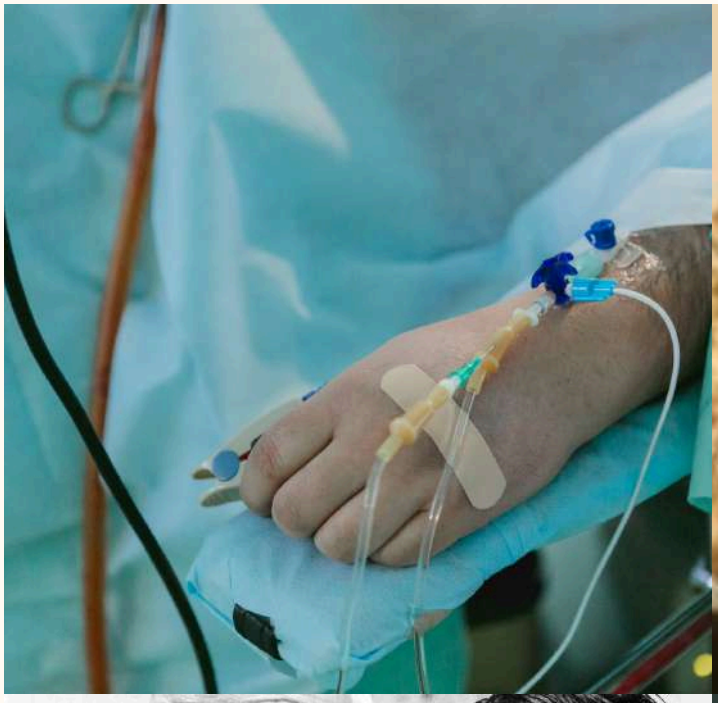
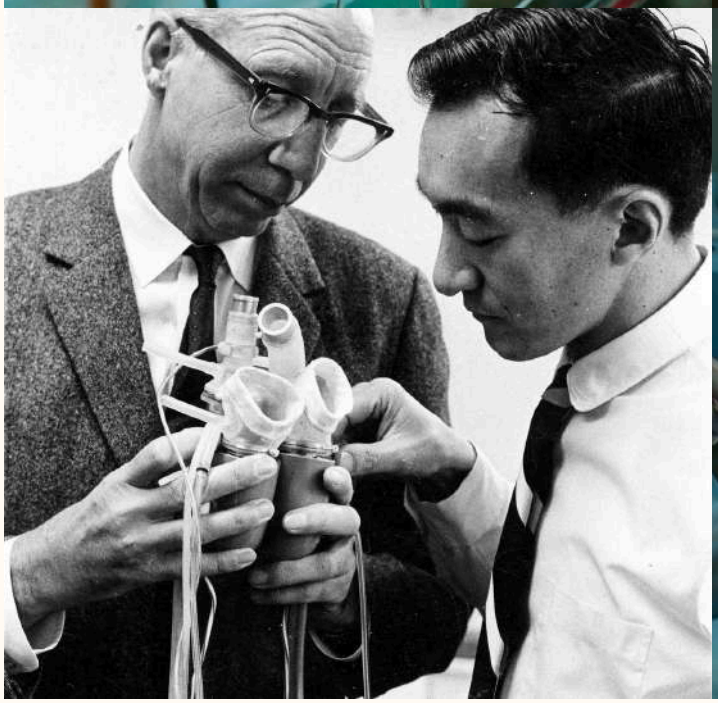
Project Dolly





Erwin Wang

Compendium

An E-book containing all our deep dives

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PROJECT DOLLY

COVID-19 VACCINES

A TALE OF TWO COMPANIES

JANURARY 2025

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

Prepared By:
Erwin Wang

www.project-dolly.com

Setting the Stage

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

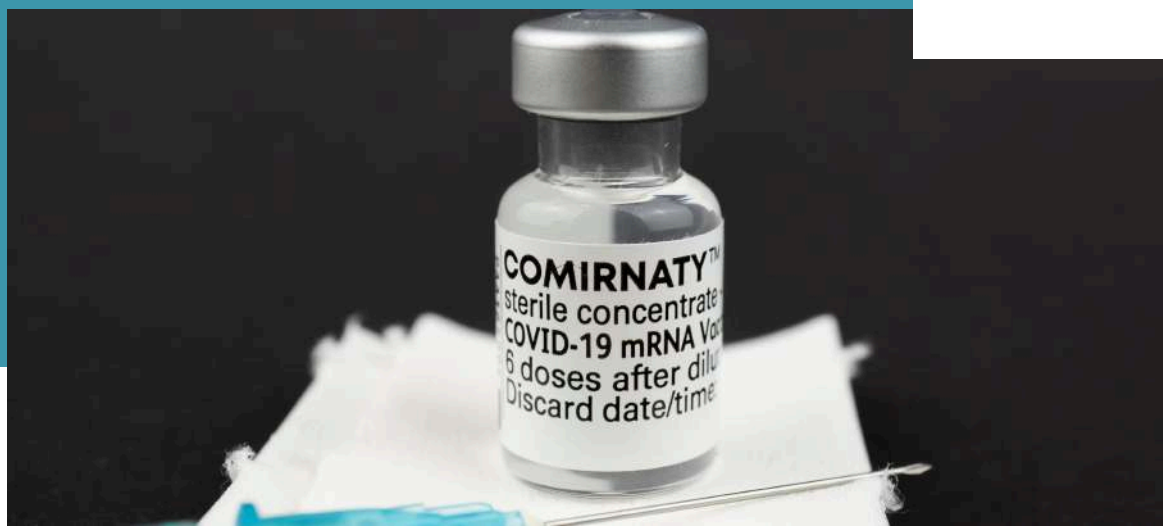
Outset of the Virus

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	6	16
MILLION CONFIRMED CASES	MILLION CONFIRMED DEATHS	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

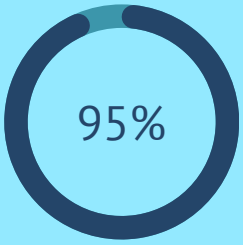
A major factor the rapid approval was the sequencing of the SARS-CoV-2 genome. Researchers were able to identify and target the virus's spike protein (it's method of entry) early on in the pandemic.

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

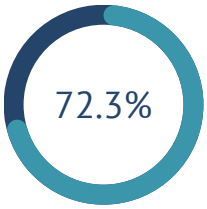
In December of 2020, both Moderna's and Pfizer/Biotech's vaccines tested 95% Efficacy in preventing covid in Phase 3 Clinical Trials. Leading to approval for EMA in many countries.

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

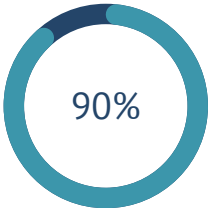


Percentage of People Vaccinated

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

01.

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

03.

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.

