

# StreamBox

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APSA Virtual Meeting

"MD-PhD: Is It Right for Me?"

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>> I'm at the University of Pennsylvania where I'm the Director of pen's MD-p.m. p.m. program. I'm a physician-scientist, hematologist doing research on biology. I currently oversee a large, but entirely empty lab. I'm spending my days having lots and lots of one-on-one conversations with distressed \* \* stressed undergraduates thinking of applying and all the MD- p.m. students wondering what they're supposed to be down with their time. Last, but not least, I'm going to do a brief shout-out. Anybody interested in becoming a veterinarian rather than a human clinician, providing that with the sciences, being a scientist, it's good to know that those tints exist around theses.

>> The moderator is here. If you want to see just the act of Cameron's, go to your menu bar of your window and there's a drop-down menu where you can reflect view active cameras.

>> Yes.

>> Can you hear me now?

>> Yes.

>> I am sorry. I was on earlier and had some technical difficulties and got kicked out. Meeting, because it was too full. So it looks like this is going to be a great meeting. Thank you so much, so I do not have to go through your CDs. And let's just start at not the beginning. We'll start at a couple of announcements that I want to tell everyone.

Welcome, first of all. Thank you all for being here. Thanks all panelists for being here. I'm glad you took the time out of your day to come virtually to our meeting and talk a little bit about MD-PhD and the program. I'm he a fourth here MD-PhD student at Oregon science and health university. I'm now doing graduate school. I just want to remind everyone that the session is going to be recorded. For those of you who are going to step away or miss a piece of it, we will have it recorded. And also, please put your questions into the chat box for the panelists and we'll have time to ask everyone to try to get to everyone's questions through that forum.

You can also tweet at me if you want to have Twitter open.

And let's see what else. Yeah. I think that's all the announcements that I have. Thank you again for all being here, and I'm going to go ahead and start with our first question. So I want to start off with what is a physician-scientist? Any of the panelists can feel free to take that question and say what you think after physician-scientist is and what that may look like no -- for people.

>> A physician-scientist is somebody that is both a physician and a scientist. We all directs programs where people come in and get the MD and the PhD, gauze we believe that is the optimal way to train a physician-scientist who wants to go into the laboratory and answer research questions that are directly applicable to human diseases and outcomes of those diseases.

>> If I can just add onto that and then the other panelists can discuss that, too, as Diane skated, we all -- indicated, we all direct MD-PhD programs, but there are other careers that take on physician-scientists. That's an important component of those are called MD only physician-scientists. Those are individuals who may have had some exposure to science or research before medical school or during medical schooling and then become enamored with the career.

>> \* Kip Kip during that time and -- [audio skipping] and engage in research that allows them to do that now.

>> He's having connection problems.

>> I'm passing the baton over to someone else.

>> Chris has frozen up. I'll add a little bit to the definition, if you will. I mean, the notion of training people by putting them through medical school and graduate school dates back more than 60 years now to the early 1950s. And the thought was that people who would be physicians who spends most of their time doing research, to get research training over and above what medical schools get and, frankly, medical schools give very little training in the worlds of research. So physician-scientist training programs back in those days were defined as an MD-PhD program where you did a gettal years of medical school and split off and did graduate school and came back and finished medical school, with the goal and the hope that all of that training would stick inside your head and would keep on you track through a career that you would view as a research-focused career where you would spend time seeing patients and understanding the diseases that they have, but then go off to your lab and work on them.

The data from more than 10,000 graduates of MD-PhD programs suggest that there really is no one specific phenotype of what a physician-scientist is. They are men. They're women of all colors and stripes and genders and proclivities and desires. Most of us who have gone through MD-PhD programs have done is gone on to have a career, a lot of us in it academia where we really do try to blend on a near daily basis the insights we get from seeing patients, as well as the research that we do in our laboratories, trying to close that arc so that what begins with a clinical observation comes back to our lab and bends around and goes back into the clinical setting again. We are, I guess, the one word to use would be chimeras. We blend together all the best parts of two wonderful careers, as far as I'm concerned.

>> I think those are great answers and I'll pass. I was going to make sure you used the word chimera, though.

[Laughter]

>> I might have appropriately censored me by freezing my internet goings a seconds, but I want to finish a thought in case it didn't get out there, because I see it's one of the questions as well, and then what's the advantage of doing an MD-PhD program versus doing a later research pathway effort such as doing and engaging in research during residency and fellowship? Is I can tell you my opinion about that is that the MD-PhD program gives rigorous education [audio skipping] committed research experience at a time when it's perhaps a little bit easier for you to focus on those activities. Then there may be more challenges if you're trying to develop those research skills at the end of your clinical training when there may be other factors that complicate that, such as having a family, having a personal life. Pluses there's

some value in getting that rigorous scientific training early on and then lay the clinical training on top of that, rigorous scientific training. That

might choose to make those clinical observations that skip referred to, that might leads to research pursuits. I don't believe that I think all of our panelists, there are no shore cuts. You're going to be put -- shortcuts. You're going to be putting in the time to learn to be a scientist, either through a PhD program or during an extended period of time during residency or fellowship.

>> Well said.

>> So one question that may come up is whether if you want to do clinical research, is it worth getting an MD-PhD? And I would say that that's one area that being do into without doing a form MD-PhD. Many, many, probably most of the medical schools across the States have the opportunity for people that are coming out of their fellowship to get research training in clinical research and they're finishing up their fellowship or when they're starting their first faculty position in unacademic Medical Center so that you can learn those skills to do clinical trials, out come research, and so on. But if you want to be able to take a clinical question into the laboratory to explore and understand little mechanisms [Indiscernible] MD-PhD is the best way to do that training. I went through the MD-PhD program. Did my internship residency fellowship and started faculty, and other people that graduated from college at the same time, that went through their training, but didn't get the MD-PhD started on faculty at the same time I did. They just had to tie on that laboratory training at the end of their fellowship and the down part is that they came onto faculty as an MD only and I came on as an MD-PhD.

