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Justin Barr: Good evening. This is Justin Barr interviewing Dr. Daniel Nussbaum, last name, as part of the oral history project for chief residents at Duke University. It is 24 April 2019 in Duke University Medical Library. Thank you very much for joining us, Danny. We really appreciate your time.

Dr. Nussbaum: My pleasure.

Justin: Will you start by telling us a little bit about where you came from, where you went to school, how you got interested in medicine.

Dr. Nussbaum: I grew up in New York. I was born in New York City. I grew up in a suburb north of New York City. I went to the University of Wisconsin for college. I'm not quite sure how I became interested in medicine. There were some physicians in my family, but not my closest family. My mom really urged me to go to medical school. I guess at the end of the day, when I thought about it, I thought of all the professions that I could choose from, and there was only one where: you didn't sit at a desk all day long; you were always doing something interesting; you got to help people every day; and you were well compensated for it.

There's a lot of jobs where you get to do all of those other things. My sister is a public school teacher, and she loves it for all of those same reasons. When people ask me these days, should you become a doctor, I list all of those reasons. I still think it's the greatest job you could ask for.

Justin: What in undergraduate pushed you towards medicine?

Dr. Nussbaum: Very little. In truth, I skated by, in undergrad. I was interested in the courses. I was a political science and a creative writing major. I just kept medicine on the back burner the entire time. I kept different career options open, law, something in politics outside of law, writing. Those are probably the three other things I considered doing. I just took the courses that I would need if I wanted to apply to medical school, and I took the MCAT. Then, my last year, I sent in the application.

Justin: Did you have time off between undergrad and med school?

Dr. Nussbaum: Yes, for one year I spent working at a lab in Columbia.

Justin: Then where did you end up going to medical school?

Dr. Nussbaum: I went to med school at USC.

Justin: Did you know, going to medical school, that you wanted to be a surgeon, or is that a decision you made in medical school?

Dr. Nussbaum: I have a little bit of trouble remembering now. I honestly think I went to med school thinking I wanted to become a pediatrician. You don't have to laugh. I think that's honestly what I wanted to do.

Justin: What pushed you towards surgery?

Dr. Nussbaum: Some actual exposure to what practicing was going to look like. Also, I can't now remember if I got involved with them because I knew I wanted to do surgery, or if I decided to do surgery because I got involved with them, but I ended up working with the congenital cardiac surgeons at CHLA, the children's hospital affiliated with USC. I left medical school thinking I was going to be a congenital cardiac surgeon.

Justin: Who were some of your key mentors?

Dr. Nussbaum: My biggest mentor in med school was probably a doctor named Wood Wells, who was one of the senior pediatric cardiac surgeons at CHLA. It's funny, I think back now on how closely I worked with him and the idea of someone that senior working with a medical student who knew nothing about congenital cardiac surgery, and just figuring it out on the job. It was pretty remarkable of him.

My probably second biggest mentor was his fellow at the time, a guy named Dilip Nath, who's now a practicing pediatric cardiac surgeon. He's moved jobs. I think he's in Chicago now. I guess he was the filter between me and Dr. Wells, but not with the layer of filters that we sometimes work with here. I worked one-on-one with Dr. Wells a lot, and I learned a lot. That's what I thought I was going to do. That's why I came to Duke.

Justin: When you were applying to residency, what was Duke's reputation at that time?

Dr. Nussbaum: It's funny. Everything I think about now is so colored by a little bit more experience and seeing the way things really are. I think when I was looking at a residency program, honestly, the main thing I was looking for was, number one, did they put their graduates into the fellowships and jobs they wanted to go to? Number two, what was the reputation? How good was it?

I think I lucked into coming here because I didn't know the right questions to ask. By and large, I think we've been given an opportunity that very few other people have had. I don't think this was by my own design. I think I lucked out.

Justin: What was the interview day like?

Dr. Nussbaum: The interview day was very well run. Very well run. I bring up a lot how important it is I think we keep doing it like this. Maybe that's just because I value the fact that they made me feel valued. It was very organized and very professional, and you left feeling like you were going to be valued. If it had not been that good, I do not think I would have been willing to move from Los Angeles to Durham, where I now have a life, and I love living. But, when I was 27 years old and also had a life and really enjoyed living there, I don't know that I was quite as prepared to leave. The interview day won me over.

Justin: Did you think about staying in Los Angeles?

Dr. Nussbaum: I did. At the time, I thought I wanted to do cardiac surgery, and I had been discouraged from UCLA because nobody had done cardiac surgery there for a long time before, when I was applying. I thought about staying at USC. I had a lot of people I was very close with there. They all encouraged me to stay. I had a secondary mentor of mine who was a little bit younger, mid-career. All in all, a good guy who had stayed and was very successful staying. He had given me the advice that it's better to be a big fish in a small pond than it is to be a small fish in a big pond. I didn't know whether or not to believe that. I believed it.