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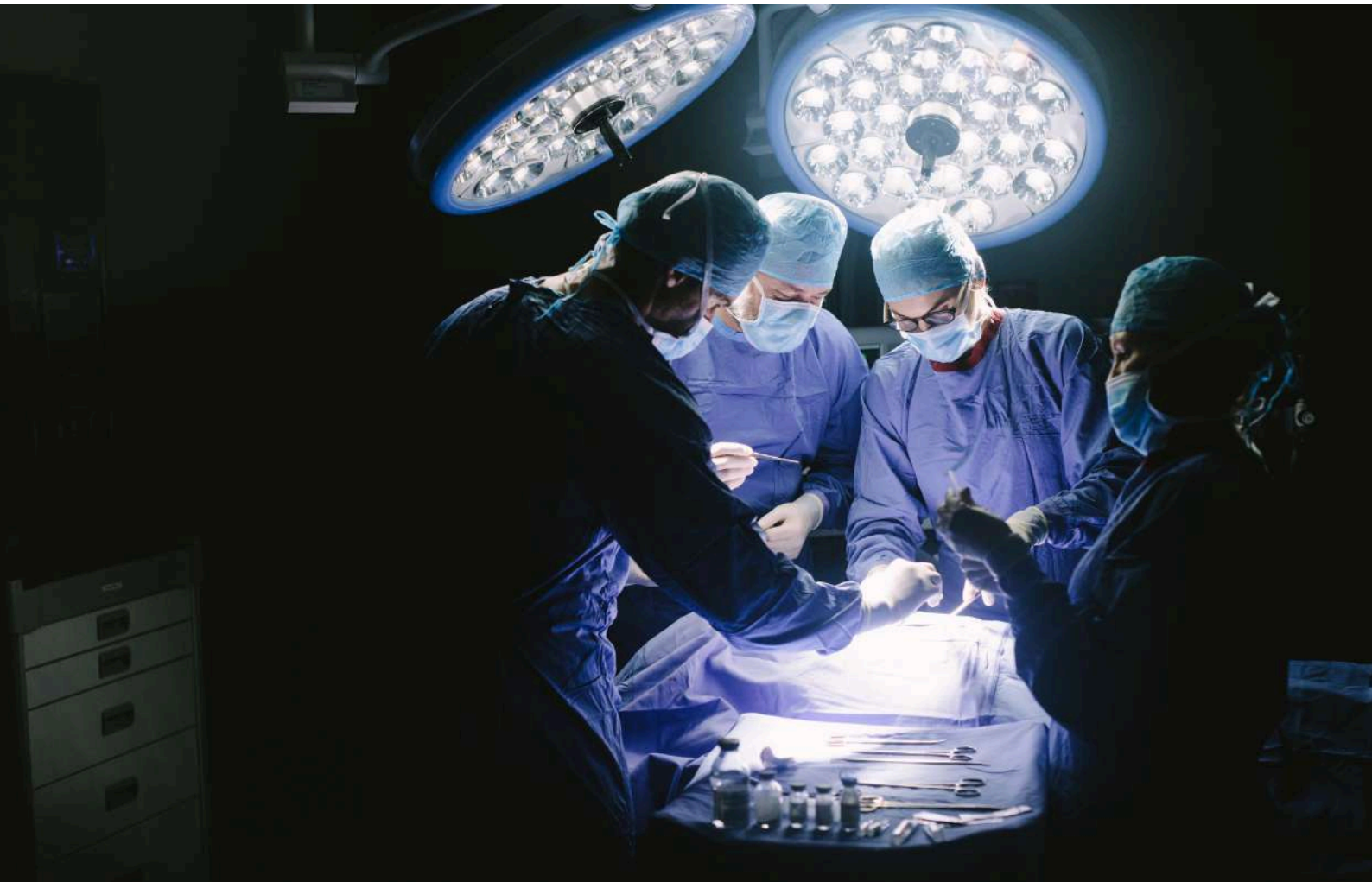
Plastic Surgery South Korea

THE GREY AREA



Tradition and Innovation

Korean culture has historically advocated for physiognomy; the notion that faces suggest personality and fate. This belief, which dates back centuries, established early notions that beauty was not merely skin deep but intrinsically linked to one's fate. Over time, Confucian ideals, emphasizing conformity and collectivism, reinforced a cultural expectation for uniformity in appearance. In such an environment, subtle facial modifications (bleaching, skincare, and other methods) were seen as a way to align with these ideals.

Bioengineering in South Korea is championed not merely as a way to ensure proper medical choices, but also as a state enterprise for national advancement and global supremacy. Consequently, South Korean policymakers predict that the advancement in biotechnical fields and related industries will position the nation to shift from a production and export-based economy to a high-tech creative economy.

This state-led drive for innovation has resonated strongly with the people. In everyday life, high technology in aesthetics is visible in the rapid proliferation of advanced cosmetic procedures and skincare treatments. Citizens, who take pride in Korea's image as a cutting-edge center for both beauty and biomedicine.

Ethical Concerns

Health concerns exist with plastic surgery. There are risks of infection, scarring, nerve damage, and anesthesia reactions. Many plastic surgery operations also require follow-up visits to assess whether the procedure worked and to prevent additional medical complications. While many surgical procedures have been professionally vetted over the years to make them safer, these aspects are important considerations for anyone who may be considering going under the knife.

Furthermore, there's an ethical concern about increasingly natural bodies. With so many celebrities and social media, the expansion of unrealistic expectations of beauty infiltrating society raises concern about those who might want to change their bodies for a particular popularity factor over the acknowledgment of the natural beauty of diversity. It's an ethical concern when people, especially young people, start believing surgery is a standard requirement to feel and look good and not understand how successful they already are with their naturally diverse bodies.

Finally, plastic surgery is an ethical concern psychologically. For example, those with body dysmorphia who seek surgical intervention to fix what they believe is such a flaw may be even more disappointed with the results. When plastic surgery fails to meet the expectations of what's desired, it creates more rifts in self-esteem, or people go back for more surgeries to get it "right" the next time. Thus, when plastic surgery fails to please, it only heightens insecurities instead of relieving them.

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So?

