

THE FUTURE OF SCIENCE RESEARCH FUNDING

Nicholas Florko 00:14

Hi everybody. Thanks for joining this session on "The Future of Science Research Funding." I'm Nick Florko. I'm a staff writer at The Atlantic. I suspect that most of this isn't going to be a surprise to folks in the audience, but I just want to do a little bit of level setting about where we are. So, we've seen tremendous efforts from the Trump administration to sort of upend what scientific research funding has looked like we're going to be talking about billions in dollars of grants that have been terminated for NIH but then also smaller things such as the impact on immigration. We've seen \$100,000 H-1B visa costs, and how that might impact the workforce that works in these labs as well. So, I really wanted to start with just understanding this question of what the last few months have looked like, and I want to start with our university partners here on the stage. Obviously, a lot of this is still up in the air, but give us some sense of how the last few months have played out, and sort of how your institutions are responding thus far. And how about we start with you, Douglas.

Douglas A. Girod 01:21

Sure, thank you. Good morning, everybody. Thanks for joining us today. You know, I don't think we've ever seen this level of federal activity, in terms of, as we all know, a flurry of executive orders that have impacted sort of every element of what we do as research institutions. And I would say, if there's one thing that's been good out of this. It really has, I think, codified our institutions together in a collaborative fashion, to really think about how to focus and address some of these challenges, and then pull together to do things like putting together an expert group to think about different F&A models, to start that conversation for as just an example. And so I think we've all lifted our heads up in this moment in time. I think we've been heads down for a long time doing the work that everybody in this room does every day, but I think we may be in the process of doing that, lost a little bit of track of what was going on at the highest level, and I think it's forced us to lift our heads up and think a little bit differently.

Nicholas Florko 02:21

And Ronald, I'm really curious for your thoughts as well. Last I checked, Hopkins was the biggest recipient of NIH funding grants. Can you give us some sense of how much of that has been impacted and sort of how you all are dealing with it?

Ronald Daniels 02:32

Sure. So I think it's fair to say that the impact, just in the way that Doug described, has been pretty profound, and it has been unrelenting in terms of the number of initiatives, executive orders, funding shifts that have impacted the rank and file, and it's felt very palpably across the institution. So as you indicated, Nick, we are the largest, at least, have been for a number of decades, the largest recipient year over year of federal research funding. So, as you can imagine, we really feel we're on the front line of number of the changes that we're seeing. I think first and foremost, excuse me, as much as the conversation has focused on grant terminations, and they have been significant. At Hopkins, we've received about \$58 million of terminated grant notices, and that's significant, of course, for the research that's being supported by that activity. But in truth, I think that's much less important than what we're seeing in terms of new grant awards and continuing grant awards. And there actually the impact has been profound this year, year over year, of the fiscal year of the federal government, our NIH research awards—new awards, continuing awards—are down by 30 percent and that's someone in the order of \$350 million of reduced grant awards. So you get some sense of just the sheer impact and the number of PIs that are impacted by that, the postdocs, the graduate students, the lab staff that are all in place, and then, of course, the loss in research activity that impacts patient populations and technological innovation in this country that is the fallout from that reduction, just another data point that I think is significant. Again, we're waiting to see with the closure of government, the shutdown, we haven't been able to fully assess the impact of all that we've experienced at Hopkins, and indeed across the system. But again, at Hopkins, our new grant awards for those faculty who typically receive funding from the National Cancer Institute are down 68 percent so this is profound, and as you said, Doug, it's pretty unprecedented.

Nicholas Florko 05:03

How do you make up that loss? Like just walk me through before we get to bring in the other panelists—what has that looked like? That early response? Is it forcing new partnerships? Is it moving internal resources? How do you keep the work going with such significant disruption?

Ronald Daniels 05:19

So I think it goes without saying, first and foremost, you know—the money is not there, so you got to figure out how you can sustain the research, and so at every level within the organization. First and foremost, you start to cut costs. You go back, and we've been doing this over a number of years, but you double and redouble your effort around administrative cost savings and consolidations, then you're reallocating other income streams to prioritize support for your faculty and postdocs who are affected by this. So we have a set of awards that we call bridge awards that will provide some temporary funding. But again, we don't know if this is a permanent loss or this is just a temporary situation. We also have awards

that allow faculty to pivot to other grant areas that ostensibly, hopefully may be supported by them. And then, of course, you look to outside sources of funding. After we've exhausted what we can do internally, you're looking at foundation support. You're looking at corporate support. And of course, what I think is interesting is just even the moment, and we've seen some really interesting examples of this, we're looking to state support and making the argument to state government that the activity that is being supported on a meritocratic basis in our institutions has very significant regional impact that is worthy of state support. So the investments that the state of Massachusetts is talking about at a \$400 million level, the \$23 billion investment that's being contemplated in California, again, will help. But I just want to leave on the following note that despite all these efforts to reallocate, to prune costs, to look outside funding, nothing, nothing is capable of making up for the loss in prospective funding from the federal government, just the sheer scale and character of this extraordinary system that's been created in the United States over the last 80 years, meritocratic allocation of funds on a competitive basis, and such significant quantum if that quantum goes down, we're really in a very, very tough place where I think it's really hard to imagine that we could ever make up for that level of funding, and also be really concerned about how that funding gets allocated. It's not just the quantum, it's the way in which it gets funded.

