

Podcast Interview: Robert Tjian

PNAS: Welcome to Science Sessions. I'm Brian Doctrow.

In recent years, a considerable amount of funding for scientific research has come from philanthropy. For example, in 2015 private non-university non-profit organizations contributed \$19.4 billion to research and development, according to a report from the National Science Foundation. The long-term impact of such funding on how scientists conduct their research remains to be seen. NAS member Robert Tjian, a biochemist and molecular biologist at the University of California, Berkeley, has an insider's perspective on private non-profit scientific research funding. From 2009-2016, Tjian was president of the Howard Hughes Medical Institute (HHMI), a private nonprofit medical research organization whose mission is to support basic biomedical research, as well as science education. HHMI is one of the largest private funders of biomedical research in the nation, with \$662 million spent on US biomedical research and \$86 million on education in fiscal year 2017. I spoke with Tjian at the World Conference of Science Journalists in October about philanthropy's role in scientific research funding. Tjian believes that private non-profit organizations like HHMI provide a valuable complement to government research funding.

Tjian: We have greater degrees of freedom as private non-profits in how we support the science, what types of people we support. Our ability to take risk, or at least our willingness to take risk is higher. We can make decisions faster, so the process from conceiving of an idea to implementing it and putting resources to work for that idea can be very short. We're more nimble.

PNAS: Nevertheless, government funding of science remains essential.

Tjian: As big as the philanthropic effort in the United States is, it's still relatively a small percentage of the total funding that the federal government or state government puts into research. It would be a mistake to think that, no matter how impressive some of the private organizations are in funding science, that we are somehow going to replace the federal government or state governments. I think it's a very healthy complementary relationship; that's the way I look at it. We can do some things better than the federal government can, and they can do lots of things better than we can.

PNAS: Tjian also emphasizes the importance of private foundations for supporting basic research.

Tjian: A lot of times, people want to get to helping patients right away, when in fact the fundamental underlying biology isn't known. And so my view of it is that we need to continue putting a lot of resources into the fundamental discovery process. And that's where I think private foundations have an easier decision to make, because the federal government is progressively being pushed more

towards the translational or preclinical and clinical end, because the pathway is so long between making a discovery and getting it to the bedside where patients can benefit from it. There's a whole other aspect of science and research, which I think certainly in the past the United States has excelled in, and that is research because of curiosity and trying to solve interesting problems, with no necessary translational component at the end. So I think the biggest challenge is how to maintain that curiosity of trying to understand the physical and biological world. And from that will come some of the most important discoveries in health.

PNAS: HHMI's flagship program is the HHMI Investigator program. Currently there are nearly 300 Investigators at more than 60 institutions across the United States. The Institute runs several funding programs in addition to the Investigators. As president, Tjian expanded the Institute's support for researchers in the early stages of their careers who might not yet qualify to be Hughes Investigators.

Tjian: One that we started was on what we began to call the earlier career scholars. These were not Hughes Investigators *per se*, they were more grantees, because they were pretty early in their career. We didn't think it was necessary for them to be employees at that point—they had just been hired by universities—but we could support them. The chief science officer that I had recruited to HHMI, Erin O'Shea, who's currently the president, and I both felt that there was a real need to try and help bridge that gap from when you first get hired, and then when you become a Hughes Investigator. So this early career program I think really served that purpose.

PNAS: Tjian also wanted to expand the audience for HHMI's educational programs beyond high school and college students, bringing scientific research to the general public through a documentary film division that has covered topics such as evolution, vaccines, and drug development. Another of Tjian's accomplishments as president was establishing a peer-reviewed open access journal, *eLife*, in 2012 in collaboration with the Wellcome Trust and the Max Planck Society.

Tjian: *eLife* is really about the scientists and how best to provide them with a platform to, as quickly as possible, put the science out. I felt strongly that the editorial decisions should be made for scientific reasons, not because the subject happens to be hot that month, and that the best people that could make those decisions about scientific quality were active scientists.

PNAS: One of the hallmarks of the Hughes Investigator program is its focus on people over projects. Investigators are chosen based primarily on their past performance, as opposed to their proposed research. Tjian believes that this approach provides a good chance of yielding transformative research.

Tjian: If you're not choosing individuals but rather just deciding on certain areas, I think it's harder, because you're making predictions about what areas are

going to be interesting for the future. Especially in a situation where you have a limited amount of funding, which is almost always the case, I just feel that it's very challenging to figure out how to make those decisions. I think it would be a mistake for us to always think that we can predict what discoveries are going to lead to something that will be transformative for biomedicine, or for materials sciences or chemistry. But we are a little bit better at judging the quality of the individual, given their track record.

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