Careers in Bioethics: Interview with Dr. Paul Wolpe

Jake Zaikowski*

INTRODUCTION

Paul Root Wolpe is a bioethicist with sprawling interests. He is currently the Raymond F. Schinazi Distinguished Research Chair in Jewish Bioethics at Emory University, and his biography there lists over a dozen areas of expertise ranging from Death and Dying to Corporate Ethics. Before he was at Emory, Dr. Wolpe was on the faculty of the University of Pennsylvania's Departments of Psychiatry, Sociology, and Medical Ethics for over 20 years. In that time he also spent 15 years as Senior Bioethicist for NASA, where he still serves as a consultant.

I sat down with Dr. Wolpe to discuss his time at NASA and the bioethical issues he faced there. He thinks that the desire to explore is part of human nature and space is simply the next step. That view of exploration guides his thinking on bioethical issues in space. We learned about the most pressing medical issue facing astronauts, why he thinks of risk in a "fuzzy" way, and what Teflon has to do with justice.

INTERVIEW

JZ: Hi Dr. Wolpe, thank you so much for joining me. The first thing we always like to ask is how did you get into bioethics?

PRW: There are a lot of ways to tell that story. I was always interested in medicine, I was interested in culture and the way we culturally transmit knowledge, why we think we know what we think we know. When you put those two things together, I realized that medicine was probably the single most fertile area of social life for understanding how culture thinks about itself. Because it deals with life and death, with healing, with power, with technology. So I became very interested in studying medicine, and actually studied medical sociology – I'm a sociologist.

And as I was studying medical sociology at University of Pennsylvania, I met Renée Fox, who was my mentor and one of the first people who thought about bioethics from a sociological perspective. Put all that together and that's how I started out to become a bioethicist.

* Jake Zaikowski,

JZ: I know you've got a wide range of interests, from simulation-based medical education to neuroethics. How do you see space exploration and the ethical issues around that fitting into how a culture understands itself?

PRW: I became the bioethicist for NASA not because I was interested in space ethics; instead, I became interested in space ethics as I became the bioethicist for NASA. NASA needed somebody who really understood research ethics and I was recommended to them. I was in Philadelphia, and it was a fairly easy commute to NASA headquarters in Washington. And as I began to work with NASA I became more and more interested in some of the ethical issues that the Chief Health and Medical Officer had to deal with. So that's how I got into it.

JZ: Let's talk about specific medical issues that arise. There's a huge range of those too, from things like bone demineralization, to radiation, to mental health effects. Do you think there's one or several of these that really stands out and demands the most attention?

PRW: Well clearly, in terms of long-duration spaceflight, if we're going to go to Mars and beyond, clearly radiation is the single most problematic issue. Bone loss and muscle loss are both things that happen in space. There are some ways to think about how we might mitigate these issues on long-duration spaceflight. You create centrifugal force and use it to apply constant force over all of your body – not so possible on something like the space station – but that's why just exercise in microgravity doesn't work. If you just bungee cord yourself down to a treadmill you're not getting uniform, universal muscle resistance. You're just getting it at the point of contact. So there are ways to think about that. Those problems are significant, but probably surmountable.

The problem with radiation in space is that we can't figure out how to significantly block radiation without adding significant weight to the ship. It seems denser materials block radiation, and denser materials are heavier which is a problem for getting them into space. There are some suggestions about how to do that too, but that probably is the primary problem.

JZ: What should be the focus in terms of reducing risk? Should it be for elements we know will cause a serious effect down the line, like cancer due to exposure in 10 years? Or should we be focused on short-term things like Acute Radiation Syndrome from solar particle events – where you'll become nauseated, you might vomit, you'll get some skin burns, but it won't have that same lasting effect? But it will happen during a mission as opposed to, you know, cancer after a mission.

PRW: It's interesting because risk reduction for environmental hazards is not that different from another question I spent a lot of time on, which is: how we stock a ship in long-duration spaceflight with medical equipment? Especially with drugs.

Think of it as three elements that vary. First is likelihood of occurrence, the second is severity of occurrence, and the third is effectiveness of countermeasures. So if you think of disease or injury, what's the likelihood the person will get this disease or this injury, how severe will it be if they got it – how much will it affect them and the mission, and then how good are our countermeasures? And if you think of those three all as sliding scales from 0 to 100, you can move each one and make any of them higher or lower and change the configuration.

It's the same way you think about risks from environmental hazards. What's the likelihood of something, severity depends how long they're up there, depends on what kind of countermeasures they have, and it also depends in part on people's physiology, which brings us to interesting other questions about things like genetically testing astronauts. And then, how effective are our countermeasures? And

you can't – it's hard to choose what is the *one* thing you need to concentrate on. You really need to try to come up with a strategy that mitigates as much as possible for as long as possible. But there is a principle at NASA they call ALARA, which is As Low As Reasonably Achievable. And when you have an ALARA standard, there is some point at which you say, "Ok, we've done the most that we can, the best that we can, so now, is this risk worth taking?"

