Bob Barrett:	This is a podcast from *Clinical Chemistry*, a production of the Association for Diagnostics & Laboratory Medicine. I'm Bob Barrett.
	Timely and accurate diagnosis of complex conditions like myocardial infarction is essential to give patients the best chance of a favorable outcome. However, shortages in healthcare resources and increasingly crowded emergency departments make it challenging to rapidly evaluate suspected cardiac disease, hindering efforts to promptly initiate treatment for those who need it while confidently allowing those who do not to return home. Several biomarker-driven algorithms have been established to evaluate myocardial infarction, but recent studies incorporating machine learning have shown even better performance. Will machine learning eliminate well-trained, experienced human clinicians, or is it possible to develop an approach that combines humans and machine learning into an optimal diagnostic tool?
	A reflection article appearing in the March 2024 issue of *Clinical Chemistry* describes recent advances in the application of machine learning to the evaluation of myocardial infarction and proposes strategies to balance machine learning with human expertise.
	In this podcast, we are pleased to welcome the perspective article's lead author. Professor Damien Gruson serves as the head of the Department of Laboratory Medicine at the the Cliniques Universitaires Saint Luc in Brussels, Belgium. He is also the chair of the Emerging Technology Division at the International Federation of Clinical Chemistry and Laboratory Medicine.
	Doctor, with the advent of machine learning and AI technologies, what are the implications for the future of healthcare and laboratory medicine?
Damien Gruson:	So, Bob, I think that the implication for the future of healthcare and laboratory medicine is part of a general context. A context where we have more and more requests

for laboratory testing, labs value for the clinical decision. We are also in a context where we have economical pressure for hospitals, for labs. We are in a context where there is a shift in the mindset of patient, physician, looking for new kind of services, and we are in a context where there is a healthcare workforce shortage, which could be more and more pronounced in the coming years.

So, the value of AI could be seen as at least two level. A level which will be more at the operation leading to a smarter process, smarter labs, smarter way of dealing with quality controls. AI could be also a way toward intelligent design of clinical labs having more intelligent or assisted project management. I think there is also values for in vitro diagnostic industry with augmented way of designing the test, the system, having like for the pharma company in silico modeling before going live to laboratory. We have in the same kind of ideas the digital twins.

Bob Barrett: So how do you see machine learning addressing resource shortages and overcrowded emergency departments, and what specific advances do you find promising in improving the diagnosis of myocardial infarction?

Damien Gruson: Yeah. So, with the global benefits of AI to support the clinical decisions, or clinical decision support system, we can go to something which will be new tools for a more timely identification of the patient. So, shortening the triage time in ED [emergency department], and there is overcrowded ED all over the world, so more efficient with these data driven diagnosis, more efficient by the integration of different kind of data, so early accurate diagnosis of myocardial infarction. That's the way. I will say that there is an impact also for the hospital, where we can reduce some unnecessary hospital admission by improving this patient flow in the emergency department. So, the consequences are not only the ED but it's the hospital pathway at large.

Bob Barrett: Could you please elaborate on how to safely integrate machine learning and human expertise?

Damien Gruson: To safely integrate machine learning with the human expertise, I've seen that it is essential to maintain the human oversight and responsibility.

Machine learning models should serve as decision support tools to augment work practices but not to replace. So, the professional judgment of the healthcare professionals of the lab remain super important. So that's meaning the understanding of the individual patient needs, how to manage some new or rare cases, and how to address situation where AI may not have sufficient data to make informed judgments. So, we need to have this human insight. We need also to

comply with the regulation and we have example in Europe where there is a new European AI Act to ensure the high-risk AI system can meet ethical and safety standards.

Bob Barrett: Doctor, how do you foresee the adoption of such technologies in the real-world clinical setting?

Damien Gruson: So, the adoption of the AI technology in this real-world setting rely on validation, human warranty, and consideration of the clinical judgment. Again, it's not replacing but it's assisting the clinical team. So, we need to address a different dimension as we were discussing in the article, like the ethical aspects around AI, the legal framework to use AI, the liability dimension which are associated to the use of machine learning. If we are able to ensure that these technologies are transparent, fair, accountable, and in the respect of patient privacy, we will be in good condition. I think that also we need to take care that those system should enhance and not reduce the richness of team-based decision. The expert advice are extremely valuable and it's a way to also stimulate and amplify multidisciplinary team care and team decision. So, yeah, the AI to amplify the human intelligence.

Bob Barrett: Well, finally, what challenges should healthcare professionals consider as they integrate these advances into their practice?

Damien Gruson: So, the healthcare professional should consider multiple challenges before implementing into practices. There is the question of the high-quality standardization, interoperability of the data use in the AI algorithm, the quality of the information, the quality of the training sets and clinical data used to train the models. It also include that machine learning models are used as decision support tool within the context of human oversight and expertise.

There is, as mentioned earlier, the need to be as ethically and liably coherent with these new emerging technologies. So transparency, respect of patient privacy are really important. There is the need to also go for the workforce evolution. So lab specialist, healthcare specialist, need to be trained to this new technology, to AI, or retrain to get this knowledge.

I was mentioning previously the value of multidisciplinary teamwork. I think it's new teams with lab specialist, data scientist, clinicians, physician to make the best use of the AI after the identification of the needs for AI. So, yeah, multiple challenge, but that we can face with this multiple teamwork. I think that the scientific societies like ADLM, like IFCC, have to play important role in the education, in the design of guidelines, to make the best use of AI, and ideally also joint education back to our case of today. Joint education with scientific society for cardiology, joint discussion will improve

the way we are designing AI and emerging technology for the benefits of the patient care.

Bob Barrett: That was Professor Damien Gruson at the Cliniques Universitaires Saint Luc in Brussels, Belgium.

He served as lead author of a perspective article describing the integration of machine learning and human expertise in the March 2024 issue of *Clinical Chemistry*, and he's been our guest in this podcast on that topic. I'm Bob Barrett. Thanks for listening.