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TRANSCRIPT - GR 10 04 24 ***"How Clinicians Can Participate in or Lead Innovation in Medicine"*** guest speaker Amit Bhatt MD, Cleveland Clinic

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Internal Medicine Grand Rounds

- Good afternoon. Everyone. Thank you for attending. I'm Andy Wong, chief of the division of Gi. And Hepatology. Also, you know, shout out to everyone attending online. Thank you for being here. It's my distinct pleasure to introduce to you a good friend of mine, Dr. Amit Bhatt Amit, is a professor of medicine at the Cleveland Clinic where he also serves as co-director of endolluminal surgery.
- He is director of the endoscopic submucosal dissection also known as Esd Program at the Clinic
- Amit. Did his Research Medicine Residency and Gi. Fellowship training at the Cleveland Clinic.
- Early in his career he spent time learning and training at the National Cancer Center in Tokyo, Japan, which is one of the groups credited for developing and 1st performing Esd, which is a very important procedure in our world today.
- Dr. Bott's 1 of the Us's busiest advanced endoscopist, and he's credited as being an early adopter and teacher of Esd. And 3rd space endoscopy. And of course he's a leading expert in the Field
- Amit has published over a hundred Peer reviewed manuscripts. He's been an invited professor and regular speaker at of all all of our international meetings.
- His Cv. Has more talks and presentations than I can actually count.
- Dr. Bott's research interests include biomarkers for detection of early Gi cancers and endoscopic device innovation which we'll be hearing about today.
- He has won numerous Cleveland clinic innovation awards. And he's the inventor of an important device that's really been a game changer in the field of endoluminal resection. We use this device performing Esd procedures at Uva, and very excited to learn about how this came about. I think Ahmed is probably best characterized by his Twitter or X account which lists him as a husband, father advanced endospoce and innovator, and, by the way, he has 400 more followers than I am, so
- I am fortunate to have him as good friend, colleague, and collaborator. He's taught me a lot about our field and what we do. It's really an honor to welcome him here to our department of Medicine grand Rounds, and I'm going to bring him up here. I also have an engraved Jefferson Cup, commemorating his talk and visit to us at Uva without further ado.
- Hello!
- See if I can get this mic to work properly.
- So, 1st of all. I'd like to thank Andy and Shami and the entire team for having me over to give this talk. Both Andy and shabby are world renowned, advanced endoscopists who've been very supportive and mentor to a lot of us in the field, including myself. So thank you.

- The talk I'll be giving today is on how clinicians can participate or lead innovations in medicine.
- Here are my relevant disclosures.
- So innovation is basically a new, better or more effective way of solving a problem and there is no greater satisfaction than seeing a patient being helped by a technology that you helped shape.
- And for physicians it's an opportunity to touch more patient lives than you can individually.
- There are 2 main methods of innovations in healthcare.
- One is the technology push strategy.
- and the other is the needs driven approach.
- In the technology push strategy, a new technology comes about and people work to look for an application of that technology. Of how can it help patients.
- An example of this is in Carnegie Mellon, Snake. Robotic platform was developed and invented.
- This was bought by a company called Med Robotics, that wanted to build the next generation of surgical robots based on this platform.
- They built their technology, and then they looked for a place for that technology to be used. They 1st went to cardiology to look for cardiac interventions without success then to ent, and then came to gastroenterology, trying to make a flexible Endo surgical robotic platform, and eventually the company went bankrupt. But we learned a lot from their ventures in the area.
- And this is an example of trying to take a technology and finding a purpose for that technology.
- The other way is a needs-driven approach.
- You 1st find an unmet need in healthcare, and then you work on finding a solution to address it.
- So, for instance, the endoscopic tube placement.
- Dr. Ponsky was looking for a way that they could minimally, invasively put a feeding tube into a stomach of a patient.
- They noticed during an endoscopy in the, or that they could see the light of the camera from the patient's skin transillumination in theorized. They could use that to accurately pinpoint the location and do an endoscopic peg tube, and that was the birth of the peg tube that we know of today or the 1st endoscopic polypectomy.
- We knew that there were pulps in the Colon that were precancerous, and we wanted to remove it.
- And actually Dr. Shinya was a visiting Japanese surgical resident to New York and during that time as a resident, he actually drew out the schematic designed and built the 1st snare polypectomy device.
- Another example of needs-driven approach to innovation.
- My talk is going to concentrate on this, because this is an area that physicians can lead and participate in.
- So the framework for a need-serven approach to innovation is outlined very well in a book called Biodesign, which is the textbook for the Stanford Biodesign course and for anybody who's interested in this area.
- I really recommend you take a look at the book.
- So the 1st part is to identify. What are you wanting to address? What is the problem that you're trying to fix next is the invention arm where you're coming up with concept generation prototypes.

