



Technological Advances in Pathology: AI and drones are changing the future of cancer diagnosis.

Announcer:

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Host - Rebecca Griffin:

Dr. Admire Matsika, welcome to Health Tech Talks.

Guest - Dr Admire Matsika:

Oh, thanks. Thanks, Rebecca.

Host - Rebecca Griffin:

You are an anatomical pathologist and the clinical director of anatomical pathology for Mater Health Services. After a decade of clinical practice in Africa, the United Kingdom and Australia, you earned your fellowship from the Royal College of Pathologists Australasia in 2015 and worked as a staff specialist at Queensland Children's Hospital and Royal Brisbane and Women's Hospitals before joining Mater Pathology. It's really a pleasure to be talking with you today, Admire. I'd like to start by asking you to please explain what an anatomical pathologist is.

Guest - Dr Admire Matsika:

Anatomical pathologists are specialist medical doctors who are trained in tissue diagnosis. You might remember, if you go to a doctor, for example, with say, a lump on part of your body and the doctor says, "Oh, we are going to do a biopsy to see whether that's cancer or some other tumor." That tissue specimen goes to the lab, and in the lab there's a pathologist there who looks at that tissue. They're trained in all different types of cancers, and they can tell what sort of tumor it is by looking at that tissue under the microscope. That's an anatomical pathologist.

Host - Rebecca Griffin:

At what stage did you discover your passion for anatomical pathology?

Guest - Dr Admire Matsika:

My initial encounter with anatomical pathology was in medical school. So a good story. I developed a lump myself on my chest, went to my doctor at the time, and they gave me several prescriptions, antifungals and steroids and a few other things. But that lump couldn't go away. And at some point someone suggested, "Why don't we take a biopsy and see what it is?" So a biopsy was done and the pathologist who looked at my biopsy happened to be my lecturer at the time. So she called me when she saw the name and said, "Oh, come and show you what diagnosis you have." So she went through the whole description of what she was looking at under the microscope, and it just opened my eyes to a



whole new world that I didn't know existed. Something just clicked in me like, oh, so this is where the answers are. This is the holy grail of medicine.

Back in the day, traditionally, pathologists have been called doctors' doctors because they're sitting at the back of the hospital. They're not seen by the public, but they're the ones giving the answers to the clinical doctors who are patient facing.

Host - Rebecca Griffin:

And so then did you do your specialty training in the UK?

Guest - Dr Admire Matsika:

No, I did my specialist training in Australia. So my first few years in Australia, I actually started training in emergency medicine. At some point I started to think back to my medical school years. By the way, I wanted to be a pathologist. What happened to that? And the more and more I thought about it, the more I realized I needed to jump ship. So I stopped my emergency medicine training in fourth year and started pathology training here in southeast Queensland, and it's a five-year training program.

Host - Rebecca Griffin:

And so within anatomical pathology, is there an area that you specialize in?

Guest - Dr Admire Matsika:

Yes. So there's been an explosion of information in medicine and in particular in pathology as well, such that it's no longer possible for an individual to know the whole field of pathology as it were. So people are starting to subspecialize as well. So you can be an anatomical pathologist with interest in skin or bowel cancers, breast cancers and so forth. So my areas of expertise are genital urinary pathology, so looking at prostate cancers and kidney and bladder tumors as well as perinatal pathology. So in perinatal pathology, we are looking at placentas and investigating causes of morbidity and mortality in the pregnancy setting. We can talk about the placenta because it's one of my favorite organs. Surprise, surprise.

There's so much information about what happens in pregnancy that can be obtained by examining the placenta properly. The placenta is that interface between the baby and the mother during pregnancy. So if there's any complication of pregnancy such as there was diabetes in pregnancy, there was high blood pressure in pregnancy, there was infection, we see the telltale signs of all those conditions in the placenta. So we can look at the placenta and confirm or refute some diagnosis that would have been raised during the antenatal period by looking at the placenta under the microscope. That's most of perinatal pathology.

Host - Rebecca Griffin:

You wouldn't look at a placenta of a healthy mom and a healthy bub. It's only if there's an issue.



Guest - Dr Admire Matsika:

At the Mater, as you know, Mater is one of the biggest maternity hospitals in the country. The last time I checked, there were over 10,000 deliveries happening at Mater South Brisbane campus. It's not possible to look at all those placentas. We receive about 2,000 of those placentas where there's either a possible complication in the mother and the baby or in the delivery process. Those are the ones that we can look at and assist the obstetricians and pediatricians.

Host - Rebecca Griffin:

Admire, what about in the case of twins? Would the placenta come to you?

Guest - Dr Admire Matsika:

Yes, that is correct. So a twin pregnancy in itself is an indication for us to look at the placenta, even trying to work out whether these are identical twins or non-identical twins. We can tell that by looking at the placenta membranes.

Host - Rebecca Griffin:

As we said, you're the clinical director of anatomical pathology at the Mater. What does your role involve?

