

During WWII, getting the flu vaccine was patriotic. Some no longer view science that way

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The world had lurched into a dark and uncertain winter. Americans were dying by the thousands, and the rhythms of everyday life seemed to

carry only mournful notes of loss and deprivation.

Even mundane things, like a trip to the grocery store, were different. Shelves were increasingly bare, and shoppers discovered ordinary staples were no longer easy to come by. Air and train travel virtually ceased.

Hints of normalcy could still be found across Philadelphia in February 1943. Department stores, like Lit Bros. and Strawbridge & Clothier, tried to lure customers through their Market Street doors for furniture sales. A hiking club planned to meet on a Friday night in North Philly and trek to Belmont Mansion in Fairmount Park. The University of Pennsylvania's basketball team had a 13-game winning streak end with a thud against Cornell.

But mostly, there was just the war.

It had been 14 months since Japanese fighter planes attacked a Navy base in Pearl Harbor, propelling the United States, through plumes of smoke and a fleet of smoldering ships, into World War II.

Behind closed doors in Washington, officials fretted about an invisible threat, one that could kill more members of the military than any Nazi weapon: the [influenza virus](#). The 1918 flu pandemic had struck near the end of World War I, and claimed the lives of more than 45,000 service members.

Now, millions of young service members were squeezed together in ships and on planes, fighting in foreign lands and then returning home, while millions of refugees were fleeing the ravages of war that swept across Europe. The perfect breeding ground, in other words, for another pandemic.

To prevent a devastating outbreak, the United States needed something it

didn't have: a vaccine.

"Developing a [flu vaccine](#) was considered to be as important, if not more important, than any wartime planning activity," Kendall Hoyt, an assistant professor of medicine at the Geisel School of Medicine at Dartmouth College, would later say.

The government pulled together medical, academic, and pharmaceutical experts and tasked them with finding a path to an effective vaccine, an effort that would be repeated generations later, when the world once again confronted an existential crisis.

Research developments were detailed on the front pages of newspapers across the country, alongside the latest war dispatches, with headlines like "Can U.S. Win The Battle Against Flu?"

The virus, though, was the last thing on Ed Costantini's mind. He was 19 and itching to fight. Drafted by the Army—and eager to join an older brother already in the service—Costantini left his parents in South Philly that February, and stepped onto a train bound for Georgia. He'd spend 15 weeks in basic training at Camp Wheeler, before making his way to Liverpool, England, and, later, France.

But first, he had to get jabbed.

Decades later, at age 98, Costantini would recall in crisp detail how he waited, alongside other young soldiers, to receive a handful of vaccinations that the Army required. "The government was worried about their soldiers," he said.

It didn't occur to Costantini to question the necessity of the vaccines, or to refuse them in the name of personal freedom. "We didn't give a crap. OK? It was that simple. You got in line, took your shot, and that's it. It

was no big deal."

This was a different time, one when personal sacrifices became synonymous with patriotism, and scientific breakthroughs were hailed as miracles that would help define a new generation of discovery. It was a moment that also contained seeds of division and distrust that would metastasize across the country decades later during another hour of crisis.

'More devastating than war itself'

With few existing vaccines, public health was essentially a gamble, like driving down a hill in a car with faulty brakes.

Kit Kita was in grammar school when her parents moved, during the war, from Connecticut to Philadelphia, where they operated a bar in Northern Liberties. Money was tight, and sometimes there wasn't enough to pay for a doctor if she got sick. The only vaccine she'd receive as a little girl was for smallpox.

"That hurt," she'd recall, "like a sonofagun."

The weight of the flu vaccine effort fell on the shoulders of Thomas Francis Jr., a 41-year-old native of New Castle, a steel mill town on the western edge of Pennsylvania. Jowly, with a neatly trimmed mustache, Francis was the country's foremost expert on influenza.

He had been a young man in 1918, when the flu killed more than 50 million people around the world—and about 12,000 in Philadelphia—its victims suffocating as their lungs filled with blood and other fluid. The pandemic "demonstrated virulent influenza may be more devastating to human life than war itself," Francis observed.