The current data says that really makes a difference when you go into apply for NIH funding and other types of funding. It gives you, like, that stamp of credibility that you took the time to really understand how to do high quality rigorous mechanic an its tick research, hypothesis driven research -- mechanistic.

It's a great point you brought up about the timing of this, your experience and the appearance of all of your friends is not atypical. I get questions a lot about the length of time it takes to go through the MD-PhD program and to do the additional training that comes afterwards clinically and in the research setting. It seems like a long time. And so often the question is couched in the unstated question of, well, maybe I'll just skip the PhD and I'll get there three or four or five years sooner. The data are very clear on that nationally. It takes about the same time to hash a physician-scientist or maybe I should say incubate a physician-scientist, about the same age. You put the time in either in graduate school, at Diana said, or you put it in later, but put it in, you will.

>> Can I just add one -- sorry, Carrie. Just one thing to that? Having directed a postgraduate physician-scientist program and seeing the training experience of those what are sometimes referred to as late bloom I was, so the -- bloomers, so the MD only that did the research later, when they come on the faculty, they're moving a little bit more slowly than the MD-PhD. But I do think there's some added benefit to have that early rigorous research training, all of the clinical training to inform that, and then a post-doctoral experience in coming on faculty. The MD-PhDs are savvy in picking that post-doctoral spinal. They're savvier in picking a mentor and they get up to speed quicker when they come onto faculty.

>> I'll just make one last hopefully for this piece, one last comment be, maybe to summarize it. I think the advise I've given people who are asking those questions if you know now in your heart that what you wanted to do is be a physician-scientist who tries to balance all of these things in a future career, and typically that career is a faxal at this member at a medical school. It can be other things, but it most typically is, if you know that now, go with the MD-PhD route. If it you're uncertain of that, it doesn't mean that you can't achieve that later. Doing it later would take additional effort.

>> Great.

>> Jerry, can I answer that? to do a virtual piechart for everybody on this call? Which is what kind of career do you have piechart? So what Jerry was referring to, the data shows about two-thirds of graduates of MD-PhD programs have ended up at academic \* I can Medical Centerers, being physician scientists and scholars at a medical school or something closely related to it. But there are also nice cohorts of people, aloquats, if you will, who ended up in the biotech and pharmaceutical industry. There are another group that ended up at places like NIH or research institutes like Scripps or Rockefeller. Pick your favorite research institute. There are people who ended up working for the federal governments in organizations that have three letter names like the CDC and the FDA and maybe the CIA, for all I know. And then there are people who, in addition, have gone into a variety of different groups that they find very satisfying, that they feel that the training they've

gotten really helps them. So if you add all of those numbers up nationally, all graduates in the MD-PhD programs, it's about 75 to 80% total of people, at the very least. And that's why, you know, is MD-PhD programs, I think, can some justification point to the outcomes of the program nationwide as by far one of the very most successful training programs that the NIH has sponsored for many years. And we should all feel good about that. But those are the paths people follow. I think there's some changes over time. I hear from the students in my program a lot more interest than I used to hear from them than when I game director 25 years ago in careers in the biotech and pharmaceutical industry, opportunities, translational research in that setting and not just in unacademic setting, and I think that's terrific, too, as people come in with [Indiscernible] events and start [Indiscernible] while they're MD-PhD students.

>> Get us back on track.

>> Yeah. I was just waiting for a moment. You guys are really taking off here. Yeah. So we have a couple of really timely questions that have come up from people in the audience right now. And they're wondering about building a competitive application during the time of this Covid-19 crisis. A lot of things like summer jobs, research labs have been closing and canceled. Ability to shadow a physician right now is kind of not going to happen at this point. So people are wondering, is it still worth it to apply to the cycle and what other things can they do to be competitive for this upcoming application cycle?

>> If you don't mind, I'll take a quick shot at that. I think we're all in the same boat. The people who are going to be applying in this cycle are all going to have similar kinds of issues. If it this is the very first research experience you're having this summer and you're an buying this summer -- applying this summer, you probably are applying too early anyway. You need more research experience.

I can see programs having a lot of understanding and flexibility about what happens this, you know, from now through the summer in terms of doing your application. So I don't think it's going to counts against you in any pager way, but again, if this is the first time you've done any clinical experience whatsoever and you're kinds of counting on this last thing, then maybe you do want to wait, because medical school, you can see that you had some clinical experience before applying to medical school. You really need to demonstrate that you know what you're getting into, and I think that's what the main purpose of the clinical experience is. So again, if this was the first time you were doing these things, then probably wait, but you probably might not be a competitive applicant anyway if this is the first time you've done it.

>> Maybe it would be helpful if one of us summarized what we looked for on the admissions committee. Chris, you're smiling about that. Your thumb is up.

>> I saw Diane smiling as well. I'm going to pass it over to Diane.

>> So I think that we are looking for people that show a sustained and hopefully long term interest in research. And we really want to see very strong letters from the people that you did research with. Preferably not with the person you worked with directly. That post doc or graduate student, but the head of the lab. And when you go to ask for your letters, make that clear to the people that you request letters from. So you're going to need some letters for the MD part. We will really be looking at the letters from the people that were heading up the labs that you worked in. And then we really want to see, obviously, good numbers in terms of GP A&M CAT. I think every program balances this a little bit differently, we have to fulfill all of those MD requirements. And at least for our program the interview is really important. Represents we want to see you're curious about science, you have a tiff at this in the way you think and -- creativity in the way I think and evidence that you can lead a research team in the future and some evidence that you have some leadership skills and also that you can really step back and look at the big picture and be able to think through problems at a pretty high level. We don't want you coming in and telling us about how kill it was to get that pieces of DNA in the practices mid and get the protein made. We want you to talk about that, but also be able to step back and say this was the goal of the lab. This is where we were going and this is my little fleece that I worked on and these are the problems I have and this is how I solved them. But I was so excited to be doing this part of it and now they have gone on to do this with the step that I made. So if you can also talk about what happened after you left. So go ahead and call up the labs and call the post docs, graduate students that you're worked with about where does the project go? How did my contribution help things? Just to kind

of almost remind you before you go to the interview.

