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## **Be Skeptical of Those Who Treat Science as an Ideology**

**Scientific knowledge is always provisional. The point is to produce evidence, not doctrine.**

By Sue Desmond-Hellmann (Jan. 19, 2018 6:10 p.m. ET)

**Skepticism is the lifeblood of scientific progress. By constantly asking whether there is a different answer, a better approach or an alternative view, scientists drive improvements and innovations that ultimately benefit everyone.** It is not “antiscience” to be skeptical—it’s definitively pro-science. At a time when people of all ideological stripes are seeking definitive sources of truth, we should all embrace our inner skeptics and turn to the scientific method for a fresh approach to resolve our differences.

When I started out as an oncologist in the mid-1980s, women with the most aggressive form of breast cancer were subjected to surgical removal of not only their breasts but large amounts of their chests and rib cages. Treatment later evolved toward less-extensive surgery but greater use of chemotherapy, which too often came with debilitating side effects. I still remember what I called “the mother sign”—women being helped into my clinic by their moms because they were so weak from the therapies I gave them.

In the 1990s I left patient care for biotechnology, which held promise in improving cancer treatments. I led product development at Genentech, where we developed drugs such as Herceptin, which targeted cancerous cells and left healthy ones largely intact. By challenging the status quo, we found ways to treat at least some patients without first making them sicker. In a little over a decade, cancer treatment moved from disfiguring surgery to powerful drugs to precise gene therapies. Today, harnessing the immune system to treat cancer shows immense promise for the next advance.

**But whereas skepticism and uncertainty have always been the heart and soul of science, confidence and certainty are the coin of the realm in much of today’s public discourse.** Unquestioning confidence is deeply troubling for the scientific community because it is not the currency we trade in, and it has led people in America and around the world to **question scientific enterprise itself. We should all be troubled when science is treated as if it were an ideology rather than a discipline.**

Valuing beliefs over science manifests itself as cynicism at best, denialism at worst. **Scientists talk about skepticism to assert that nothing should be accepted or rejected without considerable evidence.** Denialism—the refusal to accept established facts—is different and dangerous. According to Harvard research, between 2000 and 2005 AIDS denialism in South Africa led to an estimated 330,000 deaths because the government rejected offers of free drugs and grants and dragged its heels on establishing a treatment program. And in just eight weeks last year—April 7 to June 2—Minnesota saw more cases of measles, a disease easily prevented with a vaccine, than had occurred in the entire United States in 2016.

The point of science is not to produce doctrine, but to collect and test evidence that points toward conclusions, which in turn inform approaches, treatments and policies based on rigorous research. These conclusions are provisional. Scientific investigation is undertaken to question today's knowledge, to seek new evidence through research and experimentation.

That is not to say that previous evidence was “false,” merely that it was less complete. Those surgeons who performed radical mastectomies in the 1980s were acting with the best knowledge available at that time. As the understanding improved, so did the methods. Nor is it to say that current knowledge shouldn't be trusted—there is strong evidence that vaccines save lives, for example, and scant evidence that they cause harm.

When I was a practicing oncologist, one way I built trust with patients was to be open and honest about what I knew for certain and what I didn't. On my best days, I didn't just talk; I listened. I answered patients' questions to the best of my knowledge and did follow-up research on the ones I couldn't answer. If I witnessed an outcome I didn't expect, I revisited my assumptions. That's how I applied the scientific method in the wild.

I follow a similar approach in my current job. The Bill & Melinda Gates Foundation uses a data-driven, evidence-based decision-making model. When the evidence changes, so does our strategy—as it did with malaria. Once it was clear that controlling the disease world-wide was practically and politically unsustainable, we increased our focus on accelerating elimination in regions where it is feasible now. At the same time, we're continuing to support efforts to save lives and develop the tools that will eventually allow us to eradicate the disease.

What is undeniable is that the scientific breakthroughs in which we invest, such as new vaccines and hardier crops, help people around the world survive and thrive. How many more people benefit—and how quickly—will depend in part on public confidence in science.

We can rebuild that confidence by uniting around the qualities of the scientific method. As the name suggests, the scientific method is not a belief system, it is a practice. We would all benefit from more practice.

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