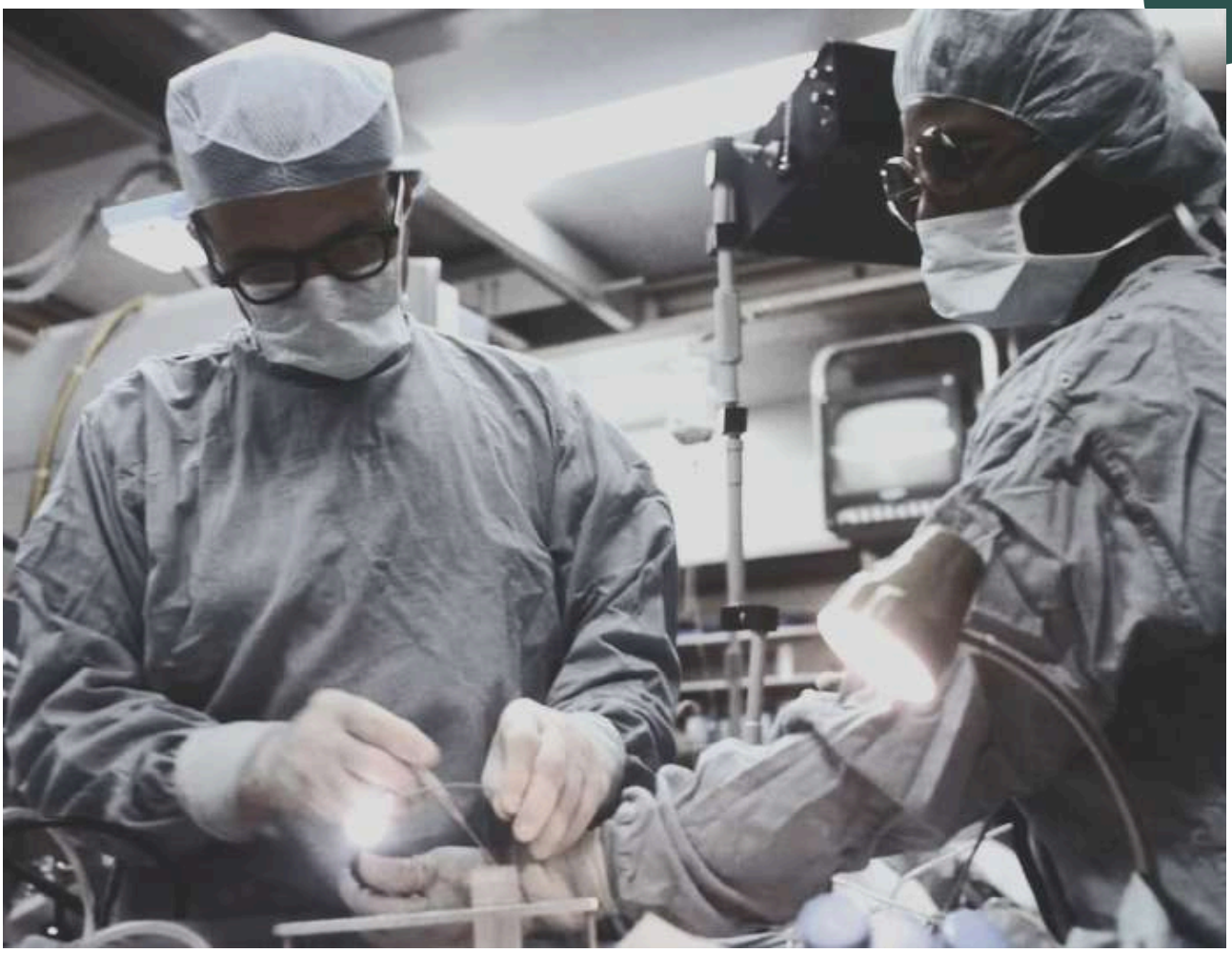
Plastic surgery in South Korea is an example of social awareness, human decision, and technological advancement at play. Although surgery comes with risks, the chance to gain socioeconomic advantages through a more "attractive" face has generated the social expectation that surgery is inevitable. Of course, this trend is not limited to South Korea; instead, it shows a global appeal to human evolution. Yet when assessing bioethical considerations, answers are not simply black and white. With technology consistently advancing and extending potentialities for physical and genetic alteration, advances complicate assessments of universal advantage, idealistic expectations, and personal agency. Ideally, ethics should ground technology in a reality check; unfortunately, they often emerge frantically and exponentially before any ethical considerations, which situates a gap that complicates socio-cultural advancement.

Project Dolly/ The Grey Area

Gut Wrenching

When Olympus' Duendoscopes caused a
SUPERBUG OUTBREAK

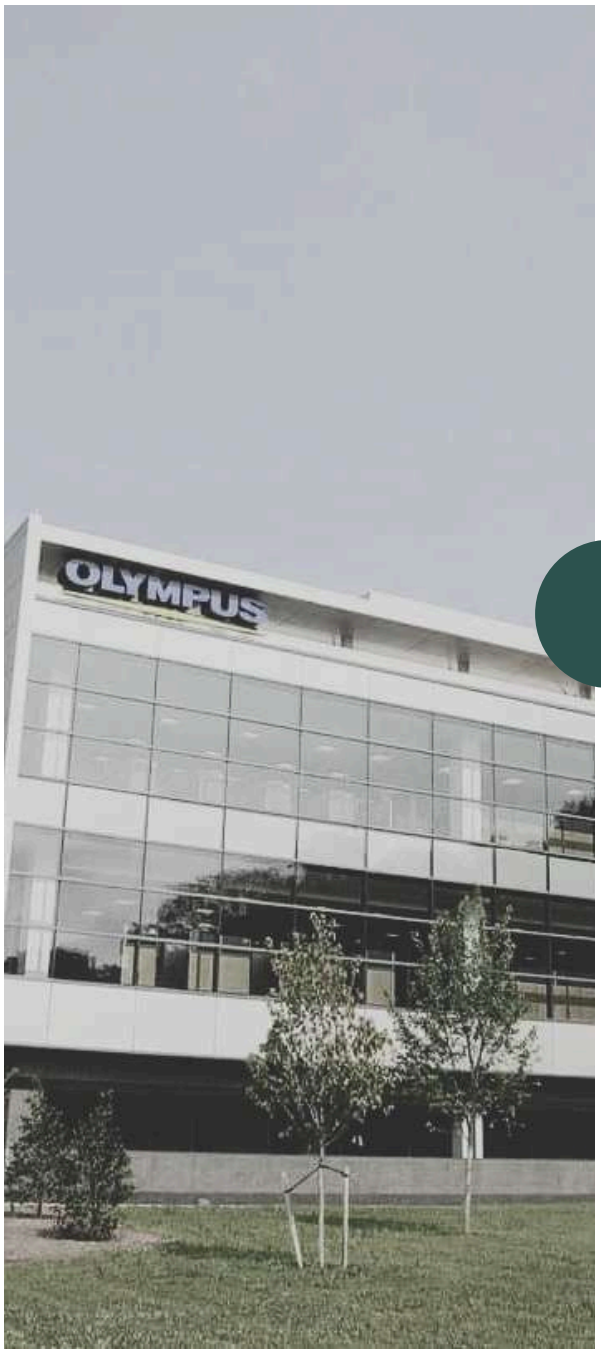
Intro - What are Endoscopes? What is Olympus?



Endoscopes are flexible, camera-equipped tubes that allow doctors to examine inside the body without open surgery. They are used in many medical fields to diagnose and treat conditions minimally invasively.