>> Great suggestion.

>> Yeah. Other things you guys want to add?

>> Yep. Skip, if I could add, and then you can correct me, I think all of us, you know, I want to pause and say you can see that we, as MD-PhD directors, are very collegial. We all have a common goal of running programs to train the next generation of physician scientists and we're all super delighted that you all have this interesting in joining this webinar \* that are and absolutely are going to organize this for us. I think all of us take a holistic approach. Dr. [Indiscernible] outlined some of those factors. So there's not one factor that's going to predominate. It's kind of the whole picture. We are really interested in determining if you know what you're getting yourself into and if this is something you really want to do. So how do you convince somebody that an MD-PhD in the position scientist -- in the physician-scientist career is something you want to do. Your experience suggests that's what you want to do, so you've engaged in meaningful research activities to a degree and a depth that you can demonstrate your understanding and your passion for that process. -- passion for that process. Have excitement about discussing the project that you might have worked on and go into a little bit of depth. I think interviews are very important and in the interviews is where you can really shine.

Some have asked, well, is it important for me to have one long longitudinal research experience or multiple years in it one lab or should I have a bunch of smaller experiences? I think it all depends. I think if you have smaller experiences because of opportunities or that your interests have changed or the type of research that you've engaged in, then be able to talk about those experiences and probably hone in on one experience that was most impactful. If you've had a really long experience like a three or four-year reference experience, then probably an interviewer would expect you might have a little bit more depth of knowledge on that topic and maybe a little bit more to show for that experience, like a poster or a presentation or et cetera.

And then we want to, I think, all want to see that when you see that there's something missing in the communities that you're engaged in, that you're somebody that steps up to try to fix that. Some leadership activity or service activity -- leadership activity or service activity. In this career path, more likely than not, in academia and industry and government, you're probably going to be involved in some leadership activity, and we like to see that that's something that you're already primed to engage in. With that, I'll be quiet for a little bit.

>> Looking at the chat feed at some of the questions coming up about admissions, and a couple of the specifics include is it necessary to do gap years? Is it necessary to have publications? So maybe we should address those two issues specifically.

>> I think that's great. Let's go with that.

>> All right. Somebody want to start?

>> That's you or Carrie. Diane and I just spoke.

>> I'm happy to take a stab.

>> Take one.

>> So the publications are always nice to see, but they're by no means essential. Many people are successful applicants without having, you know, a paper, but like Chris mentioned, if you've been in a laboratory for, you know, four years or something and you don't have anything to show for that productivity, such as, you know, a paper or presenting at meetings and things, then questions may come up about, well, how much were you really involved? So it kind of goes both ways A little bit there.

As far as gap years and so forth, I would say, and if I look at our own applicant pool, that something like half the applicants probably, some number like that are taking gap years, but that is not a necessity by any means for good outcome in the application cycle. Really what we're looking for is sufficient research experience that we're convinced that you know what you're getting into, and so if you're an undergraduate who has only started research as a late junior or senior, a gap year may be necessary in order to show that you've taken the time to have enough experience. But if you started Research as a freshman and got right into the lab and worked, you know, all through that period, I don't see any reason why a gap year would be required.

>> Yeah. Let me dive in on that gap year question after you, Cary. One of the things that I've noticed anecdotally is there's been a big increase in MD-PhD applicants who have gaps of one or two years of graduating from college. There is a relevant level new phenomena, in my experience. It wasn't at all typical if you go back five or ten years ago. In fact, it was unusual back then. And I have only a partial senses of what's driving it, but one of the things that seems to be driving it, in talking to applicants, is the growing sense nationwide that you have to do that in order to be a successful applicant to an MD-PhD program. And I suspect that the four of us here probably represent the views of lots of other program directors as well, which is that that's by far not a requirement. It's not a requirement. And when I meet with the members of the admissions Committee that I oversee, I remind them that they need to calibrate their expectations based on whether something

is coming in right after their junior year or has been working for two or three years full time in somebody's laboratory in terms of the expectations for what they'll have accomplished.

>> The afternoon time to complete the MD-PhD program nationally, I think it's eight years, 8.2 years. It's around there. So remember, you've got a long time of training. You've got your MD-PhD, eight years, and I believe ten ship and residency, then -- internship and residency, then fellowship after that. Add on 1 to 3 years of a gap year, it's not necessary in terms of making a decision did about an MD-PhD program, then you really should not do that. If you are sure you want to do an MD-PhD program and you've had that significant research experience, then go ahead and apply.

>> Great advice. One of the questions that relates to this that somebody popped up, and I won't name that person, but it's in the feed, is whether or not programs look for younger applicants in the hopes that, you know, they will be able to survive longer in the field of being a physician-scientist when they get to their careers. If we extended that thought far enough, we'd be looking for people in elementary school. I'm number of years ago having an applicant who was ready to graduate college at 14 and wanted to get going, and I don't remember thinking at the time, wow, that would give him lots of extra time to do it. Every MD-PhD program is entitled to have its own little twists on how they do the admissions process, and at some point, I think lots of programs gets a little concerned if somebody had been out of college for a long time, but I would define that as eight or ten or more years, not whether it's one, two, or three years. So I wouldn't worry about that particular issue.

>> Thank you, Chris. Sorry. I would just say I agree with that as well. I would just say a challenge that one might have if one has gone from professional career to professional career to professional career, is you will have to convince the admissions committee about how is this what you really want to do now? So you have to be thinking about that in that context.

>> Gina, what do we have next?

>> I think one of the next things we're looking at is how do they choose a program? So like how as an applicant do you decide on which program you want to go to and what kind of things should applicants be looking for in different programs? MD-PhD programs?

>> A lot of silence.