In 1940, as the chair of microbiology at New York University, Francis became the first in his field to isolate the Type B strain of the flu. A year later, he was named executive director of the Army's Commission on Influenza, and called on a 27-year-old former NYU colleague for help: Jonas Salk.

Slender and bespectacled, Salk grew up in New York City the child of Russian Jewish immigrants. "When he was really young, he had this sense that he was going to do something to help the world," Salk's son Peter would later explain. "It was embedded in him."

Months before Pearl Harbor, a U.S. ship ferried secret cargo to England: 500,000 doses of a potential flu vaccine that had been tested on ferrets. But a Nazi sub torpedoed it. The government concealed the name of the ship, and where it sank, but the Associated Press described the incident as a "major medical disaster."

There was little glamor in vaccine work; researchers often sat hunched over long rows of eggs that were used to cultivate the flu virus, their faces hidden behind masks and protective goggles. But advertisements for pharmaceutical companies like Merck & Co. encouraged the public to see a link between the military and medical science, proclaiming: "The Health of Our People Is a Vital Part of National Defense."

Salk and Francis, meanwhile, had decided—against established medical wisdom—not to use live flu virus in their vaccine, believing that a "killed virus" could still provoke a person's immune system to respond.

In 1942, they conducted their first field trials of the vaccine on 8,000 patients at two Michigan hospitals for mental health patients, Charlotte DeCroes Jacobs recounted in her book *Jonas Salk: A Life*. Some were deliberately exposed to the flu—an approach considered ethically acceptable at the time. In patients who had received the vaccine, flu

antibodies climbed by 85%.

A year later, 12,500 members of an Army training program at eight universities received injections with the Type A or Type B strains of the flu. The stakes were high; cases of the flu had already begun to spread across the country. In Philadelphia, school officials sent home students and cafeteria workers who had "even a slight fever," and 200 police officers and firefighters fell sick with the virus.

The stress gnawed at Salk. He slept poorly and began to experience chest pains. Then the trial results delivered a verdict: Only 2% of those who had been vaccinated had gotten sick with the flu. The vaccines worked. With a large number of students vaccinated, the virus had a smaller chance of spreading.

Salk and Francis had a term for this scenario. The herd effect.

The Surgeon General's Office of the Army ordered millions of doses for its troops, and a nightmare outbreak in the service never materialized.

Ed Costantini, the Army soldier from South Philly, years later would say he felt certain that he was among those vaccinated. "I took my shot, but I had no knowledge of vaccines," he'd say. "I didn't even know what the word meant."

Civilians wouldn't have access to the flu vaccine until just after the war. Some surely were hesitant to get vaccinated—"People have been anti-vaccine since we've had vaccines," Hoyt would later say—but their voices were muted. Black communities, meanwhile, had reason to be wary of the white medical establishment.

"Partly this was the result of the appalling, racist attitudes by physicians who either refused to treat them, or put them in basements, or in

segregated facilities in hospitals," Naomi Rogers, a professor of the history of medicine at Yale University, would later explain. "It was the very example of separate and not equal."

But in the short term, the flu vaccine was hailed as another American wartime triumph—Francis was awarded the Medal of Freedom—and a harbinger of more dramatic achievements to come.

"Science had helped us win the war," Rogers would say. "Why wouldn't it help transform American life?"

A time of miracles—and a Florida hoaxer

Harry Truman could hardly contain his glee.

It was 1952, and Truman, in his second term as president, had traveled to Philadelphia to speak at the American Hospital Association Convention. Life expectancy in the United States had reached a new peak, and a growing number of once-fatal diseases were being contained by vaccines. Flu deaths had fallen by 50%.

"We now have the highest standard of health in our history," Truman told the attendees.

The budget for the National Institutes of Health had been \$8 million during Truman's first term. It would soar to more than \$1 billion by 1966.

"There was a sense towards science, in that postwar era, that we were living in a time of miracles and wonder," Hoyt would later say.

Jonas Salk was now in charge of his own virus research lab at the University of Pittsburgh School of Medicine and had set his sights on

conquering another horrific disease. Along the way, he would attract the attention of a businessman on a mission to undermine vaccines.

