

Q&A

Hannah A. Valantine, M.D., Stanford University School of Medicine

Dr. Hannah Valantine is renowned for her work in transplantation medicine, leadership, and mentoring as well as her efforts to improve scientific workforce diversity. In this interview with *Cell*, she discusses her research; what Juneteenth means to her; the persistent gender, race, and ethnicity leadership gaps that exist in academic medicine; and the importance of equitable, inclusive, and diverse science.

Biography

Hannah A. Valantine, M.D., is currently a professor of medicine at the Stanford University School of Medicine and Senior Advisor, Team Science, to the chair of the department of medicine. She is a nationally recognized pioneer in both transplantation medicine and scientific workforce diversity, with more than 200 peer-reviewed publications and patents and sustained funding from the National Institutes of Health. In 2014, Francis Collins, M.D., Ph.D., then the NIH director, recruited Valantine to be the inaugural NIH Chief Officer for Scientific Workforce diversity and a tenured investigator in the National Heart, Lung, and Blood Institute's intramural research program, where she established the laboratory of transplantation genomics. She was elected to the National Academy of Medicine in 2020. Valantine received her M.B.B.S. and M.D. degrees from London University in 1978 and 1987, respectively, then conducted a cardiology fellowship at Stanford, later rising from assistant professor of medicine to full professor in 2000. In 2004, Valantine was named Stanford's inaugural Senior Associate Dean for Diversity and Leadership.

Could you tell us about your research?

I am a cardiologist interested in understanding the mechanisms of rejection of a transplanted heart. I've spent my whole career in clinical research trying to figure out non-invasive ways to monitor impending rejection in patients. I think my most important work has been the application of genomics to monitor and detect rejection after heart transplantation.

A major breakthrough in this journey resulted from a fruitful, interdisciplinary



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collaboration with Stanford colleagues, specifically Steve Quake, a pioneer in single-molecule DNA sequencing and non-invasive prenatal diagnostics to replace amniocentesis. We worked together to develop cell-free DNA sequencing technologies to monitor heart transplant rejection. That test is now widely used in the clinic. I am currently laser-focused on trying to understand what's going on at the molecular level when a heart is rejected. While heart transplantation is a life-saving procedure, not all people benefit equally. I am particularly interested in mechanisms that underlie poor clinical outcomes in transplantation patients of African ancestry. My research has uncovered some really interesting hints about biological determinants of this disparity that accompany, and likely synergize with, social and environmental factors. We have highly sophisticated tools now that we can use to identify rejection mechanisms and move toward developing new therapies and diagnostics. I am convinced that this new under-

standing will benefit all transplant recipients, not just those of African ancestry.

What are your thoughts on team building in science and medicine? How do you build a team?

Team science is critically important for solving the big problems that remain in biomedicine. When you bring together multiple disciplines and multiple ways of thinking—true diversity of thought—you're much more likely to come up with creative and productive solutions. Organ transplantation is a really good example of why we need diverse teams, such as those with immunologists, human geneticists, clinical transplant scientists, pharmacogenomics experts, and cutting-edge data scientists. But we also need researchers who study health disparities as well as scientists who are using newly available molecular tools so that we can uncover and fix the causes of poor transplantation outcomes in certain populations such as people of African ancestry.

What are the challenges or exciting questions in your field?

One of the key challenges the transplant community must solve is to understand in detail how various factors combine to create greater risk for acute and chronic rejection (and poorer outcomes) in patients of African ancestry. Both social and biological contributing factors are thought to contribute to this health disparity, but none alone or in combination fully explain the inferior clinical outcomes these individuals experience. Understanding the basis of this risk will uncover new mechanisms to lead us to a whole new era of diagnostics and therapies to prevent and treat acute rejection.

One area ripe for exploration is chronic stress from racism and discrimination that disproportionately affects African Americans. Does chronic stress induce a hyper-activated immune state prone to organ rejection? I am interested in digging deeper into the phenomenon of “weathering” that has been identified outside the field of transplantation. It is a hyperimmune state induced by chronic stress associated with systemic racism. Weathering leads to premature aging and increased risk for certain diseases, all of which can be linked to an activated immune response. Is rejection risk another example? And how does it occur at the molecular level? These are critical unanswered questions.