>> Well, [Indiscernible]

>> I can start. But I'm sure there will be more on this. I mean, what you're looking for is an institution that fits your research interests. That has to be there. That's not too hard for many research interests and the basic biomedical sciences, but if you're interested in an engineering degree or he beam I can't logical degree or something -- epidemiological degree or something less than the classic sciences, you have to be a little more picky that way. You want to be able to find investigators at that institute doing things that you find quite interesting.

I think another piece that most of us would agree on is that having an active MD-PhD program, whether it's an MSTB funding or MD-PhD program without MSTB funding, is definitely something you want to look for. There are several schools that have MD-PhD training available, but there really isn't much of a community of students pursuing that, those degrees. And part of being within a group of students all pursuing that, you get to benefit from interacting with those individuals and having some comrades as you negotiate that eight year time frame, as you go through it.

So identifying programs with good communities of MD-PhD students is I think a real important thing. The last piece that I can think of, and I'm sure there's lots more, is sort of the nature of the medical school curriculum and the kind of learning that take place. If it you look, if I just look across the four of us, you will know that there are different approaches to medical school education and where in some cases the first two years are shrink in the chats I can first two years are shrink into a shorter period, where there's an opportunity for clinical training before you engage in the PhD phase of the program, so there's different aspects of learning and you need to understand what the schooling is about and whether that learning style fits you.

I guess the other thing is location. Obviously, you may want to be close to family. You may want to be far away from family. There's all sorts of choices in between, though those are the considerations I would think about. How about the others? I'm sure there's a lot more.

>> I'm going to interject here real quick. I just want to remind everyone that this session will be recorded. So I think we'll have it available potentially on the website, but it's going to be recorded. That's for everyone.

>> I just want to echo what Cary says about the students and the community. You're going to be in that room for a long time. And so you really want to make sure there's a community there, because the medical students won't understand why you want to get an MD-PhD and the graduate students won't understand what you're going through in terms of medical school. So to have that community that supports you and peer mentors that help you find your way through this very difficult -- not difficult, but complicated program of getting both the MD and the PhD is really important. I think that there are differences in the way the programs train students, and one of the biggest differences, when do they pull you out of medical school to actually do that dissertation research? And that varies somewhat across the country. As a traditional program, we'll people out after they do their bit of classroom learning in medical school, the didactic learning, which was typically the first two

years of medical school. And it's a little shorter now from other medical schools.

And then there's other programs like hours in Houston where we let the students go through both the classroom learning and do all their clinical clerkships that third year of medical school before we pull them out to do their PhD. And we do that intentionally so that they have the experience taking care of patients, looking at how patients respond to drugs, how do we diagnose disease, how well are we die Al noticing dies -- diagnosing disease, and finally, understanding what our treatments are and how well they work. We want them to have that information before they go into the laboratory.

It used to be there were a few programs that let the students do clerkships at all before he PhD, and now I think more and more there's programs across the country that are allowing the students to do at least some of their clerkships before they go into the dissertation, start their dissertation. So a lot of that, you know, is what is your preference in terms of training?

And then finally I want to say that in Houston, we track a lot of people interested in cancer research because of MD Anderson, a major component of our program. But at the same time, people can come into a program with a very set idea of what they want to do and then completely change their mind, especially during the clinical clerkship. You may get in there and find out I just love Ob/Gyn. Or finally, decide psychiatry is the only type of medicine or pathology you actually want to practice. And so I just don't know that until you experience medical school and experience that type of training. And so you really also keep in mind that you want to go to a program that has broad options in terms of training. Don't get totally fix ad on a program that has a very narrow area of research.

>> Or IPI.

>> Or IPI.

>> In our program, we don't like to see that. Because of narrow interest when they come in, I don't know about all of you doing your training, but you can get things completely turned upside down by one interesting patient you see that just triggers your imagination or curiosity.

>> So if I could just dovetail off of that, I think all of us and all of the MD-PhD programs, we're allowed to do research rotations. And you've got a couple of years of most programs before you really pick a lab that you're going to end up joining. It's not uncommon at all for those research interests to let's call it be refined or be directed as you're informed by your clinical experience. You interact with more mature MD-PhD students and faculty. Another thought might be to try to identify a program in which there's a broad research pace. As those interests change, we've got a number of research programs that you could explore as you engage in those rotations, and boy, just all of us are going to say that that student community is so important. And so when you're interviewing, if the programs really kick the tires of the program, see what the programs are like. Hang out with those students and just see if those students are looking to your right, looking to your left. Are these folks that you can see yourself with for the next just couple of years of your life? Is it a community that cares and that a rising tide lifts all ships type of community? The students are the greatest strengths of all of our programs, quite honestly. I think we'll admit that. And the students are going to be the ones that are providing you with that advice, peer to peer kind of interactions that really allow you to maximize your training. And I'll add to that one. There are at this .75 active MD-PhD programs in the country. There are more than that on paper. Let's take a number of about 75. And they range considerably in how big they are. Smaller programs having 30 or 35 students in them total. Not per year, but total. And the larger programs, like the one at WashU and Penn having 200 plus students in them. That's a lot of variation in size. Therefore, to some extent, it tells you about the differences in the size of the community that you interact with. And I meet people all the time who have eye preference all over that particular map.

When I was an MD-PhD student back in the Dark Ages of the last Millennium, there was really only one day to do MD-PhD. Program.

>> Before electricity, by the way.

>> We learned by rocks and that was it.

[Laughter]

>> but the standard of education -- with no connection to graduate schools and you disappeared for a while, got a PhD and came back again to finish up medical school and that often meant you didn't have clinical experiences to any meaningful extents until after you completed the PhD. That was certainly the case for me. That's gone by the board now. And everybody tries hard in one way or another to integrate the training for future physician scientists. In the future, your job is going to be to integrate all of these together. It will be great if your education -- so most places in one form or another say day one, you're starting medical school and you're starting graduate school as a combined degree student and we'll make sure you have experiences along the way that really tie those things together as much as we possibly can. The details of that, though, do vary considerably. And although everybody probably has their favorite, there are a lot of variations on the theme that seem to work just fine in terms of outcomes for what happens to the students.

