

Dre Tomoe Stampfli,
Chairwoman Jury Fondation Coeur de la Tour

Friday, 20 October 2023

Cardiovascular Research Prize

Dear Doctor Stampfli, dear members of the jury

I would like to submit the manuscript “Artificial intelligence to improve ischemia prediction in Rubidium Positron Emission Tomography – A validation study” for consideration for the cardiovascular research prize. The paper has just been accepted in the *EPMA journal* (IF 6.5, Q1 in Medicine, Research & Experimental).

With the increasing prevalence of coronary artery disease (CAD) globally, the demand for accurate diagnosis and risk stratification with non-invasive imaging techniques is rising. Consequently, this will lead to ever growing health care costs due to these expensive tests. Hence, cost-efficient diagnostic and risk stratification tools are becoming more and more important. Guidelines recommend referring patients to advanced cardiac tests according to their pre-test probability (PTP). However, this approach is imprecise resulting in a large proportion of the performed cardiac tests being normal. With an individualized PTP assessment, normal tests – and consequently unnecessary radiation exposure and costs – might be avoided.

In the manuscript, we describe the performance of an artificial-intelligence (AI) based algorithm which incorporates variables from patients’ history, physical exam, ECG and biomarkers, and compare it with commonly used PTP tools for CAD. Using a sophisticated, individualized risk profile for every patient, the AI – based algorithm was the only model which correctly predicted very low pre-test probability of myocardial ischemia on PET. With its excellent sensitivity and negative predictive value, it would allow exclusion of ischemia with high certainty. Furthermore, it allocated patients more evenly across PTP categories and reduced patients with “intermediate PTP” by up to 51%. Therefore, this tool successfully reclassified patients and might be used as gatekeeper prior to advanced non-

invasive testing. By maintaining the same diagnostic quality and safety, down-stream costs might be reduced using this AI-based approach.

The data required for this AI algorithm are readily available to every general practitioner (GP) or cardiologist, and the test characteristics to exclude myocardial ischemia are excellent. This offers the opportunity to patients and their GPs and cardiologists to get a precise, cost-effective and individualized triage tool to avoid expensive, advanced cardiac tests. The tool was created with a novel, memetic pattern-based algorithm based on a meticulously characterized patient cohort.

Our approach and results represent a big step towards personalized medicine in the risk stratification of CAD.

I thank you and your team in advance for your time reviewing the application and would be honoured if the project would be rewarded with the “Coeur de la Tour” research prize.

Yours sincerely,

A handwritten signature in black ink, appearing to read "S. Frey". The signature is written in a cursive, slightly slanted style.

Simon Frey, MD

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