Nicholas Florko 07:50

Let's talk a little bit about how we make up some of that. Your point is well taken that nothing can really make up for that funding. But I want to bring in folks from philanthropy here and just give us—give me your sense of how you all are approaching this moment and how your approach maybe has changed since we've seen such an impact at the federal level. Karen, do you want to start?

Karen Knudsen 08:11

Sure, happy to do. You know, let me double down on everything you just said. Yes, and—philanthropy cannot make up for the gap, nor should it. You know, if you think about the way someone who's entrepreneurial as a scientist is as I am, the way that you run your laboratory operation is by a risk portfolio. So fundamental research that's going to lead to that has the potential to lead to something to be transformative, but that is not so high risk, high gain, that the failure rate is insurmountable if you only have in your portfolio, high-risk, high-gain research then there, you know, there's risk for you, there's risk for your staff, there's risk of the viability of your program. So there tends to be a balanced portfolio as any entrepreneurial person would run. So, the way that we function at the Parker Institute is to serve as a mechanism for that high-risk, high-gain research. So in order to answer, I just going to get quick second about how we work, because we're a radical model, or, I think as simple as we are radical, but a model of one. So we actually fund cancer therapeutic research around the country. By definition, it has to be ambitious, nonincremental science that's high risk, high gain with an eye toward bringing cancer therapeutics to commercialization. We're pretty unabashedly open about that. We believe science needs to get to people. So how do we do it? We fund it, then we actually employ in the technology transfer office. So we have an opportunity to look at all of the subject matter IP that's generated across all of our investigators. And then that's where we become an investor. We start early stage companies. So we have 17 companies in our portfolio where we are either the lead investor or part of a syndicate. By the end of this month, we put in, over the last nine years, a little more than \$350 million in just the venture

component of the Parker Institute. And because we're not finding our founders in the wild, no one's pitching us on an idea, we've seen it from the very beginning. And derisk the science, then venture capital comes behind. So almost 5 billion raised in those 17 portfolio companies, most of them in clinical testing. And in oncology, it takes about 15 years for discovery to make it into FDA approval. So the way that we measure success is actually collapsing that timeline. That's what our goal is. So how are we responding? We want to and we must do more. So I came to the Parker Institute earlier this year to scale and to crank that flywheel. I think it's more important than ever. We cannot provide the balanced portfolio outlet for investigators, but we can find a way to do more on the high risk, high gain, but not leave it in the laboratory. We need to get those innovations into clinical testing and into people. That's what the early stage companies are about. And I'll leave you on this of the why—in this country—in the United States, so forgive me for giving a US view for just a second—the high water mark for cancer mortality rate was actually 1991 and since that time, we have reduced cancer mortality by 34 percent. And that's no accident. That 1991 inflection point was when there was an investment in cancer science. And so it is imperative that we do more. I think, like, every organization is thinking about how we can do more, but I think that it won't be a positive structure for us if we start to veer from what is our core, and for us, our core is getting curative cancer therapies to people.

Nicholas Florko 11:33

Lynda, walk us through how the Fund for Science and Technology is approaching this moment.

Lynda Stuart 11:39

Thank you very much, and thanks everybody for being here. The Fund for Science and Technology—we're a new private foundation, we're part of the Paul Allen philanthropic ecosystem. We were founded in 2022 and we just happened to come into the world this year at a very interesting time. And we are a sort of big bet organization, so we focus on bioscience, artificial intelligence (AI), and the environment, and really based on our founders' kind of principle. He was a man with great imagination, great curiosity, and deeply interested in the power of ideas. And so we as a foundation are really very committed to funding everything from the first ideation, that spark of brilliance that you see in really great basic researchers, all the way of taking those ideas to impact. And so in some ways, similar to the Parker Institute, we really have this sort of end-to-end view of our portfolio, and to be able to work in that end-to-end construct, it's actually really important as a philanthropist that we use every tool in the philanthropic toolkit. So we talk about early grants, which are high risk, nondilutive efforts that you know are substantive. They go to, you know, just an idea. We don't need any proof of concept. Once we have that proof of concept, we can then engage through program-related investments with venture capital, kind of for startups and spin outs. And then there are other tools further down the pipeline that philanthropists can use to get that idea all the way to impact. And so I think in the context of this moment in time, really, we are very committed to actually, very strategically trying to deploy all of those tools to fill in the gaps and to make sure that we can get things from from beginning to end. Everybody who you're going to hear [from] today, there is nothing that is going to fill in the gap from the federal funding. But I think what we can try and do as philanthropists is be strategic about how we deploy our dollars to make sure they have maximal impact across the entire ecosystem and really keep it going. And I actually think there's also—I was saying earlier

to note that I'm a little bit of an optimist, and I do think there is an opportunity to reimagine how we—this whole ecosystem, to actually strengthen it, so that when we emerge from all of this, we actually emerge as a sort of stronger, smarter, more agile and more strategic kind of funders of science. So that's my optimistic ending to my comment, but that's how we're approaching things.

Nicholas Florko 14:48

I want to bring you and Jim here—walk me through thinking about the private sector. I know your company does royalty financing, help us understand briefly, just what that is and what role that could play here.