>> Awesome. Okay. Let's move on to some other questions that we're getting from the chat box. Going back to the applications, I just wanted to remind everybody that the current data I think is that one third of the individuals that apply for an MD-PhD program actually get into one. So it's competitive, but just keep that number in mind.

>> Right. About 600 out of 1800 applicants nationwide.

>> Right.

>> [Indiscernible]

>> In terms of competitiveness, yes.

>> And there were lots of questions in the feed about how strong does my MCAT have to be and is it tougher to get into an MD-PhD program than into an MD program? Maybe since it's come up so many times we ought to say something about MCAT scores.

>> Go ahead, skip.

>> Yes, you started it.

>> I would say as a rule of them, and the other three of you can expect if you like, that the MCAT score you need to get into medical school varies somewhat in different medical schools and there's probably the same variation among MD-PhD programs, meaning what goes on MCAT score and GPA score wise in an MD-PhD program probably matches what's happening in the MD program. The data on their website said that you can get in with a wide range of different scores on the MCAT and GPA, but the lower it gets, the lower percentage of people with that particular score, that particular GPA will get accepted. And yeah. I agree fully with Skip that the MCATs and the GPAs, certainly at my institution, I believe at many others are similar to the incoming medical school classes for those who think that the MDs -- the MD applications -- let me say it this way. MD-PhD applicants are coordinately reviewed and decisions are made as part of a medical school admissions committee. So even

though it is MD-PhD may have its own admissions committee and process for interviewing and bringing students in, ultimately, it is a medical school decision in all cases for bringing those students in. So you need to be at least as good as the other folks who are coming into medical school.

>> Can I make a suggestion? Skip, there's a question about what are the most common residencies of MD-PhDs and I think you probably can speak to that and I can just make a comment about PSTPs maybe.

>> Sure. So imagine a piechart with lots of different slices, different widths. About two-thirds of the graduates of MD-PhD programs who choose to do residencies,ing and most do, but not all, two-thirds end up in either internal medicine, pediatrics, pathology, or neurology. After that, you can find somebody who has done just about anything that you can possibly imagine, but the slices vary in their widths. About 7%, if I remember the data properly, of MD-PhD program graduates have gone and become surgeons. And that's combining all the different surgical specialty areas together. So there is a minority outcome, but it's an important minority outcome from the perspective of many of us who care about the training of physician scientists.

Chris, back to you?

>> Sounds good, based on that question, just to say I think, Skip, about a quarter go into internal medicine. Is that the? And about -- is that right? And another 10 to 15% are into pediatrics, for example. So if you think of MD-PhD programs as predoctoral physician-scientist training, there's a companion program for postgraduates, physician scientist training, and those are called PSGCs. And they provide a similar sorts of programmatic support as an MD-PhD might be, and probably the biggest advantage really in both programs, is predoctoral and postdoctoral, is providing some structure around which communities can form. Dr. Mill wits did a great job of explaining what they're

going through as an MD-PhD student. Same thing is the Cole with PFCT programs at the postgraduate level. So if you're a residents be or when you're a fellow. Gina, back to you.

>> Fabulous, fabulous. Awesome. That is great. I'm glad you are catching on to the comments that are coming up in, the questions coming up in the comment chat area. So another one that a few people have asked is how do you get research experience at your institute or somewhere else when there's limits on what undergraduates can do and what kind of funding is available for students who are applying? Yeah, what is the best way to get research experience? Are there different ways that you can suggest for applicants?

>> We're all waiting for Diana.

>> [Indiscernible] if not, there are summer research programs run by almost every single medical school across the country. The application for those programs is typically starting as early as December. And then runs through about the ends of February to apply. And most of them do pay a stipend for that research time. And so even if you -- so that's a good way, if your undergraduate institution does not have a lot of research, for you to get those experiences during the summer. So even if you're in an undergraduate institution where you're doing high quality chemistry research, at least in terms of our program, we really would like you to explore what it's like to be a physician-scientist and spends at least one summer working in a medical school and doing research, preferably with a physician-scientist. But if not, with somebody doing research within an academic Medical Center.

>>

>> Question comes up a lot, if you happen to be at a place that's not a research intensive university as an undergraduate. Just how do you go about doing it? And I think this used to be a bigger problem than it is now, because now there are lots of opportunities to put away for the summer, if nothing else, or to go to a nearby institution that might have the facilities that you want. Try to avoid doing a lab tour in the sense of, you know, each summer in a different place, because that generally doesn't give you a solid enough experience to make sure that you really would want a career of doing this full time.

>> Yeah. Anyone?

>> I feel like those were good answers to the question, yeah.

>> Excellence.

>> I mean, and some cases, let me add, I mean, in some cases, for people who either don't have a lot of experiences, sometimes this is why people do the gap year. Just add that. Have additional research experience. The NIH-ERDA program is a really good example of a one or two year gap for people, especially who want to experience the NIH. Make sure they really like doing research full time and make up for the fact in some cases that they've not had a chance to do a lot of it as undergraduates.

>> Excellent. Awesome.

>> I have nothing to add.

>> All right. So I'd like to ask each of you, how do you split your time between, like, research, patient care, and other professional roles that you have? Is it known it sounds like more of your roles are as program directors at this point, but how did you throughout your career as well, then?

>> I'll take that. I'm the odd ball out in this group in that even though I completed an MD-PhD, I chose the path of going directly into a post-doctoral program rather than a residency training. So I was a faculty member within three years of finishing my -- four years of finishing my MD-PhD and went ahead to run a laboratory. And only after about ten years started to be involved in more administrative kinds of stuff. Always been a teacher in medical school. Have taken on significant administrative roles as Director of the program, but I spend at least 50, 60% of my time running my laboratory. And my mother thinks I'm a doctor.

>> Probably the most important thing of all of the

>> Yes.

