**LabMed Podcast Ep3 - David Gaze - FINAL**

MUSIC JINGLE

**VO - Welcome to *Life in the Lab*, brought to you by the Association for Laboratory Medicine. I'm Kamiljit Chatha, and I'm a Consultant Clinical Scientist at University Hospitals Coventry and Warwickshire NHS Trust. In this series, we bring you inspiring stories of clinical scientists and medics working in laboratories in the UK and around the world.**

**Today, we’re talking to David Gaze. After decades of working in clinical pathology with the NHS, David is now a senior lecturer in chemical pathology at the University of Westminster in London.**

**He’s dedicated over twenty years to cardiovascular research, developing life-saving tests to detect the cardiac biomarker troponin.**

**And the thing is, David knew from a young age that he wanted his career to focus on the heart.**

I don't know, I think, you know, from a young child sort of looking at biology books and things like that. It was always the heart that was interesting. It's central to life. You know, without the heart beating, you don't have life. And it's such a complex organ and it can go wrong in many different ways.

So, that's always been the sort of the draw and the interest to that. And my career could have gone into sort of medicine and maybe - a cardiac transplant surgeon, or something like that. I was interested in maybe becoming a paramedic and working, you know, in the emergency services. So, all of those had the underlying effects of cardiac disease, if you like.

And then at the age of 14, I was at school and had the opportunity to do work experience for three weeks. There were a number of different placements that we could apply to. And pathology was the only one that was a medical related field. So I thought, well I'll go and try it and see. And that allowed me to go into the laboratory. I worked as a medical laboratory assistant and that was my first exposure to chemical pathology.

And luckily at the age of 15, I was allowed to come back and work between my GCSEs and my A levels. And once I was there I managed to go and see other aspects of the hospital, but I actually felt quite at home within the pathology services.

So, although initially it wasn't the area I was destined for, it became quite apparent at an early age that it was going to be something that I was going to enjoy.

MUSIC INTERLUDE

My expectation when I first thought about the world of this profession was whether or not I was good enough to go to university. I would have been the first one in my family to go. There was nobody that had been through that process. So, it was quite daunting, thinking about applying to a university to do a degree. And then at that point, I didn't have an idea in terms of where that degree would take me.

**Of course, David didn’t get here on his own. He had mentors along the way. And it was at university that he finally got the chance to focus on that one organ that he’d been fascinated by since he was a kid.**

I asked if there was any laboratory work for the long summer period again. And unfortunately, at that time, there wasn't, there wasn't any available money. But the consultant said, look, I'm just about to start a new project, it's funded by the Department of Health. So, he said: If you would like to, for the summer, come and work and be a research assistant. And this was to do with the introduction of a new biomarker for heart disease.

**Just a quick reminder of what a biomarker is: it's a biological molecule or characteristic that can be measured to show if something’s normal or if there’s a condition or disease. This was a game-changer in cardiac research.**

**Creating a reliable blood test to definitively tell if someone had a heart attack was groundbreaking.**

At the time when patients had a heart attack, there were very limited options to diagnose the heart attack. There was the ECG, which is the trace of the heart activity, but that only changes in about 45 percent of patients. The vast majority of people that have a heart attack don't show that change on the ECG.

So, at the time there was a limited number of tests that we could do from a blood sample. But these markers were problematic in that they were elevated in many different conditions. Most of them were associated with other diseases of muscle, skeletal muscle. So, there was nothing that was out there that was truly identifying a cardiac muscle problem, which is what is associates with a heart attack.

So, this was the first time that we had an opportunity in the UK to look at this particular biomarker. And this marker is called troponin. So, it's found within the cells of the heart and is normally located on the face of the contractile apparatus that makes the heart beat.

Now the troponins are very different in the heart to the ones in the skeletal muscles. So, the test could identify the difference between heart and skeletal muscle. So, when this test was developed, we had a novel way, a new mechanism by which we could identify heart attacks. The problem at the time was that those tests were less sensitive. So, we had to wait for 12 hours by the time that you would then detect that in the blood.

And then over time, the technology for measuring this troponin in the blood became more sensitive, so we can measure at an earlier time point. So, we were able to pick up patients earlier, diagnose them earlier, which means that you can treat them earlier, which also means then you save the damage of the heart occurring for a long period of time.