Then a guy who had left USC to do his cardiac surgery training at Columbia basically pulled me into his office and was like, "That is the worst advice you can possibly get. You need to go explore something bigger." He's like, "I would not have gotten a tenure track job here if I had stayed." He's like, "You need to get out of here."

Justin: When did you start at Duke, and who was in your intern class when you began?

Dr. Nussbaum: I started in 2011. My intern class was me, Jeff Keenan, Brian Gulack, Cam McCoy, Jeff Yang, Emma Neff, and Hang Hang Wang.

Justin: What was it like to be an intern at Duke in 2011?

Dr. Nussbaum: It was a blast. It might have been my favorite year. I always say, There aren't any other specialties where all the senior residents disappear after rounds. They'd go to the OR all day and they just leave the kids to play on the floor all day. You learned a lot really quickly because you had to learn, and you learned as a group and on your own and that was it. I thought it was really fun. I thought the first four months of my internship were the most rewarding time, probably, in my residency until this year just because I learned so much so quickly.

It's like watching an infant pick up language. You see yourself getting better on a daily basis in the beginning, and then on a weekly basis, and then on a monthly basis. Then intern year and residency can get really tiresome after that because you plateau a little bit. You're still learning, but you're not learning with the same rapidity that you were in the beginning.

I think it's a motivating force when you constantly see yourself getting better, and it is sometimes a demotivating force when you feel like you're putting in just as much time and you're stagnating. Some days, you're feeling like you're somehow getting stupider or technically, less fit. Of course, that's not true, but it would feel that way. I think that's a rough patch a lot of people have after the excitement wears off and they've learned 90% of what they're going to see within a few weeks. Then you realize, you got a lot more years left to put in.

Justin: Any particularly funs stories from intern year?

Dr. Nussbaum: Gulack was so ripe for good stories. Almost all of my funny stories somehow revolve around Gulack, obviously, with Keenan as somewhat of a spectator with me. Watching Kakosis actually learn English... When George got here, he spoke English 90% well, which is almost funnier than someone who speaks English 20% well, because he almost had everything perfect and would just throw in one out of every 10 words in a completely meaningless way. He picked it up fast.

Justin: What's a funny Gulack story?

Dr. Nussbaum: How appropriate does everything have to be?

Justin: It can be totally inappropriate. Now, if you hate it, it can be stripped from the record or you can embargo it for 50 years.

Dr. Nussbaum: I don't need to embargo it. I guess I can't tell these stories. I'm going to go off the record for one minute.

Justin: Sure. Just know that Keenan and Gulack both told stories about you in their interviews.

[laughter]

Dr. Nussbaum: All right. Whatever. I guess, my very favorite story is, as a young Jewish man from New York and LA, who had only lived in places where Jews were not a rare commodity, was watching Gulack try to date. Just time after time watching him go out with these born-again Christians who would tell him things like he was going to hell and he wasn't going to be saved. Then just repeating the same thing over and over again and expecting a different result. In that regard, I'm not sure that anything has changed.

Justin: Fair point. Now, you've been a chief. You've had the opportunity to observe and supervise interns. How do you think the intern experience has changed over the eight years that you've been here?

Dr. Nussbaum: I think it's, by and large, the same. We now have APPs, which we didn't really have when I started, which I think is a good thing. I think as we learn that their role not just being to take care of patients and we to improve the early resident

experience, it's going to change more. The chief of the service and the intern used to have a really close relationship, because he or she was your only go to, and you had been in the operating room all day.

That's not quite the same anymore because I talk to the APPs as much, if not more, than the interns now. I think in some way, the bond between the chief and the intern has gone away a little bit. You couldn't leave the hospital when you were an intern until you had checked out with your chief for the day, and I don't even expect that. I don't even expect that anymore, which is fine. Look, nobody came here for the goal of having a good relationship with their chief resident.

As much as the chiefs would love to think that that's the most important thing in the world, it's not. Everybody came here to be a surgeon. Nobody came here to be an intern. I think a lot of the focus on "how great an intern everybody was when they were an intern and how much everybody sucks today" misses the point. I think a lot of the tasks that we had to do were not educational and didn't help us become better surgeons or clinicians or thinkers or anything.

I think to have people who can fill some of those roles and get the interns to the OR, so they actually know how to operate when they come out of the lab or in their second year is going to be a great thing. The way the program worked and essentially still works, is you learn how to operate in your last three years. That's because the way the hospital functioned for decades was that the interns and the junior residents did all of the work. They were the labor force. Then you move on and somebody else takes on that labor force and you get to learn how to operate. That's the quid pro quo of coming to an academic program. You knew what you were getting into. If you didn't know what you were getting into, you didn't ask the right questions or you somehow came from a place that didn't function like every other place, which I find hard to believe, or you're just completely unobservant. But I don't think that's the way it has to be.