>> Diane?

>> So the things that I really love to do are research and mentoring the next generation of physician scientists. That's really where I focus my time. I only see patients a half day a week and I'm in the very nice position that every single patient I see in my clinic is recruited into a research protocol.

And I have to fight to keep my clinical responsibilities to a minimum so that I can still maintain a very large research program and very high quality cutting edge research. One thing that sort of surprised me about doing translational research and research that impacts patient care is how much you get tied up inpatient care as part of your research. So we have found a whole series of genes that code for different types of vascular diseases. And as you find these genes and report them and they end up in diagnostic panels around the world you welcome the world's expert in the care and management of those patients. So every time I open my e-mail or I have people contacting me about patients that were diagnosed in gene mutations, genes identified and information on how to manage those patients. So I feel like I spent a lot of time doing clinical work that I don't get any reimbursement, but once again, it gives me the opportunity to recruit those patients that can into the research. And I actually launched a big clinical research component to my program just to answer those questions, that once we have a gene, what exactly are the complications that those individuals experience? So I can address better how to manage the patients. And I never thought I would be doing this much clinical research when I started my career.

In terms of administrative responsibilities, once again, just kept that to the MD-PhD program, because that's what I love to do I've turned down invitations to look at department chairs or with a few exceptions, as Skip knows, and a few dean positions, because that's sort of administration work that is not really what I enjoy doing.

>> Chris?

>> All right. So I would say now I spend about 50% of my time in physician contented training activities, vis-a-vis to the directing MSTB program in for engagements of postgraduate position, scientist training, and I think all of us wouldn't be in the positions we're in now if we didn't love mentoring and if we didn't have a solid commitment and belief in that we need this next generation of physician scientists. We need to give them the schools they need to be successful.

But so I spend about 50% of my time doing that. I spend another 35% of my time running my research program and the remaining 15% in clinical activities. I'm a practicing gastroenterologist. My practice is confined to Veterans populations and that provides me with some benefits in partitioning my activities.

Now, I'll say there's a time and a season, so when I first came on faculty and opened my lab, I was about 90% engaged in getting my lab up and running and doing 10% patient care. In my division, she gave me some great advice. She said, Chris, you're brand new on faculty.

You're a reasonably nice guy, so people are going to ask you to do a lot of things that they'll try to convince you is the most important thing for you to do in your career. He said, I hired you to be a physician-scientist. You need to focus on being a scientist now. When they invite you to this wonderful activity, you tell them you are thrilled and honored that they thought of you, wait about a day, and then send them an e-mail saying I told you no. Don't let me know about it. I don't need to know.

So the message is quite clear. I needed to focus on developing my lab. As my lab became more mature and more sustainable, then I took on more mentoring and more administrative responsibilities.

>> You know, it's interesting. We did a survey of all graduates of MD-PhD programs and asked them how they split their time, and the numbers are all over the map. So one of the things that I learned from that is that we all do a lot of different things and how we balance them is fluid at different parts of our career. So when I used to try to answer the questions that we're talking about now, I would start down the list by saying I take care of patients. I run a laboratory. I teach in the medical schools. I teach in the graduate school. I oversee an MD-PhD program. I used to have other administrative jobs as well. And if you assigned a percentage to each of those and add them up, they add up to 150% of time.

So I think the answer for anybody who is contemplating this career and still figuring out what it is that it all means is that whether you go through an MD-PhD program and commit to become a physician-scientist, you're given the keys to a really great car and you can drive it in a whole lot of different directions and do a whole lot of different things. And it will be up to you to figure out which of those things you want to do. Along the way, you should try to avoid the kind of pitfalls that Chris' mentor told him to avoid and you should be thoughtful about where it is that if you take a job, especially your first job, in the sense of making sure that you are in a setting in which the people that you're working for will support you in the decisions you wanted to make about the kinds of career that you want to have.

As you keep going further and further down the road in that position, you'll be able to make the decisions for yourself and probably for other people as well, and how you'll balance it will, in fact, shift over time, just like Diana's story, which I always will have to hear when she talks about it, about how she does more clinical things now, because she discovered that she needed to in order to do the research that she wanted to do to take care of the people that she encountered in the course of doing that research.

>> But the beautiful part is I have all of that training to fall back on. So I can get in any direction I want to or need to.

>> Well, and this is this is huge to me, one of the huge advantages of a physician-scientist career is a pretty big degree, you're the captain of your ship. As your career evolves, I'll be able to make choices about the activities you engage in and how much variety there is in a day, and there's that [Indiscernible] the time as your career progresses, you can make choices that can affect how we spend that time. It's pretty unique opportunity, actually.

>> Back to you, Gina.

>> Awesome. Thank you for all sharing your individual experiences. \* and positions. So another question has come up. How closely does your PhD lab or research need to fit your clinical interests and if you don't know what those are, when you started your graduate schoolwork, how much does that influence, like, what you're going to do in the future after, as a clinician, like, as a physician-scientist?

>> Do you guys mind if I grab this one first?

>> Go for it.

>> We've got a little bit of data. So we surveyed and skipped help with this. We surveyed those postgraduate physician-scientist training program directors and asked them how important it was that one's graduate research was [Indiscernible] to whatever clinical discipline one was going into, and the answer was not at all. So what you really need out of graduate school is a rich scientific training and experiences. When you learn how to think like a scientist, talk like a scientist, communicate like a scientist, combine experiments effectively, efficiently as you 50 hypothesis. -- test hypothesis, and think about how those experiments move the field forward. Those are the basic toolkits that you're gathering during that graduate school, and that's broadly applicable to -- broadly applicable to whatever you might tackle during your career path.

>> Very well said, Chris.

>> I noticed in the chat feed that somebody put up a link to Diana's Ted Talk. So let me put in it a plug for everybody to watch that. It's one of the most inspirational talks of a physician-scientist I've ever seen.

>> I second that recommendation.

>> Oh, thank you, guys.