Jim Reddoch 14:59

Sure. Good morning. Great to be on this panel and this and talking about this important topic. And you know, we at Royalty Pharma, you know, are continually thinking about, you know, how we can facilitate, you know, bringing new medicines to patients. And I can tell you a little bit about how we have done that in the past. And you know, we're pushing ourselves, challenging ourselves to stay creative and talk about interesting new pharma models and financing models to help this issue of the academic funding gap. But Royalty Pharma is a 30 year old company that, as the name suggests, invests primarily in royalty streams. So that has meant in the past, talking to academic institutions about their inventions and their IP and seeing if they're interested in pulling that IP—the value of that IP forward to the present, rather than waiting for the 10 or 15 years that it would have taken those cash flows to come into the university. And we've probably done transactions with 15 or so of the more translational-focused universities out there, and have probably brought in \$5 billion of capital into academic institutions or nonprofits. Actually, if you count the Cystic Fibrosis Foundation, which is \$3 billion in itself then it probably adds to, you know, closer to \$8 billion. So those are examples of our traditional model. And you know, something that I can talk about is our interactions with tech transfer offices and and finance teams at universities about, you know, how they can push themselves a bit more to sort of get some of this IP and their own discoveries out into the world, because I think they can market themselves a little bit more in this particular time. And another thing that we were added on to our business that's really interesting is not even waiting for there to be a royalty, but to rather just go to drug developers themselves, drug discoverers themselves, and say, why don't we directly be your partner in funding this? It will just make a royalty. Will make a way for us to get paid out of the success of this molecule if it makes it to the market, when and if it makes it to the market. So that's really opened up a lot of discussions with biotech companies, you know, obviously, for which has been a bit of a biotech winter in the market, but also academic institutions who are spinning out interesting companies and are looking for, you know, novel ways to get those funded. Because I do think that novel funding mechanisms, like us, and there have been several of them started recently that are also nonequity, nondebt. New models of financing our world are really starting to proliferate out there, and I'm happy to point people to who might be the right partner for them in the ecosystem out there.

Nicholas Florko 18:03

I want to go to one of the questions that we have from the audience. As a reminder, you can send me questions via the QR code, which I think is popping up there periodically. But this is one actually that Ronald you touched on a little bit at the start, and it's what is the impact on future generations of our young scientists.

Ronald Daniels 18:21

Do you want to start Doug?

Douglas A. Girod 18:22

Yeah, sure. I wanted to follow on all your comments, because I think buried in what you were talking about, the most critical element, is the shutdown of new funding. And the approach that's been happening in particular at the NIH to get rid of the funds that they have currently has been to fund grant five year grants for all five years, as opposed to bringing on new grants. And we're at about 40 percent down year over year, much like Hopkins is, and that's the feedstock of the future that we're talking about. Those are the new PIs. Those are the grad students and the postdocs. And if you shut that tap off, the impact of that—actually not in five years. The impact on that in probably six to 12 months is going to be profound, but it will impact us for a generation. And so I think in this moment in time, it does help require all of us in the room maybe to think a little bit differently about how we're going to support this ecosystem, and if we don't support the feedstock, which is our future scientists, then this whole conversation has kind of moot at the end of the day

Ronald Daniels 19:27

So just building on what Doug said. I mean, it is incredible, the shift in just sentiment within our communities that are affected by the changes, the shifts in science funding, but you can see it, you know, even in our PhD student population, and we know this actually was confirmed in a recent nature survey, but basically, 75 percent of them see the opportunities to pursue their science as outside the United States. I mean, it's just such an extraordinary but abrupt, to pick up Doug's point, loss and talent, that is basically saying we're looking to exit because we've lost confidence in the capacity of the system to forward our career. And, again, I think for all of us on the panel who are part of this rich and complex ecosystem that is developed in the United States, that has all these different players, but fundamentally, at core, is built upon the promise, the commitment of 80 years of federal government research funding. What we're seeing is just the extent to which the retreat of the federal government, and not just in terms of quantum not just how much, but how the funding goes out. It is really quite profound, and at a time when you're seeing all the promise in so many different areas of health care for truly transformative interventions that can change the prospect of our fellow citizens in terms of grappling with really fundamental disease and at the same time, of course, being acutely aware that while we're having this moment when we are debating and acting upon a set of activities that are undermining comps in the system. We see this geopolitical threat coming from China, which is just lurching forward, and ironically, they're basically working off of our playbook. They've taken our playbook significant national funding to

support basic and translational research, helping with startups and funding at a level that shows no equivocation on a meritocratic basis, which has been the essence the genius of the system. So you know, just, I'll just finish on this. This observation a few weeks ago, there was a piece published in the New York Times by two academics that looked across 64 critical technologies that are being developed now and to see where we stood the United States versus China. And here's the, of course, the really sobering conclusion of their work. And 64 of the baseline of those 64, 57 of the 64 the preeminent institution in that particular technology is in China. And more than that, they populate to a much greater degree than we do the top 10 institutions. So this has happened in real time that we're having this equivocation, these shifts at a time when China, using our playbook, is showing absolutely no ambiguity whatsoever in terms of their commitment to fueling the research enterprise.