There's no one answer to that of course, that's a judgment call.

JZ: When you get a situation where you think, "Ok, we've done everything that we think is reasonably possible," what do you think would make for a borderline case where you might say "I'm not really sure if it's worth the risk at this point"? What might be the circumstances for that?

PRW: Sure, long-term irreversible health risks that mean significantly earlier death or significant chance of life-threatening disease. I'll give you an example. According to NASA and the National Council on Radiation Protection and Measurements, the amount of occupational radiation that's allowed for astronauts is the amount that would raise someone's lifetime risk of cancer by 3%.

Now that measure is arbitrary. I don't know exactly how they came up with 3% - they could have come up with 2%, they could have come up with 4%. They just settled on 3%. Everybody would agree that something that increased an astronaut's risk of death or serious disease to 50% is not acceptable, and 1% is acceptable. And then – what about 2 , 3, 5, 10, 15, 20 – I mean, there is no magic moment over which risk becomes unacceptable. It's very much a negotiated level of tolerance.

And it also depends on the importance of the mission itself. So we set up these standards, they're arbitrary, they're hard to defend, in that if someone says "I've reached my lifetime allowable occupational radiation exposure, but you need me for this really difficult task, so it'll raise my lifetime risk to 3.25%," it's very hard to say "absolutely not, that's outrageous, we can't tolerate it." It just doesn't make any sense because 3.25% is just as arbitrary as 3%. There really is a significant philosophical problem with risk assessment in that sense, in that human beings, when they think about risk, think about it in a kind of fuzzy way…because it is fuzzy.

That is, these numbers don't have real meaning, there's no way to make any kind of definitive determination that one number or another number is where we should draw the line. That's why I think of the ethics of these kinds of things as negotiated.

And also, importantly, an organization like NASA, which has a responsibility for the safety of the astronauts and of all its employees, has to take a harder line than often the astronauts take themselves. There is a kind of appropriate paternalism, which by the way often really annoys the astronauts. There is a point at which NASA says "I know you're willing to take this risk, but we can't allow it because we as an agency have a responsibility to you as an employee, even if you're willing to take the risk."

JZ: That is really interesting, because one of the next topics I wanted to talk about was astronauts as research subjects. In some ways they're participants like anyone else. They have to receive basic protections, they have a right to be informed, etc., but at the same time they're clearly unique as a group of research participants. They experience significant harms that don't offer them direct benefits, and you can't really imagine any IRB on earth approving any sort of study for non-astronaut participants on earth in those circumstances. But of course the ones for astronauts get approved all the time. How do you think that we should think of astronauts as their own type of research participant?

PRW: Astronauts of course are subject to the same regulations as everyone else: they have a right to withdraw from participation at any time without penalty, they have the right to refuse participation, but that's problematic for space research because the kind of research that's done in space has very, very low sample sizes. You might do it on one or two or three astronauts, especially these days because so few astronauts go into space.

And then there was a whole other problem that arose about astronaut participation in research – confidentiality. If you do a study on astronauts with a sample size of three, it's very hard to anonymize the data. If one is 5'3" and 150 pounds and male and the other is 6" and 190 pounds and male and the other is female, you can't give *any* demographic data to try to correlate with your findings because immediately you'll know which astronaut it is. And that became a very big problem. So you have the problem of withdrawal, of refusal, of confidentiality. These are all in some ways unique to the astronaut situation.

This came to a head with the Safe Passage Report, where the Institute of Medicine was asked to look into research by NASA, came up with a suggestion that for astronauts we should "reinterpret" the Common Rule, which is the regulation that protects all human subjects involved in research in the US. What they were basically saying was we should make astronaut participation in research much more difficult for them to avoid and withdraw from.

I think that that's a very misguided approach. I think a far better approach is, and this is actually the approach they ended up taking, to simply get astronauts far more involved in the research process. It's one thing for the powers that be in Houston to just tell you what research you will conduct and participate in. It's quite another thing if you've got astronaut scientists who are part of the review panel because studies in space go through an IRB review but they also go through a scientific merit review.

So getting astronauts involved from the beginning, seeing it as a shared common enterprise, does a lot to keep them from withdrawing or refusing to participate and they care less about confidentiality. This is a much longer, more complicated issue than we have time to talk about now. There are a bunch of other issues around confidentiality that, one of the things that I did was help solve those issues.

But the bottom line is yes, they're unique research subjects, but there are a lot of unique research subjects in the world. If you want to cure an orphan disease that only has a few thousand people in the world who get that disease, and you have a drug you want to test because you think it might treat or cure this disease, well those few thousand people are just as rare and just as valuable as astronauts are to NASA. That is, you can't find out if this drug works without their participation, and they're the only ones who can participate. So that's the first thing.