Surgery is hard, and we do a lot more now than people did 30 or 40 years ago. The expectation to learn it in three years might be becoming a little bit antiquated. Anything we can do to get people in the OR more first and second year…if you add one more year of OR experience, you've just increased operative training by 33%. I think that's the direction things are going to go. Nobody's going to want to add more time on the back-end. I think it's all going to be about what we can do to optimize the time that you've already committed here.

Justin: People say that JAR year's one of the most challenging years of residency. Did you find that to be the case or what was your experiences as a JAR like?

Dr. Nussbaum: Yes, I thought JAR year was not the year I worked the most, but probably the most emotionally-draining year. It's because you are a little bit in this ether. You're in it, SAR-1 too, where you're not quite the most junior and you're certainly not quite senior, but at any given moment, people can fault you for being too junior or too senior. It's almost like you can never meet the expectations.

Sometimes, you do behave in that way and not live up to the seniority you're supposed to be in for or taking care of the more junior level tasks that, unfortunately, you're obligated to do. I think that was the hardest part. Hours-wise, it definitely was not the worst, especially because intern year is so easy. Not in the first couple of months, but by the end of it, you finish your work for the day or the hour. What once took you 12, 15 hours to do, now takes you 90 minutes.

The level of confidence finishing intern year is sky high for most people. It's very task oriented. Most people here are efficient and organized and task oriented themselves and like being able to do objective things really well.

Then suddenly you come into responsibilities that are much less predictable, that you have not had experience with yet. You very quickly realize you do not know as much as you thought you did, and that it's not going to just be a checklist of things that people tell you to accomplish. You're going to have to do more critical thinking. The problem with critical thinking is, it doesn't just matter how smart you are, you actually also have to know stuff.

Justin: You eventually went on to the lab where you took three years' time to do research. What were you doing in the lab for those years? Why did you decide to take an extra year?

Dr. Nussbaum: I had by the end of my intern year decided I wanted to do oncology.

Justin: What made you make that decision so early and switch from cardiac?

Dr. Nussbaum: I think there was always a part of me that knew that cardiac wasn't the right fit. That was probably the reason I came to a place like Duke where I wanted to keep every option open for myself. I knew that. I knew coming here, whatever I decided to do, I would be able to do it and go to a top place to finish my training.

Why I decided to do oncology? I was just fascinated with the disease. I liked general surgery, and I liked the complex general surgery. To some extent, that's what oncology really is. It's one of the last ways you can train to do really complex general surgery. Once I decided to do oncology, my main mentor at the time was Dr. Tyler. Doug Tyler, who really to his greatest credit, because he didn't know at the time he was going to leave within the next 18 months, was he didn't just funnel me into his lab. He listened to what I was interested in. Then he found a young hotshot investigator and said, "You should work with this guy."

Usually, if you can get a surgical resident to come and work for you for free, that's a hard thing to turn away. Maybe he thought I would suck in the lab. No, to his credit, he set me up with Chris Wood, who had just come from MIT. I think I was probably the first person to sign up to join his lab. By the time I actually started six or eight months later, I was the third person who was there.

He was this baby genius from MIT who was not even a biologist by training. He was a chemical engineer from MIT, who, when he finished, just decided to become a biologist and found himself doing his post doc in the best biology lab in the country, and gained the skills he needed to become a cancer biologist. I worked in his lab. It really had no infrastructure at the time.

It's funny because I was there today, and I can hardly figure out what anything is anymore. There are so many people there, and I don't even know where we keep things anymore. People are always changing. At the time I started, the shelves were empty. We had one centrifuge. We had two tissue culture hoods that were available anytime. That was our infrastructure. As smart as Chris was, things all ultimately worked out.

Probably it was a credit to how naive I was thinking it was a good idea to join a brand-new lab. There were a lot of challenges. Things don't just go as smooth as you hope they do. I would probably never recommend to a surgical resident to do what I did. I would probably tell everybody to join a lab with a well-established project that you can accomplish. What I would tell people to do is join something that you know you can finish in two years, and work on a moon-shot idea at the same time. If that works out, that's great, take as much extra time as you need.

If it doesn't work out, which is so possible, make sure that you're going to leave those two years with something that proves you can take a project from point A to point B and that gives you real exposure or research so you can decide if it's something you want to do for the rest of your life. If you do decide you want to do it, you're going to need to have that time where you've proven that you can accomplish stuff. I think, practically speaking, it's in everybody's best interest to join something that's relatively established, where they're working on at least one sure thing over that two year period. Two years goes by fast.

Anyway, I did not have that. We started recreating the wheel. Not only did we recreate the wheel, but we started recreating the wheel just as a new wheel was being introduced. Chris started his lab as a loss of function screening-based lab using small hairpin RNAs, which became obsolete within the first 12 months I joined his lab.

