Who needs experts? I'm doing my own research

When Green Bay Packers quarterback Aaron Rodgers tested positive for coronavirus disease 2019 (COVID-19) in late October 2021, he was initially cagey about his vaccination status but eventually acknowledged that he was not vaccinated. In a long and bewildering statement, he averred that his case was unique and that after his own extensive research, his path would be different and that he would not be using any of the "one size fits all" approaches to prevent infection, which of course it did not. At about the same time, international superstar Nicki Minaj tweeted that she would not be getting the vaccine because her cousin's friend "…got it and became impotent. His testicles became swollen." Prominent, if nonexpert, characters fueled a second epidemic of disinformation: over the course of the pandemic, approximately two thirds of the disinformation on social media has come from 12 individual influencers—"The Disinformation Dozen"—whose ranks include Robert F. Kennedy, Jr., and Rizza Islam, whose posts target the especially vulnerable Black community.

Fear of the impact of COVID-19 vaccine on fertility is a major source of overall hesitancy. In a survey of unvaccinated individuals, 58% worried about overall unknown long-term effects. Of these, 41% were convinced that there were adverse fertility effects, and another 38% thought there may be (1). Paradoxically, those most fearful of possible negative effects had higher socioeconomic status and were better educated, urban dwellers, and married, hardly a flat-earther demographic. The fear of the ill effects of the vaccine had a real-world impact. In response to lagging vaccination rates among pregnant individuals—31% overall but 25% among Latina and 16% among Black women—the Centers for Disease Control and Prevention issued an urgent advisory in September 2021 touting the benefits (2). Despite the advisory, the rates did increase but sluggishly.

There has been no dearth of information on the benefits of vaccination for those pregnant or trying to become pregnant. The American Society for Reproductive Medicine COVID-19 Task Force was diligent, timely, and aggressive in getting the word out; at the time of this writing, there have been 19 updates and a 2-year summary report, with crisp recommendations that were based on solid scientific evidence where available and a sensible discussion of risks vs. benefits where the evidence continued to evolve. The Centers for Disease Control and Prevention, American College of Obstetricians and Gynecologists, Society for Reproductive Endocrinology and Infertility, and Society for Maternal-Fetal Medicine, among many others, were similarly dynamic in their presence on social and traditional media. On the demand side, patients were reading: when using varying combinations of the terms "COVID-19," "vaccine," and "fertility," researchers found a range of 7- to 29-fold increase in searches on Google in the month immediately after the Emergency Use Authorization for the messenger ribonucleic acid vaccine when compared to with that in the month before, although the majority queried side effects rather than benefits (3). Even now, Googling "fertility" and "COVID-19" vaccine, the first 3 pages have 52 of 52 of the results professional statements in support of the vaccine, several references from the medical literature, and a handful of lay articles debunking vaccine myths. In looking for any disinformation, I gave up looking beyond the 10th page. It would seem that those looking for disinformation go out of their way to do so. Another Google search of television and print appearances by reproductive endocrinology and infertility doctors yields additional volumes. Never have we in the reproductive endocrinology and infertility community seen so many of our friends on television.

So, what gives? Why would stories about Nicki Minaj's cousin's friend's nether regions have more traction than the overwhelming body of evidence, widely available, coming from those who would be considered experts? As with anything in the social sciences, the answers are complex, but there are several prominent possibilities.

