2 in future.

### Considerations

Generate strong immune response.  
May need to be stored at specific low temperatures.



### Examples in human use for other diseases

Ebola vaccine

### Approved in the UK for COVID-19

AstraZeneca/Oxford

### Approved elsewhere in the world for COVID-19

Janssen, CanSino, Gamaleya

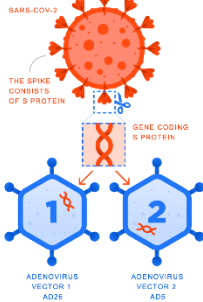
# Sputnik V platform

COVID-19  
VACCINE

## Two-vector vaccine against coronavirus

### Vector creation

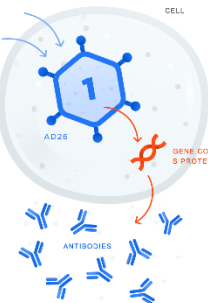
A **vector** is a virus that lacks a gene responsible for reproduction and is used to transport genetic material from another virus that is being vaccinated against into a cell. The **vector** does not pose any hazard to the body. The vaccine is based on an adenoviral vector which normally causes acute respiratory viral infections



A gene coding **S protein** of SARS-COV-2 spikes is inserted into each vector. The spikes form the "crown" from which the virus gets its name. The SARS-COV-2 virus uses spikes to get into a cell

### First vaccination

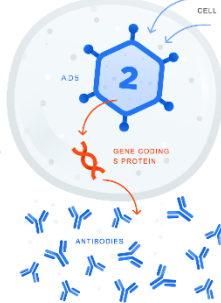
**Vector** with a gene coding **S protein** of coronavirus gets into a cell



The body synthesizes **S protein**. In response, the production of **immunity** begins

### Second vaccination

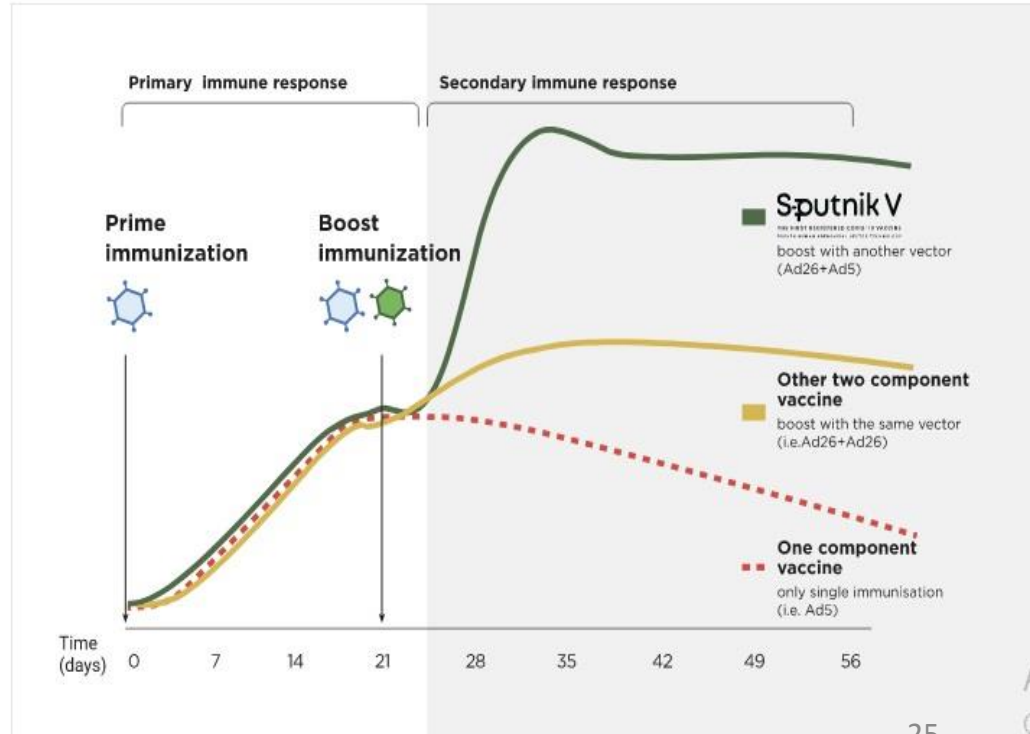
Repeated vaccination takes place in 21 days



The vaccine based on another adenovirus vector unknown to the body boosts the immune response and provides for long-lasting immunity

The use of two vectors is a unique technology of the Gamaleya Center making the Russian vaccine different from other adenovirus vector-based vaccines being developed globally

