AI-powered, early detection of pancreatic cancer
AI-powered, early detection of pancreatic cancer, 2022 AMA Research Challenge

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Featured topic and speakers

In this episode of Making the Rounds, AMA Research Challenge finalist, Garima Suman, MD, discusses her research on early detection of pancreatic cancer using artificial intelligence. Dr. Suman is a radiologist and clinical fellow at the Mayo Clinic in Rochester, Minnesota.

The AMA Research Challenge is the largest national, multi-specialty research event for medical students, residents and fellows, and international medical graduates to showcase and present research.

Speakers

- Garima Suman, MD, radiologist and clinical fellow, Mayo Clinic
- Brendan Murphy, senior news writer, American Medical Association

Host

- Marielisa Cabrera-Sánchez, 2021 AMA Research Challenge winner

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Transcript

Cabrera-Sánchez: Welcome to Making the Rounds, a podcast by the American Medical Association. I’m Marielisa, last year’s winner of the AMA Research Challenge, which is the largest national, multi-
specialty research event for medical students, residents and international medical graduates.

Today’s interview features one of this year’s five finalists for the 2022 AMA Research Challenge, interviewed by AMA Senior News Writer, Brendan Murphy.

Murphy: Hello and welcome to Making the Rounds, a podcast by the American Medical Association. I'm Brendan Murphy, senior news writer at the AMA. On this episode, we will be speaking with another finalist from the 2022 AMA Research Challenge, Dr. Garima Suman. Greetings, Dr. Suman. How are you?

Dr. Suman: I'm doing very well, thank you.

Murphy: Thank you. Thank you so much for joining us. We're so glad to have you here. Dr. Suman is a radiologist and clinical fellow at the Mayo Clinic in Rochester, Minnesota. Her submission for the AMA Research Challenge is a poster entitled, “AI-Powered Fully Automated Early Detection of Pancreatic Ductal Adenocarcinoma on Standard of Care CT scans.” I'm excited for you to tell us more about this research.

Dr. Suman: Well, I'm happy to be here. Thanks for having me.

Murphy: Well, with that, I'll get to the questions we've prepared. Can you tell us a little bit about this topic, why it appealed to you and how you got involved in the AMA Research Challenge?

Dr. Suman: Yeah. Pancreas cancer is one of the most lethal cancers and the best way to ensure that the patient gets the best possible outcome is detecting it at a stage where surgical cure is still possible. Unfortunately, a lot of pancreatic cancer, almost up to 40% of the cancers, are initially missed on CT scans and that is because this cancer has very subtle imaging features that are very hard to see, and the patient presentation initially is very non-specific and that can mimic various other diseases.

So, the disease is often missed initially, which is what we found when we retrospectively reviewed hundreds of thousands of CT scans of a lot of patients who subsequently developed pancreatic cancer. And we realized that there are some signatures on CT scans that an AI or artificial intelligence can potentially pick up that human beings are missing. And artificial intelligence has shown a lot of promise in detection and characterization of various other diseases.

So, with that rationale, we decided to use artificial intelligence in detection of pancreatic cancer. The work is still ongoing at Mayo Clinic, and my mentor and the principal investigator of this study, Dr. Aziz Goanga, informed me about this AMA Research Challenge. And AMA being one of the largest medical platforms, was the ideal platform for us to showcase our work and engage our colleagues from various other disciplines of medicines, and hopefully find some future collaborators. So that is why we decided...
to participate in the AMA Research Challenge.

**Murphy:** Well, we are very glad to have you as a Research Challenge participant as you take on this complex and important issue. I'd like to ask, what were some of the challenges you encountered in doing this research?

**Dr. Suman:** Well, one of the most important steps in research related to artificial intelligence, in general, is to have high-quality data set on which the AI models can be trained. And this is required to ensure that we do not inadvertently include any cases or overlook any factors that can bias the AI model's decision-making. So, the most time taking part and the critical part was reviewing thousands of cases. And our team reviewed almost 10,000 cases to finally get a data set of 3000 usable cases, on which we built the AI model.

Another challenge or a critical step is to test the AI model again and again to make sure that the results that we are getting are reproducible and valid. The third thing I want to point out and highlight here is that it is still an issue for us, the medical professionals, to fully trust an AI model's output because we still don't know how that artificial intelligence model is arriving at a certain decision. And as you can imagine, it can be hard to completely trust a tool when you don't fully understand the reasoning behind its output. That is something we are still working on. There's a lot of research going on in this area, and in the future, hopefully, we'll have some good methods to demystify the neural networks of the artificial intelligence models.

