PROJECT DOLLY

COVID-19 VACCINES

A TALE OF TWO COMPANIES

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How a David vs Goliath tale unfolded as Moderna and Pfizer raced to make the first Covid Vaccine

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Setting the Stage

COVID-19, caused by the novel coronavirus SARS-CoV-2, emerged in late 2019 and rapidly transformed the world.

Outset of the Virus

Discovered in Wuhan, China, in December 2019, by that spring—just a few months later—the world went into lockdown as an unprecedented pandemic changed the face of everyday life, the economy, and medicine as we know it . Because the coronavirus propagated through respiratory droplets, it was simple to contract and difficult to regulate. Thus, many governmental policies were instituted to control the spread, including weeks of lockdown, travel restrictions, and social distancing.

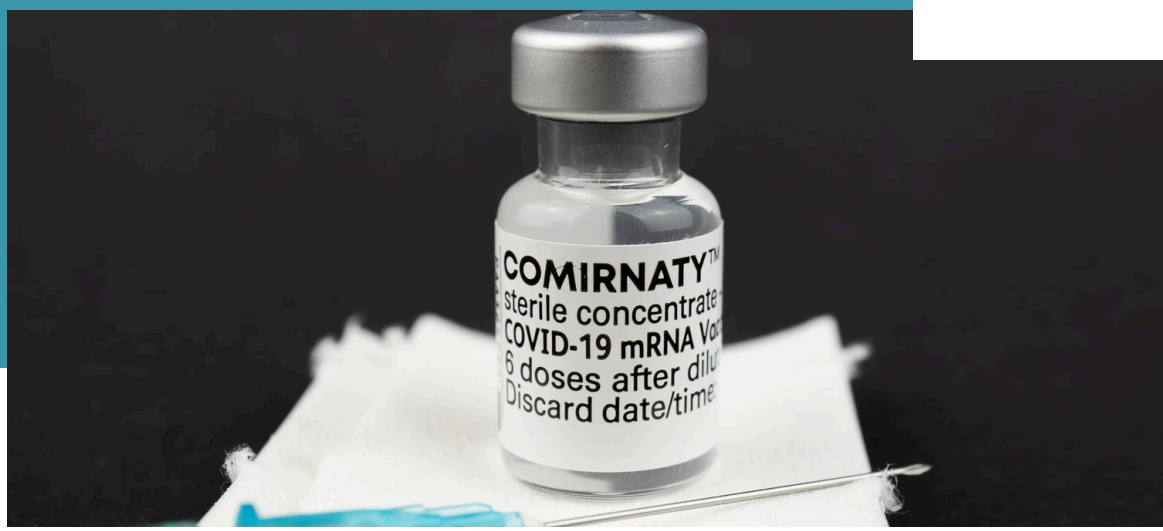
600 MILLION CONFIRMED CASES

6 MILLION CONFIRMED DEATHS

16 TRILLION USD LOST

World Health Organization (WHO)
National Library of Medicine

> *I can't even imagine not being able to hold my loved one. Nobody wants to die alone. It's awful for the patient. It's awful for the family.*
>
> Nadine Kaslow



David and Goliath

In the scramble to develop a vaccine, two distinct players emerged: Pfizer/BioNTech and Moderna. Although both harnessed messenger RNA (mRNA) technology, their path showed different strategies and backgrounds.

Pfizer's Global Reach

In April 2020, Pfizer, a well-established pharmaceutical corporation, partnered with BioNTech, a German biotechnology firm specializing in immunotherapies, to develop a COVID-19 vaccine. This collaboration combined Pfizer's resources and manufacturing capabilities with BioNTech's innovative mRNA research.

BioNTech's Role in mRNA Advancement

BioNTech had been researching mRNA technology for years, particularly in the realm of cancer immunotherapy. This knowledge allowed the team to pivot towards vaccine development when the COVID-19 pandemic began. Their ability to rapidly design and test mRNA sequences allowed Pfizer/BioNTech to be one of the first teams to enter clinical trials, ultimately leading to the first emergency use authorization for an mRNA-based COVID-19 vaccine.

Moderna's Pioneering Approach

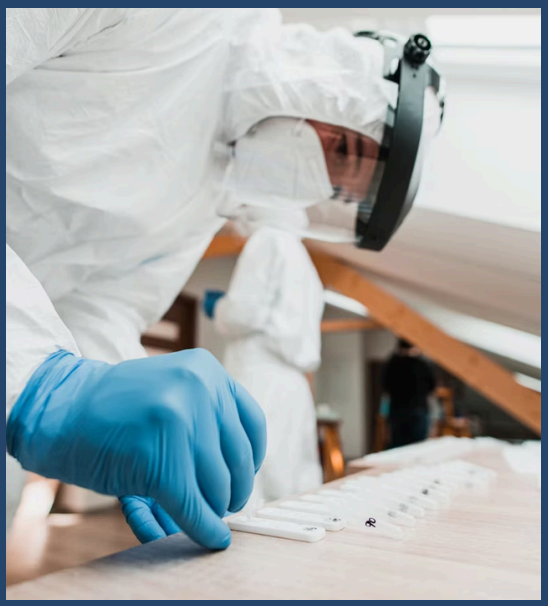
Moderna, a relatively young biotech company focused solely on mRNA technology, initiated its COVID-19 vaccine development in January 2020. By March 2020, Moderna had launched a Phase 1 clinical trial, marking the first human trial of a COVID-19 vaccine in the United States. The Moderna vaccine received EUA from the FDA on December 18, 2020, just one week after Pfizer/BioNTech's authorization.