Source: Gamaleya Center, RSCF, 2020

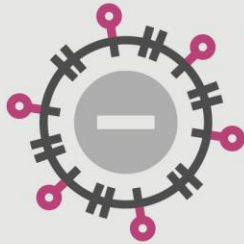




Types of SARS-CoV-2 vaccines for COVID-19

## Inactivated vaccines

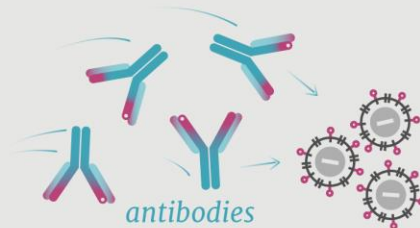
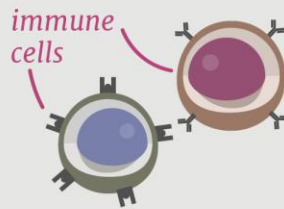
British Society for  
**immunology**  
www.immunology.org



Contain **killed SARS-CoV-2 virus**.

The killed virus is recognised by the immune system to trigger a response without causing illness.

This response builds immune memory, so your body can fight off SARS-CoV-2 in future.



### Considerations

May need to be administered with an adjuvant to boost immune response.



### Examples in human use for other disease

Influenza vaccine

### Approved elsewhere in the world for COVID-19

Sinovac, Sinopharm, Bharat Biotech

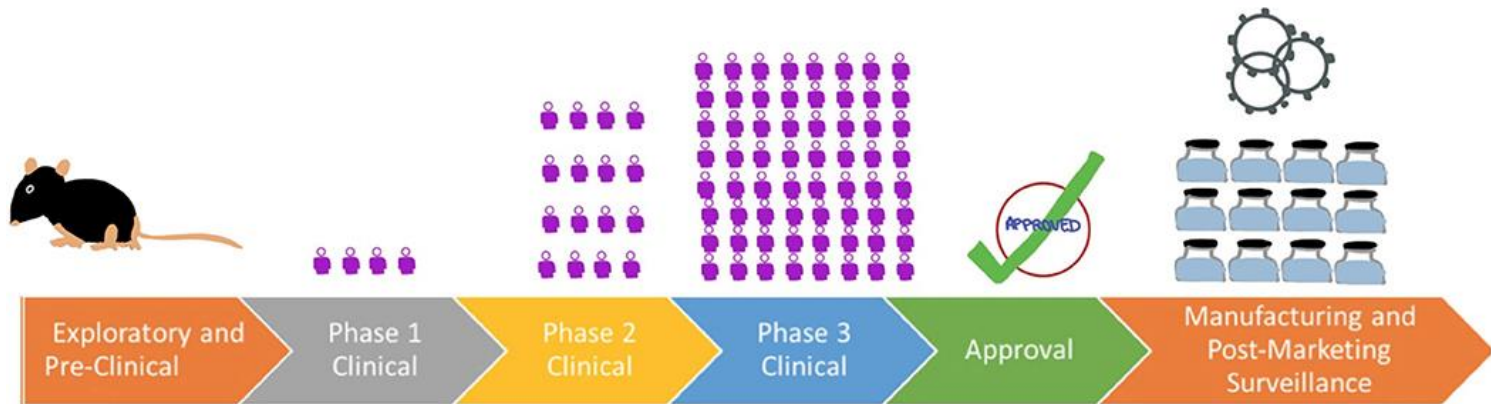
### In clinical trials for COVID-19

Shifa-Pharmed, Chinese Academy of Medical Sciences



# Phases of Clinical Trials

COVID-19  
VACCINE



# Results on SARS-CoV2 vaccines trial efficacy

COVID-19  
VACCINE

**Table 1. Summary Results on SARS-CoV-2 Vaccine Trial Efficacy and Viral Neutralization of the B.1.1.7, P.1, and 501Y.V2 Variants, as Compared with Preexisting Variants.\***

Vaccine (Company)	Preexisting Variants		Neutralization by Pseudovirion or Live Viral Plaque Assay			Efficacy in Settings with 501Y.V2 Variant	
	Sample Size no.	Efficacy in Preventing Clinical Covid-19 % (no. of events with vaccine vs. placebo)	Efficacy in Preventing Severe Covid-19	B.1.1.7 Variant	P.1 Variant	501Y.V2 Variant	%
Ad26.COVS.2.S (Johnson & Johnson)	43,783	66 (NA)	85 (NA)	NA	NA	NA	57†, 85‡
BNT162b2 (Pfizer)	34,922	95 (8 vs. 162)	90 (1 vs. 9)	Decrease by 2x	Decrease by 6.7x	Decrease by ≤6.5x	NA
mRNA-1273 (Moderna)	28,207	94 (11 vs. 185)	100 (0 vs. 30)	Decrease by 1.8x	Decrease by 4.5x	Decrease by ≤8.6x	NA
Sputnik V (Gamaleya)	19,866	92 (16 vs. 62)	100 (0 vs. 20)	NA	NA	NA	NA
AZD1222 (AstraZeneca)	17,177	67 (84 vs. 248)	100 (0 vs. 3)	NA	NA	Decrease by ≤86x to complete immune escape	22§
NVX-CoV2373 (Novavax)	15,000	89 (6 vs. 56)	100 (0 vs. 1)	Decrease by 1.8x	NA	NA	49§
CoronaVac (Sinovac)¶							
Brazil	12,396	51 (NA)	100 (NA)	NA	NA	NA	NA
Turkey	7,371	91 (3 vs. 26)	NA	NA	NA	NA	NA
BBIBP-CorV (Sinopharm)	NA	79 (NA)	NA	NA	NA	Decrease by 1.6x	NA