The second thing is you made what I think is the important point here, which is when IRBs think about the research that they do, they think about the risk-benefit ratio. In medicine it's usually really clear what the benefit is. In space it's not. And I once asked when I first started at NASA, I asked the IRB at the Johnson Space Center to describe to me the benefit standard that they used when they were doing risk/benefit analysis of studies, and they couldn't.

That's because there are a lot of different ways to think of that benefit. Is the main benefit of research in space the benefit to the next astronauts that go up? Is it to the space program as a whole? Is it to the country or to mankind as a whole because when the asteroid hits we're going to need it?

If you think of the benefit of space research in the broadest terms, ultimately it's there to assure the future of mankind because we need to colonize other planets because the earth will be destroyed at

some point. Then there is no risk that's not worthy of taking. On the other hand, if it's just so that the next astronauts will be marginally more comfortable, the next group up, then you have a very high bar. You have to decide what is the benefit against which this research is being measured. And I have my opinion of what it should be, and different people think about it differently, but I think the real challenge there is that nobody was really sure what it was.

JZ: That's interesting as well because of something else you've spoken about in other interviews in the past, the idea of "exploration" being a good and a principle in and of itself.

PRW: And it is. And I believe that. And there are a lot of goods in the world that aren't worthy of risking people's lives for.

JZ: I read the remarks you gave at the Interfaith Platform speech, where you had mentioned the good of exploration, but noted that exploration can cause really bad things, your example being the colonization of America and the millions of deaths caused by that. What were your thoughts on that?

PRW: The exploration itself wasn't harmful. The colonization of the United States wasn't an inevitable result of exploration, it was a result of exploration accompanied by an imperialistic ideology. So, you know, we now engage in certain kinds of exploration in order to protect tribes. There are tribes in various countries where the countries don't allow outsiders to interact with those tribes as a way to try and preserve them and their way of life. So exploration was required to identify those tribes.

But human beings are innately curious creatures and we're not going to stop exploring. The issue isn't explore or not explore. The issue is what kind of an ideological position do we take with us. Do we use the Prime Directive and not harm others, not involve ourselves with or disturb, if we were to discover intelligent life that was less advanced than us on another planet? Who knows? We haven't made those decisions yet and they are still far in the future – we can barely get off this planet. But you know, those are really important questions to have a conversation about and think about standards for before we start looking around the universe.

JZ: The idea of trying to categorize exploration as a good – do you think that would fall under one of the 4 principles of bioethics – beneficence, non-maleficence, justice, and autonomy? Do you think exploration falls under one of those four or would be its own fifth principle?

PRW: I don't use those principles, I don't think of them as the basic principles of bioethics. They were principles that were created in the 70s and I think bioethics has gone way past them. But I will say that all of them, and others that were not included in Beauchamp and Childress' principles, have an impact on exploration. Human beings have the autonomy to explore, they need to do it with an eye not just towards not harming human beings but not harming other animals. Our exploration on this planet has resulted in extinctions of species, so it's not just about human beings. Justice of course, we were just talking about colonizing the United States. So all of them are relevant.

But the question of exploration, again for me, really isn't that different than other human activities, in the sense that it isn't the activity itself, but it's the principles and the moral structure we bring to the activity that's really the issue. I would really be interested to see what happens if we find even microbial life on Mars. There is an office at NASA whose job it is to make sure that all spacecraft that land on Mars and the moon are sterilized to the degree possible so that we don't inoculate Mars with bacteria we bring from spacecraft that we send there.

That has two kinds of reasons. One is scientific, we don't want to send bacteria up there and then discover it and think it's indigenous. The second is ethical. There was an office there – I think they've changed the name of it now – when I first got there, a guy there named John Rummel was the head of that office. And his title was Chief of Planetary Protection. Which I think is like the coolest title a human being can have.

JZ: You think he might be shooting down asteroids, right?

PRW – Yeah imagine "What do you do, Dad? Well I protect planets, my job is to protect planets." But I was talking to him one day and he really said something that fascinated me. He said, "My job is to protect the ecosystem of the moon and Mars." And I said, the moon doesn't have an ecosystem, it's barren rock. And he said "Well, you say it doesn't have an ecosystem, to me it has an ecosystem because I have to believe it has an ecosystem if I'm going to protect it. If it's just a rock there's nothing to protect."

I thought about that a lot, it's a fascinating moral statement. Because what he's really saying is "I need to think of this as something I can have a relationship to, I can't have a relation to a rock, I just don't have the emotional framework to have a relation to a rock. But I can have a relation to a living ecosystem. So I need to, in my mental construct, think of it as a living ecosystem if I'm going to really protect it properly." And I think it's a brilliant moral statement in many ways. That question of what are the ethics of the way we explore, I can't think of a more articulate and profound statement of that than the one he made.