Crispr CAS 9 systems took over, and that was very exciting. We didn't create the technology by any means, but I got to learn how you take a technology and implement it in a new laboratory and get it functional and reproduce technologies that work in more experienced people's hands and make them work in your own. We spent a lot of time figuring out how to make them work in our own hands.

By the time nearly two years had passed, I did not have much. I had just made one finding that I was beginning to show was reproducible and was novel and was interesting. I certainly was not going to flesh it out in a month or two. I went to Chris and I asked him a couple of questions. The first was, "Do you think if I spent another year in your lab we can really make this happen?" He said, "Yes, I believe in this project. I think that in a year you can make real progress on it."

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The second was, "Do you think I'm capable of being a PI?" I was like, "If you think that I don't have the chops for this, this is all a waste of time. I have a great fall back career." He said, "No, I really believe that you can do this." There was nothing that was going to benefit him by saying that. I went to Dr. Kirk. It might have been the first time I ever met with him one-on-one. I asked him if I could take another year. I had this whole spiel ready for him to try and convince him, and he didn't ask a follow up question. He just said yes.

The next year, a friend of mine who I had known from the lab -- a guy named Colin Martz, who was a medical student….no, wait. That's not even true. He was an undergrad at the time who had just graduated. He was the first hire Chris actually had in the lab as his manager and technician while Colin was applying to medical school. I knew him from those early days. He actually went on to publish a *Science Signaling* paper during that year, with help from a few other people.

He ended up getting into Duke medical school, I think on a full scholarship. Then he came back to the lab to do his research time. He and I teamed up on this project. He worked for the next two years on it. Then he went back to finish medical school with the project now probably about 50% done. He's now a med-peds resident at the combined Brigham-Boston Children's program who's probably going to be pursuing a fellowship in oncology, although he hasn't made up his mind yet.

By the time he left, like I said, we had the project about 50% done. I've been working on it ever since. The last three years, I have been balancing my time between finishing residency and finishing this project. It's become more expansive. We've now collaborated with groups at UNC, the University of Colorado, other groups at Duke, and will probably submit the project a couple of months after I finish up here.

Justin: That's pretty exciting. What's the project going to show?

Dr. Nussbaum: Man, I wonder how much cancer therapy is going to have changed by the time people hear this. When I joined Chris's lab, it was just after the first clinical trials showing a benefit of vemurafenib in BRAF mutant melanoma in the metastatic setting. It was really at the apex of targeted therapies, and not just targeted therapies, because people already knew that resistance was developing to targeted therapies, but about looking at why and how resistance develops and ways to combat that. I'll get back to what the project actually shows in a minute.

It's funny because now, since my time in the lab, immune checkpoint blockade is more or less taking over the roles of one targeted inhibitor after another. They're obviously having better clinical benefit. My PI, before any of this even happened, he made a point talking about something. He said science moves like a sin curve, and that different ideas undergo peaks and valleys. Dr. Seigler was working on tumor vaccines and the immune response to tumors 40 years ago. That stuff was essentially forgotten by the '80s and '90s.

All it takes is one or two insights or technologies to come around for old ideas to come back again. I find it hard to believe that targeted inhibitors are going to be written off. I do think they're going to have a resurgence. Ultimately, it will have to either understand ways to block lots of diverse resistance mechanisms or ways to deliver agents more potently and directly to tumors, as opposed to normal host tissue. Or, what I really think is going to be the breakthrough, and this might be also true for immunotherapies, is being able to monitor tumor response to treatment in real time. I have no idea what the breakthrough is going to be that leads to that, but we are so now delayed in understanding whether or not people are deriving a benefit from treatment, that we're always three, four steps behind the eight ball.

I think once we understand in real time how people are responding to treatments, it's almost not going to matter what treatments we've put them on. Different people are going to respond well to a variety of things. As long as we can keep track of how well they continue to respond to them, lots of different things are going to be important.

Anyway. Sorry. My project looked at resistance to MAP Kinase inhibitors, and MAP Kinase dependent cancers, particularly KRAS mutant cancers. There was a early generation of MAP Kinase inhibitors that didn't work, resistance developed so quickly.

A few years ago, some newer classes of inhibitors came out that were supposed to block a lot of the early feedback reactivation that was responsible for resistance in first generation inhibitors. In our hands, we saw they really didn't work so much better either. We started to explore the concept of RNA transcriptional reprogramming as a mechanism of resistance. Other people had done some similar work, particularly in the last 24 months or so.

What most groups have been saying is that cells that are exposed to Kinase inhibition undergo very early transcriptional response, where resistance is rendered ineffective within the first day or week of treatment. What we've shown is that this transcriptional reprogramming is a process that occurs not over hours or days, but really over weeks and months, as cells take on different levels of fitness in the setting of these drugs. We've come up with a few different strategies that act at bottleneck points in the early transcriptional reprogramming.