- And then the final arm is implement, how do you bring this product to market?
- And what is that strategy around it?
- So to begin with, to identify. So the origins of biodesign innovation, it's driven by a compelling need.
- My general advice is to concentrate on your area of expertise. If you're a contour expert have a very physical clinical practice. It's a fertile ground for realizing what works, what doesn't work, what's needed and what might be already coming out in your field.
- We've tried in the past to innovate in areas outside of our major practice, but we've found it challenging and hard to do.
- So. Look at what is time consuming? Can you make something more efficient to perform?
- What is frustrating? Can you make it easier?
- What leads to poor outcomes? Can you make this procedure safer to perform and in this time of cost constraints.
- And it's very important to focus on value.
- Can you make something cheaper to perform?
- And once you've got your unmet need, or whatever you desire to fix it's important to do just a little screening at this point, to think about your problem.
- And is your problem large enough to garner attention and funding? Or is it a very niche topic?
- And is the problem significant enough to address?
- And it's important to do this now, because these are the issues that later on will determine if you're able to receive funding and commercialization in the future.
- But don't overthink about it. Make sure your overthinking doesn't kill a good idea.
- The devil's advocate may be the biggest innovation killer.
- So you've got your unmet. Need. You've now decided that you want to come up with something to address that.
- And that comes into invention concept generation.
- So so far, I've said, this is a physician-led process of innovation but, like many beautiful things, it takes a group to be able to make it and everybody will have their own group of what works and what doesn't work. This is my group, Dr. Gao, who's a research engineer and the head of the Polymer lab.
- He's known me since I was a fellow. And we've developed a number of new technology and devices together.
- And Bill Closei, our Innovations officer who's the Director of Medical Device Innovations.
- We tried a week on a nearly weekly basis for brainstorming.
- We have a nice, shiny innovation building that has a room in it with whiteboards, Lego pieces. Nice place to have coffee and just sort of brainstorm, many different ideas.
- And that comes to how do you generate ideas? Right? And I think this is a good quote that keeps us on stray is, if you want to have good ideas, you must have many ideas.
- So we focus initially on trying to get out, sketch as many ideas as possible with diverse fault, thoughts, concepts, absolutely no judgment when we do it virtually, we tended to use fig jam, or Microsoft whiteboard where we can actually collaboratively draw out the ideas together.