Karen Knudsen 22:57

Well, you can't blame them, because it worked right? But in truth, though, and I agree with everything that you said. The plight of the early career investigator, early career scientists was not good, even before this started. Right? So we, you know, we know in the US that you know, by and large, people who win the Nobel Prize in science and medicine or chemistry make those discoveries before age 45 yet the time of the first R01, you know, the major grant from NIH is in the early 40s, so already there was this imbalance, and that's where I think philanthropy has traditionally played a role. This is an area where I know we are continuing to step up. We're about to announce a joint award with another major organization and endowed, so it will happen every year for early career investigators doing cancer therapeutic clinical research, which we haven't touched on here, which I think is really important, but we know that that's a big gap. And the you know, the physician scientist has been on the decline for years, and we're really concerned about what that means, because how do you get the science to people without clinical research, which is a key component of the government funding that often gets overlooked.

Ronald Daniels 24:07

So I just want to pick up on what Karen said is, I think we can actually concede we you know that there are improvements we can make, and it's great that you're actually taking leadership on issues of young investigators and so forth and how we accelerate their time to independence, that's wonderful. I mean, it would be even better if the NIH and NSF could find other mechanisms to be able to address some of those issues. There's a lot of ink over many decades that has been spilled on this issue. So the ideal world would be able to do that. But clearly, the answer is not to retreat from the investment nor to the meritocratic basis for the funding model, so we can hang on to that core idea, while nevertheless saying we want to see reforms and how this funding can go out in a way that gets us closer to the excellence, ideas, the goals that motivate the system.

Douglas A. Girod 25:04

I think, going to the many elements that we're contending with. Lynda and I were talking about earlier—Lynda came to this country on an H-1B visa, and—with her husband, who came out, you said a J-1 visa, I

think—and would not probably have come if it weren't for the prospect of the ability to stay and to have a successful career in the United States, and that has been another key element to the success of our model has been to attract the best and the brightest from around the world and to offer them an opportunity to really pursue their careers in a way that has really advanced science globally, but certainly within our country. And that's another pipeline that is being challenged quite significantly right now.

Nicholas Florko 25:47

Another question from the audience in this vein—Jim, I'm going to go to you for this one. How can pharma support training programs in universities to feed the pipeline of future talent?

Jim Reddoch 25:58

I was just about to add on to the last conversation by saying that one thing that I think the US has better than any other geography is this sort of venture, you know, sort of like deep, you know, reservoirs of capital and establish, you know, 30+ year industry, 30+ year track record of funding some of the great companies in the world. I mean, Amgen came out of academic research. Genentech came out of academic research. So, you know, it has always happened. And I think advertising or sort of making sure that that is known to entrepreneurially-minded researchers that you know, this is the place that's going to be most likely for it to happen for you, in terms of being able to spin out your research and having it, you know, be funded by smart venture people who will not only just be capital, but also be kind of a mentor to you as you—that's deeper here than it is anywhere else. In fact, I think in Europe, it's sort of like retracted a bit in the last decade or so. China is—it's definitely happening in China on a science basis. And I just heard recently that if it's nine innings, you know, China does like the second through the ninth innings way better than us and the first inning, which is, you know, the research, either early research, we have done better, but they're probably going to figure that out pretty soon, because basic research—I mean, I go to the medical meetings and the scientific meetings like ACR and ASCO. The number of posters and talks from Chinese researchers is just up 10 fold in the past five years or so. So to answer the question, I think it's continuing to make our ecosystem attractive in terms of the options that young faculty members have at their disposal and making sure that they know all of the infrastructure at their university or institution, in terms of translating their discoveries into interesting projects. It really—and it's not just about the fact that you can make some nice proceeds from this down the road. But many people who I know, who have are startup entrepreneurs, they just love this interaction with smart people from the finance world or smart people from the industry world. It enriches their job to have other places or other types of people to talk to, so... I do see that, you know, happening. I mean, I talk a lot with, you know, MSK, and Brown, and MGB, and MIT, we hold a conference at MIT, and we hold another conference at University of Cambridge, but the new faculty that are coming into these places right now are translation-minded, and, you know, entrepreneurially-minded, and have that in mind for themselves is to sort of have a foot in both worlds.

Lynda Stuart 28:53

Can I make—just a comment on China? Because I think this is—it's an interesting observation, the emergence of China, as in a force in this ecosystem. But I want to remind us all that we are not actually—we all went into medicine or research or whatever, not to beat China, or not beat China. We went into it to beat disease. And actually—we're actually all on the same side, if you think about it. And what is exciting is that China is now this force moving forward cures and amazing research. And I think, you know, it reminds us of the power of the US system in that, as well, and that we all should keep that in mind, right, that, how can we work together against all of these, you know, blights on humanity and use—see the best in each system and leverage the best in each system. So I just always like to maintain our focus on that as the problem, not—

Ronald Daniels 29:58

I agree and I think it's important not to see this as zero sum and just describing but all I'm really saying is that the thought that we retreat from the model and the strength of the system and the robustness of this ecosystem that we've created, and willing to see that role, I think, is really gravely unfortunate. We can't see this in the sense that someone else is going to do it. What we want to have is the additive effects of our staying the course and then having others who share in this enterprise. And just the way you've described.

Jim Reddoch 30:34

I also think, from a story standpoint, it helps the American public, you know, want to get funding back to our great institutions, if it is portrayed a little bit as like we need to do this as a matter of national pride.