What that accomplishes is, a lot of these early programs that occur in the first week or so are conserved between cells of different lineages. Most cells ultimately go on to develop lineage-specific, very diverse, stable terminal mechanisms of resistance. What we're looking at is approaches to play with the epigenetic and transcriptional machinery to damage that initial conserved response in order to block many different diverse terminal mechanisms, without having to a priori identify them. Essentially, block terminal mechanisms of resistance without having to predict what those transcriptional mechanisms are going to be.

Justin: That would be revolutionary in the therapy of tumors.

Dr. Nussbaum: Have I bored you yet?

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Justin: No. It's actually quite intriguing. You've also done a lot of healthcare service research with Dr. Trey Blazer, yes?

Dr. Nussbaum: I've done a bit with Dr. Blazer, yes.

Justin: You guys came out of lab. There's only four of you all in your SAR-1 class.

Dr. Nussbaum: Yes. There were four of us in my new class.

Justin: How did that affect your SAR-1 experience, having only four people?

Dr. Nussbaum: I think we probably had the best SAR1 experience you could ask for. You're not supposed to call something very unique, especially as a writer, but we had a unique SAR1 experience. There were only four of us. We did everything in blocks. They needed us really in the field, doing cases for coverage. We didn't do a lot of the service-based rotations and instead did a lot of operative heavy rotations that frequently were reserved for the senior residents. We got a terrific experience.

I spent my first four months out of the lab working at the regional with doctors Dillavou and Fong and Novick, whom I really credit from turning me from a junior resident to an actual surgeon in training. They gave me all of the building blocks that I use now. I've got a lot to say about how I think residency training could be better, but one thing I think is obvious and wouldn't hurt anybody would be working with the same people for long periods of time.

I don't know why we move around every four weeks. I think everybody wants to feel like they're getting the same exact opportunity as everybody else, but sometimes different experiences are better for everybody. I think we should be more willing to give people different experiences, for consistency, with working with people who are proven good teachers. Anyway, I worked with them for the first four months. That was the closest equivalent to the first four months of my internship I can think of, where I really saw myself getting better on a daily basis.

Leaving Durham Regional -- actually, Dr. Dillavou had to drive me home because my car broke down for like the 50th time. I drove it here today, though. It only has to make it another month. It was very emotional leaving that hospital because it had been a long time since I had seen myself develop so much in such a short period of time, and doing it at the community-based setting in a smaller place where you really get to know everybody was one of the more special experiences of my residency.

Justin: Any particularly fun stories from SAR2 year?

Dr. Nussbaum: I think what makes SAR2 year unique is your trauma experience. Suddenly being responsible at night for the hospital is another big leap. If your third year is about really picking up the basic skills to be able to operate all over the body, then your fourth year is about starting to put them together and figure out how to get through cases with a little bit less handholding and a little bit less guidance. Certainly,

you're still learning that your fifth year. My trauma experience with Dr. Georgiade is probably the thing I will value the most from my SAR 2 year. We were one of the last-- We might've been the last class that got to work with him in a trauma capacity. His legend is so well-deserved. I can't think of a better surgeon I've worked with.

He is cool under fire, can put facts coherently together in the trauma bay in an instant. He would show off quite a bit. He would tell me what injuries the patient would have before they went into the scanner. He would scan patients with gunshot wounds to the abdomen and then tell me that only he was allowed to do that. He always had a reason, and his reason was always right. I've never seen him make a misstep.

I remember doing a trauma nephrectomy with him. It was probably one of my favorite cases I did during all my time here. He is another person who is gifted at making you feel like you're capable of doing this and not holding your hand, but talking you through in a way where you realize there is a method towards doing this well. And he knows it.

Justin: Since you got here, the program leadership has changed both in terms of the chairman and the program director. How has that affected Duke Surgery?

Dr. Nussbaum: I think all the change has been for the better. Why don't I start with Dr. Brian Clary and Dr. John Migaly? When I came here, Dr. Clary was the program director. He had been doing it for quite a while. By all objective measures, except, perhaps, by ACGME approval, the program was doing great. The surgeons were well-trained. They were going to their top fellowships. They were taking on academic appointments. Dr. Clary was an old-school program director, and he was good. In some ways, he didn't think about people individually, or at least it was not obvious to the individuals. He thought of the program as a whole.

I got the impression he didn't think he could cater to everybody's whim because he had to think about the program as a whole. To some extent, I think he was right. He did have more experience, and you do need somebody with experience leading the show, but you cannot come to him quite as easily with things you wanted to individualize about the program. That said, I came to him countless times with oncology career-related advice, and he was very welcoming of that and incredibly helpful.

There were opportunities that I thought I wanted to take. For instance, I thought I wanted to go to Sloan-Kettering for my research time because I saw something online about an opportunity. This was during my intern year. I'd just moved to Durham. I was like, "Man, I could go back to New York city for a couple of years, work at this great place. I think this is where I want to go for fellowship." I told this to Dr. Clary. He had trained there and I thought he was going to be all behind it. He's like, "That's a terrible plan. That's how you end up not getting to be a fellow there."

