Michael Birrer of the University of Arkansas for Medical Sciences was invested as a member of the American Academy of Sciences and Letters in 2025. In this video, Academy Executive Director Greg Forster interviews Prof. Birrer about how government funding distorts scientific research, why this is the best time in living memory for advances in cancer treatment, and why democracy depends on the mission of the university.

Greg Forster, American Academy of Sciences and Letters

Hello, I'm Greg Forster with the American Academy of Sciences and Letters, and I'm speaking today with Academy member Michael Birrer of the University of Arkansas for Medical Sciences. Mike, thank you so much for being with us today.

Michael Birrer, University of Arkansas for Medical Sciences

My pleasure completely. Very excited about it.

Forster

Let me ask you my first question. What would you say are the one or two most important challenges right now for maintaining high intellectual standards in your field?

Birrer

Just to set the platter a little bit, my field is the molecular genetics and genomic characterization of gynecologic cancers. One of the issues in that setting harkens back to what one of our previous presidents, President Eisenhower, said at the end of his term about a military – industrial complex. We've evolved in that direction a little bit in terms of the biologic sciences. It is very concerning. This came to head at a meeting I had when I was up at Harvard. I was at MGH [Massachusetts General Hospital] for quite a while, for about 11 years, a professor of medicine at Harvard Med. I was at a symposium in the Dana-Farber, which was very enlightening. The topic was, why is so much science not reproducible? The comments were made that 80 percent of papers published in high-impact journals cannot be reproduced, which I completely agree with. It's a phenomenon of what Eisenhower observed with the military, which is that there is this collaboration going on. It's an unhealthy collaboration between academic funding sources and high-impact journal publications.

I'll even throw in institutions, because money is driving a lot of this. Investigators, for lack of a better term, almost ingratiate themselves into their positions, so it creates a phenomenon that the rich get richer. The big labs, which have a terrific reputation, I have no doubt that it's been established by *some* very, very solid science. But once that has been established, then there is this process where study sections say, we can't really reject a grant from this person because they have had so many publications. They've had so many grants in the past.

It's a self-defeating and continuous process that actually corrupts peer review. Then you add into it another level, which is that because of the reputation of the laboratory, it doesn't really matter in some ways whether the data is correct when it gets published in a high-impact journal; it's going to give a high-impact factor because people are going to quote it. So it's really very corrupting.

When I brought this issue up, it was interesting because the person leading the conference at the Farber said, I agree; it's really a problem with pharmaceutical companies inserting themselves into these kinds of efforts. I stared at him and I said, it's not the pharmaceutical companies; we know where they come from, we know what they want. That's very transparent. It's the process by which the funding sources—because most of it comes from the government now, which is unfortunate. This is why philanthropic dollars are so important to keep the system somewhat honest, because that's where we're evolving now. It is not an honest system. Because of that, 80 percent of things that are published are not reproducible. I'm a big believer. I don't want to go on record as saying I'm not a big believer in peer review. Peer review is the best review process that is fundamentally flawed. I can't think of I can't think of a better one right now.

Forster

Like Winston Churchill said about democracy, it's the worst system except for all the others.

Birrer

Exactly. You took the quote right out of my mouth. So that is the single most dangerous threat to the process. It extends way beyond the biologic sciences, but the biologic sciences command much more money because they affect human health within this country, so the dollar amount is just bigger.

Forster

Of course, the relationship between money and science is not a totally new problem. I think it was Thomas Hobbes who said that if you could make money by denying that two and two make four, there would be a school of thought at Oxford denying it. But as science progresses, it both costs more to do and it produces far more monetizable results. It seems that the problem of money and science gets more intense as science progresses.

Birrer

I completely agree with that. I want to circle back to the point that I made before. I'm not naive about this, but if Merck is sponsoring a clinical trial and sponsoring a project, that's transparent to me, I know what their motives are. I get it. The other process is much more surreptitious and, in that sense, more threatening. A lot of us feel that way in the field. I'm more in the life sciences than in the biologic efforts. We deal with a lot of pharmaceuticals. In an industry trial, take it for what it's worth. Here is the randomization. Here are the patients who are included. It's been conducted with GCP code. So that's fine. I can deal with the fact that Merck paid for the drug.