MUSIC INTERLUDE

One of the reasons why that particular study, the initial study that was done and funded by the Department of Health was of significant importance was that it was the first time that we had adopted troponin as point of care testing.

We would have normally have had to wait for the samples to be taken, sent to the laboratory. Those tests that were available in the laboratory were not suitable because of this problem with elevation in other conditions. So, the development of The rapid test, the point of care test, or the testing that's done near the patient was really important and it was a game changer in the development of the diagnostic world of biomarkers for cardiovascular disease.

**Over the years, David and his team have been asked to look at all sorts of testing methods using the troponin biomarker, always pushing the science to new heights.**

We've pretty much looked at every troponin method that's out there over the number of years. So, we would do robust testing of the performance of the test in the laboratory, the analytical performance. And we would do testing with patients to see whether or not clinically it is suitable to be a better marker than what was currently available.

One company that we worked with had the idea for a new test, they had a platform to measure the test, but they didn't have the technology to actually measure the reaction. So, I was involved from an early start to develop the test components to identify what we use as antibodies, which binds to the troponin molecule to identify it in the blood and to test it. So, that was a key change in experience from going from verifying a product that's already manufactured to being integral to the manufacture of the product itself.

MUSIC INTERLUDE

The interest and the drive to keep working in this field is the fact that the tests are being updated. They have new applications. We now know that the use of troponin is far greater than using it just to diagnose a heart attack. So, all those things always come as a new avenue to explore. And that's the thing with research in a clinical field is that you set out to do one thing and it throws out more questions than answers.

Nothing goes completely smoothly, even though you have that intention at the beginning. And we've had a number of challenges over the course of that sort of 15, 20 year period. They can involve personal challenges such as time management.

Another challenge has been the way in which we've changed in terms of ethical approval to do studies. Things that we did a long time ago were quite simplistic. We could use redundant material in the laboratory to analyse the performance of a test. And that has changed and became quite a bit of a challenge and there's been multiple reasons, and it's been for the better, but it has been limiting in terms of some of the simplistic things we could have done, which are now mandated by these new governing processes.

**David’s work to refinine Troponin as a Cardiovascular biomarker has earned him multiple awards and accolades. Today, he’s recognized as a world leader in the field.**

 I think the thing is with this particular profession, you know, once you start to become an expert within one particular area, then the pool of people out there that are experts in that field becomes narrower. And then your name then gets known as the person. So, the Mr. Troponins of the world are the research group that I was working with.

Um, so you become known as the guru.

MUSIC INTERLUDE

We had a particular interest from a zoo who had a patient, well, their patient was a gorilla. So, the gorilla actually had heart failure and they wanted to measure the biomarkers in the gorilla, which was fine. They asked if we could take a sample and send it to the laboratory, which we did.

What we can't do is identify whether the results were abnormal because we don't know what the normal range is for a gorilla. So, we can't apply the human ranges because the human is not the same as a gorilla. So, that then led into automatically a whole new study looking at the biomarkers in captive apes in the UK and in Europe.

**As if dedicating his career to life-saving diagnostic tests wasn’t enough, in 2016, an opportunity popped up in Biomedical Science in the School of Life Sciences at the University of Westminster. It was a chance for David to step out of the lab and into the classroom.**

A new challenge was, sort of, on my mind. And giving back to academia was really my interest. And now I can give support and help students coming through this process because I understand what they're going through and how they need to think about what they're gonna do in the future.

So, that sort of really spurred my interest in moving from NHS to academia. Running a master's course with a significant number of students, running the undergraduate course which has 400 students on, it's a big commitment to academia!

Having a degree gives you so many opportunities. With our own students doing a degree in biomedical science doesn't mean they're always going to be a biomedical scientist working in a laboratory. That might be an entry point into a career, but it might be a stepping stone into other things. So, they might consider to go and do a Master's or a PhD and go down a research route. They might go into a commercial sector. But all of those aspects require dissemination of information.

**For David, sharing results and findings is key to a successful research career. And it's something he’s always emphasizing to his students.**

Publication is a huge part of disseminating the outputs of the research that we find. You know, if you do some research and it doesn't get put into the public domain, what's the point? And, with our own career, as of my own career as a researcher, I've published significantly in medical journals and that has led into further roles within that profession in terms of becoming an editor, commissioning review articles for *The Annals of Clinical Biochemistry*, that is an important part of that process.