He's like, "You want to stay here. We have lots of opportunities here. You want to get to know people here and do good work here, and then you'll be set to go there." He

was exactly right. When it came time for me to apply for fellowship, he was already at UCSD. Just how loyal and dedicated he was to making sure his residents succeeded became all the more apparent. He went out of his way to see that I ended up at Memorial.

Justin: That's impressive.

Dr. Nussbaum: He has kept in touch. When Match Day occurred, he was the first person who emailed me to see that I match there. Dr. Clary was not your friend, and you knew that. He didn't socialize with the residents, and he was not approachable. I mean, you wouldn't just call his cell phone out of nowhere, but he cared about his residents. He was incredibly loyal to them and wanted them to succeed. He is probably one of the people that I have the most gratitude to.

Another one who I have the most gratitude to is Dr. Migaly, who leads in a very, very different way. I think he realizes that in the modern surgical residency, there has to be a little bit more focus on the individual, especially since it seems like training is getting more tailored to the individual and to, somewhat, early specialization. Dr. Migaly, he really cares about the individual residents. He does develop personal relationships with them, at times for better or worse, but every inch of him emotionally is invested in this program.

I pissed him off really badly this year, and it was over something stupid. I couldn't realize why he got so upset at that time, but you realize that he cares so deeply about the program doing well, and he invests so much of his time into it and his emotion into it that I think it can be very hard when things take a turn or he feels that you've abused his trust in even the slightest type of way or have made decisions that can be perceived as a little bit selfish, that can be detrimental to the larger group. Dr. Clary never walked this tightrope. He just always had an eye out for what was going to be best for the group.

Dr. Migaly has lengthened the leash a lot and allowed people to focus more on themselves and what they need or want personally in their training, but with that comes moments where people don't always act in the interest of the group, and it just comes with some repercussions that he has to deal with from time to time.

Justin: What about the Dr. Danny Jacobs and Dr. Allan Kirk transition?

Dr. Nussbaum: I never knew Dr. Jacobs. He invited us to his house when I matched here. He was always very cordial when I saw him. He did a couple of early mock oral things with me and my classmates when I was an intern, during which George Kakosis famously, on the initial presentation of a Board's question, said that the first step he would do was take the patient to OR and perform a colostomy. Keenan might have told that story.

Justin: [laughs] No.

Dr. Nussbaum: Do you want a good story?

Justin: Yes.

Dr. Nussbaum: All right. My best memory of Dr. Jacobs is that early in our intern year project, the third month, he decided to meet the interns and do a session of mock orals. We didn't know anything about the Oral Boards. We didn't know the format, what we were supposed to do. Dr. Jacobs sat us down and presented an Oral Board's question, and he chose George Kakosis who, as I said, when he came here, his English was imperfect, and chose him to go first.

He presented this case, he is like, "All right George, you've got a 60-year-old man, and he presents with a couple of days of nausea and vomiting and some distension." He's like, "All right, what are you going to do?" George's response was, "I would take him to the operating room and perform a diverting colostomy." Dr. Jacobs goes, "I appreciate the enthusiasm, but usually we start off with a history and physical examination."

Justin: [laughs]

Dr. Nussbaum: Anyway, that was one of my few experiences with Dr. Jacobs. Dr. Kirk got here, I think, during my second year. His arrival was really transformative, not just on the spirit of the residency and not even just on the focus on investigation, but on really inspiring residents to think bigger and feel that they could accomplish things that might seem years above or ahead of them and that were diverse in scope. Dr. Kirk did not care what you wanted to do as long as you were aiming towards something that could potentially be transformative.

If Dr. Kirk was going to make a resident factory, he'd probably turn everyone into an immunologist because that's what he loves. You know where his heart is and where his brain is, but he knows that not everybody is an immunologist. He wants everybody to care about something as much as he cares about immunology. I think as long as you present something to him that is broad in scope, or at least large in scope, that's potentially going to lead to something transformative, and that's going to keep you intellectually engaged, he's going to support you in that capacity. I think he has made the residency more focused, more cohesive in most ways.

Justin: What has it been like interacting with him as a chief, both in the Friday conferences and when you are the admin chief?

Dr. Nussbaum: It's funny. He is very cordial and very respectful, very willing to listen to what you have to say. You don't, or at least I don't feel particularly stressed talking to him one on one. He is very willing to tell you when you're wrong, and it is very clear just how much more experience he has than you. When you look at the same problem through your eyes versus through his eyes, he sees every angle immediately. You might realize that you are seeing things through just one miniscule peephole. He

always sees the farthest, and in a not condescending way, but in a way that is instructive, he will let you know that you are frequently seeing the trees.