How do you find inspiration, particularly during challenging times?

Patients are a major source of inspiration for me. I go to clinic, and I see the challenges they face and how they cope with difficult, life-threatening situations. And that inspires me to go back to the drawing board and try to make their lives better. For so many years, the best we could do to detect rejection was to do a heart biopsy on a routine basis. It’s a surgical procedure, and patients hate it. One once told me, “Dr. Valentine, first you give me a new heart, then you take it away bit by bit. Can’t you do something to help us that doesn’t involve surgery?”

I am also really inspired seeing the work of my colleagues, especially the younger ones coming up through the pipeline. Building the next generation of scientists is critically important to me.

Do you have a role model in science or medicine? If so, who and why?

Role models are extraordinarily important in science. A lot of scientists from underrepresented groups have not had the benefit of role models that look like themselves. I am fortunate to have had great role models. That’s both in organ transplantation and more generally within science. My role models have combined both their scientific research and an attention to diversity, equity, and inclusion. In my recent career, one that stands out is Dr. Francis Collins, the prior NIH director. This is a person who has had a strong commitment to diversity while also being

a fantastic scientist. He led us through the Human Genome Project, which has been pivotal in expanding research in so many fields, including my own. He also maintains a complete dedication to the idea that science and religion are mutually compatible, and he has successfully communicated this concept. That is a view I also hold.

What is your approach to mentoring the next generation?

Good mentoring is an important ingredient for professional success and satisfaction, and there are so many facets to it. A philosophy I hold very closely is the need to go beyond mentoring to embrace sponsorship. That means not only explaining to your mentees successful career strategies, but actually opening doors for them, advocating for them, and giving them more opportunities to be successful. With any new innovation, I’ve made sure that a junior colleague is right there next to me along the way, and then I’ve stepped aside and turned it over to them.

Do you feel that racism in STEM has personally impacted you? If so, would you be willing to share any experiences you’ve had?

Yes, racism has affected me, but perhaps not in the way you might think. I was born in The Gambia, but my parents moved the family to London when I was 13 years old. I instantly went from being part of a majority group in Africa to being part of a minority group in the United Kingdom. I was the only student of color in a high school of 500 students. I did not feel like I belonged, and it affected my enthusiasm for school. I didn’t do very well, and it took a fantastic experience in a microbiology lab to get me back on track. Thinking back to living in London as a teenager, the stress of not belonging really affected my early academic performance.

But that experience also gave me tremendous resilience. As a consequence, I’ve always aimed to be the best: to be the first in the class, to be the first to discover something, to move into fields where I would have to put a lot of personal effort to be successful. I haven’t shied away from those challenges, and I have found success. But it is stressful to constantly feel that you have to do more, that you have to be the best. Ulti-

mately, the chronic effects of racism can take a huge toll on health. So, yes, racism has affected me, but I have found ways to channel those experiences toward a better future for myself.

What does Juneteenth mean to you? What does it mean in the context of STEM?

During my many decades living in the United States, I have really come to understand what racism means, because it was not taught to me during my formative years abroad. Juneteenth is a day to celebrate the proclamation of emancipation by Abraham Lincoln in 1863. For me, it is a day to pause and reflect on what racism’s consequences have been in life in general—and in particularly, in science.

Over the course of your career, what DEI-related changes have you witnessed in science and medicine?

Most of us working in this area over the last 30 or 40 years have focused, quite rightly, on getting more scientists of color involved in research and medicine. We are definitely moving in the right direction. Are we moving fast enough such that scientists reflect the diversity of this nation? No, we aren’t there yet, but we are moving in the right direction. If you look at the racial distribution of scientists who are applying for national awards and national funding, there’s been a real uptick. NIH recently released these data. What are some other examples? Recently I have been working with the Chan Zuckerberg Initiative (CZI). They put out a call for applications to support scientists who are heavily involved in diversity, equity, and inclusion work at their institutions: we often call this the “diversity tax.” CZI had an application pool of 450 applicants for 25 awards, and the majority of them were individuals from underrepresented groups, including scientists with accessibility challenges. Diversity in clinical trial participation also remains a hurdle. The American Heart Association has a new program to address this issue, and I’m playing a leadership role to train the next generation of scientists to have a more inclusive approach to clinical trial enrollment.

