Media release

December 1, 2022

Milestone in laboratory medicine

Averting severe embolisms through artificial intelligence

After major surgery or severe inflammation, patients are treated in hospital with the anticoagulant heparin to prevent thrombosis. However, a small number of patients develop a rare complication called HIT (heparin-induced thrombocytopenia), in which the body produces antibodies, paradoxically leading to severe life-threatening embolisms. Only immediate discontinuation of heparin and continued treatment with other aggressive anticoagulants can avert this.

Until now, HIT has been difficult to diagnose in the hospital. If a patient is suspected of the rare complication, a laboratory test can detect the typical reduction in blood platelets (thrombocytes), but this alone is not a definite indication of a HIT. If a patient is mistakenly treated for HIT, this again is hazardous.

Experts in laboratory medicine at Inselspital, Bern University Hospital, have recently developed a diagnostic prediction model in a long-term prospective multicenter study in collaboration with data scientists at the University of Bern, which provides treating physicians with an indicator to reliably diagnose HIT.

AI system integrates laboratory and clinical data
The research team led by Prof. Michael Nagler included clinical and laboratory data from 1393 patients with suspected HIT from 10 hospitals. Combining this information with two clinical questions that can be answered easily in everyday hospital practice, an artificial intelligence (AI) can reliably indicate whether the patient is very likely to have HIT or whether HIT is highly unlikely. Equally possible are the test results: "not very likely" as well as "rather likely", after which the treating physicians can then conduct another test to confirm or rule out the diagnosis.

AI tools to be immediately used in clinical practice

"A diagnostic machine learning tool like this in the field of laboratory medicine is unique in the world," says Michael Nagler of the approach, which was turned into an online tool with the help of feedback from AI experts at the Center for Artificial Intelligence in Medicine (CAIM) at the University of Bern. "Good approaches to HIT diagnosis have been sought for quite some time. Having said that, our system is truly pioneering and shows significantly improved performance compared to previous diagnostic tools, with strong reductions in false positives but also false negatives."

Prof. Raphael Sznitman, who leads an AI research group at the ARTORG Center for Biomedical Engineering Research at the University of Bern and helped develop the algorithm, adds, "Here in Bern, we are well advanced in developing AI systems that arise from a clinical need and can be applied directly in the clinic. Through new technologies, we can support professionals in making therapy decision timely and reliably. Seeing that our research thus directly contributes to improved patient care is extremely motivating!"

Experts:
- Prof. Dr. med. Michael Nagler, University Institute of Clinical Chemistry, Inselspital, Bern University Hospital
- Prof. Dr. Raphael Sznitman, ARTORG Center for Biomedical Engineering Research & Center for Artificial Intelligence in Medicine, University of Bern

Links:
- [A machine-learning model for reducing misdiagnosis in heparin-induced thrombocytopenia: A prospective, multicenter, observational study](#), Henning Nilius, Adam Cuker, Sigve Haug, Christos Nakas, Jan-Dirk Studt, Dimitrios A. Tsakiris, Andreas Greinacher,, Adriana Mendez, Adrian Schmidt, Walter A. Wuillemin, Bernhard Gerber, Johanna A. Kremer Hovinga, Prakash Vishnu, Lukas Graf, Alexander Kashev, Raphael Sznitman, Tamam Bakchoul, Michael Nagler. EClinicalMedicine, VOLUME 55, 101745, JANUARY 01, 2023

  - Institutions
    - Universitätsinstitut für klinische Chemie, Inselspital, Universitätsspital Bern
    - CAIM, Center for Artificial Intelligence in Medicine, University of Bern, Insel Gruppe Bern

Contact:

- 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. 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. Insel Gruppe employs more than 12,000 staff members, including aprrentices. It provides training for a large number of professions and is the most important institution for the further training of young physicians. More than 12,000 employees (including apprentices) work at Insel Gruppe.

Visit us via: