

RACE TO THE VACCINE

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serving as

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Outline:

- Guidance of Holy Quran
- Vaccine landscape
- Story of the race to the vaccine
- Directive of Hadhrat Khalifatul Masih V (atba)

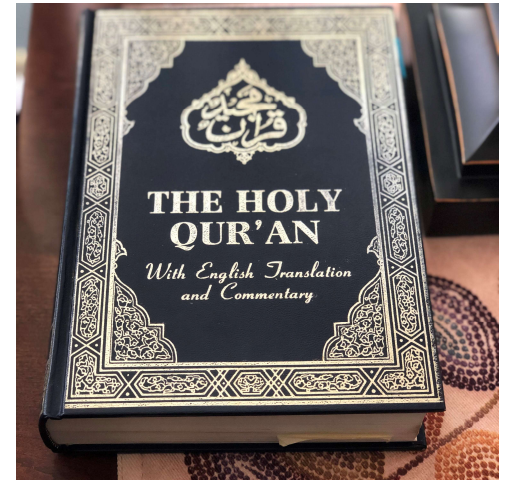
These are unprecedented times

وَقَالَ الْإِنْسَانُ مَا لَهَا ۚ

- And man says, “What is the matter with her?” (99:4)

إِنبَأَ أَمْرَهَا إِذْ أَرَادَ شَيْئًا أَنْ يَقُولَ لَهُ كُنْ فَيَكُونُ ﴿١٣﴾

- Verily His command when He intends a thing is only that He says to it is Be! and it is. (36:83)



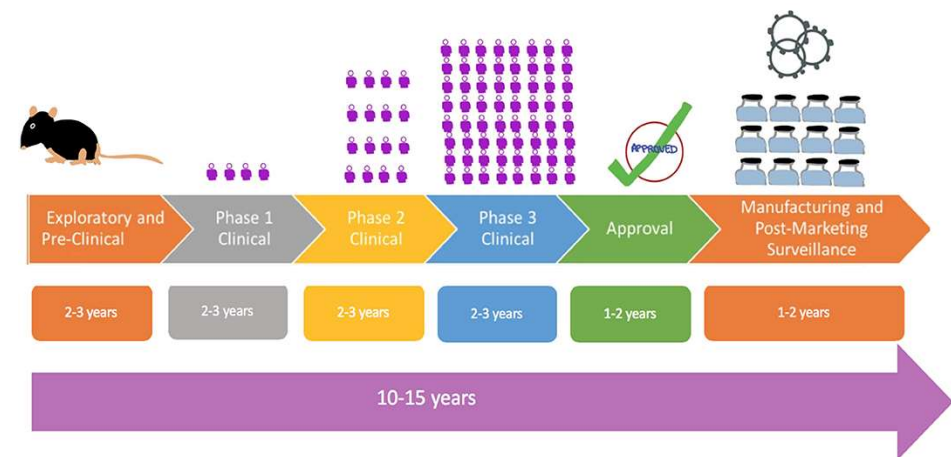
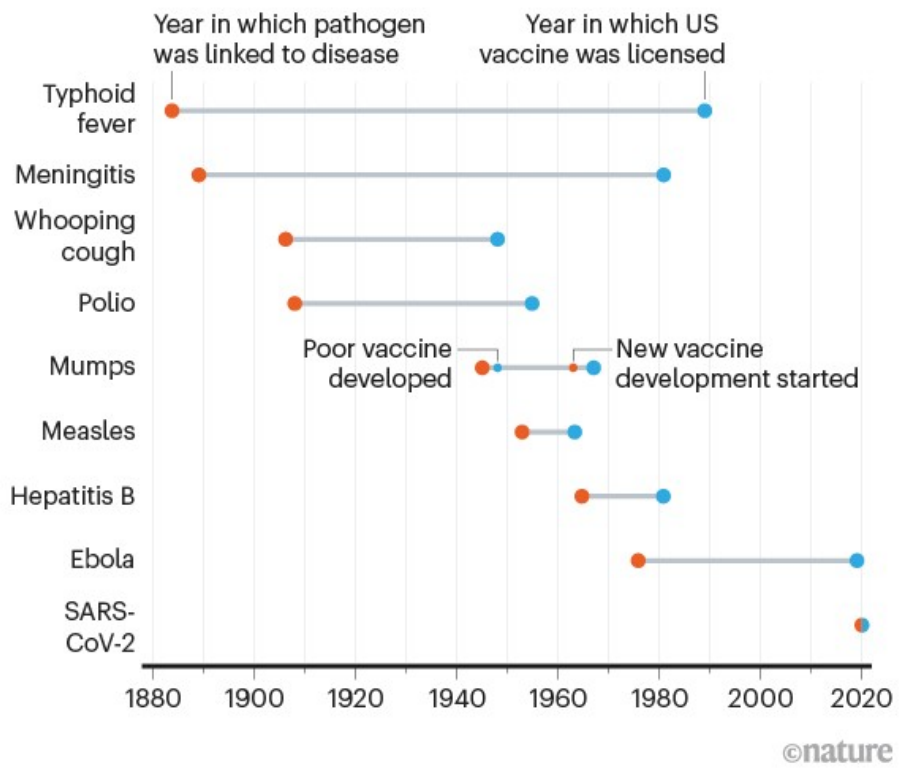
The quest to find a vaccine
– humanity’s dire need



