

## Opinion

## Coronavirus Disease-2019 Conspiracy Theories are Alive and Breathing on the Internet

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## ABSTRACT

The more detailed origin stories of severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) and the coronavirus disease-2019 (COVID-19) vaccines are both unknown to the layperson. These unknowns serve as opportunities for misinformation messaging to the layperson. How did pharmaceutical companies create a vaccine within a matter of months to a year for a relatively new virus? Were aborted fetal cells used to make the COVID vaccines? What if there are long-term side COVID-19 vaccine effects not yet known to scientists and the public? While the internet, without a fact-checker and combined with opportunity and individual attitudes and information preferences, may flourish with misinformation and conspiracy theories. Scientists have a professional duty to publish evidence-based data in all pursuits, but recently the scientific community has spent much time educating the public in hopes of neutralizing many of the COVID fallacies we see every day on social media.

Misinformation and conspiracy theories have thrived on the Internet since the emergence of severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2). Based on the Centers for Disease Control and Prevention (CDC), as of this writing nearly 64.3% of total US population received one coronavirus disease (COVID) vaccine meanwhile 55.3% received two COVID vaccine doses. With a more than adequate supply of the COVID vaccine within the US territory; why isn't the US at 100% immunization rate? The origins of SARS-CoV-2 and the COVID vaccines are both unknown to the layperson. These unknowns offer many opportunities for misinformation messaging to the layperson. Meanwhile, health care professionals and scientists, while by training and experience are cognizant of viral vector-based vaccines and recently well-informed about messenger ribonucleic acid (mRNA) vaccines, seem susceptible to this trend. If the overwhelming majority of evidence to date is honest and accurate, why have some healthcare professionals refused COVID vaccines mandated by their hospitals and choose to be suspended/terminated from employment?

I will not discuss the origin of the SARS-CoV-2 pathogen. Both the World Health Organization (WHO) and US Government have yet to come to a definitive conclusion regarding its genesis. The focus instead will be on the origin of the COVID vaccines and the controversy that besieged them.

I would like to address a first point of contention with

the vaccine: "How did pharmaceutical companies create a vaccine within a matter of months to a year for a relatively new virus?"

Nowadays, COVID-19 vaccines by Moderna, Pfizer/BioNTech and J&J/Janssen are approved for use in the United States. Two out of three were household names prior to the COVID onset in the US.

Hundreds of scientists have worked for decades on mRNA technology. Initially, the premise of this technology was to disrupt defective or missing proteins. Not only was this technology a sign of hope for rare diseases, but also in oncology treatment research. Using mRNA technology was and still is a prospective mechanism to attack tumor cells. As of Summer 2021, Moderna, the International acquired immune deficiency syndrome (AIDS) vaccine initiative (IAVI) and the Bill and Melinda Gates Foundation (BMGF) have already started Phase I experimental trials on a mRNA human immunodeficiency virus infection (HIV) vaccine candidate. The mRNA HIV vaccine candidate should stimulate B cells of the immune system to generate broadly neutralizing antibodies against HIV.

On an annual basis, scientists select up to three of the predominant Influenza virus strains and pharmaceutical companies mass manufacture an inactivated Influenza vaccine within months. The preparation and logistics required to formulate, manufacture, distribute, store, and administer to the public make and logistics

for these types of vaccines are astounding. Using this timetable comparison, mRNA COVID vaccine mass manufacturing was the epitome of success amongst older, more onerous vaccines. Older vaccines took decades to design, perfect and mass manufacture meanwhile the public was able to receive the mRNA COVID vaccine within months. This is thanks to decades of work by scientists and relentless investors willing to risk their capital for the benefit of mankind and their pockets.

Artificial intelligence (AI) is by definition machine discernment using algorithms *versus* natural human intelligence. The public may not be aware that AI has disrupted drug discovery at large pharmaceutical companies and small biotech firms. I recall in early 2020 when Moderna and Inovio Pharmaceuticals proposed to make a selective and targeted COVID vaccine candidate in less than a 12-month schedule, within hours many were astounded and thought these companies should be reported to Securities and Exchange Commission (SEC) for false claims to the public. Instead, the confidence to deliver came from their deployment of machine learning (ML) and AI tools to select a prospective drug candidate for further research and development.

Next, I would like to address a second point of contention with the vaccine: “*Were aborted fetal cells used to make the COVID vaccines?*”. Yes, some of the COVID-19 vaccines used fetal tissue cells isolated back from the 1970s and 1980s. But, the mRNA COVID vaccines only used fetal tissue cells in the proof-of-concept phase of development. To validate that mRNA was delivered from the vaccine using lipid nanoparticles (LNP) into the cells; scientists prefer to use human cells over animal cells for proof of concept. Fetal cells were not used in the ongoing manufacturing of the mRNA COVID vaccines. Many in the public due to religious reasons refuse to get immunized and attempt to gain an exemption in the workplace or university for these very reasons.

Further, I would like to address a third point of contention with the vaccine: “*What if there are long-term side effects unknown to scientists and the public currently from the COVID vaccines?*”. There was and still is vaccine hesitancy amongst the public and healthcare professionals because of possible long-term side effects. When learning size of these early studies (number of volunteers taking the experimental vaccine) were in the tens of thousands (much lower than older-paradigm vaccine approvals demanded) then I agreed with the naysayers. However, now the world’s population has become a living, ongoing Phase IV clinical safety study (post-Emergency Use Authorization). In the United States, and despite research methods counterintuition, an Emergency Use Authorization (EUA) was provided by the Food and Drug Administration (FDA) for the aforementioned vaccines with rigorous study and good-to-excellent virus protection that exceeded standards for prior vaccines and by that certainly met criteria for efficacy approval.

An example of a larger study size that magnified side effects is the J&J/Janssen COVID vaccine. The J&J/Janssen COVID vaccine uses traditional vaccine technology with an adenovirus as a vector. The FDA halted J&J/Janssen’s COVID vaccine

administration by healthcare professionals on April 13, 2021 due to the risk of thrombosis with thrombocytopenia syndrome (TTS) amongst women younger than 50-years of age. However, by April 23, 2021, the FDA lifted and resolved this matter by including a warning to women under the age of 50 that there are other options such as the mRNA vaccine available in the market.

Finally, I would like to address a fourth point of contention with the vaccine: “*I am pregnant and there are not enough studies to show safety to myself and unborn child.*” These topics are very sensitive and addressing a person’s health is an intimate discussion to have with co-workers, family members and friends. Nevertheless, I would like to bring awareness to the fact that women who had a SARS-CoV-2 infection or received immunization are able to pass virus-neutralizing antibodies to their unborn child in utero. This is a great gift for the newborn, especially with the continued presence of the pandemic worldwide.

The internet may flourish with misinformation and conspiracy theories but scientists must publish evidence-based data to educate the public to neutralize many of the social media-related COVID fallacies we see daily. The internet, for better or worse, has become a venue for those who prey on COVID-related insecurities and fears. Finally, misinformation of this type and scale will assuredly generate downstream mental health impact on society due to COVID, more country-based quarantining for long periods of time, and ultimately delay the resolution of an already devastating yet collaboratively resolvable disease pandemic.

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