

Media release, March 24, 2022

AI enables personalized treatment of myocarditis

A research team from the University of Bern and Inselspital, Bern University Hospital, has received funding from the Center for Artificial Intelligence in Medicine for a research project to personalize the diagnosis and treatment of myocarditis. In the future, the use of artificial intelligence will allow personalized, individualized risk assessment and prognostication.

Myocarditis (inflammation of the heart muscle) is usually caused by viruses, e.g. in Covid-19 disease. However, it can also be induced by medication, toxic substances or in the context of a rheumatological disease. Clinical assessment is difficult due to widely varying symptoms, from fatigue to chest pain, palpitations, shortness of breath, and, rarely, sudden cardiac death, the latter associated with sports activity. Nowadays, cardiac magnetic resonance imaging (CMR) is usually performed when myocarditis is suspected. In some cases, the data obtained from these scans do not provide a sufficiently personalized risk assessment and respective optimal treatment options.

Review study points to new approaches

In a scientific review in collaboration with the University of Tübingen, the Bristol Heart Institute and Harvard Medical School, a research group led by Prof. Christoph Gräni, MD, PhD, from Inselspital and the University of Bern assessed various CMR parameters in terms of their importance for diagnosis, prognosis and monitoring of myocarditis.

“From the comparison of the different used diagnostic tools, we can derive novel approaches for future research and development. Next, we will determine how artificial intelligence (AI) can assist us in a rapid and comprehensive evaluation of the many different clinical parameters and image data,” according to **Christoph Gräni**. *“To this end, I am pleased that we have received funding from the Bern Center for Artificial Intelligence in Medicine (CAIM) to pursue this promising research direction.”*

Making complex cardiac function data readable with AI

Using CMR, more than 1000 measurements can be collected per patient, including parameters on anatomy, tissue characterization of the heart muscle and pericardium (e.g., inflammation or scars), and heart muscle function data. Physicist **Yasaman Safarkhanlo**, who is a PhD student under the supervision of Prof. Gräni at the Department of Cardiology at the Inselspital, explains: *“Only AI can evaluate these many variables quickly in their entirety. We want to let the data speak to better understand what exactly happens during myocarditis. This is a novel approach that does not start from our previous understanding of physiology and looks for a known feature in the images. With our project, we’re rather starting from the data aspect to see what new correlations we discover on the images – so, ultimately, we can allow better treatment in the future.»*

Personalized counseling of athletes

The researchers' objective is to develop evaluation tools that can be used to determine whether myocarditis will heal spontaneously and sustainably or whether close monitoring is needed. *“Athletes in particular could be better advised in this way: On the one hand, the goal is to avoid sudden cardiac death, but on the other hand, to not unnecessarily restrict athletes in their activity,”* **Gräni** explains. In this respect, all clinical data and image data will one day flow into the Insel Gruppe's digital clinical information and control system (KISS), where they will be automatically evaluated in order to provide the treating physician with a probability of diagnosis, a prediction of the course of the disease, and an optimal therapy suggestion.

Focus on digitalization and AI applications in medicine

The Department of Cardiology's commitment to using the latest digital technologies for personalized medicine is timely with the strategic digitalization projects at the Insel Gruppe and the University of Bern. *“The Faculty of Medicine of the University of Bern is strongly committed to digitalization in medical education and research. With the establishment of the Center for Artificial Intelligence in Medicine (CAIM) the university and the Insel Guppe have created an excellent research platform. It allows utilizing the latest developments in cutting-edge digital technology and artificial intelligence for personalized treatment approaches and to anchor this knowledge in education and training,”* says Prof. **Claudio Bassetti**, MD, Dean of the University's Faculty of Medicine and Director and Chief Physician of the Department of Neurology at Inselspital.