- And once we get our concepts out, we start to hone in and see which ones might have potential.
- And we keep refining them and refining these concepts until we get to that sort of Eureka feeling that we're like, Wow, that might just work.
- I would say, the majority of time that we spend is actually in this concept phase.
- Once we have something that we think has merit, we then submit an invention disclosure to our institution.
- This helps protect us, one, that this is something that we're disclosing at the clinic that we have described and invented and they do what is called a prior art search.
- Unfortunately, many of the ideas that you think of maybe have thought of before just because you don't see that device in market doesn't mean that somebody didn't go down the same pathway. You do.
- So the prior art search looks at previous patents, publications, abstracts, looking for any description of your concept that is previously being published.
- Unfortunately, if there is prior art for your invention, it's very hard for an institution to go ahead, because without a patent, it's hard to license that technology.
- The next thing innovations does is they do their own market analysis and they check to make sure that there's enough sort of market selling point price points for this to be something that is successful.
- It must pass through those 2 checkpoints, or it's back to the drawing board.
- Once you get past that checkpoint at this point you do need funding to sort of take things to the next level.
- You would have to build out prototypes, do animal testing, and there are a number of different ways that you can raise money. One is nih small business grants societal grants. There's now a number of national innovation grants coming throughout the country at our own institution.
- Our Innovation group actually funds and gives us grants for our own inventions. Their feeling is if they invest in the technology, they get payback once it's commercialized, and that money starts coming to the institution and that money is not insignificant. If you look at the bottom line of Cleveland clinic, significant percentage of it is from royalties coming from previous inventions from physicians.
- So you have a little money in your pocket, and you now want to try building out your device.
- So we really try to leverage every resource that we have in our local university and research center using their engineering core, electronic core prototype, polymer, biorobotics whatever it takes to build our device.
- And you do not need to build the perfect prototype. You just need to build enough to be able to see if the concept works or not, so don't focus on perfection think more marshmallow challenge and however many initial prototypes I've made, I've always thought that that was the one it's going to work perfectly and invariably I fail every time. 1st prototypes never worked there, so we really believe, into rapid prototyping of rebuilding, learning what we learn from the process and keep improving.
- And so a lot of our focus recently has been on reducing time between these testings.
- Because if you have to go to the animal lab each time, that means booking, finding that time. So as an advanced endoscopist, a lot of the things that I work on are in the Gi luminal tract.
- So we needed a model of basically the Gi wall. So we found these mucous membrane models from Japan that are made out of potato starch and actually

emulate the Gi wall quite successfully. So we can just test out device concepts on the bench top.

- I've left a link there. If you're ever interested, Andy.
- Once we get to the next stage.
- We do take it to the tissue lab. And this is our sort of animal lab that does surgery, endoscopy and all sorts of other things, and we take exploded pig stomachs, and we scope them and try out devices.
- And as somebody with a very busy clinical practice, we soon realized that I was the biggest limitation for this testing to happen.
- So we have a number of fellows, residents who are interested in innovation and device creation and the learning advanced procedures. So they're actually the ones that mostly on a weekly or bi-weekly process do the prototype testing data in the lab innovation. Engineers are there, and they make videos that I can review. And we can learn on what works and what doesn't work. And it's also a very fun way of incorporating more than just yourself in the innovation process.
- So let's say you've come up with your prototype. You find it works, and you think you're getting close to what is potentially beneficial to patients and commercially viable. The next part is to create data in our experience. Companies are no longer interested in napkin drawings.
- They want to de-risk their investment from money and time.
- They don't want to invest time into something that will not come to fruition anymore.
- So they're interested in a technology that they can see work and has data behind it.
- So our final step is to actually run a small trial in live pigs to generate data and show our concept. Working in living tissues.
- We invite these companies to our lab.
- If they have physicians, we actually allow them to play with the prototypes and see how they can actually work in a tissue setting.
- So actually, a little back step before we get to companies before you start talking about companies or commercialization.
- It's important to understand the patent process.
- You do not need a completed patent to talk to companies. The patent takes about 3 to 5 years to obtain.
- But what you do need is a provisional application file.
- So before you start talking to anybody outside, you need to put a place card which is your provisional application file that will say, on this date, you're declaring this invention to the Us. Government.
- Then you can feel free to talk to companies. And most companies actually do not want a completed patent because they want their hand in the patent application, so they can try to protect as much technology as possible in that application.
- Here is our innovation sort of operating model of the clinic, talking about engagement, assessment, innovation development.
- And once you're done with your
- product. There are 3 potential ways to go.
- One is what is called business partnership by licensing that technology to a company which means the company has a right to build and develop that technology, and they would give you an upfront payment milestone payments when they get FDA clearance when they get 1st market lease, hit a certain number of sales, and then you get royalty on each device.
- Another way is to sell your device outright for an X amount of money.