Karen Knudsen 30:46

Yeah, but there's another little piece here that actually does affect patients and the US public. Because I very much agree with you. We're a global organization. We see ourselves as global. If you know where the science comes from, if it's going to give cancer cures, we're all about it, but it's what happens to clinical trials here in the United States. So what the emerging paradigm that we're actually seeing, whether you're an entrepreneur with an early stage company who's doing a phase one study, or whether you're pharma, or whether you're a leading academic investigator—doing phase one here in the United States is very difficult at the moment. There's some things that we can do on the on the you know, side of just bureaucracy, to ease the speed of activating a phase one study, but also the reduction in funding that's direct to research. And also the indirect costs, I can tell you, from having, you know, run oncology for one of the largest health systems in the US, you need those indirect costs to actually pay for your clinical trials unit, and this is where cancer patients in particular are going to lose in the US, because access to early stage medicines is not happening. China has addressed this, you know, they have positioned themselves as a great place to do early phase studies. So has Australia, so has New Zealand, and more will come. And so I worry about the, you know, long-term effect on the early career investigator in the US, definitely, for sure. But I worry about this earlier point, which is what happens to access to potentially life saving therapeutics, cancer and beyond because early stage trials are not, are drifting out, and I don't know how we get that

back. I want us to—I'm with you. I'm an optimist, and I'm solution-oriented. So if there's solutions to be had, we'll do it. But we're seeing that with our early stage companies as well.

Nicholas Florko 32:30

I want to ask actually, just about basic science research to pivot a little bit, because that's one of those places that strikes me that I often think about who is going to fill this gap. Like that's one of the places where it feels like the government plays a very key role. And I'm hearing a lot of talk about finding big bets in these big projects. But what about just like, basic lab science? How do we make sure that that doesn't get lost?

Karen Knudsen 32:51

You mean, like, the science that gave rise to GLP-1's because somebody was studying lizard venom?

Nicholas Florko 32:56

Yeah, exactly, exactly. Anybody.

Lynda Stuart 33:00

So I'll start by saying, I think the US—speaking to what was amazing about the US system, and why has China not probably matched the US in the upstream in that basic—is the sheer volume of and the way the funding is deployed for investigator initiated awards in the US. It's going—that's a very hard thing to do, to replace because it really does look across so much of a portfolio, such a huge portfolio, that, you know, it's not something that can simply be—that anybody can step into. That said, I think that we are at this unbelievable moment in time in history. We have artificial intelligence, we can engineer biology, we understand systems that we've never understood before. And as you look at that, now is just the terrible time for us to retreat from this because there is so much opportunity. So, coming back to my, you know, positive framing, I look at this huge opportunity that is in front of us all, and how do we really strategically make sure that we actually leverage all of it?

Ronald Daniels 34:29

So, Nick, just—you know, I think you really hit on something that again, at the risk of dreary repetition, just again underscores the importance of government. I mean, the basic research enterprise, the curiosity-driven science that we know has been at the wellspring of so many critical advancements that later on get translated again with a lot of the actors whose sectors are represented on this panel, gets translated into patient populations or into new technologies and accounts for our industrial, military, medical dominance. I

mean, again, starts with a function that is very much quintessentially a public good. And as much as we hope that foundations and others will step into the breach if government retreats, the fact is that even the foundations often come with a sense of my disease, my particular—I'm thinking about, you know, how we increase, you know, translation for this particular patient population, how we get that molecule into production, get it through clinical trials and so forth. And what you worry about is the basic foundational research that we don't know precisely where it will go and what applications it will have that is going to be the casualty, and that is in truth, again, in this incredible system. That's what governments do. Governments fund public goods, because no one else will other than some enlightened foundations, but basically everyone else is in a more translational vein, with the hope of getting private benefits from the commercialization of activity. There's nothing wrong with that, but you need the core foundation.

Karen Knudsen 36:14

Except some states have done it, right? Like if you look at CPRIT in Texas, a perfect example, right? And then look at what that's happened, what that's been realized in in terms of the economy in the state, the ability to attract, keep talent in the state, and to now have early stage companies developed within that state. So, you know, maybe that's one of the answers.

Ronald Daniels 36:36

So again—you know, I think this is—it's government. I'm really ecumenical. Any government that wants to give us money, state, local, federal, super national, be careful. There's states we would not but—out of this, out of this country. But again, within the United States, any level of government that's interested in funding us. But we also have to be realistic. You know, just again, some of the other shifts that we're seeing in federal funding priorities has put excruciating pressure on states. So at least I'm in a state where, particularly with the number of federal workers that live in Maryland, you know, we're seeing, this is a time of real challenge. So you know, the prospect of a \$23 billion California investment seems a little remote right now, but I agree with you, it's an important source of funding.

Nicholas Florko 37:31

I don't want to spend too much time on talking about DC politics, but I see some interest in the questions in this, this realm. So I'm curious, for folks that have talked to policymakers in DC, how is that message resonating about the importance of federal funding for research? Are you getting through and what role should the scientific enterprise have in telling that story?