And it's important for students to understand as well now that this is where the world of publishing is for dissemination of information. And things are changing as well. So, you know, it's not just a case of publishing in a medical journal. It's about open access books, there's social media, I have exposure of being an expert witness in a judicial case, I've given an opinion on radio, I've done the same for podcasts, for interviews online, and within the national press.

Having the opportunity to give an expert opinion in a way that's accessible for the general public is a huge important part of being a researcher.

I think it's because you need to make sure that people are getting the right information. There is so much disinformation and misinformation that's out there with all aspects of life because of the instant access to information that we have. But we need to ensure that the quality and the correct information is provided.

MUSIC INTERLUDE

I think that the rewarding aspects of doing this job is that you see the students change from the day they start at university to the day they leave and you can nurture them and and the ones that get it from the beginning see the potential and the outcome that they can, they can achieve.

And it's great to see that and to stand on the stage at the Southbank Centre and see them graduate - we have a graduation next week - and watch them walk across the stage and get their degree. It reminds you of what you did in your career, but also the fact that the opportunities that are available to them are only just starting at that point.

**Today, David isn’t resting on his many achievements - he’s looking ahead to new projects and what's next.**

I lead a research group here which is the ageing biology and age related diseases. So, this covers obviously the cardiovascular diseases that I'm interested in, but also the process by which humans age and how the ageing process influences how disease starts. So, there's lots of different aspects of things that we are interested in - looking at patients with diabetes, long-term health conditions, and the metabolic response to changes in physiology which then lead to disease processes further down the line.

And that means then disease processes may start earlier or later in different people. So, why are some people living to 50, 60, 70, 80 without any disease processes and others finding they're getting, say, cardiovascular disease at 45, 50?

It’s not all about things like diet and the genetics of this. It’s a wider field. And understanding the process by which ageing is influencing disease processes.

The personal reflection for me was when I was doing my PhD, my grandmother was ill with triple vessel disease in the heart. She had to urgently have three stents put in and subsequently had three vessels bypassed. But then survived and had an active life for a long period of time afterwards, but always living with cardiovascular disease. So, that's the interest I've had.

And now, the interest in terms of people living longer is considering the changes that we're seeing now in the vasculature in the brain. So, looking at patients who are developing vascular dementia. The same type of processes that give people heart disease and heart attacks we’re now seeing is becoming more apparent in the brain as the population ages.

It's now understanding that actually all these systems are interlinked. Your whole body is interlinked. So, the brain, the heart, the liver, the kidneys, everything is linked and all the systems talk to each other. Disease doesn't occur in single pathology. It occurs in multiple pathologies and you have to understand those interactions to understand how these things manifest and many people present, with multiple disease processes.

MUSIC INTERLUDE

I suppose it sort… of maybe it's because as you age you start to question your own mortality and you know. When are you going to die and by what mechanism so maybe that's the sort of thing you're thinking about, you know maybe we can start to research it and prevent it and in the hope that we can save ourselves. (laughs)

**Looking back at David’s incredible career and all the important work, research, and projects he’s involved in today, could his younger self - the teenager in the lab - have ever imagined this career path?**

I think 14 year old David going back to doing those three weeks in the hospital as work experience would never have thought that I would be an academic working in the university. My exposure to the world of research. It was solely driven by that opportunity to do that Department of Health study when I was 15 years old. And that's the driver that has given me the opportunity to formulate this career plan and pathway since then.

It's not just about doing the research. It's about the networking, the opportunities to travel, to present work, I've been to China, I've been to India, Australia, you know. Going to Australia to be invited to give a one hour lecture is a long way to go. Collaborations with people in Germany, in China, in the US. It exposes you to so many different aspects, which is far more than just being a clinical scientist in the laboratory. It's been a great opportunity. And it's given me some great friends.

**For a transcript of this episode or for more about David Gaze and his work, visit our website at** [**www.labmed.org.uk**](http://www.labmed.org.uk)**/podcasts**

**This podcast is brought to you by the Association for Laboratory Medicine. Produced and edited by Caroline Bacle, sound mixed by Daniel Fletcher. Special thanks to Avi Surskas and everyone in the LabMed team.**

**And we’ll be back next time for more stories of *Life in the Lab*.**

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