- This is the technology they don't pay out the royalties. We can see that happened with both axios and Apollo suturing that were sold straight out, and however successful the company will be with that technology, those inventors will not be getting royalty from them.
- The other way is, let's say, your device is more complex. You're building a total heart replacement or something of that magnitude. Then the hospital or system can think about releasing a spinoff company and starting a company that gets venture capital and brings in money to be able to design that my personal preference is for business partnership. I like the innovative creative process and try to unload it to companies to take it further from there.
- So a little story about this is our 1st device that we brought to market.
- In total, we've licensed about 3 different technologies to companies. Now so a little background about what we do. So you can understand where it fits is, we perform endoscopic resection of tumors and cancers.
- An endoscopic resection to treat cancer is perhaps one of the most gratifying endoscopic procedures you can perform you're able to remove tumors from patients in a minimally invasive fashion with little impact to their quality of life.
- Great long-term curative resection rates allowing them to avoid invasive surgeries like esophagectomy and gastrectomy.
- The 30 day mortality from an esophagectomy alone just undergoing the surgery is about 4 to 8%. Nationally so, if you think an endoscopic procedure can avoid that for a patient that's phenomenal.
- So endoscopic resection started in 1969. We talked about Dr. Sinha did the 1st simple snare, polypectomy.
- Then came saline injection, snare, double channel, pinch and cut ban capymr. These are just different ways to remove a tumor but one of the limitations of all these were for larger size tumors. They had to be removed in pieces.
- When that occurred there was a higher recurrence rate that wasn't really deemed as an oncologic resection when it was presented to tumor boards.
- So at the National Cancer Center Hospital in Tokyo, Japan, they developed endoscopic submucosal dissection we're using little knives. We have precise control of both the lateral and deep margin dissection meaning we can remove these tumors and I and block resection rate, which means we remove the tumor completely in one piece.
- When this occurs, patients have lower recurrence rates it allows for precise histopathological analysis and high curti resection rates.
- When a tumor is moved in one complete piece, it's much easier for the pathologist to see the complete picture that when it comes out fragments they're able to clearly tell if the tumor has been completely removed, or if there are any positive margins and if there are any high risk, features like submucosal invasion or lymphovascular invasion.
- So I became interested in this very early on in my career as a Gi. Fellow and at that time there were very few people in the Us. Doing this procedure, maybe Andy and Norio at the time.
- So I got grants from our societies to travel to Japan for a few months and learn about Esd at the National Cancer Center Hospital that it was next to Skiji Fish market. So we had lots of good sushi at the time and I made really good friends, who not only taught me about Esd but really became lifelong friends and come to Cleveland, and we go back and forth.

- But the one thing I noticed is these procedures take a lot of time even in expert hands. It's a beautiful and intricate procedure, but technically challenging even in the world leaders of this procedure.
- There's a reason why it took so long for these procedures to infiltrate into the West and one of the big limitations of Esd is, it lacks any surgical principles of triangulation.
- There is no surgeon secondhand, lifting up the lesion, so you can fire the dissection plane to cut through.
- We essentially try to do a surgical procedure with just one arm trying to push our endoscope underneath a mucosal flap and dissect.
- So I thought that what we needed was a traction device, a surgeon second hand, to be able to make the procedure easier and actually drew up most of these concepts when I was a gi fellow, and I had time and was looking at procedures.
- And I thought the ideal attraction device would be independent to the scope, so it would not interfere with the delicate motions needed to perform Esd.
- Be something similar and familiar to use, and would not rely on insufflation. So during the Esd procedures we generally, like a deflated lumen, where the tissue is more loose and easier to cut through it would work throughout the entire procedure providing continuous traction, and it could be used anywhere that we would find cancer or tumor.
- So I came up with the idea of a retraction strip. The idea was something that we could attach, while which was straight but once it attached, it would return to a curved position, and then lift up the lesion and allow us to dissect through it and to sort of work. On this we we came up with many different concepts. I think it was about 29 different prototypes, trying to find what was easy to work, what was practical. And eventually we came across one concept that we thought was extremely simple, served the purpose and worked.
- It was a wireframe that was made out of Nibnol, a shape memory, alloy that was attached to a hemo clip.
- Once the clip was attached to the backside of the lesion the nitinol wire would return to its pre-curved shape. Lifting up the lesion and exposing the submucosa below.
- We really wanted to concentrate on something that could be fast and easy to use.
- So our next step, after we liked the concept was to do a live porcine study.
- We performed 6 Esds in each pig, about 3 pigs in total and we randomized them to either with traction wire or without
- See if we can go back here. And we found a statistically significant difference in time which was reduced when the Traction bar was performed using the videos and this study, and it should be noted, the company asked us not to publish this study until the product was available. Commercially medtronics was actually the 1st company we showed the technology to.
- And they purchased this and another technology. And we're very happy to partner with them. Where they have now brought this device to market can simply be passed through the accessory channel of an endoscope making it easy to use during an Esd procedure.
- And here's a short animation sort of showing the entire concept.
- So a tumor is found in the colon, and we make markings around it to highlight the borders.