*“Every disease has a cure, if
the cure is applied to the
disease, it is relieved by the
Grace of Allah”*

- Holy Prophet Muhammad^{sa}

Vaccines take years to develop... so what happened with the SARS-CoV-2 vaccine?

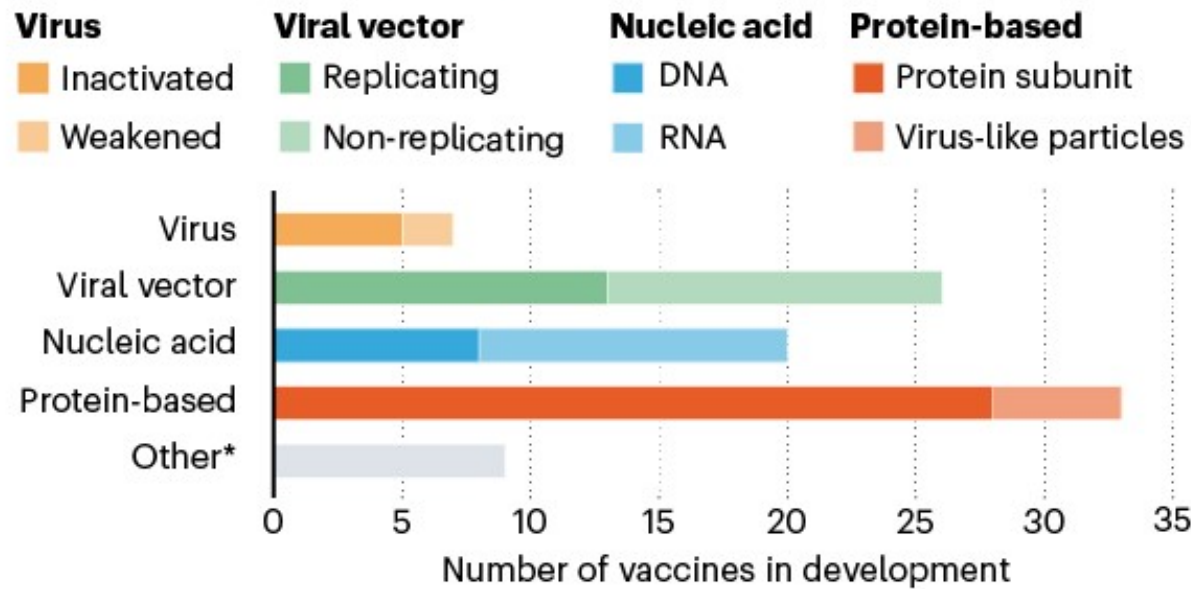


Emergency authorization use of the SARS-CoV-2 takes place within months

Approval of vaccine typically takes years to decades

The Vaccine Landscape: who will be the first to deliver a safe and effective vaccine?

AN ARRAY OF VACCINES



* Other efforts include testing whether existing vaccines against poliovirus or tuberculosis could help to fight SARS-CoV-2 by eliciting a general immune response (rather than specific adaptive immunity), or whether certain immune cells could be genetically modified to target the virus.

