Excessively rising healthcare costs mean there is a growing need for better and earlier disease diagnosis. Biomarkers, biological indicators of specific diseases, are crucial in achieving this. The Perspectief programme Biomarker Development Center (BDC) aimed to bring biomarkers that have been identified in scientific research projects closer to actual applications.

‘Each year, a myriad of scientific articles is published claiming the discovery of new promising biomarkers for a wide variety of diseases. Too often, after publication, no one ever hears about those discoveries again, let alone that they find their way into the clinic,’ programme leader Rainer Bischoff, Professor of Analytical Biochemistry at the University of Groningen, explains the rationale behind the programme. ‘One reason for this is that it is often hard to acquire funding for the larger, multi-centric cohort studies that are needed to validate biomarkers: in order to prove that the designated protein or peptide is specific for the disease, and that it can be measured sensitively and reliably enough to base clinical decisions on.’

Promising candidates
The Biomarker Development Center began where the original research left off. It took promising biomarker candidates from literature, data mining and participants’ own research and validated them in a standardised manner at different clinical centres. The programme was organised in six projects. Three of them aimed at developing new bioanalytical technologies. The other three projects focused on applications in three major disease areas: Alzheimer’s Disease (AD), Chronic Obstructive Pulmonary Disease (COPD) and Type II Diabetes (T2DM).
Aim
The Biomarker Development Centre aimed at bridging the gaps from discovery to validation, and from validation to application, of promising biomarkers for three major disease areas. The aim was to deliver a number of validated biomarkers that are ready to be turned into diagnostic tools for these diseases.

What was investigated?
‘We worked on several challenges,’ Bischoff explains. ‘We started with the pre-analytical phase. How have the samples containing the biomarker been treated and stored? Sometimes the storage conditions change the properties of a biomarker, decreasing its reliability. A second challenge was to enrich the biomarker in such a way that it can be analysed reproducibly. Biomarkers are extracted from bodily fluids like plasma, serum or urine. These contain many different proteins, often in higher concentrations than the specific protein or peptide that is the disease indicator you are looking for.’ The researchers therefore investigated more sensitive methods to detect small quantities of molecules and the first validation steps were taken for a number of biomarkers.

What has the programme yielded?
‘Multiple new bioanalytical methods have been developed,’ Bischoff says. ‘We now have a high throughput sample preparation method that enables the quantification of a range of proteins in thousands of samples.’ Progress has also been made in the disease-specific projects, he continues. ‘We have been able to link the risk of developing Alzheimer’s disease to changes in certain plasma proteins. For COPD, we collaborated with a US-based consortium to perform a biomarker test under evaluation in the US to support drug development that will slow down lung function decline due to emphysema. For this specific biomarker, called sRAGE, we also proved that controlling the pre-analytical conditions is of vital importance for the interpretation of the results.’

Overall, Bischoff is especially proud of the strong cooperation that was established between the technical researchers and the clinicians involved. ‘When you are working on innovations for the health sector, it is vital to have a clear understanding of the clinical need, and not only of what is technically feasible. The BDC has taken the first step in bridging the gap between lab and clinic. We are now trying to go even further within a newly created network (Xomics) to bring more biomarkers to the clinic and to the benefit of patients.’

**Facts & figures**

- **Research institutions & universities**
  - University of Groningen

- **University medical centres**
  - Erasmus MC
  - Radboudumc
  - UMCG

- **Knowledge institutions**

- **Companies**

- **Top Sector**
  - Life Sciences & Health

- **Total budget**
  - 4.1 million euro

- **Co-funding**
  - 1.8 million euro

- **Highlights**
  - Dutch national Xomics platform, which combines proteomics, genomics and metabolomics ([x-omics.nl](http://x-omics.nl))
  - Validated methods to analyse a number of biomarkers, including sRAGE, a marker for COPD

Perspectief focuses on creating strong collaborations between researchers, companies and societal organisations, leading to technological innovations with potential economical and societal impact. Visit [nwo.nl/perspectief-en](http://nwo.nl/perspectief-en)