\* Data were available up to March 18, 2021. The definitions of mild, moderate, and severe coronavirus disease 2019 (Covid-19) vary across the vaccine trials. A list of references associated with these vaccines is provided in the Supplementary Appendix, available with the full text of this letter at NEJM.org. NA denotes not available, and SARS-CoV-2 severe acute respiratory syndrome coronavirus 2.

† Shown is the efficacy of the vaccine, as compared with placebo, against moderate-to-severe Covid-19.

‡ Shown is efficacy of the vaccine, as compared with placebo, against severe Covid-19 and hospitalization.

§ Shown is efficacy of the vaccine, as compared with placebo, against symptomatic Covid-19.

¶ Data are shown separately for the trial sites in Brazil and Turkey.

Table 2. Vaccine effectiveness against S-gene target negative (B.1.1.7) and S-gene target positive (B.1.617.2)

Vaccination status	Test negative controls	B.1.1.7 or S-gene target negative			B.1.617.2 or S-gene target positive		
		cases	cases:controls	aVE(%)	cases	cases:controls	aVE(%)
Unvaccinated	58253	4891	0.084	base	695	0.012	base
Any vaccine							
Dose 1	32703	1481	0.045	51.1 (47.3 to 54.7)	279	0.009	33.5 (20.6 to 44.3)
Dose 2	8483	74	0.009	86.8 (83.1 to 89.6)	27	0.003	80.9 (70.7 to 87.6)
BNT162b2							
Dose 1	7036	344	0.049	49.2 (42.6 to 55.0)	49	0.007	33.2 (8.3 to 51.4)
Dose 2	6412	28	0.004	93.4 (90.4 to 95.5)	13	0.002	87.9 (78.2 to 93.2)
ChAdOx1							
Dose 1	25667	1137	0.044	51.4 (47.3 to 55.2)	230	0.009	32.9 (19.3 to 44.3)
Dose 2	2071	46	0.022	66.1 (54.0 to 75.0)	14	0.007	59.8 (28.9 to 77.3)

Activate Window:

# Effect of an Inactivated Vaccine Against SARS-CoV-2 on Safety and Immunogenicity Outcomes

## Interim Analysis of 2 Randomized Clinical Trials

Shengli Xia, BS; Kai Duan, PhD; Yuntao Zhang, PhD; Dongyang Zhao, BS; Huajun Zhang, PhD; Zhiqiang Xie, MD; Xinguo Li, MD; Cheng Peng, MD; Yanbo Zhang, MD; Wei Zhang, MD; Yunkai Yang, MD; Wei Chen, MSc; Xiaoxiao Gao, PhD; Wangyang You, MD; Xuewei Wang, MD; Zejun Wang, PhD; Zhengli Shi, PhD; Yanxia Wang, BS; Xuqin Yang, MD; Lianghao Zhang, MSc; Lili Huang, BS; Qian Wang, MD; Jia Lu, PhD; Yongli Yang, PhD; Jing Guo, PhD; Wei Zhou, PhD; Xin Wan, MD; Cong Wu, MD; Wenhui Wang, MD; Shihe Huang, PhD; Jianhui Du, MD; Ziyang Meng, MD; An Pan, PhD; Zhiming Yuan, PhD; Shuo Shen, PhD; Wanshen Guo, BS; Xiaoming Yang, MD



COVID-19  
VACCINE

**IMPORTANCE** A vaccine against coronavirus disease 2019 (COVID-19) is urgently needed.

**OBJECTIVE** To evaluate the safety and immunogenicity of an investigational inactivated whole-virus COVID-19 vaccine in China.

**INTERVENTIONS** In the phase 1 trial, 96 participants were assigned to 1 of the 3 dose groups (2.5, 5, and 10 µg/dose) and an aluminum hydroxide (alum) adjuvant-only group (n = 24 in each group), and received 3 intramuscular injections at days 0, 28, and 56. In the phase 2 trial, 224 adults were randomized to 5 µg/dose in 2 schedule groups (injections on days 0 and 14 [n = 84] vs alum only [n = 28], and days 0 and 21 [n = 84] vs alum only [n = 28]).