Douglas A. Girod 37:56

I would say that we certainly are having those conversations. There is a profound misunderstanding of how we operate, even how the government itself operates, and how it has built the infrastructure that we

have today and the key elements of that, and you don't have to look any farther than just making a mandate of a 15 percent overhead rate. I mean, that's a profound misunderstanding of how everything actually operates, and it's complicated—and by the way the government designed it, so by definition, it's complicated. But you know...so there's really a lack of understanding, and that's probably on us in part, that there is that lack of understanding, and there is a desire to do the sexier, more applied type research as well, to shift money that direction, which really then undermines, to Ron's point, undermines that foundational basic science. And there's a desire to, quite honestly, reallocate funds in a way that is not based off meritocracy. And so, you know, again, not really understanding how we got to where we are today, and that doesn't matter which side of the aisle you're on, by the way, that level of misunderstanding exists in this city, and that's a lot of work that we have to do to both listen, take critical feedback. We can always get better. Certainly the agencies can get better. But at the same time, we have to help bring them along to understand. If we're going to do it differently, don't forget about these pieces of the building blocks that gets us to where we are because if you pull any one of them out, the house falls.

Nicholas Florko 39:34

Sure. Jim, I think you had a—

Jim Reddoch 39:35

Yeah, I don't have direct interactions with, you know, congresspeople or anything, but I did hear from a filmmaker whose name is Bill Haney, who has screened a movie for congresspeople, and was asked to come back and show it again and again. The film was about Phil Sharp, who is an MIT professor who won the Nobel Prize. And I think what is resonating with the people who are seeing this movie, who are congresspeople who is kind of like opening their eyes, of like, I hadn't thought of science in that sense before. But what's resonating is—it's not like the university going to Congress and saying, we need more funding, but it's a personal story of this man who grew up in a tobacco farm in Kentucky, and was dyslexic growing up and like, how—what is his story of how he got to, you know, not just the heights of MIT and starting the whole Kendall Square ecosystem there, but winning the Nobel Prize for RNA science. I think those are the kind of stories that will help our field more is, if it's not just this, you know, these are big, bad pharma companies, or this is, you know, rich universities asking for additional funding, funding when they already are doing pretty well. But it's if we don't fund people like this and enable their dreams to happen, then we're going to miss out on interesting people discovering their dreams.

Nicholas Florko 41:00

There's a question from the audience—as a reminder, feel free to submit questions. We're getting a bunch in. But this is actually basically the question I was going to ask, which is, just, how do you think researchers and institutions can overcome that broad lack of understanding by the government around the value of funding research? And I guess I would add on to that, what does that tell us about the efforts that have happened thus far to communicate the value of that research that it's not resonating?

Karen Knudsen 41:25

Yeah, I mean we certainly have a marketing problem, right? And we're not approaching it like we do, but I think there are a couple different things that that can happen. One is that if you actually look at the US public writ large research America, which is phenomenal organization, did it did a really phenomenal study over the last several years looking at us public's view on research, and the vast majority of Americans—vast—said that they thought that medical funding for research should be a national priority, rank-ordered, amongst other things. So the support and the national public is there, but making that connection to the person in the lab and the Phil Sharps of the world doing foundational studies, that's where we have a marketing issue to make that connection of, yes, I want my tax dollars to go toward advancements in science and medicine that have an opportunity to help me, but telling this story about these discoveries that ultimately become lifesaving or life-changing, I think, is where we can actually get some work done. But I'm—you know, I worry that part of the struggle with research funding has less to do with the fact that there's, you know, the politics of research, and more to do with the politics of universities, right? And that the research, is just an ancillary, you know, damage effect of [inaudible].

Lynda Stuart 42:42

So can I just double down on that statement? I think this is a really important differentiation to make. There is a distrust in the institutions of the university, an ideological question around that. And then there is as part of the collateral damage, the research enterprise is being unwound, and they're actually slightly different things. They're very interdependent, but I think we need to be able to make sure we're actually speaking about them separately. I'm not convinced that the government doesn't want to fund research. I actually am not sure that that is a true problem. I think they do have some issues or questions around the ideology of universities that they find challenging. So we need to tell the story of scientific research as that story, the Phil Sharp story, and not get it caught up in other discussions.

Jim Reddoch 43:49

The other night, and there's a few other people in the room who were at the Breakthrough Cancer dinner, where Sid Mukherjee gave a talk that ended with a challenge, which is basically saying, like in academic science, we've been entrusted with, you know, a great, you know, responsibility and one thing that we can do to sort of show the public that we're fulfilling that responsibility is checks on our progress and auditing and demonstrating to the public that we are following through, or if we didn't follow through, and a goal that we put out there was not achieved, why was it not achieved? So I think that would strike the public as like, okay, we've given you this gift, but you are handling it like a business would, or a responsible, you know, teenager who's like, been given a budget and can actually, extend within the budget. But I think those that sort of framework showing that back to the public, and an audit would be a good way to start.