Guest - Dr Admire Matsika:

Three out of five days a week, I'm still doing my day job, looking under the microscope and putting diagnosis on prostate cores and kidneys and bladder tumors and placentas. But the other part, it's of a managerial/ leadership role like anywhere else. So managing people, doing a bit of budgeting, rosters.

Host - Rebecca Griffin:

So when I think of a pathology lab, I think of lots of test tubes, pipettes, microscopes, centrifuges. But I imagine with technology advancing fast, labs look a little bit different nowadays. How has technology changed during your time as a pathologist?

Guest - Dr Admire Matsika:

It's interesting that in anatomical pathology, a lot of things haven't changed. So yes, there's still test tubes there and machines and a lot of chemicals. There's still microscopes. However, what has started to change gradually is the introduction of digital pathology. To me, that is the main thing that has changed in the last decade or so that I've been in pathology.

Host - Rebecca Griffin:

Can you explain then what digital pathology is? Is it similar to when radiology went digital?



Guest - Dr Admire Matsika:

Yes, similar. So digital pathology involves conversion of those histological slides that we look at that has got the information that we are after to make a diagnosis into digital formats. So think of them as JPEGs, although they're not really JPEGs, it's kind of a different format. So once we convert that into digital images, the interesting part is what we can do with those digital images afterwards. For example, you'll be able to send that image to someone to get a second opinion remotely. You could report your cases remotely. You could use computer algorithms to help you with the diagnosis, like counting the number of cells or what we call mitosis. And that all encompasses what digital pathology is.

Host - Rebecca Griffin:

So you're looking at a computer screen rather than looking through a microscope?

Guest - Dr Admire Matsika:

Yes, pretty much it will be now looking at screens rather than microscopes. There are some people out there who are playing around with virtual reality goggles or augmented reality goggles, trying to see if we can convert those images and being seen with those gadgets, which is something that I'm really excited about.

Host - Rebecca Griffin:

Yeah, absolutely. So how then does digital pathology benefit the patient and the hospital, and what about the benefits for you as a pathologist?

Guest - Dr Admire Matsika:

So for the patient, digital pathology, particularly when it includes artificial intelligence, it adds another layer of quality control. So you are more likely to get accurate results of your diagnosis. It's also faster to get your results, also easier for the pathologist to get a second opinion. Every once in a while you get a case that's so difficult that you might want to refer to another expert in another part of the country or even across the world. And digital pathology has just made it so easy to share those files, get a second opinion instantly, and convey that message to the doctor who then conveys that message to the patient.

With regards to the pathologists themselves, a lot of pathologists are really excited about digital pathology for the same reasons that makes their work much easier, makes it faster, and also make it easier to collaborate with colleagues across the world, but more importantly, the ability to work remotely. So we are now entering an era where I might not need to be sitting in a pathology lab in South Brisbane. I could come to the Gold Coast, sit on the beach at Southport and do my work for the hospital or for the health sector role. It also means that we'll probably need less pathologists going into the future. There is a shortage of pathologists in Australia as well as across the world, quite a significant shortage actually. So having some of these aids means that going into the future we'll need less people doing the work and it will be more cost-effective.

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Host - Rebecca Griffin:

So are there instances when traditional pathology is still used?

Guest - Dr Admire Matsika:

Yes. So at the moment, traditional pathology, or some people use the term analog pathology, still remains the mainstay of diagnosis. Digital pathology is slowly coming in, so we are seeing a number of labs within Australia who have started to use digital pathology as well as traditional. But it's going to be a transition over years, if not a decade or more, whereby eventually we'll see everyone going digital. But at the moment it's analog with some digital pathology getting on board.

Host - Rebecca Griffin:

Admire, what about artificial intelligence use in pathology? Is AI becoming a diagnostic tool for you in pathology and is it still very early days?

Guest - Dr Admire Matsika:

Yes, absolutely. So artificial intelligence is probably the most exciting component of digital pathology and all this change that's happening that we are talking about today. So in the past decade or so, there's a number of companies and people who are smarter than me in using computers who have realized that a lot of tissue diagnosis that we do, some of it is really pattern-based. So for you to say, this is a carcinoma, this is a lymphoma, this is a sarcoma and so forth, you're looking at the pattern of cells and how they're arranged and how they look. And then these people have realized that we could actually train artificial intelligence to be able to recognize these cells and these patterns and actually assist pathologists in making their diagnosis. So at the moment, we've got all these algorithms being developed by several companies across the world where you could put those digital images into these algorithms and they'll spit out a diagnosis and just tell you, this is a melanoma on your skin, or this is a basal cell carcinoma, for example. So it's really exciting.

Host - Rebecca Griffin:

And is it still very early days though?