In the late 1940s, with funding from the National Foundation for Infantile Paralysis, Salk began developing a vaccine for poliomyelitis, as cases multiplied at a worrisome rate. By the early 1950s, the disease was paralyzing more than 15,000 people every year; young children were especially vulnerable.

Photographs of polio-stricken kids, with only their heads poking out of metal iron lungs, haunted parents and youngsters—and Salk, too.

"I have memories of my father coming home, well after dark, with notes pinned under his tie clip. Lists of things to do," Peter Salk would recall. "He was constantly thinking, constantly going in the lab early, constantly getting home late."

In May 1953, Jonas Salk carried something from his lab to his home in Wexford, Allegheny County—several doses of a potential polio vaccine. Like the flu vaccine that he and Francis had pioneered, it did not contain a live virus. Before long, the vaccine would be tested on more than a million American schoolchildren, whose parents had volunteered to have them participate in double-blind trials, considered the "gold standard" for determining a drug's efficacy.

But first, Salk gathered his young sons, Peter, Darrell, and Jonathan.

Peter, who was 9, stood and faced the family's kitchen table, his eyes drifting toward a large window that looked out onto a side yard. His father boiled glass syringes and needles on the stove, then readied the doses.

Once again, the stakes were dizzying. If successful, the vaccine could

prevent tens of thousands of people from becoming paralyzed. Salk plunged the needle into his boy's arm.

Peter, who hated needles, was stunned. "I just plain didn't feel it," he'd remember.

A year later, Salk enlisted his old mentor, Thomas Francis, to help administer the sprawling vaccine field trials—and America got a glimpse of an insidious misinformation campaign that, decades later, would become all too common.

While Salk and Francis tested the polio vaccine, Duon H. Miller, a cosmetics manufacturer in Coral Gables, Fla., began using newspaper ads, fliers, and the mail to spread anti-vaccine rhetoric. "Fake vaccine may kill your child—send a three cent stamp for details," read one.

Miller even created an official-sounding company, Polio Prevention Inc., to share his propaganda, which included claims that pasteurized milk was a "deliberate fraud on the public," the Dayton Daily News reported at the time. Miller himself had no medical expertise; his cosmetics company had been flagged by the Federal Trade Commission for using misleading language on its products.

New Yorkers ripped some of Miller's leaflets from the walls of buildings in the Bronx, and the Better Business Bureau warned the public that Miller's claims—which included personal attacks on Salk—were false and to ignore Miller's vow to stage an "American rally" in Chicago. He was charged federally with sending libelous material through the mail, found guilty, and fined \$1,000.

April 1955, meanwhile, brought another national sigh of relief: Salk's vaccine was found to be safe and effective. The Inquirer devoted nine pages of coverage to the news; more than 78,000 first- and second-grade

students in the city were slated to receive the first of three doses within weeks.

Kit Kita, a child when Salk first worked on the flu vaccine, was now teaching in Willingboro, N.J. She didn't hesitate to get the polio vaccine. "We were all relieved," she'd later remark, "everyone in my circle of friends."

Salk was feted at the White House, where President Dwight Eisenhower praised him as a "benefactor of mankind." Polio was eradicated in the United States by 1979.

Postwar medical achievements loomed large in the public's imagination. "If you had asked parents, 'What would you most like your son to become?' everyone said, 'A doctor,'" Naomi Rogers would say.

Those feelings wouldn't last.

'Mind-bending and heartbreaking'

At the University of Pennsylvania, Drew Weissman and Katalin Karikó were living lives of quiet obsession.

As a child growing up in Hungary, Karikó had been endlessly curious about life around her—farm animals, birds in trees. By the mid-1990s, she was at Penn, trying to understand even tinier subjects: RNA, the molecules that direct protein production in the body.

Karikó believed RNA could be modified for therapeutic uses, and was soon joined by Drew Weissman, who'd studied immunology at the National Institutes of Health. But synthetic mRNA injections in mice had long been shown to produce harmful inflammation; Weissman and Karikó had to scrounge for funding. Their research papers sat

unpublished.

In the middle of the night, they'd email each other, mulling studies they'd read, obsessed with finding a path forward. "As a physician," Weissman would later say, "my dream was always to develop something in the lab that would help people."

