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Q1 You developed the machine learning-based Global Registry of Acute Coronary Events (GRACE) 3.0 score for early risk stratification in non-ST-elevation acute coronary syndrome. How does this model improve upon traditional risk scores?

GRACE 3.0 represents the next evolution of the GRACE score, bringing AI methods into one of the most widely used risk tools in cardiology. It was trained and externally validated on data from hundreds of thousands of patients from multiple countries, which gives it a very strong evidence base. Unlike traditional risk scores, GRACE 3.0 captures complex and non-linear relationships that conventional approaches often miss. Another key improvement is that GRACE 3.0 is sex-specific and tailored specifically for patients with non-ST-elevation acute coronary syndrome, rather than being applied more broadly across the acute coronary syndrome population. We made it available online,[1] and it is now becoming increasingly integrated into international guidelines.[2,3]

Q2 At this year's European Society of Cardiology (ESC) Congress, you co-chaired the Late-Breaking Clinical Science session on AI-driven cardiovascular biomarkers and clinical decisions. What were the most important take-home messages for clinicians from this session?

What stood out is that AI is no longer an abstract future: it is the present. We also saw very clearly that technological innovation is a key driver of progress in healthcare, and that the current landscape is changing rapidly. Thus, I think we, as a society, need to go where the puck will be, not where it has been in the past, meaning we should position ourselves where the field is heading. And perhaps the most important message was that integrating AI into daily practice has huge potential to improve the way we deliver care and implement prevention strategies.

Q3 In your opinion, what are the main barriers to implementing AI-based tools in everyday clinical practice?

There are still many hurdles. From a data science perspective, it starts with challenges around creating workable, reliable data objects, and then there are all the important regulatory questions around data safety, privacy, and legal accountability. But perhaps the biggest gap at the moment is evidence. Many AI tools currently available have not been externally validated, and very few are supported by trial-level evidence. Until we close that gap, clinicians will understandably be hesitant to adopt them more broadly.

Q4 You also co-chaired a session on precision diagnostics. Can you briefly explain why the shift towards precision therapy in cardiology is so critical?

This was a vibrant session that I had the pleasure of co-chairing with Anja Hennemuth from Charité – Universitätsmedizin Berlin, Germany. For decades, cardiology has largely been guided

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by the average treatment effect. While this approach has served us well in many ways, it does not fully reflect clinical reality. A given therapy might be highly effective for some individuals, but less beneficial or even harmful for others. Recognising this heterogeneity in treatment effects is crucial. Moreover, we are now at a point where we have remarkable tools, such as gene editing, small interfering RNAs, and monoclonal antibodies, that enable us to target disease mechanisms much more precisely. Together, these advances create the basis for truly individualised care in the future.

Q5 In your presentation, you showed that gut microbiota-derived imidazole propionate predicts cardiometabolic risk in patients with coronary artery disease. How might this novel biomarker guide the development of new therapeutic targets?

This is a very exciting area. Mechanistic studies published recently have shown how imidazole propionate drives atherosclerosis by modulating innate immune cells and endothelial cells, leading to inflammatory activation.[4,5] Our recent study, presented at the ESC Congress, brought those findings into the clinical space by showing that this metabolite is a non-traditional cardiovascular risk factor that independently predicts adverse outcomes beyond established determinants of risk.[6] This really puts the gut–heart axis back on the map in residual risk management. Targeting either imidazole propionate production or its signalling pathway could open up new opportunities for personalised secondary prevention strategies.

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Q6 As a member of the ESC Digital Cardiology and Artificial Intelligence (DCAI) Committee, what are the committee's top priorities in using digital innovation to advance the ESC Strategic Plan?

The ESC has made a strong commitment to making European healthcare AI-ready. Under the leadership of Folkert Asselbergs, University College London, UK, our committee is working on several fronts. We are looking at how to harmonise datasets across Europe, build federated learning infrastructures, and establish a robust evaluation framework to ensure that AI is both trustworthy and useful. Education is another top priority. The committee is currently developing a curriculum framework for digital cardiology and AI and, for the first time, has launched a dedicated congress on AI: the ESC Digital & AI Summit.[7]

Q7 Looking ahead, what do you hope to achieve, both in research and within the ESC, before next year's Congress?

In research, we are currently working on several projects aimed at refining cardiovascular risk prediction and participating in ongoing RCTs exploring new translational treatment strategies. Within the ESC, I have the privilege of working as part of the big data group, where our goals are to launch a phenotype library and establish a network of centres of excellence in big data. This will help foster international collaboration and accelerate progress in the field.

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