He's an incredibly open-minded, tolerant, disciplined, thoughtful, and patient person. I suppose that's one way to get to the position he's in. There's probably other ways that involve less attractive personality traits. One thing I'm not particularly good at that he exemplifies and he will call me out on when I don't do it, is thinking before you speak. He almost never says something stupid or that is not well thought out. He has it in him to just keep his mouth shut until he has thought something out. That is one lesson that I'm still trying to learn from him, some days better than others.

Justin: It's a challenging one. What has chief year been like in general?

Dr. Nussbaum: In some ways, chief here has changed. Things have changed in surgical training. The chief used to function autonomously in a big place like this, and that's just not realistic any more. There's too much of a focus on quality and outcomes. There's an expectation that things are going to be done safely and appropriately and truthfully, that involves an attending surgeon. Things are so complex these days.

Everybody talks about how the chiefs are less prepared than they were 30 years ago, because we're not on Q-2 call and we potentially don't work as many hours. I'm sure that there is an element of that, but I think something that goes unrecognized is that things are much more complicated these days. We do a lot more different types of surgery in different types of ways. We are expected to have much better outcomes than 30 years ago. I don't think that the chiefs are ready to function in that autonomous role that was expected of them years ago, and we need to continue to be coached in a less hands-on way than in the earlier years, but we continue to need some degree of teaching to gain that level of expertise.

I could probably safely get my way through almost every operation we do, but that's not good enough anymore. You got to bat close to 1000 these days. That's my perspective on why some things with autonomy have changed. Chief here has been great. I basically get to work with all the people whom I have been waiting to work with for the past seven years. Dr. Peter Allen got here, my chief here working with him. Things are always in flux. I never got to work with Dr. Clary or Dr. Tyler as a chief. While I worked with Dr. Pappas a lot, he's largely shut down his more complex practice.

Look, that's going to happen to anybody when you're going to be placed in someplace seven or eight years. A great place will replace those people with other great people and certainly, that's what it was bringing Dr. Allen here for me. Talk about a master surgeon and master teacher! I think everybody, whether they're going to oncology or not, has loved working with him. My time at the VA has been great.

It's funny, despite the fact that we don't have that same level of autonomy, by the time you finish chief here, you realize you don't need it. You've learned so much by doing things in a structured, well-supervised way, that even though you might not have done

it all by yourself, you've learned how to do it. I have found myself in multiple cases now where I have had to be by myself, and in cases where doing that exact same case with an attending, thinking to myself, "I need this time to do this by myself so that when I am by myself I'll know how to do it." Then, realizing that when I was by myself, I had learned how to do it. Even at times, watching someone do it, I learn how to do it. I think we're very ready and very well trained still.

I also recognize that we still have a lot more to learn. Each of us are probably going to make some really bad judgment calls in the next few years and do some damage that a more experienced surgeon wouldn't do. It will be interesting then what our perspective on autonomy looks like. My guess is that we'll wish that we had another set of eyes or hands available at those times.

Justin: Socially, your chief class is not as close as some of the chief classes that have preceded you. How does that affect the chief experience?

Dr. Nussbaum: I don't know that it's affected the chief experience, per se, all that much. The truth of the matter is you don't need to spend all that much time together and you don't need to be all that cohesive. We were always able to at least get work done. You spend very few days or hours all sitting around a table together trying to get something done. What I will say, certainly, the fact that not everyone has gotten along at every moment during the year has made the times where we do have to sit around a table less pleasant, and has detracted from our time. That said, I think a lot of the wounds that were created are hopefully on the way to being healed and are better.

I would say, one perspective I have about residency as a whole that arises from that situation is that we don't do a very good job of not making this seem like a competition between classmates. It really starts at the intern year probably more than anything. Everybody wants to be perceived as good and competent. There's always going to be somebody or somebodies who struggle. I think that we allow people to validate their own success based on the struggles of other people and don't put enough focus on helping them catch up, which is one thing.

The other is that you realize ultimately that you're paired with a very talented group of intellectual peers who are almost all as capable as you are. It's possible that you all are going to be really great, and that should be what you strive for. Nobody's success or nobody's failures for that matter are a direct comparison of somebody else in their class or in their program. I think that residency is structured in a way that sometimes for the trainee, it's hard to see that.

You're always being compared to other people, you're always being evaluated, they're always putting a number on you. Somebody's always getting recognized for X, Y or Z. I think it does create the danger for resentments to develop between people that often take years to come to a boil. It doesn't have to be like that.

Justin: What other changes would you like to see in the residency program if you could wave a magic wand?

Dr. Nussbaum: I'd have interns in the operating room earlier. I would have a greater focus on anatomy. That might seem like the most obvious and stupid thing to say, but I think somehow we have gotten away from our fundamental understandings of human anatomy. Probably the biggest thing I've learned in the past year or last two years in my residency is, if you know the anatomy stone cold, you can avoid or get yourself out of a lot of trouble. If you do not know the anatomy stone cold, you can find yourself in trouble that you didn't even know was there.