- We inject a fluid, a submucosal lifting agent to separate the tumor away from the muscle wall and then we do what is called just a mucosal incision to get into that submucosal there.
- Then the traction wire is attached to the front part of the lesion.
- Second clip is used to grab the wire and anchor it on normal tissue and once released, it lifts the mucosa up and gives exposure of that submucosal plane that we're talking about, that we want to dissect through the second clip is designed to be atraumatic is grabbed with the forceps pulled off the mucosa and the whole lesion and device are sent off to pathology.
- Here's a video of actually one of the initial cases we did with traction wire, Esd.
- And this is what we describe as a carpet-like polyp with a dominant nodule in the rectum, which is a lesion that would be at higher risk for having cancer or deeper invasion.
- So, after performing a complete circumvential incision we attach the traction wire to one end of the lesion grab it with the anchoring clip place it on null mucosa proximal, and on the opposite wall and you can see, as it released the mucosa is lifted up, and we can nicely see that dissection plane allowing us to dissect very close to the muscle. There she allows us to avoid the superficial vessels and the superficial submucosa clearly see when there's penetrating vessels coming through the muscle air and avoid them.
- This is very important, because in this procedure that's already difficult, and time consuming bleeding can make it much worse. So if you're able to keep a bloodless field where things are clean. It's much easier to be fast and efficient.
- Penetrating vessels coming through the muscle layer can be grabbed with coagulation, graspers and coagulated attraction lasts until the end of the procedure where the entire lesion is lifted up and until the final incision the anchoring clip of the traction wire is grabbed the whole lesion is removed from the patient as well as the device.
- The resected specimen is sent out for histology. This is a patient who had superficial submucosal, invasive cancer and it was within curative criteria and completely removed. So they did not need to go on to surgery.
- So after our initial experience, showing that it worked in patients.
- we plan to do our multicenter study looking at the outcomes and experience of traction wire. Esd so before a device can come out fully to market. There's a pre-market release from the FDA to a limited number of centers in the Us. And Japan. So these were all the cases that were done as part of the limited release on 103 patients.
- And what we found was very high end block resection rates, meaning that greater than 98% of tumors were completely removed in one piece.
- 90% r 0 resection rate means complete histologic removal.
- And most importantly, for us, the device worked in all cases, and the median deployment time was less than 2 min, meaning that it was something that was easy and simple to use.
- The traction wire is now one of the number one best-selling traction devices in the West and we're fortunate for the the journey in collaboration with Medtronic and others.
- Thank you very much for your kind attention, and please let us know if you have any questions.