THE PLACE OF EXPERTS IN SOCIETY

The Death of Expertise by historian and pundit Tom Nichols (4) relates the story of Astrophysicist Robert Jastrow's discussion/debate with an undergraduate. When Jastrow declined to accept the student's position, the student said, "Your guess is as good as mine," to which Jastrow responded, "No, mine is better than yours." Whether or not one thinks this was a kind response from the renowned professor, the vignette highlights one of the paradoxical effects of the information age. Because we are educated in one field, we may believe that we can painlessly gain equal expertise as well as offer opinion in another field, which of course is our right in a free and equitable society. There is more information out there than ever before, but confirmation bias incents us to look for those tidbits that fit our world view. The way we "read" also has changed. Information now comes neatly packaged in 6-minute YouTube videos, with an introduction, materials and methods, results, and conclusion in the amount of time it takes to finish your latte, and there is objective evidence that feeling confident in the expertise gained through these little packets is a real phenomenon. Describing the "easiness effect of science popularization," researchers from the University of Muenster had laypeople read a series of articles on scientific topics from the lay literature (tabloids) and articles from online journals addressed to an expert audience (5). Subjects felt that they had greater mastery of the subjects after reading the simple articles and, therefore, had less need for expert opinion. The more complex and complete expert articles gave them pause and less confidence in their grasp of the topic. In their natural state, it stands to reason that lay readers will opt for the more accessible renderings. No expert opinion needed.

RAPID DISSEMINATION OF INCOMPLETE INFORMATION

More than ever before and certainly in a rapidly evolving situation such as a pandemic, when society is anxious for any bit

of good news or suspicious that government is leveraging the situation to exert more dominance, fragments of incompletely vetted information can circle the globe in less than 1 news cycle. Such was the case in the release from the preprint purveyor bioRxiv suggesting that COVID-19 was created in the laboratory because it shared genetic similarities to human immunodeficiency virus. Furious responses from the scientific community rapidly forced its withdrawal, but the damage was done, and the theory can still be found online in conspiracy circles. In late 2020, a German epidemiologist speculated without data that because the placental protein syncytin-1 shared genetic characteristics with the COVID-19 spike protein, the vaccine could render patients infertile. Another unfounded theory was created that continues online despite being refuted scientifically.

LACK OF FAMILIARITY WITH SCIENTISTS AND THE SCIENTIFIC METHOD

Scientist/science communication advocate Sheril Kirshenbaum, in a compelling TEDx talk (TEDx Talks, February 1, 2014) notes that only 18% of Americans know an actual scientist and when asked to name the top 3 scientists, the winners are Albert Einstein, Bill Gates, and Al Gore. Physicians are probably more accessible but are still seen as "so-called experts" and viewed suspiciously, especially because we are perceived to be well paid and, therefore, likely conflicted by incentives for personal gain.

Scientists and physicians work extremely hard in creating and then applying knowledge on behalf of our communities. So, how do we make sure the public both listens to what we have to say and then accepts the fact that we are working on their behalf? There are no easy answers, but we should perhaps ourselves listen to the experts who dedicate their lives to effective and convincing science communication. The lay abstract has become standard for several journal and grant applications, but this is a passive reflection of our work, and we need to be actively engaging the public.

In the heady days of the 1950s and 1960s, when the United States was all in on the space race with the Soviet Union, the public was massively engaged with science. This "science brain" is still there, and attendance at science centers and museums is ever increasing and is bouncing back rapidly after reopening after COVID-19. If the receptors are there, what do the agonists (science advocates) need to do? We need to remind the public that science and scientific research are fundamental parts of the society and not a special lobbying group only advocating for increased funding (although that is certainly key). We need to go to where the public is and share our passion for what we are doing; this means social media. The language needs to be accessible but not dumbed-down. No jargon and lots of take-homes! We also need to enlist communication professionals experienced in reaching a lay audience—the National Academy of Sciences Science and Entertainment Exchange is successfully connecting Hollywood and scientists to foster accurate but entertaining depictions of what we do. Let us get rid of the image of scientists as geeks or villains, and certainly, let us eliminate that rogue scientist whose unconventional and totally unscientific approach triumphs over traditional but boring scientists. While we are at it, let us recruit popular figures to advocate on behalf of individuals with recurrent pregnancy loss or infertility or getting the vaccine while pregnant. The environment has DiCaprio and neuroscience has Alan Alda. Surely, there is someone who can give voice to those who may suffer privately but are heartened to hear that *science* is working hard to address their painful issue. Finally, we can all serve as individual ambassadors for our field and represent the good, hard work being done. Teach your grandmother about intracytoplasmic sperm injection!

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