>> I know what I'm doing tonight were I haven't seen it.

>> It's a great example of how you do this research and the accident just take you in directions you have no idea where it's going to go.

>> So when I was working through my e-mail stack this morning before we did this, one of the e-mails I was happy to see was an e-mail from one of our current students at Penn who was sending out a bunch of pictures of his brand new baby daughter. And some of the questions that are in the chat feed right now are about work-life balance and we've been talking about it, but some are really meant to say how do you balance having a life outside the laboratory and outside the clinic with being an MD-PhD, a physician-scientist? So maybe we should each talk a little bit about our experience in that regard.

>> Absolutely.

>> Cary, you're looking wise.

>> Sure. Why not. So the bottom line is that, you know, eight years is a long time and people manage to figure it out. I would say that every one of our students has figured out the right -- a good life balance for them as they pursue through the training phase. I think that's what we're talking about. And stuff happens. Kids happen. Pets happen. Parents get ill. All sorts of good and not so good things happen. And our students manage just fine with that. It's just part of living. So I don't have any great advice about it, but I think life can't be on hold and you kind of have to remember that you're going through a long period of training and you're doing what you love and that's going to be the inspiration for you to put the effort into it, but you can't ignore the fact that there's other aspects to your life. . Your relationships, your friends be, your family, and those have to be attended to, too. -- attended to, too. For some reason, most people figure it out and it seems to work well.

And I think that, then, continues on as people enter their career phases and are going through the challenges of residency training and then starting a new faculty position, whatever they're doing. You continue to manage that. Finding people who support you in that is critical. This is a part of the community building we're talking about. But support can also come from family members. It can come from partners and this is always a critical piece to manage getting through these things.

>> I'll fast to somebody else. That was very -- I'll pass it to somebody else. That was very broad.

>> One thing that kinds of surprised me when I started my academic position was the fact that being MD-PhD, and Leslie focused on research, gave me a lot more flexibility in terms of my time than my clinical colleagues. When you're in the clinic and you have those patients scheduled, you have to be there. For me, it's much more open when you're running a research lab and if there was -- my kids were in a play or I wanted to run over and have lunch with them, which they only allowed during elementary school. They would die if I showed up. But my schedule as a physician-scientist gave me a lot more flexibility.

>> True. I agree with everything that Cary said. We have had many students that got married, had children during the time in the program, and just because you're pursuing an MD-PhD doesn't mean you have to put the rest of your life on hold. -- life on hold. You progress and go through those changes at the same time you do the training.

>> Great.

>> Skip, are you going to -- I don't know if I'm cutting out or if you were cutting out. I will just say I agree with everything that was said and just to reinforce one of the leading factors driving burnout, physician burnout and career burnout, continuously putting things on pause. Because it's going to be better to do X, Y, and Z at the next phase of your training. We strongly recommend against that. We had two kids while I was an MSTP student, one kid as I was an intern, and then now we've got five kids, and I can't agree more with what Diana said, that a career as a physician-scientist offered incredible flexibilities for me to be able to go to my kids' programming, which would not have been their clearly clinical. Absolutely that's for sure.

The other thing I would say is just make a comments that it doesn't have to be a balance. So balance implies one side is losing while the other side is gaining. It can be that both sides benefit. I've taken kids with me to conferences as a way that we've been able to bond, and then one of my children has worked in a lab at Vanderbilt, and so during lunch she would come over to my office and we would hang out as well. So it doesn't have to be one side losing. Both sides can benefit in this career path.

And like was mentioned, a lot happens in your life over the course of an MD \* \* MD-PhD training program. You're roughly 22 to maybe 29 by the time that you finish this program. A lot of stuff happens in people's lives during that time period. And it's important that you have those experiences outside of your professional training for your health.

>> You know, I've sat in on any number of conversations about the best time to have kids if you're training to be a physician-scientist, and the consensus that I came away with from all of those conversations with is the best time to have kids as a physician-scientist trainee is when you're ready to have kids.

>> Right. Yep.

>> Gina?

>> All right. Let's see what else we have here. I just want to put a plug in for SPSA -- APSA's mentorship program. Anyone on the video has any interest in interesting an MD-PhD assigned mentor, you can sign up for the mentorship program this upcoming year. And that's a great way as an undergrad or even as a premed student to connect with another student who is actually going through the MD-PhD process right now. That's another thing that we wanted to announce.

I think another question that we're interested in knowing is why choose an MD-PhD pathway? And I kind of know that we talked about this at the beginning, but just to, like, advantages to that you see in your careers at this point? And if there's any difference between MSTP versus MD-PhD programs, that would be another good question to address.

>> There is no one way to become a physician-scientist. There's more than one way would be a better way to put it. MD-PhD programs are terrific for people who decide early enough in college that this is what they want to do that thicks prepare themselves for it is application process and forgetting in and making a good decision.

But there are other ways to get there. If it you want to be a physician-scientist, that means you have to go to medical school, whether it's an MD or a DO. You've got to do that part. And you need training on how to do good research. And there are lots of different ways to do that, including yearout programs during medical school, additional training after you finish all your clinical training. Sometimes people will get a PhD at that point. It's harder in your Thirties when you're a trained physician than when you're in your twenties and you haven't gotten far into medical school. But all of these different paths exist.

I had any number of conversations over it is years with people who found -- the years with people in medical school, none of them PhD students, but wishing they were an MD-PhD districts, because they knew they liked to do research, and yet had been advised that, well, you know, you don't really need to get a PhD to be a successful physician-scientist. A lot of people have won flow bell prizes without a PhD, and that's true, but there are folks, at least who came to talk to me, that they'd really like doing research. They would have been a great applicant to an MD-PhD frame, but they were difficulties companies from doing that. They were encouraged to go in a different directions by advisors that they had as undergraduates, and then they say, well, you know, what can I do now? So I give them the speech about all the short-term opportunities to do research while you're a medical student, but lots of medical schools also offer the possibility of applying to transfer into their

MD-PhD programs once you've started medical school.