- If you have any interest in learning more about Esd, or where we think the future is in endo robotics.
- Please come to Cleveland, where the great Andy Wang will be giving a talk and teaching.
- Thank you very much.
- Thank you. Amid for that fantastic talk. I think we have ample time for questions. I think we can also get online questions if they're available. Right?
- Okay?
- Ahmed. What can institutions do to kind of help facilitate? Because, you know, different institutions have different models we were talking about?
- I don't know percentages that make it worthwhile to go into it. Or you know, if you start your own company like, what are some like things that you've heard about across the country, or and for people who are interested in the innovative aspect of things. You know what any any kind of starter advice points.
- Sure, I think different institutions. There's a lot of variability in this field.
- I think one thing is, you need an institution that's committed to sort of harboring innovation and promoting it.
- So, for instance our institution. If you come up with an idea, it belongs to the Cleveland clinic.
- But 40% of that royalty income that comes from that goes to the inventors
- and the other 60% goes to the hospital and the department that you come from.
- So we feel that that ratio really encourages innovation right where you know, if you invent something you design, bring it to marking. Not only are you going to have the intellectual benefit, but also the financial benefit of spending that time doing it.
- I know those rates vary throughout the country, and there are hospitals that are less than 10% where it really takes away that motivation to sort of innovate. So I think one part is to learn what that ratio is, and then 2. What is the support right?
- I think the more the institution is able to invest into good ideas, it just makes the process easier. If you have to apply for an nih small business, Grant. That's going to add significant time to sort of that development horizon.
- Absolutely not. And I don't have an engineering degree, either. So and I don't think you need it right. I'm a big believer in collaboration, right? I don't think you yourself have to have all the answers. It's better. Actually, you can see my team that I collaborate with includes an engineer and Bill, who's really a business person. He's there to make sure that the way that we're going is, you know, business sound. So I think, especially as things get more complex.
- I don't think you should feel that you have to get like a master's an engineering degree. Mba. I think a lot of times we can just lean on other people and form a team that's able to do that.
- And so I think we should at some point talk a little about. If you have an idea. How do you go about it? I think, unfortunately, a lot of us in medicine. We give no training or attention to this and the greatest thing that physicians have is, we know where the need is. We know where the problem is, and unfortunately we give away that information very quickly to companies for free.
- If you have an idea, stop talking
- right. It's not something like, Oh, great! I had this thought right. You really have to start thinking about protection, and where you are throughout the country I keep hearing of ideas where physicians have come up with something, but they have no financial outcome at the end, because somebody else went on and developed it. I

think this is in some ways exploitation of sort of doctors, kind nature. We don't think from a very businesslike standpoint.

- So for our institution, the 1st thing you do when you have an idea is, I'm sure there's a mechanism here is to submit an invention disclosure within the hospital system.
- So when you start working with other people.
- It is clear that that was your idea from the get-go, and that's the way to go for the provisional patent that takes like lawyers and money and to submit. So you don't want to submit that until you have a mature idea that is very close to the concept that you want to bring out.
- Thank you for your question.
- Times did you find those and then get funding of a few different ones and see what works that?
- Or did you have anything realistic that would work best and then build that out. And then so the 1st thing we received the funding first.st I think you know it doesn't need to be a lot of money right? $1020,000. You can do a lot with prototype testing building. From that.
- The other part, I should say is, it is truly, I believe, in a team approach. So on those patents that have gone out. I am not the only person on there.
- I really feel if people, if it's they have contributed to an idea, if they've helped generate it, they're part of that.
- So we give about 20 or 30% off the royalties to the engineers who are working on it. And I think it's actually key, because when they're working and developing like prototypes.
- It's not just a job for them. They're not just trying to execute an order. They're realizing they're part of it. This is their device as well, and they're vested into its success and will pour their heart and soul into it.
- Too busy technology develops life management skills to be able to do all of that together. And then you know what? What? Ultimately like, what do you find on your top issue question?
- It's a lot of questions. So I I think part of it is also like time reference, right? So when I was a more junior staff there wasn't as much pressure as we're under right now.
- So fortunately, during that time I was able to build up research team publications you know, work with innovation. So I have a lot of that framework already set up post Covid. We went into really productive hyperdrive. I'm not sure. Where are they just trying to make more money, or they need to do it. But we're as an advanced endoscopist. I scope 4 and a half days a week now. Right?
- So almost, I have to have other people lead and do it. So fortunately, over the years I've had many residents, fellows who've worked and trained with me. So they do actually, a lot of the device testing. They're sworn to secrecy. They aren't allowed to talk about it, but it's something they love and enjoy the innovation team. They will come visit me in my endoscopy sweater. We'll talk about it there. So a lot of the infrastructure has moved around, making sure it happens while I stick with a clinical practice. I don't know as Andy has said, I don't know how long I can keep doing this, but I really enjoy it.
- So that comes to the next part right is especially for Gi or advanced analysis. This is Groundhog Day. You will wake up every day and do the exact same thing again and again. You have to make sure it's something you love right for me. I honestly, I got into it more because I like the technology research. But what probably gives me the best joy is actually patient care right?