**DESIGN, SETTING, AND PARTICIPANTS** Interim analysis of ongoing randomized, double-blind, placebo-controlled, phase 1 and 2 clinical trials to assess an inactivated COVID-19 vaccine. The trials were conducted in Henan Province, China, among 96 (phase 1) and 224 (phase 2) healthy adults aged between 18 and 59 years. Study enrollment began on April 12, 2020. The interim analysis was conducted on June 16, 2020, and updated on July 27, 2020.

**MAIN OUTCOMES AND MEASURES** The primary safety outcome was the combined adverse reactions 7 days after each injection, and the primary immunogenicity outcome was neutralizing antibody response 14 days after the whole-course vaccination, which was measured by a 50% plaque reduction neutralization test against live severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).

**RESULTS** Among 320 patients who were randomized (mean age, 42.8 years; 200 women [62.5%]), all completed the trial up to 28 days after the whole-course vaccination. The 7-day adverse reactions occurred in 3 (12.5%), 5 (20.8%), 4 (16.7%), and 6 (25.0%) patients in the alum only, low-dose, medium-dose, and high-dose groups, respectively, in the phase 1 trial; and in 5 (6.0%) and 4 (14.3%) patients who received injections on days 0 and 14 for vaccine

← Editorial page 943

+ Supplemental content



# Iran vaccines

COVID-19  
VACCINE

Vaccine brand	Platform	Company	Trial phase
Finlay-Pasteur	Recombinant protein	انیستیتو پاستور ایران و فینلای کوبا	3
COVIran Barakat	Inactivated virus	شفا فارمد	2/3
Razi Cov Pars	Recombinant protein	انیستیتو واکسن و سرم سازی رازی	2
Fakhra vac	Inactivated virus	میلا د دارو نور وابسته به وزارت دفاع	2
SpikoGen	Recombinant protein	سیناژن ایران و وکسین استرالیا	2

# Fully Vaccinated people



COVID-19  
VACCINE

- ❖ 2 weeks after the second dose of Pfizer or Moderna vaccines
- ❖ Without any condition or are taking medications that weaken immune system



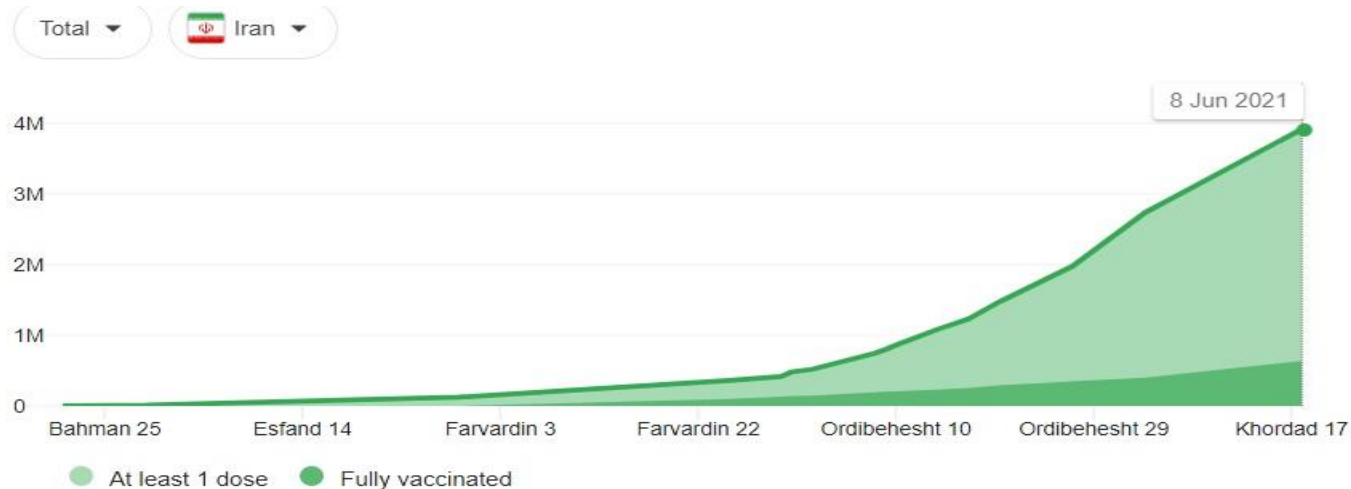
# When we will achieve herd immunity?



70% of population (60M) should be fully vaccinated

In four months: 5.18% received one dose

1.01% received two doses of vaccines



This data shows how many people have received at least one dose of a vaccine. People who are fully vaccinated may have received more than one dose. [About this data](#)



Thank you