A duodenoscope is a specialized endoscope designed to access the top of the small intestine (duodenum) during a procedure called ERCP (Endoscopic Retrograde Cholangiopancreatography)

ERCP duodenoscopes enable doctors to treat problems in bile ducts and the pancreas through the digestive tract. These devices are crucial tools – over **500,000** ERCP procedures are performed each year in the U.S. using duodenoscopes

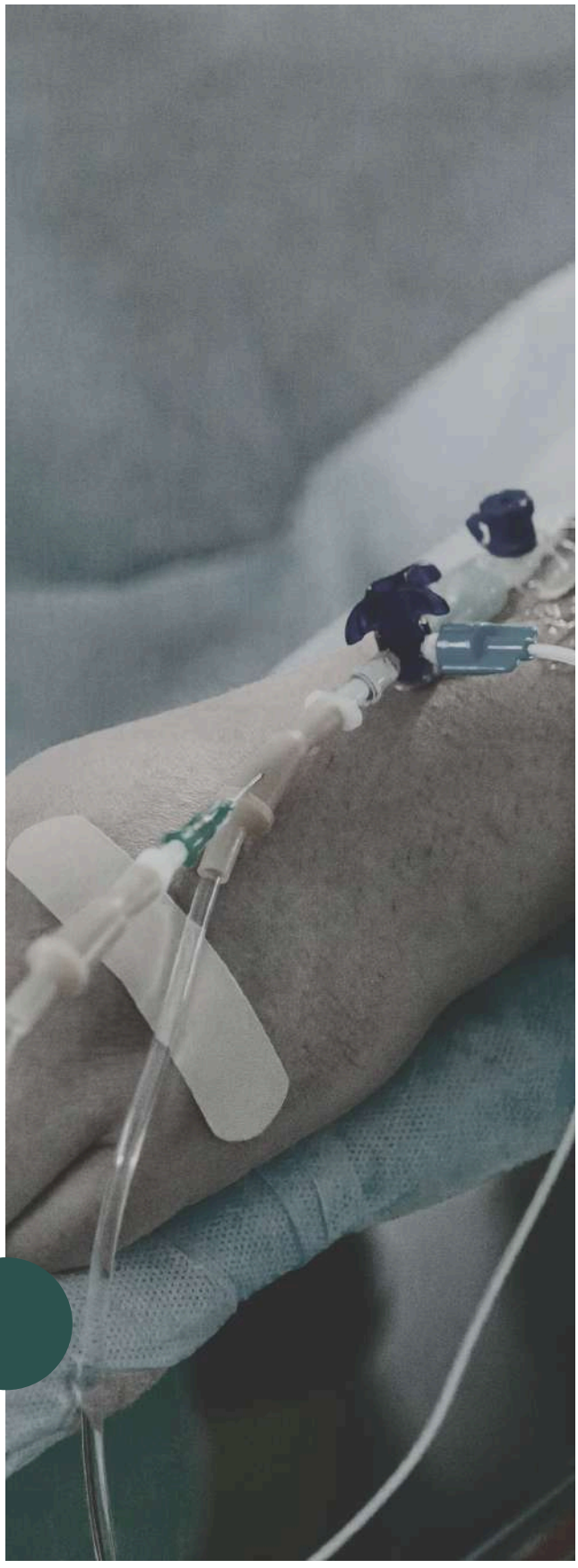


Olympus Corporation (founded 1919 inJapan) is a dominant manufacturer of medical endoscopes. The company holds roughly 70% of the global endoscope market and an estimated 85% share of duodenoscopes used in the United States. Olympus pioneered early flexible endoscope technology and has supplied gastrointestinal endoscopes for over 50 years. Its long history and large market presence mean that Olympus endoscopes are found in hospitals worldwide. The Olympus brand became nearly synonymous with endoscopy equipment – setting the “gold standard” for performance and widely trusted by physicians.

Problem - Superbug

Between 2012 and 2015, a series of "superbug" outbreaks in hospitals were traced to contaminated Olympus duodenoscopes. These outbreaks involved dangerous multidrug-resistant bacteria (such as CRE – Carbapenem-resistant Enterobacteriaceae) being passed from patient to patient via scopes that were supposed to be sterilized. Investigations eventually identified at least 25 outbreak clusters worldwide, sickening over 250 patients in the U.S. and Europe.

Olympus's TJF-Q180V duodenoscope (the model implicated in many outbreaks) had a complex tip design that made it extremely difficult to disinfect. Duodenoscopes have a tiny moving part at the tip called a "forceps elevator" – used to maneuver instruments into ducts. In the Olympus design, this elevator mechanism was housed in a sealed channel intended to keep out debris. In practice, the sealed distal tip created microscopic crevices where tissue and fluids could get trapped.



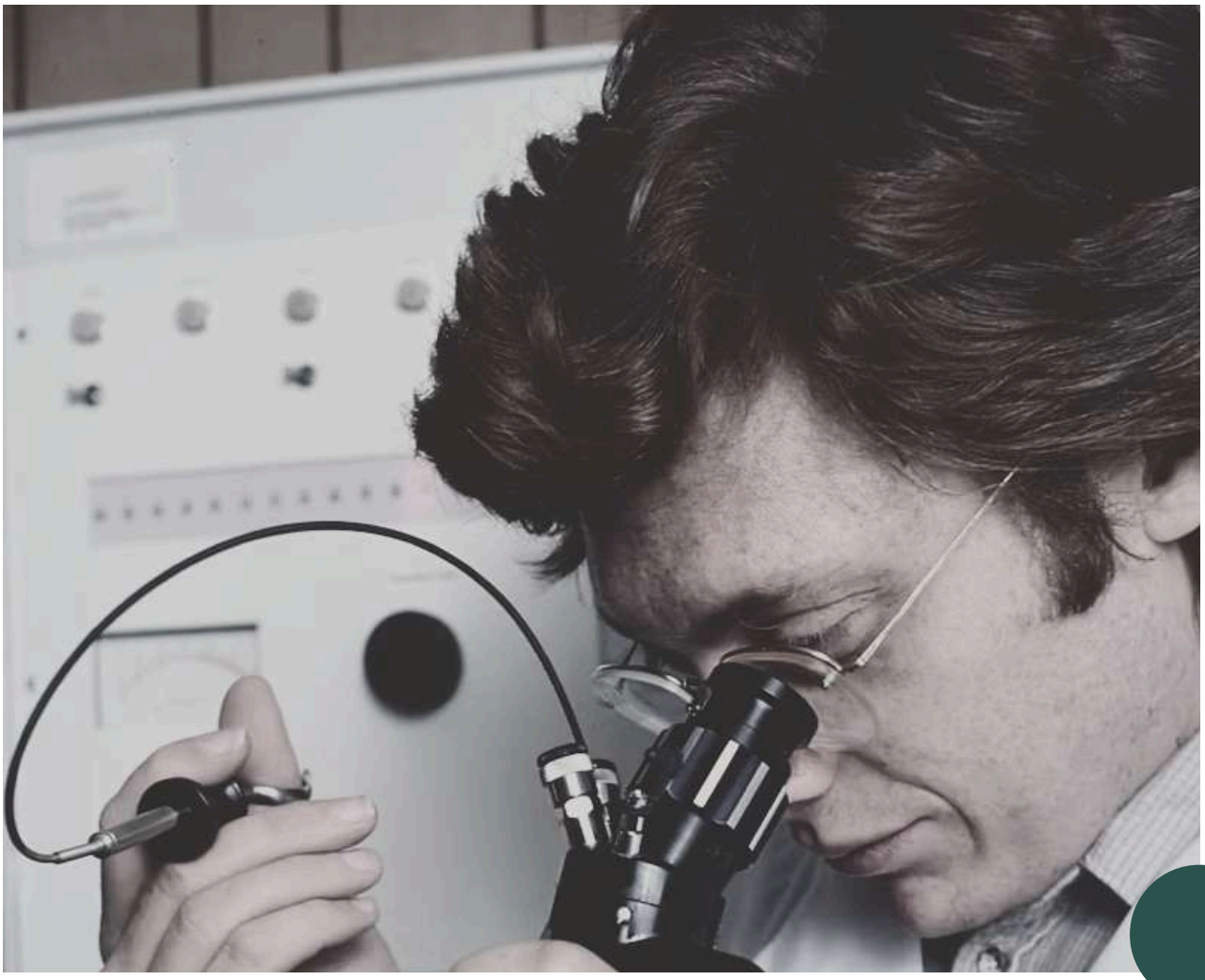
Even after standard cleaning and high-level disinfection, some bacteria remained lodged in the scope's recesses . Essentially, the design flaw allowed a "wicking effect" – contaminated matter could hide behind the sealed elevator and then spread to the next patient. It later emerged that Olympus had introduced this closed-channel design without new FDA approval, assuming it was a minor modification.