Ronald Daniels 44:50

I just want to pick up on, Lynda, your framing, which I agree with at one level, and I'll pull back a little bit from it at another. At a fundamental level—we know this to be the case in Gallup polling and so forth, the diminished trust in American higher education, and particularly the rapidity of the loss and trust, is important, profound, and something that you know, Doug and I spend a lot of time talking ourselves, but talking with our fellow colleagues at the American Association of Universities, that's the 70 top research universities in the country, we're acutely aware of this issue of diminished trust, and the various concerns that have been raised, from unbridled antisemitism to lack of conservatives on campus and so on and so forth, and failure to bridge the divides within our institutions. So there's a real—I think there is an issue there that is severable from the issue of research funding. It is instructive, though, that when the federal government went first after Columbia and then went after Harvard and other institutions, the first thing that was done was to turn off research funding so there that the issues get linked that way. So I do think they're different, and I think it's going to be important that you know, as much as I think a lot of the criticisms about universities are grossly overstated and shrilled, but there's kernels of truth in them, and I think it's incumbent upon our institutions to look with courage and exacting scrutiny at what's true and what isn't, and remediate there. But here's where I think there's another dimension in this that's worth emphasizing. There is a same—and Karen, you referred to it a moment ago—there's a same level of criticism about how we do competitive, meritocratic research funding in the United States. Why does it take so long for young investigators to get independently funded? Why can't more of our research be reproducible? Is there enough innovative, funding edge science in Jay Bhattacharya's terms to justify the, you know, the funding that goes into this system. Are we getting the most? And I think, again, much of the way I think the general criticisms are leveled against the university require conversation, self-analysis and so forth. So too do I think these issues that are now in play about research funding require that same level of scrutiny. So I think the enterprise, I think the fundamental question for all of us is, how do we get beyond the recriminations and the really coarse reactions of shutting down funding and so forth, and get to a discussion and a set of activities across sector, including our federal government counterparts, to figure out, how do we rationally rectify these things that need to be rectified without letting this be a game of combat and I think the system craves that. You know, that the willingness to look at these issues.

Nicholas Florko 48:03

So we only have about 10 minutes left, and I want to make sure we definitely hit on the title of the session, which is the future of scientific funding, because I feel like we've talked a bunch about what is happening thus far. And so, Lynda, I want to go to you, because you mentioned that you're an optimist, but I'm curious for everybody else's thoughts on the panel as well. What is one or two things you hope, really? It seems like we're an inflection point, right? So what are the one or two things you hope change in the future? What good can come out of this very clearly chaotic moment?

Lynda Stuart 48:35

So I think—so thanks for putting me at the front of that question. But I think, you know, just going back to Ron's point, there are things that we can improve, and they are things we should improve. And, you know, I think Karen made the great point of, actually, brilliance happens often when people are young and naive and they don't know they can't fly. Right, they have this ability to imagine without unfettered by

somebody saying, "Oh, well, that's never going to work." And we need to really double down on those people who retain, have that curiosity, they retain that imaginative streak that can change the world. And so, you know, if I think about, you know, a couple of things I'd love to see in the future of science funding, I think it is being willing to take a bet on an idea. When, you know—because, you know, often we really are kind of very conservative in our current funding ecosystem. We can't look at an idea and say, "Well, if this did work, would it change the world?" And when we see those ideas, we should really champion them. So I'd love to see that. I also think that there is a way of funding science that isn't so fragmented. The current, you know, you go for your R01 and then there's an R33, it's like, so confusing. It would be lovely to have some system that could build on success and on success and on success, and pull it through from idea to impact. So those are two things that I think I would love to see. There are others, but I think really speeding up that process should be our goal coming out of the current transformation, let's call it, that we're in.

Nicholas Florko 50:43

I'm just going to continue going down the line. Jim, I know we were talking a little bit about some of this earlier. When you're thinking about what good might come into this, what are you thinking about?

Jim Reddoch 50:52

Well, I think one thing that I alluded to a little bit that universities could do, that would sort of, you know, help the world is like, take stock of kind of what you have discovery-wise or innovation-wise at any given time. And a group of people that could do this could be the tech transfer office, but I would also unleash AI, you know, on the portfolio that's at a university, and have it sort of package what you have and maybe even match, you know, the top three things that you have that Sanofi would be interested in, or the top three things that you have that, you know, a biotech company would be interested in. And, you know, and come up with the elevator pitch, you know, just help us with things that tech transfer companies or offices are so busy right now they're not able to. But that would be very helpful, I think, to the world, and also better crystallize for universities the amazing things that they do have that they might not be aware of right now.

Nicholas Florko 51:56

Karen?

Karen Knudsen 51:56

Yeah, so very much agree with that. That's exactly why we embed in the tech transfer office, right? That's where a lot of things go to die. Honestly, it just is. I think you hit on a great point. Two things—one is very tactical along the research continuum. The answers are out there, right? They've got to leave the

laboratory floor. You talked about one bottleneck, the tech transfer office. The other is the clinical signal. The world has moved. The world has changed. It used to be that venture would want to invest in an early stage company, relatively early on. Now they're looking for science to be further derisked. So where do those funds come from? To take a great idea that could be game changing and get into that early clinical signal? We don't have a good mechanism for it, as I talked about before, from the universities, are getting hammered in ways that really compromise the clinical trials office. We must find a fix for that, and imagine what a world looks like if the government took this on. You know, maybe they would take an equity stake, not to be too saucy, but maybe they would. Right? But if they want to really get involved in the process of making the value of the science more accessible and valuable to the people of the United States and beyond, that's the way to do it. That's one. Two—which I probably should have said first, because to me, it's the ultimate zoom out. All today we've been talking about, what are some fixes? But we run the risk of all of us trying to solve for a different problem we've never really articulated—and correct me if I'm wrong—as a country, what are we actually trying to solve for? So just put some CEO thinking behind it. What is your strategic plan for science and medicine in the US? What do you want to achieve? Because we know it can't be everything. And so if we took this moment to not just reimagine the structure, but to think first, what are we actually driving toward, and what are the measurable metrics of success, then I think we run a much better chance of solving and taking this moment to redesign the research and university infrastructure to solve for health.