Weissman and Karikó kept at it—just as Jonas Salk had when he'd been told that "killed virus" vaccines would never work. In 2005, they reported a breakthrough: mRNA could be rendered safe by altering one of its building blocks.

"Our phones will start ringing off the hook," Weissman told Karikó.

They'd wait five years for those calls to come—and, later, messages they never imagined. Ultimately, their research was licensed to two companies, Moderna and BioNTech, a partner of the drug company Pfizer.

In the decades since Salk had been hailed a hero, some Americans' perception of medical science had started to erode. There was growing skepticism toward experts, and less trust in federal agencies like the FDA, the CDC would find in studies in the 2010s.

By 2017, only 37% of adults in the United States would be vaccinated against the flu, well below the optimal threshold of 70%.

Black Americans were more unlikely than whites to trust vaccinations, part of the enduring legacy of the Tuskegee Syphilis Study, a grotesque government experiment that forced hundreds of Black men in Alabama to suffer with syphilis—and in some instances die—beginning in the 1930s. (In another traumatic incident, one of the six manufacturers of the polio vaccine in the 1950s inadvertently distributed doses with live

virus, spreading the disease to thousands.)

Vaccine misinformation and conspiracy theories spread easily on Facebook, Twitter, Instagram, and YouTube, where users needed only their thumbs and a hunch to find answers that suited their preferred reality. "In these days, those people who know less think that they know everything," Karikó would note. "They are confident."

Measles, one of the most contagious diseases in the world, was eliminated in the United States in 2000, nearly 40 years after a vaccine was first developed. But some parents began to resist having their children vaccinated, and by 2019, more than 1,200 cases were reported in this country.

And then came 2020, and the COVID-19 pandemic, the kind of nightmare that Thomas Francis and Jonas Salk had raced to avoid in the 1940s. Schools emptied, hospitals overflowed, and businesses boarded up. Supermarkets had to place limits on ordinary items to ward off panic buying. Everyday life fell into a kind of suspended animation.

The United States, under President Donald Trump, committed \$18 billion to Operation Warp Speed, a public-private partnership that sought to develop COVID vaccines at a breakneck speed, echoing the old Commission on Influenza.

In November 2020, Pfizer and Moderna would each announce that trials had shown their COVID vaccines—built on the foundation of Weissman and Karikó's nearly two decades of mRNA research—were effective and safe.

Yet Trump proved to be a perpetual source of misinformation about COVID, and contracted the virus himself. When he later tried to encourage some of his followers to get vaccinated, during a rally in

Alabama, he was booed.

Millions not only chose to be unvaccinated, but to resist small precautions that could protect them. In Idaho, parents and children gathered in front of the state capitol and dropped masks into a fire. In Florida—where Duon Miller had once discouraged parents from getting their children vaccinated—the governor vowed to withhold funding from school districts that implemented mask mandates.

A Republican member of Congress even invoked the darkest figures from the 20th century to malign medical professionals who might offer door-to-door vaccinations. "Needle Nazis," she called them.

Stories of Americans insisting that COVID is a hoax, and then expressing remorse as they lay dying from the virus in a hospital bed, became too numerous to count.

Peter Salk, now a professor of infectious disease and microbiology, struggles to make sense of COVID denialism.

"It's not mind-blowing—it's mind-bending and heartbreaking to see this," he says. "How many people are dying, and how many are suffering loss in their families, because of not being tuned in to the reality of what's taking place?"

When Salk's father encountered people who had misgivings about his polio vaccine, he patiently reasoned with them.

Drew Weissman adopts the same approach now, logging on to virtual meetings, or visiting church groups and retirement communities, to discuss the importance of getting vaccinated against COVID-19. When people express concern about the vaccine, he responds with dispassionate statistics.

The virus has claimed the lives of more than 685,000 Americans—far more than the 418,500 who died during World War II—while hundreds of millions of doses of vaccines have been delivered, with just a handful of reported deaths from complications.

The conversations are mostly encouraging.

Later, when Weissman's talks are finished, he logs on to his computer and opens his email. He finds notes from people whose opposition to the [vaccine](#) runs darker, and has calcified into a political identity.

You're lying, some of them tell Weissman.

Then they threaten his life, and his family.

There's no way to inoculate against hate.

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