Moderna's Storage and Distribution Edge

A key distinction between the Pfizer-BioNTech and Moderna COVID-19 vaccines lies in their storage requirements. The Pfizer-BioNTech vaccine necessitates ultra-cold storage between -90°C and -60°C posing logistical challenges, especially in low-resource settings. In contrast, Moderna's vaccine remains stable at -20°C making it easier to distribute, particularly in rural or underdeveloped areas.

The Race for Commercial use

The race to secure commercial approval for a COVID-19 vaccine was an extraordinary example of scientific innovation, global collaboration, and regulatory efficiency. Historically, vaccine development takes **five to ten years**, involving extensive laboratory research, preclinical testing, multiple phases of clinical trials, and regulatory reviews. However, faced with an unprecedented public health emergency, the scientific community compressed this timeline into just under **one year**.



Early Genome Sequencing

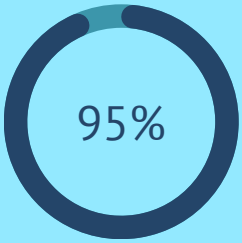
A major factor the rapid approval was the sequencing of the SARS-CoV-2 genome. Researchers were able to identify and target the virus's spike protein (it's method of entry) early on in the pandemic.

Different Method of Vaccination

Unlike traditional vaccines that introduce weakened or inactivated pathogens, mRNA vaccines use messenger RNA to instruct cells to produce a specific viral protein, which then stimulates an immune response.

Regulatory and Approval Milestones

Regulatory agencies, including the FDA, the EMA, and the WHO, played a pivotal role in expediting vaccine approval through Emergency Use Authorization. Coordinating massive funding programmes to support the development of these vaccines.



Efficacy in preventing COVID

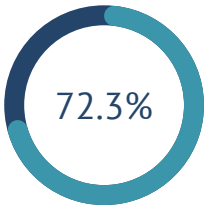
In December of 2020, both Moderna's and Pfizer/Biotech's vaccines tested 95% Efficacy in preventing covid in Phase 3 Clinical Trials. Leading to approval for EMA in many countries.

Who won?

In trying to evaluate the performance of the Pfizer/BioNTech and Moderna mRNA COVID-19 vaccines, several key indicators highlight their respective strengths and contributions to the global vaccination effort.

Global Reach - Pfizer/BioNTech

Pfizer/BioNTech's vaccine had a broader global reach due to Pfizer's well-established logistics and expansive pharmaceutical network. Their vaccine received regulatory approval in more developed and major markets. This connection allowed Pfizer to dominate in developed regions

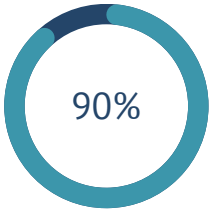


Percentage of People Vaccinated

As of March 13 2023

Storage Advantage - Moderna

Moderna, while a smaller company compared to Pfizer, had the advantage of their innovating technology. The company's mRNA-focused strategy allowed it to rapidly scale up its supply. Additionally, Moderna's vaccine was more practical for areas where ultra-cold storage was challenging, as it remained stable at −20°C compared to Pfizer's −70°C.



Efficacy in preventing Hospitalization

As Per the CDC

Efficacy

Both vaccines demonstrated high efficacy rates in preventing symptomatic COVID-19, with Pfizer/BioNTech's trial results showing approximately 95% efficacy and Moderna's showing 94.1%.

Lasting Impact

Pfizer/BioNTech's and Moderna's success proved the viability of mRNA technology, paving the way for future vaccines targeting other infectious diseases and even potential cancer treatments. Additionally, the accelerated development and approval process set a new precedent for regulatory agencies, changing how future vaccines and therapeutics will be evaluated.

13.64 Billion

Total doses of the two Vaccines

5.37 Billion

People with at least one dose of the Vaccine

19.8 Million

Lives potentially saved due to the vaccine

Lasting Impact on the world

What are the boundaries of scientific accomplishment? The COVID-19 vaccine race forever changed the nature of important international boundaries and the ethics of public health and scientific endeavor. It seems that when enough resources and global teamwork are leveraged, there's nothing humanity can't do and no previously established boundaries that cannot be crossed.

> *It always seems impossible until it's done.*
> ***-Nelson Mandela***

Precedents set

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A major transformation has been the breakthrough of mRNA technology. Originally a novel approach in the field of immunology, mRNA vaccines have now proven their versatility and efficacy against a global pandemic. Beyond their immediate impact, these vaccines hold promise for facing a multitude of future threats. From influenza to even potential future Cancer treatments.

02.

The success of these vaccines was made possible by the cooperation between governments, companies, and non-governmental organizations. These organizations worked together in a time of strife to bring this vaccine to life. Flexible regulations and collaborative efforts provided the necessary environment for development and distribution, while massive economic investments provided the backbone for research

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In the end, COVID-19's vaccine will be a once-in-a-lifetime experience and a possibility of what people can achieve when they put their minds together. The lessons learned from vaccine creation will include a need for swift action, an appreciation of regulatory bodies, a global effort for protection. Humanity banded together in a dark time , and if we've done it once, we can do it again to create a better, healthier, and safer world.