JZ: One of the recurring themes I keep hearing from you so far is that, there's a sense that this is going to happen and it's a matter of making sure we do it in the most ethical manner possible. Even the acronym of ALARA, As Low As Reasonably Achievable, is ultimately recognizing that in some cases we're just not going to be able to get this to what we consider a "safe" level, but we just have to accept that.

PRW: But that was always true of human exploration. Human exploration always caused death and disability and disease and injury. You know, we are very risk averse, in the way we think in the United States these days in many ways. But we're not going to explore the world with a totally risk-averse attitude. There are people who believe taking risks is worth it and do things in their lives – extreme sports and other things – where they think of proximate rewards being worth the risks. And as a society, eventually we're going to have to figure out what risks we are willing and not willing to take. But given the very, very compelling human desire to explore, I believe we're going to find a way to make the risks as low as possible but accept them finally so that we can continue to explore.

JZ: There's been a big rise lately in private companies doing more and more to increase the frequency of going to space. SpaceX obviously, United Launch Alliance, and others. Do you have thoughts on new ethical issues to think about when there are private companies going to space?

PRW: With public companies like NASA, their activities were at the behest of Congress, so they were always worried about what Congress would think about what they were doing, because Congress ultimately allocated their budget. So whenever there was a disaster of some kind or some problem at NASA, a part of the concern was how is this going to affect our budget and what Congress thinks of us.

That's not true with private companies, but what is true about private companies is they are responsive to the general public. Private companies can collapse and fall just based on the perception by the public that they're unethical. So there are some things that can strain private companies, but they almost certainly will engage in certain activities that NASA deems too risky for them to try. It worries me

in the sense that it's *possible* that private companies, especially if there are few of them and if they're competing with each other, will take risks that might be inappropriate risks, safety level risks.

That could happen, I'm not convinced it will. I think we give private companies a bad rap and often I've seen private companies be *more* safety conscious than not-for-profits and other kinds of places. So I'm not convinced that's what's going to happen, but it is something that we need to be vigilant about.

JZ: Do you see big issues coming up bioethicists will have to deal with regarding human spaceflight?

PRW: I think that the big issues that we'll have to deal with have to do with the privatization and commercialization of space. It's going to be a while before we start mining asteroids and mining the moon, and maybe mining Mars, but it is going to happen.

There are two kinds of financial incentives for going into space. One is surveillance or communications. Can we stay in low earth orbit and somehow reflect back down on the earth with communications or other technologies, and will going into space help us figure out how to do that? Atmospheric manipulation and other things like that.

But the other one is to try to find materials that are valuable to bring back to earth. Now that's still far in the future but we have some pretty long-term thinkers right now like Elon Musk and others that are working on this. Even the oceans aren't as inhospitable to human beings as space. I mean we came from the oceans. And so you really have a tension there between the desire to move this forward and the fact that the human body isn't designed for that.

There are two possible solutions for that. One is robotics and thinking of space exploration and space activity not as a human-based activity but as a robotics-based activity. And there are really some reasons to think that would be the best way to go for a lot of this. But then there's both that insatiable desire for human beings to go out and explore, and also there really are some things that only human beings can do. So I think that's where the great problem will arise, the degree to which we, especially at the beginning while we're still bad at it, send people into work environments in space and end up hurting them. And it's going to happen, the question is just to what degree can we avoid it, try and mitigate it.

JZ: The last topic I'd like to discuss is technology transfer. When you go to space, there's a lot of technology that gets created for it with a lot of useful applications on earth, but there is also this big interesting issue around justice too, of what types of technology are being produced and who does it benefit.

PRW: Well you know if you talk to NASA, one of NASA's raps is that, when you talk about "We're putting all this money into space travel, and what are we getting out of it?" they'll be very happy to trot out Teflon and other things–

JZ: –Tang.

PRW: Yeah, tang.

Things that came out of space exploration. You know tech transfer is one of their big success stories from their perspective. And I think it's true, but the counter to that is yeah there's a lot of interesting tech that came out of space exploration, but if you took the money for space exploration and you just put it into technological development, you'd get a lot more out of it. So that's nice, but I'm not sure it

justifies – I think there are other things that justify it – but I'm not sure that tech transfer is what justifies the space program.

That being said, all of these explorations, going to space, all of the technology that's developed, a lot of it will have applications outside the immediate reason for which it was developed. But I'm not worried about it because the companies that develop that will want to leverage it anyway. So it goes out onto the market the way all technology development goes out onto the market. I don't think there's anything special about it. You know, we can criticize how we do technology distribution and dispersal in general. I don't think there's anything particular about the space program.

JZ: Dr. Wolpe, thank you so much for your time.

PRW: Happy to be able to help.