As hospitals grappled with unexplained infections, U.S. authorities began investigating. In early 2015 (after the UCLA outbreak became public), the FDA issued safety warnings and interim guidelines urging hospitals to intensify duodenoscope disinfection procedures. A U.S. Senate investigation, led by Senator Patty Murray, released a scathing report in January 2016 – concluding that both Olympus and the FDA were too slow to protect patients.

Meanwhile, patients and families filed dozens of lawsuits accusing Olympus of negligence. Legal claims argued that Olympus knew or should have known about the cleaning deficiencies and did not warn hospitals that its recommended protocol was insufficient.

Olympus eventually faced multi-million dollar jury verdicts and settled numerous suits out of court. The "superbug" crisis not only damaged Olympus's reputation but also exposed gaps in medical device safety oversight.

Conclusion - Lessons Learnt



The international medical and regulatory landscape for medical devices and procedures changed after the duodenoscope contamination crisis. Moving forward, implementation would be focused on patient safety through device redesign and more stringent regulation. Manufacturers would make devices with simpler reprocessing and more disposable parts; regulators would relax ease of access to implementation for single-use devices while strengthening post-implementation requirements for studies to assess real-world effectiveness. Hospitals would reevaluate reprocessing techniques with additional microbial cultures, raising awareness, and requisite training for accountability. The endoscopic industry would realize the power of infection risks as a design feature; new best practices would be established to ensure that if something was supposed to work or help at such an invasive level, it could also be trusted for safety, changing how endoscopies are performed and evaluated worldwide in the future.

Finding Your Roots

Bio & Capitalism

How 23andme and Ancestry revolutionized Direct-to-Consumer Genetic Testing Analysis

01 Introduction

Direct-to-consumer (DTC) genetic testing refers to DNA tests sold directly to consumers without a healthcare intermediary, usually by mail-order kits. With a simple saliva sample, these services promise to reveal one's ancestry composition, genetic traits, and health risk markers. Over the past decade, DTC genetic testing has surged in popularity – by early 2019 more than 26 million people had taken an at-home DNA test, and by 2023 the largest provider (AncestryDNA) reported a database of over 25 million customers. This boom has made personal genomics a mainstream phenomenon, sparking curiosity about heritage and health in millions of households.

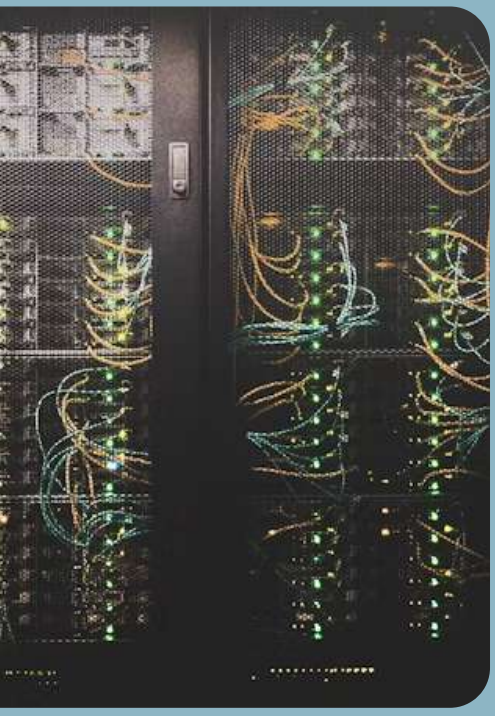
03 Benefits

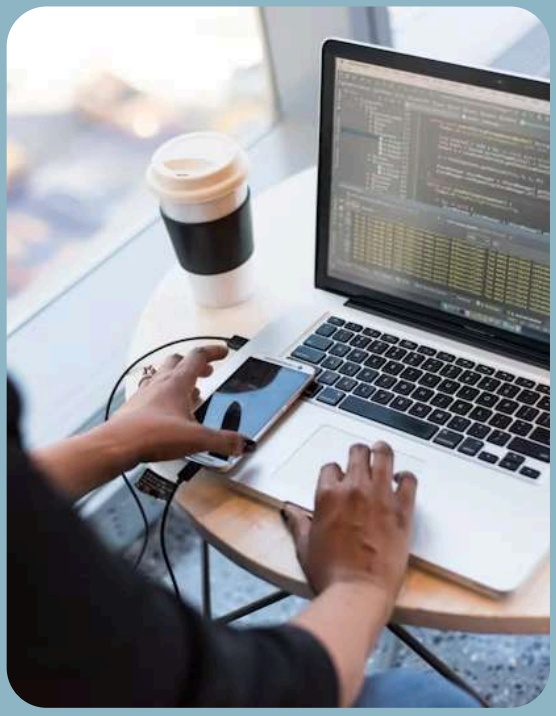
Direct-to-consumer genetic testing has made personal genomics widely accessible by offering affordable at-home saliva kits that bypass the need for a doctor's order. Users gain insights into health predispositions—like carrier status for hereditary conditions or pharmacogenomic traits—and detailed ancestry breakdowns that help them connect with genetic relatives and explore their heritage. Interactive online reports educate customers about DNA, inheritance, and risk factors, while many opt in to anonymous research, contributing data that accelerates genetic discoveries and drug development.