COVID-19 VACCINE TRACKER

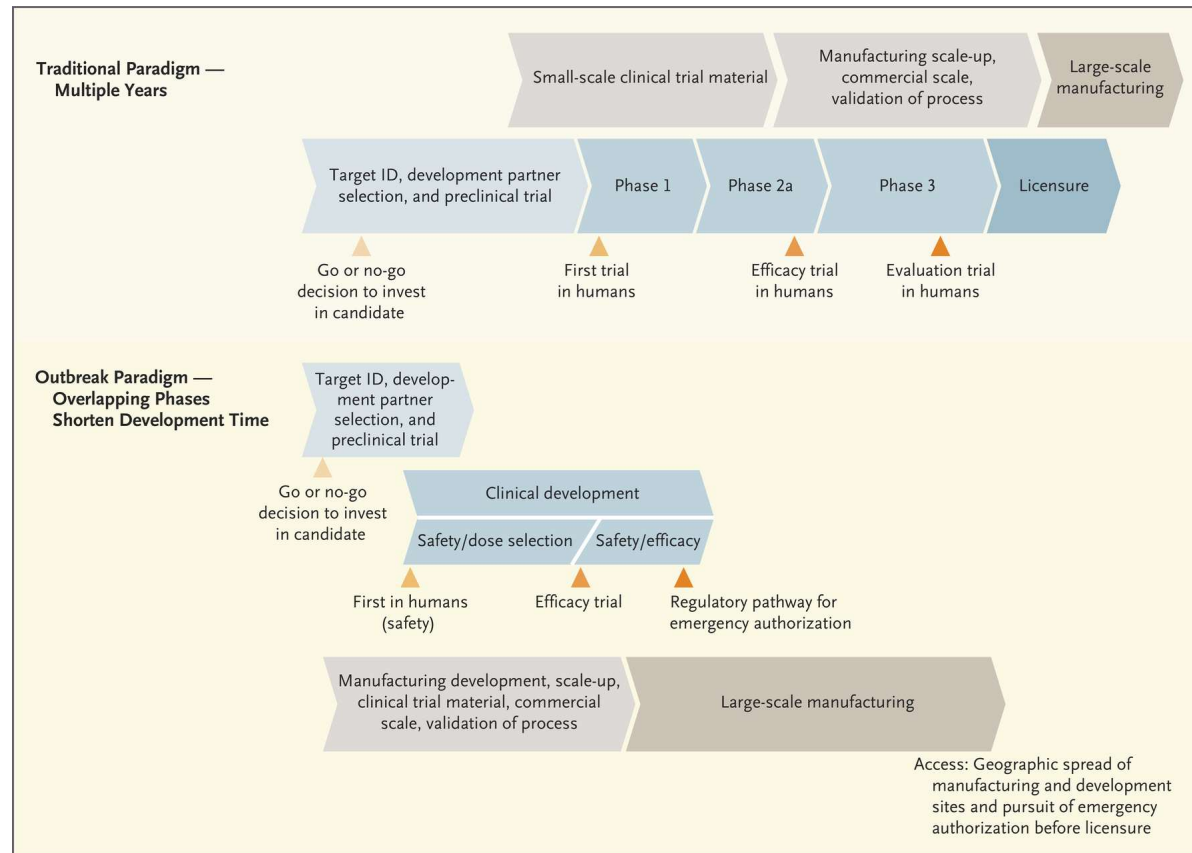


THE NINE PHARMACEUTICAL COMPANIES AHEAD IN THE COVID-19 RACE

COMPANY NAME	SYMBOL	COLLABORATION	TYPE OF VACCINE	STAGE OF CLINICAL TRIAL	COUNTRY OF ORIGIN
Johnson & Johnson	JNJ	Beth Israel Deaconess Medical Center, Biomedical Advanced Research and Development Authority (BARDA)	Version of the common cold virus to deliver a coronavirus pathogen into cells to prompt the immune system	Phase I	U.S.
Pfizer	PFE	BionTech	mRNA	Phase I	U.S./Germany
Moderna	MRNA	National Institute of Allergy and Infectious Diseases (NIAID), Lanza Ltd.	mRNA	Phase II	U.S.
AstraZeneca PLC	AZN	Oxford University	Combination of a weaker version of the common cold virus with some genetic material from SARS-CoV-2 virus	Phase II	U.K.
GlaxoSmithKline	GSK	Sanofi (SNY)	Combination of a technology that produces S protein found in SARS-CoV-2 with an immunological agent	Phase I	U.K./France
CanSino Biologics	6185 (Hong Kong)	Precision NanoSystems	1) Adenovirus type-5 vectored Covid-19 vaccine, 2) mRNA	Phase I	China
Sinovac	[private]	Dynavax (DVAX)	Combination of Sinovac's chemically inactivated SARS-CoV-2 vaccine candidate, with Dynavax's immunological agent	Phase I	China/U.S.
Novavax	NVAX	NA	Combination of S protein found in SARS-CoV-2 with the company's proprietary nanoparticle technology	Phase I	U.S.