Forster

The fact that transparency creates some level of accountability leads a little bit into my next question. In what ways do you think the public has a good understanding of the mission of the university? And in what ways does the public's understanding of the university's mission fall short?

Birrer

That's a really great question, and I'm not sure I have a definitive final answer for it because it's evolving. The motivations of the public are clear and transparent, and those motivations are on multiple levels: they want to send their kids to get educated and, in a very practical way, at least the American public defines that, at least in part, by whether they will be successful in the rest of their life. Now, there's a little bit of a rub there – you're going to hear this a lot from me, unfortunately – in that American academics have evolved a lot from the 60s generation. The mission I just described has been also corrupted in the sense that there are a lot of degree-conferring programs that will not provide that child, that individual, with a successful career. I'm not going to go through the list, though you could probably guess at it, but there are programs now in a lot of universities that make you scratch your head and ask, what exactly will this person do after getting conferred that degree in terms of a productive life, a successful life, one that contributes to society?

That is evolving; recently, we may be seeing some clarity on that because certainly over 5, 10 years, it's really been problematic and it's not all social sciences. I'll be perfectly honest. Even in biologic sciences, environmental science. Why is it important? It is a very soft science, and it has a political motivation. Then that loops back to the other point that I want to make, which is that the public is naive about this because they've been sold a bill of goods that chemistry is actually environmental science. No, it's not. It's fundamentally different. I'm still scratching my head a little bit about exactly how you put guardrails around what exactly is environmental science. I don't want to pick on it, but it just comes to mind. So that's one issue, and the public is very naive about it.

Then the other element I would put in here, which is more philosophical, is that the public is woefully undereducated. I'm talking mostly higher education, although you can back it down into elementary and high school – that's where some of these things start – but mostly higher education. How critical is higher education to maintain a democratic society? It's absolutely critical to have an educated populace able to analyze what the major issues are for society and then understand the value of voting their intentions. I am concerned about how that is evolving. Getting back to your question about the American public, they're naive about how critical higher education is for that. I don't think they get how critical it is. They'll look at higher education institutions, I'm not pointing fingers, and say, well, that's a terrific university, so what they do must be effective. Well, not necessarily. They're not preparing us for the next challenges in our society.

Forster

So, in some ways, the public overvalues things the university does because they're not aware of the weaknesses, but in some ways they undervalue the university itself because the response when they find

problems is, let's just tear it all down. But the interdependence of the university with constitutional democracy is something we very much believe in in the Academy.

Mike, let me ask you my last question. What has pleasantly surprised you in your work in the last five years?

Birrer

This will stray a little bit from the virtues of the academy because it's more focused on my particular field, myogenics, gynecologic cancers or oncology in general. But the academy is so critical of it. Just in my lifetime (I hate to quote how old I am, so I won't), I have never seen such an exciting time in oncology. Getting drugs approved for a very serious cancer based on the phase1 trial – I trained centuries ago, and it was drug A and then it was son of drug A and then it was son of son of drug A. We're talking chemical modifications, this was horrible. It was all cytotoxic drugs. It's completely changed. That to me is very exciting. It raises tremendous hope for patients suffering from a terrible disease for the future of their lifespan and for the quality of life. That part is very exciting.

That's what concerns me. That's why I really was excited about this interview. Critical to all of that are our academic institutions. If that relationship is not embraced and fortified and strengthened, then the system does begin to collapse. Both the economic system, capitalism, the governmental system, which is democracy, the democratic republic. And it all extends from having an educated populace. So it's very, very important that we maintain that. I speak very narrowly in my small field, which is cancer patients are going to benefit tremendously from this. We need to really spread the word on it.

Forster

People really want to be able to get the benefits of the golden goose, but they don't want to take seriously what has to happen to preserve it. They want to squeeze it until they get that last golden egg out. But then they kill it, and their future generations won't inherit that benefit. So the stakes are high.

We're really thrilled to have you as part of the Academy, Mike. Thank you for giving such powerful expression to the importance of what we all do in the Academy.

Birrer

Thank you very much, Greg. I really appreciate this. Happy to do it again.