- *Health empowerment*
- *Genomics access*
- *Carrier detection*
- *DNA education*
- *Ancestry discovery*
- *Research participation*

05 Drawbacks

Yet this convenience comes with significant drawbacks. DNA databases have faced breaches and often share data with third parties—sometimes without clear consumer consent—raising privacy and security concerns. Health findings are probabilistic and limited to select variants, which can lead to misinterpretation, false reassurance, or undue anxiety without professional genetic counseling. The absence of mandatory pre- and post-test guidance leaves users to navigate complex results alone, and there's potential for genetic discrimination in insurance or employment. Ethical debates continue over who truly owns and profits from one's genetic data, underscoring the need for stronger protections, clearer regulations, and better consumer education.





06 Conclusion

Direct-to-consumer genetic testing has rapidly democratized access to personal genomics, allowing millions to explore their DNA from home. Users gain insights into health risks, carrier status, and ancestry breakdowns, fostering deeper connections with relatives and heritage. The convenience and affordability of at-home saliva kits, paired with interactive reports and optional research participation, have not only educated individuals about genetics but also fueled large-scale scientific studies. As a result, DTC testing has become embedded in everyday culture—spurring public engagement with personalized medicine and advancing genomic research.

However, this growth has revealed serious risks—data breaches and third-party sharing expose sensitive DNA, and probabilistic health results can be misread without expert guidance. Debates over data ownership, discrimination, and law-enforcement access underscore the need for stronger protections and clearer regulations. Moving forward, responsible stewardship and oversight will be essential to balance innovation with consumer safety.

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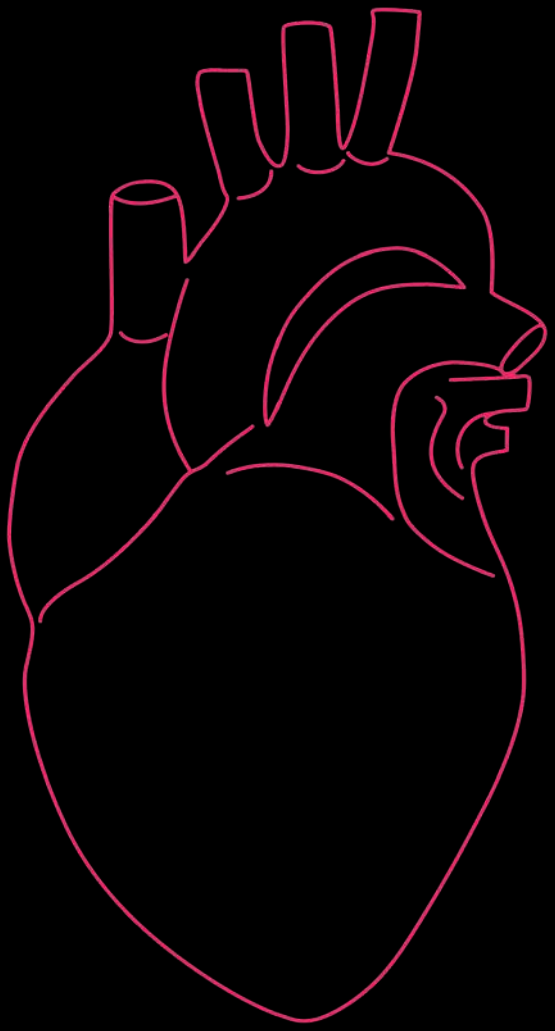
January 2025

THE BIRTH OF BIOENGINEERING THE ARTIFICIAL HEART

How Scientists in Utah cheated death for 112 days

Prepared by
Erwin Wang



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The need for an Artificial heart

01

Heartdisease is one of the leading causes of deathworldwide. According to the World Health Organization (WHO), cardiovascular diseases (CVDs) are responsible for approximately **1/3 of all deaths** in the world. https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds) In the United States alone, the CDC reports that nearly **697,000** people died from heart disease in **2020**, making it the leading cause of death all while the Coronavirus was going on.

Before Jarvik-7

- The situation was even worse when Dr. Willem Johan Kolff and Dr. Robert Jarvik first started their work. In the **1950s and 1960s**, treatment options were extremely limited, and nearly **50%** of heart failure patients died within five years of diagnosis.
- The shortage of donor hearts exacerbated the crisis. According to the United Network for Organ Sharing (UNOS), over **3,500** people are currently on the heart transplant waiting list intheU.S. alone. This shortagepushed scientiststo findan alternative