Nicholas Florko 54:13

Doug, Ron, I'm curious for your thoughts on what good can come of this, or should come of this?

Douglas A. Girod 54:19

Well, I think we're in a moment of course correction tonight. I think what you just said is true of the university as well. I think this is a moment in time for institutions with all the challenges, frankly, all the opportunities, with AI that it's going to change how we do business, can change how we educate, it's going to change how we do research. And I think it's a great opportunity for us to stop and rethink our entire institutions, and mine's not quite as old as Ron's, so it might be a little bit easier to do that. But it really is—we are moving into a new phase and I think it is an opportunity to step back and say, what are we trying to accomplish? As an institution, obviously, as a country, but even as an institution. And then how do we reposition ourselves to do that through this moment of correction?

Ronald Daniels 55:09

So I echo and endorse all the things that folks have just said on the panel. I think I would just come back to the readiness, and I think the importance of having the collaboration, not just within the private and not-for-profit sector. We need the federal government to sit down with us, and I think clarifying what are our national objectives here? What do we want to retain? What do we want to shift away from? And then going to the instruments. Look, this is an administration that has demonstrated clearly that when it wants to do something, the typical political constraints that have operated and have limited other administrations

have a different salience here. And so, you know, we have, for years, have lamented the high cost of compliance in a number of areas of the research enterprise and not seen demonstrable benefit from those activities. We have, for years, lamented the problems with clinical trials and the burdens there. We now have, you know, clearly the prospect of a federal government partner that can help us really get at some of these long-standing issues. And so, for me, the most—I think the single most important thing for us to do now is everyone's attention is now being paid. We're ready for the conversation and the collaboration, and let's fix it together. And, for me, you know what I what I've really been struck by—you asked the question before—what do you say when you meet with your electeds? The truth is, a lot of the folks we meet with in Congress, well understand this, and I think in fact, the protection that we've seen in terms of what's come out of both the House and the Senate, around protecting the spend is quite encouraging, but I think it's again, we can't do this without the administration, and we need their support and engagement to really pull this all together and to ensure all the promise for our country and our globe at large and the patient populations is properly fulfilled.

Nicholas Florko 57:12

I want to finish with—may feel like a kind of a silly question, but I'm legitimately curious wow, as I listen to this conversation. I'm curious who, for a show of hands on the stage, who feels more optimistic than pessimistic about the future of scientific research at this moment, you're more optimistic than pessimistic.

Karen Knudsen 57:32

Qualifier—we talking about within the US or writ large?

Nicholas Florko 57:35

Within the US? *applause laughter* Well, I guess my question is, why be optimistic? And then for the folks that didn't raise their hand, why be pessimistic? At this moment, we have two minutes left, so I'm gonna, I guess, lean on you all here. Give me some sense.

Ronald Daniels 57:57

Science is too good. The country's assets are too profound and can't be squandered.

Nicholas Florko 58:01

And what about on the pessimistic?

Lynda Stuart 58:01

Can I add on to the optimism as well?

Nicholas Florko 58:01

Oh, yeah, please let's add some optimism.

Lynda Stuart 58:06

It is an unbelievable moment in scientific history—what we can do. You know, AI, engineering, biology...you know the ability, the things we know now that we didn't know? They have to be turned into goods. And so—I feel—I'm with you that we will make it happen.

Nicholas Florko 58:27

Doug, anything you wanna add?

Douglas A. Girod 58:28

No, I just, I think we will figure it out. And there are just so many assets right now, in this moment in time, as Lynda just said, that we can't help but get a good outcome out of this. That doesn't mean it's going to be easy or not messy, but we will figure it out.

Nicholas Florko 58:45

What about on the slightly more—I hate to end on a pessimistic note, I like to be positive at the end.

Jim Reddoch 58:49

Okay, just to pick up one thing, I think it takes too long for American scientists to reach. You know, interesting kind of career levels in academia right now. Like as a former scientist, takes us six years to do a PhD, and then you have to do not one postdoc, but two postdocs. So that's a lot of your productive life where you have a lot of ideas, where you don't have a platform for getting those ideas out to the world yet. So it has been said more eloquently on this panel already, but it is a big issue, and if they could, you know, these days, especially with what they're hearing and then reading in the news, and with grants, and their future grant ability and everything—they're going to go into other sectors. And we're going to lose a

generation of, I'm talking about American scientists, not to mention, like all the great Europeans and, you know, Asian folks that were coming here as well, who also might see too long of a path here. So I'll say something optimistic in a second.

Karen Knudsen 58:50

Okay, it's a lot of burden on me to like, not on something negative, and I'm not negative, but a way I'm going to flip it is like, how could I become incredibly optimistic? I could be—I'm absolutely with you. Innovation is at an all time high. Our ability to convert on that innovation is not being held by deep prioritization and underfunding. So I can be excited and incredibly optimistic in this country if we actually align priorities and then we put the finances behind supporting those priorities.

Nicholas Florko 1:00:13

And we will have to end there. Thank you all so much.

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