**Murphy:** What advice would you give to medical students and residents, fellows who are conducting research on a project like this, that relies pretty significantly on changing existing technology and techniques?

**Dr. Suman:** Yeah. Medical students rotate through various departments and divisions of medicine and learn about so many different diseases. AI is being applied to all disciplines in medical science, actually. So, my first advice for them would be to find out what is exactly that they're interested in and what they feel passionate about, and then seek out a good mentor and talk to them. A mentor can guide them in how to go about the areas of their interest and the research work related to that. That would be my advice.

**Murphy:** You were utilizing AI, a fairly novel technology to solve a fairly common problem, early detection of pancreatic cancer. Did it show promise?

**Dr. Suman:** That's a great question. Yes. In fact, we tested our model on more than 1,200 CTs that were acquired at our hospital and also a large number of CTs that were acquired at other hospitals. And the model was able to exclude pancreatic cancer in more than 90% of the cases and was able to correctly identify pancreatic cancer in approximately 88% of the cases.
Then we applied the same model to make a prediction for future development of pancreatic cancer. And we found that the model had an accuracy of more than 80% in predicting who will develop pancreatic cancer in the future and who will not. And the lead time before the development or eventual diagnosis of pancreatic cancer was more than a year, which means that the model was able to predict more than a year in advance, who will develop pancreatic cancer and who will not. Although this pre-diagnostic assessment was done on a relatively small cohort of only a hundred patients who ended up developing pancreatic cancer, the results are still very promising and significant. But we need to validate it going forward on a larger number of patients and maybe a multi-institutional cohort as well.

**Murphy:** That's very interesting. What do you see as the next steps in this work?

**Dr. Suman:** Well, the next steps would be validating our study on larger multi-institutional data sets, of course. And then prospective validation would also be required. So that can be done either in a clinical setting or through some of the clinical trials that are ongoing, such as Pancreas Cancer Early Detection Initiative. So, validating the model is the most important next step.

**Murphy:** Stepping aside from the technical aspects of this research, how do you see this project and this research impacting your career trajectory?

**Dr. Suman:** Well, I have been involved in this project for more than three years now, and I must tell you, being a clinical radiologist, having the chance to see thousands of CT scans with pancreas cancer, it has immensely helped me in my clinical work, as well as in my discussions during the multidisciplinary meetings. And although I will be primarily working as a physician going forward, I will also continue to work on pancreatic cancer research alongside. And I will be practicing body radiology as a subspecialty, and pancreas will be my primary focus.

**Murphy:** That's very exciting. Our listeners, what would you like them to know about your journey in medicine?

**Dr. Suman:** Okay. I started my medical journey in India, where I did my medical school and residency in radiology. When I finished my residency, I moved to the United States and started working on this pancreas cancer research work that we are talking about today. And then I subsequently, am doing clinical fellowships that will allow me future board certifications, so that I can practice both as a clinical radiologist as well as a researcher. So currently I'm doing my body imaging fellowship at Mayo Clinic and going forward, I'll be practicing as a chest and body radiologist.

**Murphy:** One of the very exciting aspects of the Research Challenge is that the winner earns a $10,000 grand prize presented by sponsor Laurel Road. What would you do with that prize money if you won?
Dr. Suman: Well, that’s a significant amount. I haven’t really thought much about it at this point but I would like to use it towards my career advancement and professional development. And our work on pancreas cancer is still ongoing. There’s so much more to learn and unravel about this disease, so I would like to use this prize money in a way that helps us in our research work as well. Maybe I could use a part of it for my future academic trip presentations or use it for some educational resources.

Murphy: Well, that all sounds pretty worthwhile and exciting. Thank you so much for joining us and sharing your research with us, Dr. Suman.

Dr. Suman: Thank you very much for having me. And I thank AMA for giving me this platform, and I thank all my collaborators and team members at Mayo Clinic who work so hard in helping our patients.

Murphy: I’m sure they appreciate it and I’m sure that they’re very excited about this work, as are we at the AMA. A quick reminder for our listeners. You can see Dr. Suman’s research poster as well as those of the other finalists for the Research Challenge at ama-assn.org/research22. And of course, be sure to tune into the Research Challenge finals on December 7 to see Dr. Suman and the four other finalists present their work in front of a panel of expert judges for the chance to win that grand prize.

This has been Making the Rounds, a podcast by the American Medical Association. I'm AMA senior news writer Brendan Murphy. Thanks for listening.

Cabrera-Sánchez: Join us on December 7 at 7 p.m. Central time, to see all 5 finalists present their research to an elite panel of judges. The overall winner will receive a ten-thousand-dollar grand prize—sponsored by Laurel Road. For full details, visit ama-assn.org/research22.

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