17.9 million

Deaths each year from Heart Disease

32%

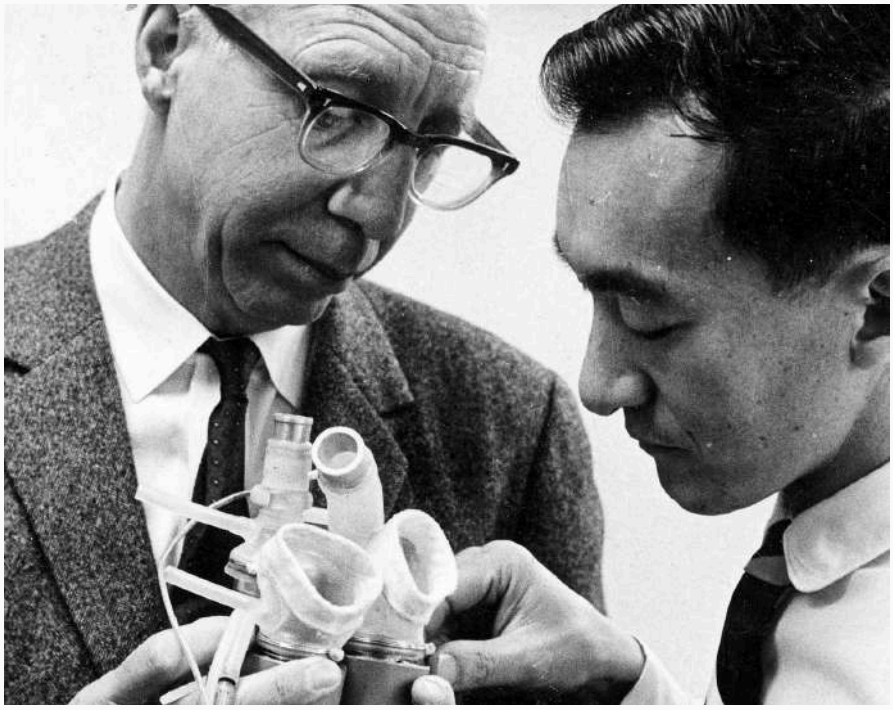
of all Global Deaths each year

The story of Johan Kloff and Jarvik-7

Dr. Willem Johan Kloff

HeadofInstitutefor Biomedical Engineering - University of Utah

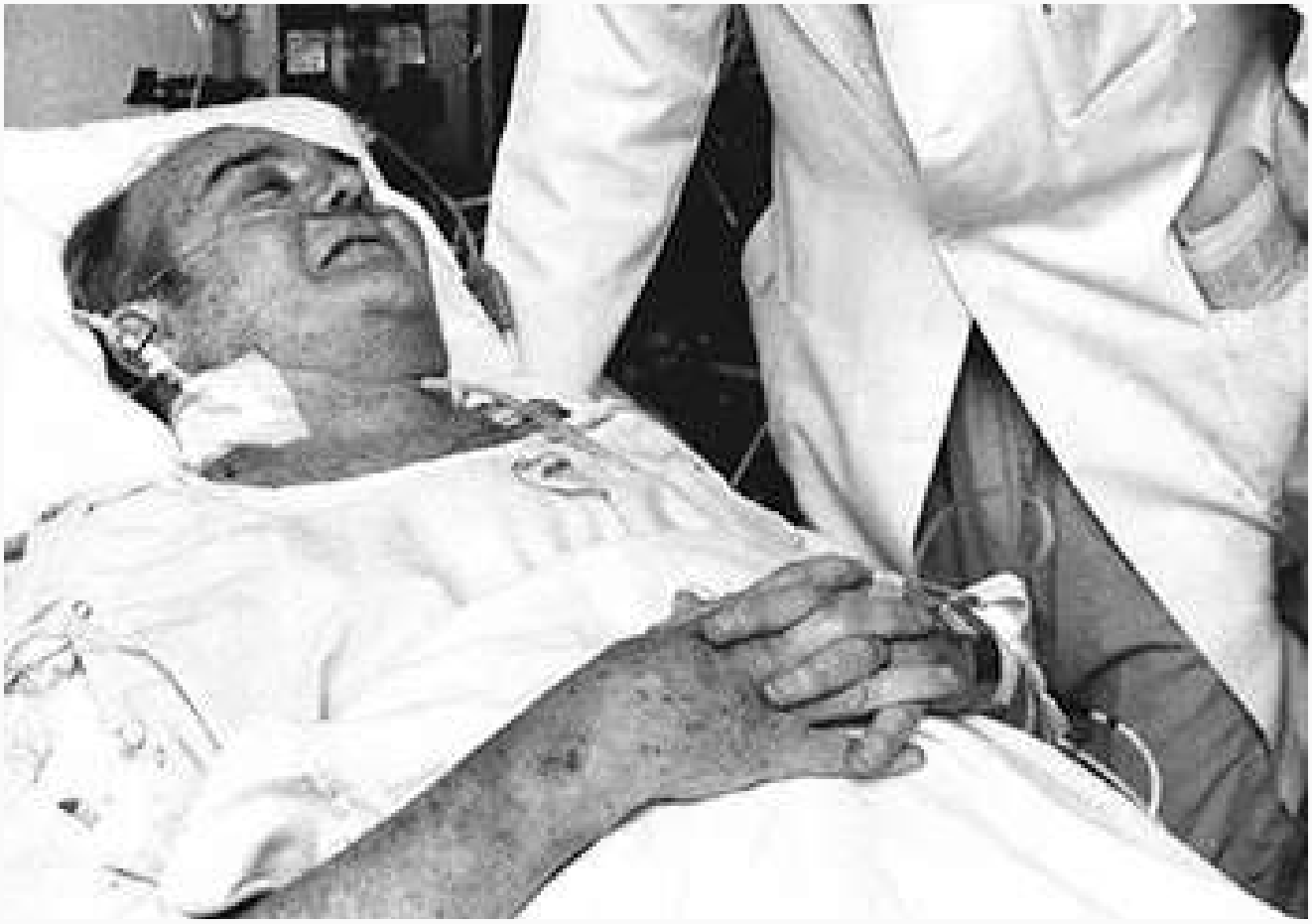
Dr. Willem Johan Kolff, a Dutch-American biomedical engineer, spearheaded the artificial heart project at the University of Utah. Kolff had previously created the first dialysis machine and brought his expertise to the challenge of creating a mechanical heart. In collaboration with Dr. Barney Clark, a retired dentist who became the first recipient of the artificial heart, the team worked on a device capable of replacing the function of a natural heart. https://pubmed.ncbi.nlm.nih.gov/6827145/



The Jarvik-7 Model

TheJarvik-7wasa pneumatically powered device made of plastic and metal, consisting of two pumps that replaced the heart's ventricles. The artificial heart was connected to an external air compressor, which controlled blood flow by pumping air into the chambers of the device. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5025644/

The First Implementation



Clark on the operating table

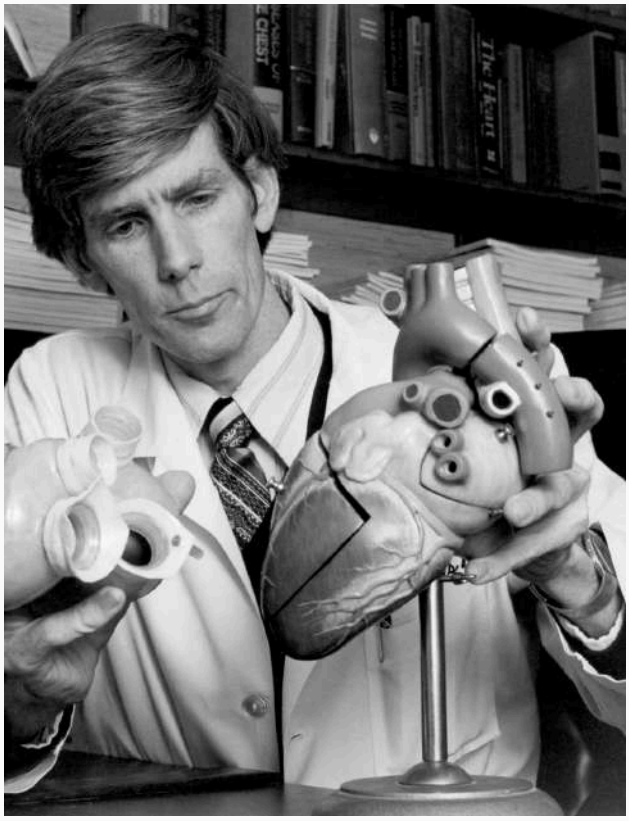
The Operation

On December 2, 1982, Dr. Barney Clark became the first human to receive a permanent artificial heart, known as the Jarvik-7, designed by Dr. Robert Jarvik and his team. The implantation took place at the University of Utah, led by Dr. Kolff and a team of cardiovascular surgeons. https://pubmed.ncbi.nlm.nih.gov/6827145/

The Outcome

Following the implantation, Barney Clark survived for **112 days**, defying expectations and proving that an artificial heart could sustain human life. During this period, he experienced numerous complications, including infections, strokes, and kidney failure. Despite these challenges, Clark's case demonstrated that mechanical hearts could be a viable bridge to transplant or even a long-term solution. https://www.nejm.org/doi/full/10.1056/NEJM198307073090102

Ethical and medical implications



Ethical Controversy

The procedure sparked a global debate about the ethics of using artificial organs to sustain life. Questions arose regarding the quality of life, patient autonomy, and the limits of medical intervention. Many people were wondering whether the Scientists in Utah were going too far. News reporters called the remaining life of Barney Clark “gruesome” and questioned whether the intention was to “save a life or to satisfy the surgeon’s interests”