CAIM selects myocarditis project for research funding

During the recent first round of CAIM's research funding, the myocarditis project was selected along with four others and will receive CHF 100 000.- CAIM director Prof. **Raphael Sznitman** says: *„It is a tremendous asset to have clinicians from the Inselspital and technical scientists from the University working closely together here in Bern. By bringing dynamic and driven individuals to reach beyond their trained disciplines, the potential for innovation and its impact on our healthcare system is simply limitless. This is at the core of CAIM and we are very excited to see such partnerships thrive and look forward to partnering with the Department of Cardiology at Inselspital.”*

Contacts, Experts:

- Yasaman Safarkhanlo, MSc Physics, PhD student, Department of Cardiology, Inselspital, Bern University Hospital
- Prof. Dr. Dr. med. Christoph Gräni, Senior Attending in Cardiology and Head Cardiac Imaging, Department of Cardiology, Inselspital, Bern University Hospital
- Prof. Dr. Raphael Sznitman, Director Center for Artificial Intelligence in Medicine (CAIM) and Director ARTORG Center for Biomedical Engineering Research, University of Bern
- Prof. Dr. med. Claudio Bassetti, Director and Physician in Chief Department of Neurology, Inselspital, Bern University Hospital and Universitätsklinik für Neurologie, Inselspital, Universitätsspital Bern and Dean of the Medical Faculty, University of Bern

Links, Publications, Institutions:

- Review paper: Multiparametric Cardiovascular Magnetic Resonance Approach in Diagnosing, Monitoring, and Prognostication of Myocarditis, Journal of the American College

- of Cardiology Cardiovascular Imaging, January 2022
<https://www.jacc.org/doi/10.1016/j.jcmg.2021.11.017>
- Feature Tracking Myocardial Strain Incrementally Improves Prognostication in Myocarditis Beyond Traditional CMR Imaging Features, JACC Cardiovascular Imaging, July 2020
<https://www.jacc.org/doi/10.1016/j.jcmg.2020.04.025>
 - Myocarditis in Athletes Is a Challenge: Diagnosis, Risk Stratification, and Uncertainties, JACC Cardiovascular Imaging February 2020
<https://www.jacc.org/doi/10.1016/j.jcmg.2019.01.039>
 - [Department of Cardiology, Inselspital, Bern University Hospital](#)
 - [CAIM, Center for Artificial Intelligence in Medicine: Projects 2022/23](#)
 - [ARTORG Center for Biomedical Engineering Research](#)

Kontakt:

- Insel Gruppe AG, Communications: +41 31 632 79 25, kommunikation@insel.ch

Insel Gruppe is Switzerland's leading group of hospitals for university and integrated medicine. It offers comprehensive health care based on groundbreaking quality, research, innovation and education: in all stages of life, around the clock and in the right place. The six hospitals comprising Insel Gruppe (Inselspital, Aarberg, Belp, Münsingen, Riggisberg and Tiefenau) carry out over 900,000 outpatient consultations and treat about 62,000 in-patients using the latest therapy methods. It provides training for a large number of professions and is an important institution for the further training of young physicians. Insel Gruppe employs a staff of over 12,000 (including students).

Center for Artificial Intelligence in Medicine (CAIM)

The Center for Artificial Intelligence in Medicine is a research, teaching and translation platform for medical technology that uses AI to deliver better care to patients and facilitate the work of doctors and nurses. CAIM capitalizes on the unique constellation in Bern that joins players from the scientific, healthcare and industry domains. It was inaugurated in January 2021 as a Center of the University of Bern's medical faculty and the Inselspital, Bern University Hospital, with the University Psychiatry Services (UPD) and the Swiss Institute for Translational and Entrepreneurial Medicine, sitem-insel, as partners. Part of Bern's initiative for digitalization in healthcare, CAIM is a virtual center connecting engineers, physicians and scientists in the area of AI in medicine and providing them with resources and access to infrastructure. By bundling transdisciplinary know-how from the Bern Biomedical Engineering Network, it promotes and expands projects dedicated to the potential of AI technology for healthcare. CAIM fosters commercialization of AI technology innovation, supports start-up incubation and creates sustained value through best in class research, translation and economic growth.

[Further information](#)