The Juneteenth remembrance inspires me to continue work related to diversity, equity, and inclusion—and to do it in new and creative ways that go beyond

workforce representation. Representation is just one piece of the puzzle, albeit a critically important one that I'm now reflecting on and urging others to think about. My current thinking is broader: how can we deliver the fruits of science to all people, including those who have been marginalized? As we develop new and powerful research tools, how can we make sure they are used by and accessible to everyone, not just those who are more privileged and have the resources? Some progress is promising. For example, CZI has broadened their human cell atlas initiative to include cells from groups that were historically excluded. If as a research community we truly view science through an equity lens, it is likely we'll make life-changing discoveries.

We are starting to see the development of inclusive science to address diseases that disproportionately affect certain racial and ethnic groups. Take for example the discovery of PCSK9 inhibitors for heart disease. Initially, scientists drew from genome-wide association studies in which the samples were predominantly from people of European ancestry, and they turned up nothing. It wasn't until the research team broadened their work to include genomes from people of African ancestry that they identified a loss-of-function mutation that led to a whole new set of drugs for reducing cholesterol. That's just one example, and there are many others.

What would you say to people who think that scientific and biomedical journals should “stick to the science” and avoid featuring DEI-related content?

I would say that's a misguided and uninformed view. There are many examples in the literature showing that a broader, more diverse approach to science leads to better solutions. How can we have good science with only part of the story?

For the reasons I have already mentioned, having special journal issues dedicated to diversity, equity, and inclusion is important. It's also valuable to publish articles that visit the intersection of

science, health disparities, and the social determinants of health: something I haven't seen very much. For the most part, we have different sets of researchers that publish in separate journals. A new publishing frontier should be a strategic attempt to bring those disciplines together to highlight overlaps and forge interdisciplinary research that will lead to new discoveries.

You've written about the gender leadership gap in academic medicine. Where do you feel we are with that leadership gap and what's needed to close it?

The leadership gap still exists, and it's persistent. Looking across the board, the representation of women department chairs is only 20% to 25%. We've got to do a lot more work to make sure that leadership gap is bridged. Unfortunately, the same holds for the leadership gap by race and ethnicity. Why is this important? People lower down in the career path need to see people like themselves reflected in their leadership. When talented scientists leave our community, everyone loses.

What's behind the lag? Cultural views of successful leadership. When we search for leadership positions, I believe most people cannot put aside implicit biases and look more broadly to what inclusive leadership looks like. That might be even more important than traditional views of a successful track record. Without representation, we don't have the examples, and the cycle continues.

I am proud that the Stanford University School of Medicine has made significant progress over the last 10 years, using a much more holistic approach to selecting its leaders. Half of our department chairs are now women.

How could scientific and biomedical publishers better support and engage with historically Black colleges and universities (HBCUs), institutions serving historically minoritized communities, and tribal colleges and universities (TCUs)?

It's important that we move away from the idea of partnering with underserved institutions as an afterthought. What we

really need is a purposeful plan for building partnerships in research, and another example is work I led at CZI called the Accelerate Precision Health Program. This is a partnership with the four historically Black medical colleges (HBMCs) to build the infrastructure for precision medicine and genomics research and to develop effective engagement between HBMC- and CZI-funded faculty, with the goal of new collaborative groundbreaking research. It also involves building a highly innovative new program to train genetic counselors to address a workforce shortage through inclusive hiring practices.

Do you have any thoughts as to what the chief remaining barriers to achieving true equity, diversity, and inclusion in STEM are? What are the solutions to overcoming them?

The main remaining barrier is changing the culture of science to be one that is much more inclusive. To reiterate what I just said, we currently lack strong partnerships between funders, publishers, and communities chronically underrepresented in science. It's not just a question of walking in and providing resources. This work is not easy, because you're talking about bringing together different life perspectives of people who don't know each other and haven't worked together. There are deep wounds from science's past abuses, and we need to build a new era of trust.

Another major challenge is achieving health equity. We should all strive for equal and equitable access to the wonderful benefits of science—those already here and those to come in the future.

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DECLARATION OF INTERESTS

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