text Barbara Davidson

AI selects the right medication

Still too often, people with IBD need to switch medications because it is impossible to predict in advance whether a drug will work for them. This is expected to change in the near future thanks to artificial intelligence (AI). Professor Geert D'Haens, gastro-enterologist at Amsterdam UMC, and fellow physician-researcher Sarah van Zon explain.

When we spoke with D'Haens and Van Zon, the OmiCrohn study had just begun. This research is part of the METHYLOMIC project, a large-scale European study under the Horizon programme that has been running for two years. Prior research under METHYLOMIC focused on the DNA of people with Crohn's disease. It showed that certain markers on the DNA, also called 'flags' ('methylation'), differ between people who do and do not respond to certain medications. What also became apparent is that the pattern of these flags in people with Crohn's differed from those without Crohn's.

Sarah van Zon and Geert D'Haens

AI

Researchers discovered that with these DNA methylation patterns and AI, it is possible to predict whether treatment with vedolizumab or ustekinumab will work. Van Zon says: 'The DNA patterns of people for whom the medication had worked were entered into a computer program, along with patterns of those for whom it had not worked. Using this information, the program developed an algorithm.'

This algorithm proved very accurate in predicting whether these medications would work for a patient. For vedolizumab, it made a correct prediction in 85% of cases, and for ustekinumab, this was even higher at 94%. During the first two years of METHYLOMIC, an AI model was developed that can make this prediction with just a tube of blood. The OmiCrohn study will now test this in practice with a large group of patients.

Which medication?

'Approximately 400 patients in six countries will participate, including the Netherlands,' says D'Haens. 'Initially, we are researching the prediction of the effect of vedolizumab and ustekinumab. At the same time, we are exploring whether AI can also test adalimumab and infliximab,' Van Zon adds. There will be two research groups. In one group, the gastroenterologist decides whether someone receives vedolizumab or ustekinumab. In the other group, AI determines which of these two medications the patient will receive.
'The advantage of vedolizumab and ustekinumab is that the chance of side effects is very small. You first get an infusion and then can inject the medication yourself,' D'Haens continues.

For the group where AI determines the medication, participants must provide a blood sample beforehand. Van Zon explains: 'This blood goes to the Amsterdam UMC laboratory. Blood samples from participants in other countries are also sent to Amsterdam. The AI model then analyses the DNA flags. Do they resemble someone who responds well or poorly to the medication? Based on this, the model decides which drug should be chosen. The gastroenterologist receives this information and prescribes the selected medication. We expect more people will respond well to the AI-chosen drug,' Van Zon says.

Satisfied

'We will be satisfied if there is at least a 15% difference in favour of the AI group compared to the other group. We believe it is achievable for at least half of the people in the AI group to reach remission after six months. In the non-AI group, where the doctor chooses the medication, this percentage is usually no higher than 35%,' explains D'Haens. Remission means the patient no longer experiences symptoms and also has no inflammation visible on colonoscopy. Participants undergo a colonoscopy at the beginning of their participation and after six months. In hospitals already using ultrasound, patients will also have an ultrasound.

Future

If AI can indeed predict the right medication with this simple blood test, the expectation is that an AI model for treatment with infliximab or adalimumab will follow soon. 'If we can develop the AI model in time, infliximab and adalimumab will also be added as treatment options in the OmiCrohn study,' confirms D'Haens. 'After that, we can also work on models for other medications,' Van Zon adds.
'It would be amazing if we could immediately provide people with the right medication using a simple blood test.'

Participating in OmiCrohn

You can participate in the study if you have been treated with a maximum of one biological medication (adalimumab, infliximab) or a JAK inhibitor, and it has not worked, or if you have not yet been treated with a biological medication. Your disease must also be active, meaning you are experiencing symptoms.

In the United Kingdom, the following hospitals are participating in OmiCrohn:
- Hampshire Hospitals NHS Foundation Trust
- The Dudley Group NHS Foundation Trust
- Kings College Hospital NHS Foundation Trust
- Luton & Dunstable University Hospital
- Cardiff and Vale University Health Board
- Hull University Teaching Hospital NHS Trust
- Oxford University Hospitals NHS Foundation Trust
- Guy's and St Thomas' NHS Foundation Trust
- Cambridge University Hospitals NHS Foundation Trust
- University Hospital Southampton NHS Foundation Trust
- Northern Care Alliance – Fairfield General Hospital

Do you have Crohn's disease and are you being treated at one of these hospitals? Do you think you meet the criteria to participate? Then ask your treating gastro-enterologist whether you can join the OmiCrohn study.