Source: CFRA.

The Challenge: Development of a COVID-19 vaccine to beat the pandemic



How did Pfizer win this race?



Albert Bourla, Pfizer, CEO - a leading inspiration

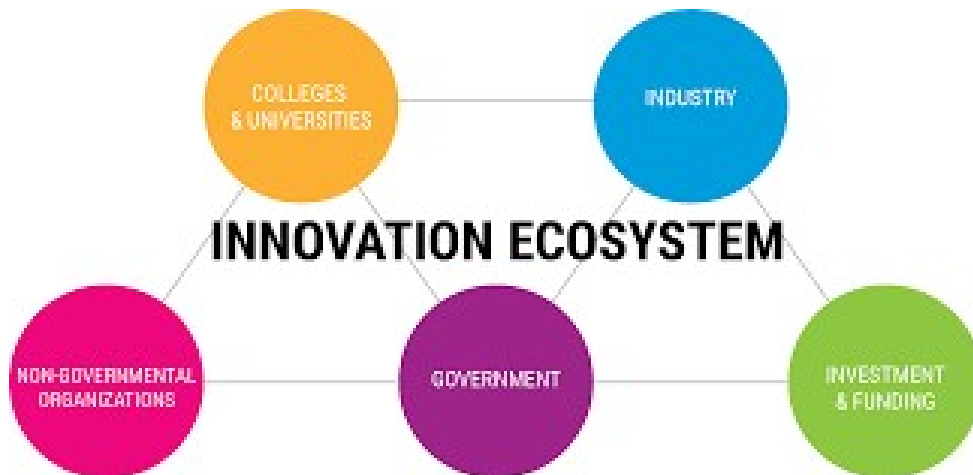
- ❖ March 2020: Albert Bourla, CEO of Pfizer expresses the urgent need to develop a COVID-19 vaccine on a WebEx video call to global leaders of vaccine and manufacturing research

*“Think that we will do things **in parallel, not sequential**. Think you need to build manufacturing of a vaccine, before you know what’s working.”*

- ❖ *“Shoot for the moon”* goal: deliver millions of doses to the most vulnerable populations by the end of the year

Global collaboration for one cause: vaccine development

“With 1,000 people dying every day in the U.S., there’s no time to lose”
–Albert Bourla



Scientists begin working at unprecedented speeds and with levels of global collaboration in all spheres to address the pandemic

The true spirit of collaboration

And everyone has a goal to which he turns his whole attention, then vie with one another in good works (2:149)

“For him who adopts a path seeking knowledge, Allah eases the way to paradise and angels spread their wings for a seeker of knowledge, being pleased with his occupation, and all that are in the heavens and the earth, including the fish in water, ask for forgiveness for a learned one” (Holy Prophet Muhammad^{sa})



Turkish-German Muslim immigrant husband and wife, founders of BioNTech, partner with Pfizer at a similar time in Germany



Drs. Ugur Sahin and Oslem Tureci founders of BioNTech



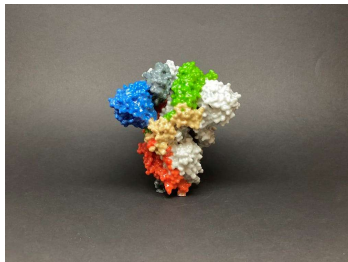
- Dr. Ugur Sahin to board members of BioNTech:

“It is wrong to believe that the virus will just come and go as easily as MERS & SARS. This time it is different”

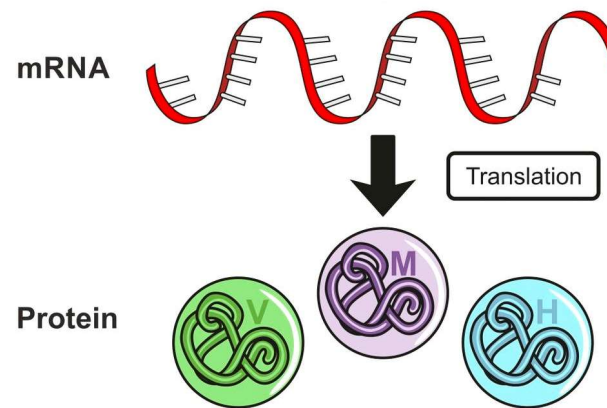
“Coming from China it is soon going to be a pandemic”

mRNA Vaccines: A Faster Formula

- The viral genetic code was published by China in early January 2020
- A crash project to launch a vaccine from RNA sequences using the genetic code was made
- These RNA sequences could cause human cells to make versions of coronavirus spike proteins
- ...then he called Kathrin Jansen of Pfizer



The mRNA vaccine targets and encodes the RBD of the spike



Kathrin Jansen Led Pfizer's Race to COVID-19 Vaccine



*Dr. Kathrin Jansen - Senior Vice President
and Head of Vaccines R&D Pfizer*

Pfizer-BioNTech Alliance

A new type of vaccine using mRNA could help defeat COVID-19 – science and industry intertwine together

- Pfizer brings its enormous, manufacturing, regulatory and research capabilities
- BioNTech brings the basic science (mRNA vaccine candidates)

March 2020

BioNTech and Pfizer had an existing collaboration working on mRNA technology for influenza virus

Kathrin Jansen: A Vaccine Leader among *Nature's* Top 10 who Shaped Science in 2020

"I took it very personally, wanted to fight it down"
- Dr. Kathrin Jansen

- mRNA- best bet to develop a Covid 19 vaccine
- Managed a team of 650 scientists on Zoom calls mostly from her NYC apartment



Another Frontrunner in the Race

- Moderna - NIAID (National Institute of Allergy and Infectious diseases) partnership
- First to dose in human volunteers



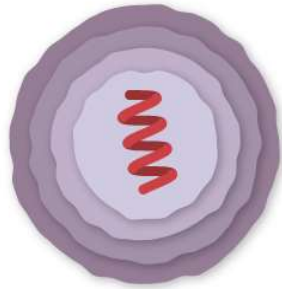
“The trial was launched at record speed”

- Dr. Anthony Fauci, Director of NIAID and Chief Medical Advisor to President Biden



Why does the Pfizer vaccine need extreme cold storage?

mRNA is packaged inside an oily shell



lipid nanoparticles
surrounding an mRNA molecule



A Pfizer "freezer farm" - a football field-size facility for storing finished COVID-19 vaccines, was under construction in Kalamazoo, Michigan

“The Ice Man”: Keeping the Vaccine Cold

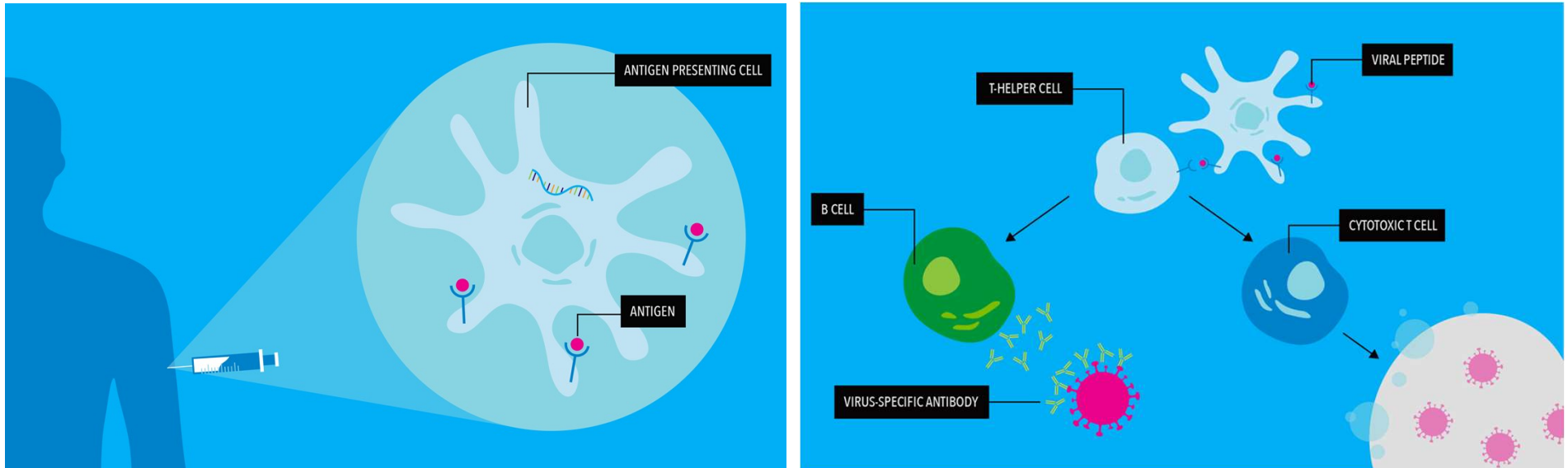


James Jean - Director Global Temperature Control

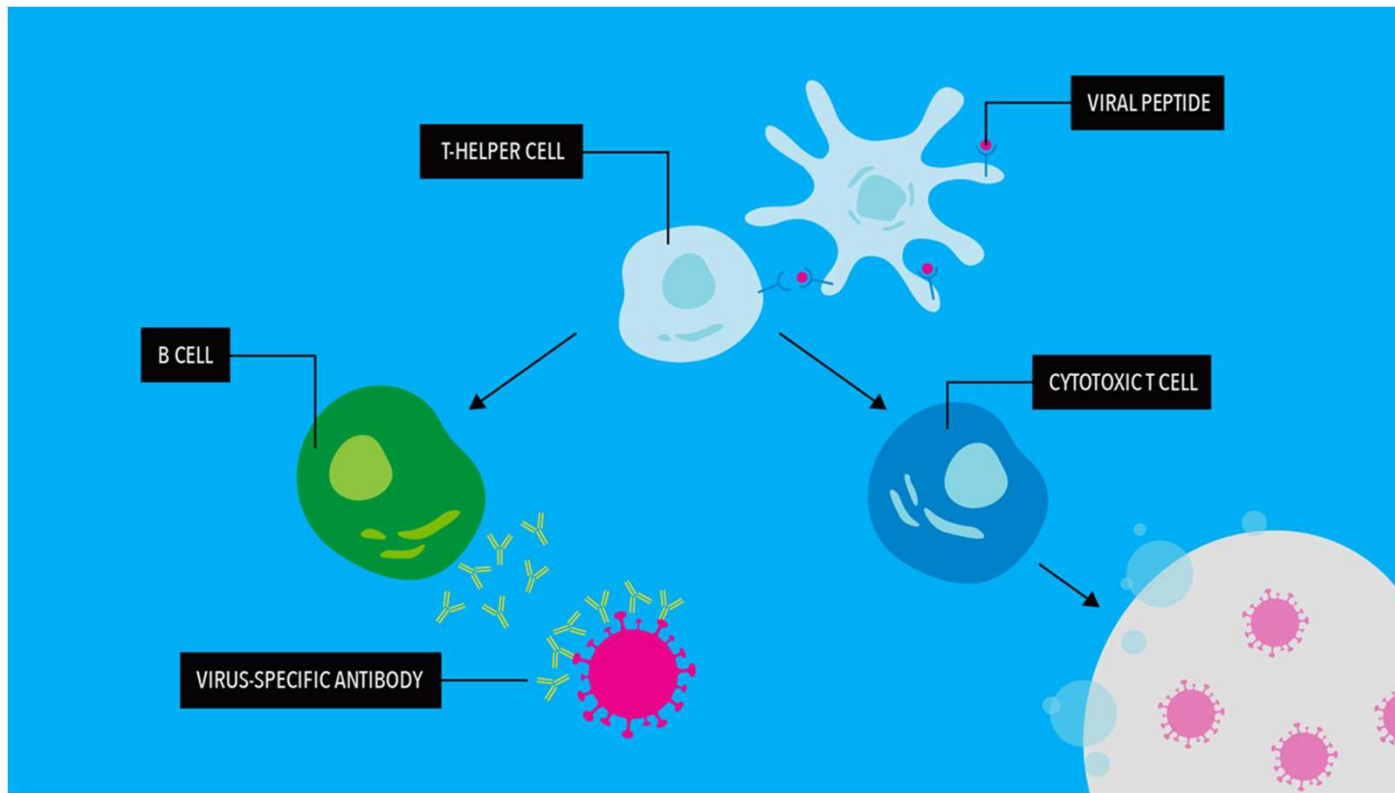


“James says he and his colleagues have worked around the clock as they recognize the urgency at hand”

How the Pfizer-BioNTech Vaccine Candidate Works



Persistence of Memory



Memory immune cells provide longer term protection from SARS- CoV-2

Going beyond the Lab: Dosing in Human Volunteers



- On the first Monday of May, Pfizer dosed the first American volunteers in Baltimore with its investigational COVID-19 vaccine
- Multiple vaccine candidates tested in parallel

“What it takes years to accomplish was done in weeks”

-Albert Bourla, Pfizer CEO



Testing Immunogenicity & Safety of BNT162 (COVID-19 vaccine candidate) in Phase I/II Clinical Trials

“The breakthrough we have been hoping for”

Months of hard work saw light at the end of tunnel

- Pfizer BioNTech vaccine offers strong protection
- This protection was seen at 10 days after the first dose, regardless of volunteer's race, weight or age



Promising Results of Single Phase I Clinical Trial Enable Seamless Movement into the Next

Larger cohorts selected

- Phase I/II clinical trial data demonstrated strong immunogenicity, safety and optimal dose in young and older adults, in a single continuous study
- On July 27, Pfizer and BioNTech announced advancement of the BNT162 2b2 vaccine candidate into a Phase II/III study
- Study enrolls 30,000 human participants to determine whether the vaccine is safe and effective

“We will never sacrifice safety for speed”

-Mace Rothenburg (Pfizer Chief Medical Officer, 2020)

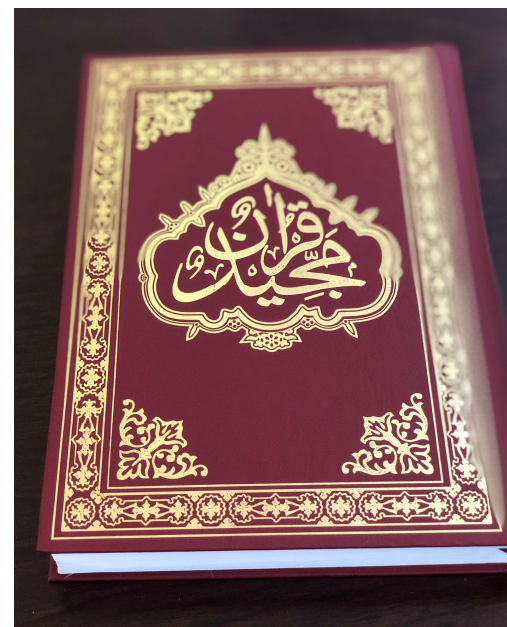
Plan for Success: Scaling and Manufacturing of Vaccine Performed in Parallel with Clinical Trials

- mRNA is a new mechanism for vaccine creation that requires rapid development and scale up of novel technologies
- Pfizer's capabilities of working at unprecedented speeds to develop, test and manufacture a COVID-19 vaccine make it well poised for success



Allah Rewards those who Strive in a Noble Path

- And that his striving shall soon be seen (53:41)
- Then will he be rewarded for it with the fullest reward. (53:42)



How close are Pfizer-BioNTech to the Finish Line?



November 9, 2020: *Pfizer's clinical trial data shows vaccine is 95% effective in trial volunteers with no serious side effects*

“Pfizer wins the global race to the vaccine”



A vaccine in just 248 days!
December 08, 2020

Global Distribution of Vaccine Brings Hope to Humanity



Pfizer global supply and manufacturing site in Michigan



December 13, 2020

What does this mean for Ahmadi Muslim Scientists?

Key Message from Hadhrat Khalifatul Masih V (may Allah strengthen his hands)

- *“As scientists and researchers, it is up to you to exercise your minds and talents to seek out ways and methods to accomplish great feats of learning.*
- *May we soon come to witness the dawn of a new Islamic Golden age of intellectual progress and advancement led by Ahmadi Muslims across the world - Ameen”*

AMRA Conference UK December 2019