Guest - Dr Admire Matsika:

It is very early stage. As you know, a lot of things in the health sector needs to go through steps of studies and then gets validated and then it gets incorporated into routine clinical use. At the moment, we are mostly in that research validation stage. For example, our team at the Mater, led by Madeline Gough and Dr. Cameron Snell, a few years ago, were one of the first to actually use some of these algorithms in diagnosis of breast cancer, looking at what's known as HER2 scoring.



Host - Rebecca Griffin:

So when AI is up and running down the track and you're using that in your work, what are the benefits of that?

Guest - Dr Admire Matsika:

So the benefits are, it's like having an assistant next to you that can help you recognize some of these patterns quicker, make a diagnosis. There are some parts of our job as pathologists that are really tiresome. For example, in some situations we might have to count the number of cells or count what's known as the number of mitosis to grade a tumor, for example, to say whether it's low, high grade. It takes a lot of time. But with computers, as you'd imagine, it's only instant. Just like that, it can tell you there's 3,500 cells there and I can see five mitosis. It would take me 30 minutes to count five mitosis out of 3,000 cells. So things like that will help us make our work much easier and more accurate.

The other part of artificial intelligence that I'm really excited about is once we start talking about machine learning and supervised versus unsupervised machine learning, there are groups out there who are looking at unsupervised machine learning in pathology where they feed these computers with a lot of data about tumors and the outcome. Over time, the computer is able to predict which tumors are going to do worse or which tumors are going to do well. And we don't know how it has arrived at this diagnosis, this conclusion, but it's actually correct. It's actually right. So it's actually identifying some of the things that are not visible to the naked eye when it looks at these images, tissue images that it can use to predict that, oh, this tumor is really bad. It's worse than the previous one that it saw, and that just adds another layer of information that we just didn't have before. It's very exciting.

Host - Rebecca Griffin:

It's like endless possibilities, isn't it?

Guest - Dr Admire Matsika:

Absolutely.

Host - Rebecca Griffin:

How common is the use of digital pathology and AI in pathology globally right now?

Guest - Dr Admire Matsika:

Australia actually has been a bit behind in terms of embracing digital pathology. So when we look into our medical literature and some of the experiences that some of our colleagues in other countries share at conferences that we attend, we've got countries like Canada, the United Kingdom, [inaudible 00:15:13], Spain, and some of those Scandinavian countries who actually started using digital pathology about a decade ago. Some of these places have gone fully digital, so they no longer use microscopes at all. So at this point, Australia is actually playing catch up.



Host - Rebecca Griffin:

Now Mater Pathology in partnership with Queensland Health recently received funding for a trial using drones to transport samples. How did this go and what were the benefits of using this technology in pathology?

Guest - Dr Admire Matsika:

Yes, so the trial went really well. We realized that it was a useful way to expedite logistics of specimens from different collection centers to our lab. It resulted in a faster turnaround time, and as you would imagine in the long term, that also means less labor costs because there won't be many people driving around picking up specimens and taking them to the lab. You might have seen some of your small cars and other pathology labs running around. It's also good for the environment. When you think about it, you've got a drone that picks up specimens here from the Gold Coast and takes them directly to Mater South Brisbane in the middle of minutes, I presume. I'm not sure how fast they go. It also means that it will be cheaper and reduce the costs in healthcare. So there was a lot to learn there.

Where we are at the moment is perhaps looking into the future. We will need more funding to continue this drone experiment and convert it into a wider scale project. At the Mater, for example, we also service not just the Gold Coast starting recently, but also we have Mater Springfield, Mater Redlands. We also have other Mater hospitals in North Queensland and central Queensland, and we foresee a future where we'll be servicing all those areas and it doesn't matter which postcode you are, you get an expedited service, which is similar. So it's a bright future.

Host - Rebecca Griffin:

Admire, now when you're not busy in the lab or in professional meetings, you are a board member of the Brisbane Youth Service. How does it support vulnerable young people?

Guest - Dr Admire Matsika:

Yes, so Brisbane Youth Services is a not-for-profit organization. Their mission is to support young people through provision of housing. They also have a clinic within their premises where they provide health services, both physical and mental to our young people. They also help these young people to establish good relationships with their peers, with their families and so forth, as well as providing education and jobs going into the future. There is a sister organization here at the Gold Coast, which is known as the Gold Coast Youth Services that we work hand in hand with as well. I joined the organization just as a way of giving back to the city that I've called home for the past 20 years or so, just leveraging what I've learned through the years my day-to-day work.

Host - Rebecca Griffin:

So Admire, before we let you go, when you're not busy in the lab or in meetings, what do you like to do to relax and wind down?

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Guest - Dr Admire Matsika:

Yeah, I don't have much time with three girls in primary and high school. They take most of my time. But between that, I listen to podcasts, listen to music, and watch movies late at night, a bit of reading. I enjoy reading about new technologies and what's going on around the world, and once in a while, go to the gym.

Host - Rebecca Griffin:

It's been absolutely wonderful talking with you. Thank you so much for your time.

Guest - Dr Admire Matsika:

Thanks, Rebecca.

Announcer:

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