Obviously, you need to have some level of basic technical skills. Some people are truly gifted and every move they make looks beautiful. That's not what differentiates a good surgeon from a bad surgeon or a safe surgeon from an unsafe surgeon. I think that until you start to master anatomy, you cannot function autonomously or independently.

Somehow, the residents these days only learn anatomy by doing enough cases. So over time, you start to recognize spatial relationship of different structures, which should seem obvious but it's not. If a lot of that expertise was gained in the earlier years, people, I think, would progress more quickly to being able to function independently. I think it's not the fault of just the residents, I think we've been very lax.

When I'm an attending, I don't expect to be hard on people or a jerk or anything like that, but I think I will do this for the resident's own benefit, but I'll have an expectation that people know the anatomy they're going to be working on and understand the way different structures relate to one another and what they can expect and what the variations that are possible are. I think that the residents gain so much more out of it if they have an understanding of this. I think this onus also has to go on the resident to prepare for this. It's probably the most important thing I think you can prepare before cases. Again, this should be obvious, but it's not anymore.

The resident early on doesn't know what he doesn't know, and he doesn't know what's important or he might not know everything that's important or how to prioritize what's important. I do think that, ultimately, the responsibility does come on the program and the faculty for emphasizing that this is not something that you should piece together slowly over time. The human body is by and large the same in every single person with slight variations that are all well-described. It's not beyond expectations that we understand what those are before we start doing things that can potentially hurt people.

Justin: Anything else you'd want to change about the program?

Dr. Nussbaum: I'd like to recruit some people who don't meet the standard mold. There was a sub-I whom I worked with very closely this year from ECU who I thought was really terrific. I thought he was a just surgeon's surgeon. He was, if not the best-definitely the top three students I ever worked with during my time here, including all

the Duke students. He was the most prepared for cases. He was technically capable for what he did in the OR. He was engaged. You knew he loved it. He didn't really have any research background, because he came from a less research-intensive program. But, he had done a couple of smaller QI project. He was really enamored by our program. I thought we could have offered him a life-changing opportunity to come here. Look, his life will probably be fine. He's a nice happy guy with a wife who's also going to be a physician. I don't actually know where he ended up, but I know we didn't rank him high enough to come here and instead rank the same people from Harvard and Stanford and UCSF that we rank every other year.

This guy was not like some schlub project that we would have had to clean up. He was ready, and we had opportunities we could have given him that nobody else could have and the kid from Harvard would have gone to another place that—

I think on the one hand, it's nice to make some sure bets. People go to Harvard for a reason. That said, we realize that with all of our resources, we have the power to offer opportunities to people who may not otherwise have had them. That can be a life-altering experience for people.

Justin: You've been here eight years, what have you see change in the residency over the course of the eight years?

Dr. Nussbaum: It's funny, I think things are so similar by and large. I think the residents might be a little bit happier now than they were when I first got here. You always are going to have residents who are happy and residents who are unhappy. I'm not even sure that what I said is true. I think that's sort of the consensus though. Then, I do think the program has become even more investigation-heavy than it was when I first got here. I think that's probably how things were during the Sabiston period, and I think we probably lost that for a while but we were still doing more than almost anyone else.

Dr. Kirk has really taken that mentality and modernized it and reemphasized it. He has residents believing that they're going to be able to change some aspects of the way medicine or surgery is practiced. Surely, not everybody is going to actually accomplish that, but if you don't set those expectations broadly, nobody's going to accomplish it. I think you're going to see that he is going to create some people who really make transformative contributions. I think that the residents are intellectually the same as they were 10 or 15 years ago. I think having somebody who believes in them and who encourages them that it's possible is what's going to be the difference maker.

Justin: It's exciting to be their colleagues.

Dr. Nussbaum: Yes, it is.

Justin: Speaking of the future, where are you going from here and how do you see your career unfolding?

Dr. Nussbaum: I am going to Memorial Sloan Kettering next year for their surgical oncology fellowship. I'll be there for the next two years. It will be a busy clinical fellowship. I'm going to try and get as much of a research experience at the same time as possible, because there's one person in particular whom I have always wanted to work with and whom I've started to correspond with to get as much time with her as possible and learn as much as possible. Then, I guess we'll see. I have my eyes set on coming back here right now. Obviously, nothing is set in stone right now, but I am not sure that there's a better place to be a young academic surgeon than here right now.

Justin: It'll be awesome to have you as an attending.

Dr. Nussbaum: You better know your anatomy.

Justin: Is there anything I didn't ask you that you want to make sure you put on the record for this interview?

Dr. Nussbaum: No.

Justin: All right. Thank you so much for your time, Daniel. I really appreciate it.

Dr. Nussbaum: You're welcome.

[01:11:44] [END OF AUDIO]