Advances in Artificial heart Technology

Since the Jarvik-7, artificial heart technology has evolved significantly. Modern artificial hearts, such as the SynCardia Total Artificial Heart, are now used as temporary devices while patients await transplants. Innovations in miniaturization and biomaterials have improved performance, making artificial hearts more effective and less invasive. According to the American Heart Association , more than **2,000** artificial heart implants have been performed globally since the Jarvik-7, and ongoing advancements in bioengineering continue to improve patient outcomes. https://www.heart.org/

Lasting Legacy

Mariam , a pre-teen in Canada that is the youngest to recieveanArtificialHeart

The pioneering work of the University of Utah laid the foundation for modern artificial organ development. Barney Clark's case demonstrated both the potential and limitations of artificial hearts, leading to further research and advancements in bioengineering. Today, artificial hearts and ventricular assist devices continue to improve the lives of patients with end-stage heart failure. Ongoing advancements in material science have significantly improved patient outcomes. The success of these devices has led to continued investment in developing fully implantable, battery-operated total artificial hearts that could one day replace transplants entirely.

Other Cases

Barney Clark's case was groundbreaking, but not the only one. Since Clark, other patients have received artificial hearts, some surviving for years with mechanical circulatory support. One notable case is that of AbioCor recipient Robert Tools, who lived for **151 days** with a fully implantable artificial heart in **2001**.

Conclusion

The University of Utah's breakthrough in **1982** marked the dawn of a new era in bioengineering and medical science. By extending Barney Clark's life for **112 days**, researchers proved that artificial hearts could function in humans, opening the door for future innovations. The technology has advanced dramatically since then, with some patients surviving **years** on artificial heart devices.

PROJECT DOLLY

STEROIDS FOR KIDS?

Prepared By.

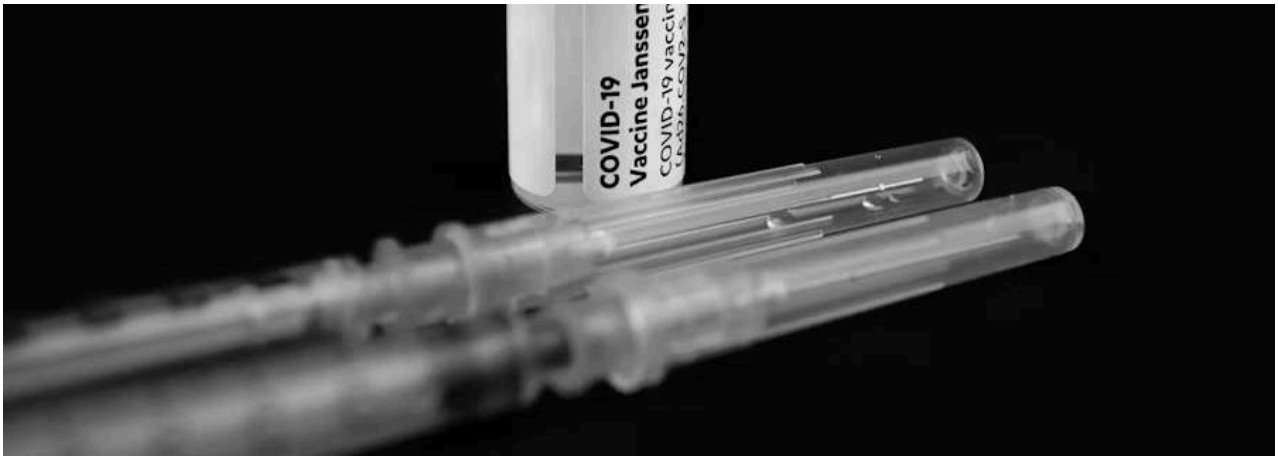
Erwin Wang

Presented For

Project Dolly

Introduction

Anabolic-androgenic steroids (AAS) are synthetic derivatives of testosterone, prescribed medically to treat conditions such as anemia and delayed puberty but often misused to accelerate muscle growth and enhance athletic performance. When taken without medical supervision, AAS misuse is illegal and can be particularly harmful during adolescence - a critical window for physical and brain development.



How this impacts the youth

Recent national data show that approximately 3 percent of U.S. high school students report lifetime use of AAS, comparable to cocaine use (4.8%) Additionally, 7 percent of students admit to using steroids without a prescription, and 21 percent know a peer who uses them . Alarmingly, 45 percent of high school seniors perceive little or no risk in using steroids once or twice, despite well-documented harms.

6-20x
likeliness of death contrasted to non users

3%
Increase in acute cardiovascular diseases

Why might people use it?

Gender

Males report higher AAS use (0.9–6%) compared with females (0.2–5.3%), driven in part by socially constructed ideals of masculinity and strength .

Age

Prevalence often increases with age during adolescence, as older teens face greater performance and appearance pressures.

Sports Participation

Athletes - particularly those in competitive or strength-focused sports - are at elevated risk, seeking an edge in performance or physique.

Peer Pressure

Influence from teammates, coaches, and gym buddies can normalize or encourage steroid use through direct recommendation or modeling behavior .

Psychological Variables

Constructs such as drive for muscularity, aggression, anticipated regret, and social norms positively predict AAS use, whereas self-esteem, resisting peer pressure, and perfectionism are protective.

Co-occurring High-Risk Behaviors

Adolescents engaging in other risk behaviors (e.g., alcohol misuse, driving without a seatbelt) are more likely to misuse steroids as part of a broader pattern of sensation-seeking.

Organizations designed to prevent it

CDC's Atlas & Athena

School-based programs combining AAS risk education with strength training, shown to reduce steroid intentions and substance use in student athletes.

Drug-Free Communities Support Program (CDC)

Over 1,000 local coalitions implement mentorship, school policies, and parent outreach to prevent youth substance use.

National Institute on Drug Abuse (NIDA)

Provides evidence-based APEDs resources for teens, parents, and educators on AAS risks and prevention

Taylor Hooton Foundation

Raises awareness through school presentations and parental education to change norms around body image and performance enhancement.

Conclusion

Anabolic steroid misuse among youth, though less prevalent than substances like alcohol or marijuana, carries disproportionate risks during critical developmental years. Prevalence estimates of 3–7 percent among high school students belie a much larger culture of "performance and image-enhancement" pressures fueled by social norms, media influencers, and peer networks. Multifactorial drivers - from gendered body-ideal beliefs to the accessibility of online black-market products - underscore the need for interventions that address psychological vulnerabilities, peer dynamics, and educational gaps.

Promising prevention models, notably CDC's ATLAS/ATHENA and community coalitions under the Drug-Free Communities Support Program, demonstrate that comprehensive, school- and community-based strategies can meaningfully reduce intentions and use. Continued collaboration among public health agencies, schools, families, and anti-doping bodies is essential to sustain these gains, reinforce protective factors, and equip adolescents with the knowledge, skills, and environments that support healthy, drug-free development.