The disadvantage of doing that is that if you're a medical student who decides they want to be an MD-PhD students, you're really limited to just one place to do that, which is the medical school that you're already enrolled in. You don't have the opportunity to an employ to a whole bench of places and look around. So in general, if an MD-PhD program is what you believe you want to do, your strategy is better to just apply to MD-PhD programs than it is to start medical school to be able to transfer into the local MD-PhD program.

We talked earlier about the advantages of graduate education as part of the mix for training somebody to be a physician-scientist.

>> Just to reinforce something Skip said. Those MD only position scientists that I've known that have been in these postgraduate programs, it is not uncommon for them to say, I wish that I had a graduate experience when I was much younger. So I think that's actually -- they recognize there is a some intrinsic value in this graduate training process when one -- maybe when one's neurons are less collapse I -- calcified. Maybe devote more time for that experience. Those who are physician scientists, MD only, I would say in the last ten years with the ones that I've only interacted with, many have said that they wished that they had done the PhD trend.

>> And I think the current data is saying, indicates that it's harder and harder to do that track, the MD only and then adding on research training in a laboratory at the very end, because the number of MDs that are going into research at laboratories, MD only, it's actually diminishing over time. Research has gotten very complicated, and I think I just have to take the time to do the MD at some point to be a successful researcher -- the PhD.

>> I don't know if anyone wants to complement on this, but my impression is that being a physician has gotten more complicated, too. That there is a great deal of additional required time and energy spent, and I won't go into the details in being a physician that goes way beyond taking care of patients. And so once you're sort of in that area and invested in that, as Chris was saying earlier, it just becomes harder and harder to find the time to really block out, you know, a time, a protected time for pursuing research intensively.

>> You know, I'm looking at the chat feed, but also at the time, and I'm wondering if we should do the equivalent of a speed dating things for the next few minutes and give quick answers to some of the things we haven't touched on.

>> That's fine. Yeah. Sounds good.

>> You know, what do you do if you're an international applicant? How does that affect things? What do you do if you're a social scientist rather than a laboratory scientist? And maybe we should just start with those two.

>> Yeah.

>> Social scientist.

>> Social scientist? Okay. So social scientists are welcome in it a lot of MD-PhD programs. You have to see whether they have a graduate program in the social sciences, at the place that you're interested in. But or but there's a minority of MD-PhD students, but a very important minority that are doing things like anthropology or history and sociology of science or economics or a number of other areas that I think make a really nifty combination of locals being trained as a physician. But not every MD-PhD offers them, and if you want to have a notion of which ones do and which ones don't, there is a listing on the website for MD-PhD program outcomes.

>> Why don't each of us grab one of these things. I'll just grab something really quick. How is quantitative research used, as well as well lab research? I'll just make a comment from me if it's different. I think what we really want to see, we really dug into a meaningful research experience and we squeezed every last drop out of that experiences that you can, that you've got curiosity about that experiences, curiosity about that area, and to talk about that in a meaningful, passionate way, both in terms of how you construct your application, your essay, personal statement, and in how you might interview about that.

And I'll just tie that with another question. I think a letter from the summer program director is probably less impactful than the individual that actually did the research with who can comment on their interactions with you as you engaged in that experience.

>> Yeah. We really need big data, scientists and bioinformaticians in research. We are completely open to people without wet lab experience that are doing computer based research. That is fine.

So the international applicants, Cary, do you want to take I can't?

>> Sure. The bottom line is there are some MD-PhD programs that do accept international applicants. The total number is probably half or maybe a little shy of that. My understanding is that most of those places that do, the number of students who are international coming in is typically limited, that most of the students are citizens or permanent residents.

There is, on the AAMC website, there is a sheet, a data sheet, a back sheet that is available that does indicate which schools will take international students of it's important when you're applying to get that figured out ahead of time, and most of their websites will have that information.

>> And I think it helps if you've done your under graduate degree in the U.S.

>> Yeah. I think it would be very challenging if you've not done that. Thank you. Diana.

>> We had another question about was there a particularly exciting moments for your career that validated your career choice? If anyone wants to take a stab at that.

>> I just think it really illustrates how the research will really take you into areas that you don't -- that you have to learn all over again about different diseases. When I see my colleagues that are just -- not just physicians, that are clinicians, it's not uncommon that they get a different type of burnout from what Chris was talking about. They get tired of seeing the same patients doing the same procedures over and over and over again. And in the past, so much of that job satisfaction came from taking care of patients, and now with all of the E PR and regulatory issues that you have to deal with, is sometimes it's hard. There's even further burnout or frustration with that career, because you have less time to interact with the patients and more time doing the electronic medical record and so on. Whereas with research, it's just -- it seems like every day or every week I come in and there's something new. There's a new pathway to understand. There's a new gene with no known functions and we have to figure out why, when you mutate that gene, you end up with this disease in humans. I mean, what could be more exciting as a career, to be able to figure out those puzzles.

>> And to get paid well-to-do it, which is really nice.

>> And invited to travel around the world and interacted with really smart, intelligent people and be involved with patient support groups and have that gratification from the patients at a different level that still a lot of patient gratification, also.

>> Awesome. Well, in the interest of time, I just want to go ahead and wrap things up here. So thank you to each and every one of our panelists and everyone who is on the call and on our Go To Meeting, online. Thank you so much for being here. I think you all learned a lot and got answers to a lot of the questions. We're trying to figure out how we're going to get some of the leftover chat questions answered, so we're going to try to figure that out. And if you are interested, we ever more information about training on the APSA website. Physician-scientist.org. And about becoming an APSA member. As a little plug for our next session that we're going to have tomorrow at 5:00 p.m. eastern, we're going for talk about the role of the physician-scientist during pandemics. Dr. Sally Permer and Dr. David Arnoff. Thanks again, and thanks to our panelists here. And I appreciate working through the technical difficulties and getting kicked off the meeting, but thank you again.

N meetings concludes.

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