- When you take a patient who's gone to 3 different institutions and you're able to cure them of cancer and see that joy in that patient's face and their families.
- And you get to know these patients will never leave. You will end up doing their surveillance for the rest of the life right but that is a satisfaction that is very rare, and can only become from clinical practiceband I almost feel without that part you cannot be a great researcher or an innovator, because you won't understand what is needed and what's not needed.
- Hope that answers your question.
- Yeah, we would with is better than these big companies who have all these teams of people.
- It takes your idea of asset to make sure nobody else is also or something. So one I actually describe. I think physician-led innovation is actually the best innovation.
- Some of the crazy stuff that I have seen from companies makes absolutely no sense right? And you can see that wow, that would harm a patient right? They don't see that right? So I actually think the best innovation actually comes from physicians, and that's why, as Annie must know, they hire us a lot of them to actually come see all their prototypes, their devices to make sure that they're on the same right course. Right?
- So I I think we actually are the advantage we just have to make sure that we, we keep that control and an advantage regarding what's coming in the industry a lot of the times as advanced endoscopists. We know what people are working on what's coming to the field.
- For instance, I love Endo robotics. I think it's got a potential to really take our field to the next level, and it's coming over the next 2 to 3 years. There are a number of platforms that will be coming to market that I feel that we have to get ready for.
- But as a physician at an institution there is no way I can build that system that takes hundreds of millions of dollars right? So that is something that I think is better for companies to develop. And you can help with that development.
- So it's a, it's a great question. Actually, are you a resident or a fellow? Yeah.
- So when I started, so I am, actually, I specialize in the resection of Upper Gi cancer.
- So most of my practice is actually not Colon polyps.
- And initially, people thought I was crazy. They're like, there's no business in the Us. We don't have gastric cancer. We don't have esophageal cancer.
- but a lot of this is going for surgery, and when you start doing it you'll be amazed how many patients will come. Many of those patients were told by surgeons to have surgery and they're hopping on Google looking it up and then looking for another source and coming to.
- So I think a lot of patients in the Us. Have early gi cancer.
- Interestingly, at the beginning of my practice most of these were serendipity, that they were caught so early. Cancer causes no symptoms.
- So once you start getting symptoms with esophageal and gastric cancer, it's too late.
- So most of these were Ibs patients or somebody had an endoscopy during a colonoscopy for no good reason, and the cancer was fine.
- But more recently, we're having the I don't know the science. Behind this there are centers in Ohio which when they do colonoscopy, they're screening to find out if patients have acid reflux.
- If they have acid reflux, they're doing esogar a swallowed pill that, you know, scrapes the lining. If it's positive, then they're doing endoscopy.

- And we've actually had a number of esophageal cancers come through that meetings.
- So I do believe there are a patient population in the Us that would benefit from upper gi cancer screening.
- We just have to figure out what that population is and I think when that occurs we'll have even more patients coming.
- When I was talking to Andy. I don't know what that population is right, because we keep hearing. The incidence is less than in East Asia, but in my practice I have a lot of Russian and Ukrainian patients coming in with gastric cancer. So the demographics of that cancer might be different in the Us.
- So I do have a background in Bme, so my 3rd year undergrad. And I've always been interested in having developing a medical device. And I've tried some healthcare competitions.
- I do know you did say that medical doctors need to stop talking, but it's kind of like difficult to have an idea of what's going on unless I do countless amount of research.
- As a biomedical engineer. How do I develop that idea without, you know, going through all that process? That's actually a really good question. So historically like, there wasn't that many innovation contests right?
- And companies like they, even my institution, will not want us to present publish anything on the idea. If you publish or present anything before the provisional patent is in. Somebody has the right to take that and actually develop that technology.
- So we've even started it at our own institution. So partly we want to encourage innovation amongst our residents, fellow staff engineering students, we have shark tart competitions inside the clinic right where the winner will get Grant funding to develop their idea further. And this, I know, I think, is happening at Aga Asge, and I think it's all great things.
- The only thing is, I don't know if it's best to. I think we have to start looking at how protected these forums are for people's ideas. For the most part, I think it would be best to get a provisional patent in before submitting your ideas to these competitions and as Andy and Chami know, unfortunately, the minute you submit an idea to a conference or to a journal there are 5 other people who have now understood what you're working on and are weighing if they can do it quicker than you are, and start doing the same research. So in some ways, for, like a lot of the research that we we find is very important. We actually don't submit it to meetings until it's ready for publication.
- I hope that helped.
- I will say. You know, we have a really strong Bme. And we in our division and across the department. I think I've had many cross collaborations, and so I think all of Amid's points are valid, but I do think you know, not stifling the collaboration between our residents or attendings near all mentors annually groups. And so I think I think that's there. It's under the Uva umbrella we've also invited as part of this talk, a representative from Darden, who he may be watching. But there's a big thrust for initiative, for innovation. And you know, how do we foster that across the University? But I do think the provisional patent is a very important thing that we probably should think about.

- And just to clarify on that point, I actually agree with you. I think collaboration is absolutely great. So more, I was talking about a provisional patent once you talk about it outside of your institution.
- I think, before that collaborating with people is great.
- A lot of our patent applications or idfs are a team that involves multiple engineers, physicians so I don't think that should stifle sort of internal. It's just going external. I feel it's good to protect yourself inertia of going from nothing to something or later on during the funding.
- You, too.
- I think it's probably early on. I think a lot of ideas get killed. It's an inception. Oh, that's too hard. How am I gonna go by doing it? How do we get the framework right?
- I think once an idea becomes like a really well thought out prototype that people can look at and see and see it working.
- Then I think you garner a lot of attention at that point for us? You know, we have a number of companies that keep actually reach out to us, asking us like, what do we have like? Do they want to bring more stuff to market? Do you have something that's ready? So I think, especially for advanced endoscopy.
- We're not a field that's at its maturity. It's actually a very exciting time to be in advanced endoscopy, I'd say, about every 6 months a year. We have a new procedure that's created. Right? We're just now learning what the potential of endoscopy is. So it's a time where companies are looking for technology. They want things to buy. They want to be part of that game. So I think the interest is there. I think the road to getting there is something that you know maybe not so defined in sort of our education and teaching and sort of our promise. I know at our institution we're really trying to make a push. So more people understand how to go down that avenue questions section of this small you have nicely shown how you can resect, but has. Can can one also take care of these lesions just by laser therapy, or something like that?
- So generally when it comes to tunes, the the best way is to remove it completely right and that is to take that tumor. Remove. Have all the edges negative. Remove that device from somebody.
- If you're unable to do that.
- The next part is tissue destruction. Right? So that would be with lasers. Argon plasma, coagulation. But the problem with that approach is you get no tissue.
- So you don't know if this was aggressive tumor, how deep the tumor went right. And a lot of the times. These destruction methods are not complete so it's not uncommon for sort of polyps or tumors to come back after.
- I think the for now until immunotherapy gets to the next level.
- The best way to deal with tumors or cancers is to remove them in one and I was interested when you were showing those pictures of those you know endoscoping peaks and what I mean. Do you all reuse those peaks all the time, or those pigs, those hogs that you'll use a lot of times they're euthanized. Oh, no it is the saddest thing I've oh I made the mistake of my 1st live animal study to go visit the pigs the day before. You should never do it.
- I felt so bad. They're so cute. I really actually try to avoid live tissue until like the end. Right? Yeah no, you don't get to have a barbecue afterwards.
- Thank you all for attending. Thank you.