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# EDITORIAL

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## The Assault on Science and .....Urology

**I**t begins in grammar school and continues throughout high school and college. The American educational system has neglected science education for too many American students. Many Americans erroneously consider our country as the world leader in science as evidenced by being the first nation to place men on the moon and apparent leadership in medical discoveries.

Trends in International Mathematics and Science Study (TIMSS) have administered tests to fourth and eighth grade students every 4 years since 1995. In 2019, 580,000 students from 64 countries participated in the exam.<sup>1</sup> The results provide a sobering snapshot of the current state of American math and science education. In mathematics, U.S. fourth and eighth grade students finished 15<sup>th</sup> and 12<sup>th</sup>, respectively. In science, U.S. fourth and eighth grade students ranked 9<sup>th</sup> and 11<sup>th</sup>, respectively.

There is evidence that the lack of math and science exposure continues into high school. The Programme for International Student Assessment (PISA) is an international exam that is given to 600,000 fifteen year olds every 3 years.<sup>2</sup> Of the 64 countries that participated in 2015 and 2018, the United States students finished 35<sup>th</sup> and 30<sup>th</sup> in math and 17<sup>th</sup> and 11<sup>th</sup> in science.

Predictably, these trends from K-12 culminate in a relatively small percentage of college students majoring in STEM (science, technology, engineering and math) fields. Of the 1.8 million bachelors degrees awarded in 2015-16, about 331,000 (18%) were in math and science areas.<sup>3</sup> This ongoing paucity of math and science exposure has predictable consequences.

A recent Pew Research Center poll found that only 79% of those adults polled knew that antibiotic resistance is a major concern of antibiotic overuse, 76% knew the definition of an incubation period, 68% knew that oil, natural gas and coal are fossil fuels and only 60% could identify the need for a control group to determine the efficacy of a new drug.<sup>4</sup>

This lack of scientific literacy translates into tangible harm. Another Pew Research poll revealed that only 83% of Americans thought that the measles, mumps and rubella (MMR) vaccine was safe, 9% thought it was not and 7% were not sure.<sup>5</sup>

The assault on science is compounded further by the lack of scientific training among our elected officials who have a major influence on health policy and research funding. In the 116<sup>th</sup> Congress, 168 congressmen and 57 senators had law degrees. Contrast that to three physicians and one optometrist in the Senate and 13 physicians, 5 dentists, 3 veterinarians, 2 psychologists, 1 pharmacist, 2 nurses and 1 physician assistant in the House of Representatives.<sup>6</sup>

This ongoing neglect of scientific education with large gaps of scientific sophistication in the populous has led to significant consequences during the Covid crisis. Erroneous claims concerning Covid treatments such as hydrochloroquine were unfortunately readily accepted by some segments of the public with the potential to cause harm.<sup>7</sup> Rand Paul, one of the physician-senators announced that "Masks don't work."<sup>8</sup> Paul was further challenged by Dr. Anthony Fauci for distorting facts on herd immunity which had previously received much coverage in the press.<sup>9</sup>

A Pew Research poll survey of 12,648 U.S. adults from November 18 to 29, 2020 reported that 29% responded that they would definitely get the vaccine, 31% probably would get it, 21% probably would not and 18% definitely would not.<sup>10</sup>

The backdrop of this “winter” of scientific training in the public domain has direct consequences for urology. The increased influence of the dispersal of “scientific” information through various social media avenues, the emergence of predatory journals, the publication of research manuscripts with inappropriate industry influence and unvetted preprint services have all contributed to a panoply of literature of marginal scientific veracity.<sup>11</sup> This has led to a bitter urologic harvest of contradictory claims of some of the benefits or harms of testosterone therapy, the efficacy of some medical devices or the publication of some studies lacking scientific rigor.

There is no simple, quick fix to this general lack of scientific knowledge in our society. The deficiencies in the U.S. educational system will not be rectified easily or soon. What urologists can do is to attend to our own household first. Urologists with their strong scientific training should demand scientific rigor within our literature and, when lacking, be quick to write commentaries pointing out the deficiencies. Urologists should also be the “watchdogs” of social media claims that are inaccurate or misleading. An erroneous report on social media, without an appropriate rebuttal, is soon considered gospel. Finally, urologists should use their standing as respected leaders in their communities to serve as purveyors of the truth. We should never forget that the word doctor comes from the Latin, *docere*, to teach.

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## References

1. Mullis IVS, Morton MO. TIMSS, 2019 Results in Mathematics and Science. <https://timssandpirls.bc.edu/timss2019/international-results>.
2. The Programme for International Student Assessment (PISA). The Center for Education Statistics, the research arm of the U.S. Department of Education. <https://nces.ed.gov/surveys/pisa2018/#>.
3. National Center for Education Statistics. <https://nces.ed.gov>.
4. Kennedy B, Heffernan M. What Americans know about science. Survey conducted January 7-21, 2019. Pew Research Center. [www.pewresearch.org](http://www.pewresearch.org).
5. 83% say measles vaccine is safe for healthy children. <https://www.pewresearch.org/2/9/15>.
6. Congressional Research Service: Membership of the 116<sup>th</sup> Congress: A profile. Updated 12/4/2020.
7. FDA cautions against use of hydrochloroquine or chloroquine for Covid-19 outside of the hospital setting or clinical trial due to risk of heart rhythm problems. U.S. Food and Drug Administration. <https://www.fda.gov/drugs/drug-safety-and-availability>.
8. Kristof N. This is the test of our lifetimes. NY Times, 12/13/20, Sunday Review, pg.7.
9. Fauci chides Paul for distorting facts on herd immunity, KHN Morning Briefing, 9/24/2020.
10. Frank C, Tyson A. Intent to get a Covid-19 vaccine rises to 60% as confidence in research and development process increases. Pew Research Center 12/3/2020. <https://www.pewresearch.org>.
11. Scheirer WA. A pandemic of bad science. *Bulletin of the Atomic Scientists* 2020;76(4):175-184.