botenstoff

SPECIAL

Biomarkers – Measuring What Matters

From molecules to medicine: Styria's cutting-edge biomarker research enables earlier diagnosis, better therapies, and personalized health care.

human. technology. styria.

acib

Biomarkers – Keys to Understanding Health and Quality

Biomarkers are measurable indicators of biological processes, conditions, or diseases. They can be molecules such as DNA, RNA, proteins, or metabolites that provide insights into what is happening in a living system at a given moment. From a biotechnological perspective, biomarkers open the door to earlier and more precise diagnostic, improved monitoring of treatments, and new tools to assess the safety and quality of products. Their applications range from medicine to food technology and industrial biotechnology, where rapid, reliable, and minimally invasive detection methods are increasingly in demand.

In recent years, the importance of biomarkers has grown enormously. Advances in molecular biology, sequencing technologies, and bioinformatics have made it possible to detect even the smallest changes in biological systems with unprecedented sensitivity. This not only transforms the way we diagnose and treat diseases, but also enables us to control and optimize industrial processes in real time. Biomarkers thus serve as molecular "fingerprints" that help researchers, clinicians, and industry partners to make informed decisions faster and with higher accuracy.

Whether it is the early recognition of life-threatening conditions, the monitoring of metabolic disorders during pregnancy, or the assurance of quality in beverages and other consumables, the versatility of biomarkers illustrates their far-reaching potential.

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acib's Contributions to Biomarker Research

At the Austrian Centre of Industrial Biotechnology (acib), research on biomarkers spans both human health and industrial applications.

Early detection of sepsis
past project:

Traditional diagnostic tests rely on detecting pathogens or visible symptoms, but these often appear only after the disease has progressed. acib researchers around project leader Petra Heidinger explored an alternative approach based on the host's response, analyzing cell-free DNA in the blood of affected patients. The aim was to identify DNA based markers that reveal the onset of sepsis before clinical symptoms become evident, paving the way for faster and potentially life-saving interventions.

Gestational diabetes mellitus
ongoing project:

Gestational diabetes mellitus (GDM) is an increasing health concern, affecting up to 10% of pregnancies, with prevalence rising due to factors such as higher maternal age, obesity, and lifestyle changes. GDM carries serious short- and long-term risks for both mother and child, from severe pregnancy and birth complications to metabolic disorders later in life. Diagnosis usually occurs relatively late in pregnancy (weeks 24–28), leaving limited time for effective preventive interventions. Together with a team at the Medical University of Graz (Herbert Fluhr, Amin El-Heliebi) and QIAGEN (a global leader in Sample to Insight solutions, helping customers transform biological samples into molecular insights), acib is developing a liquid-biopsy method that analyzes circulating cell-free DNA and RNA in maternal blood. Building on technologies originally developed in past sepsis projects and cancer research, the team around Petra Heidinger aims to "identify molecular signatures that distinguish gestational diabetes cases from healthy pregnancies. The goal is to develop a minimally invasive, highly sensitive blood test that enables much earlier detection compared to conventional glucose tolerance test, thereby improving prenatal care through timely interventions that protect both, mother and child."

Biomarker sensing in beverages
ongoing project:

Beyond medicine, biomarkers can also serve as indicators of product quality and safety. Common biomarkers are phenolic compounds, sugars and sweeteners, alcohols and metabolites, biogenic amines, microbial markers and mycotoxins. Together with Infineon Technologies Austria AG, Development Center Graz, Christiane Luley (acib) is working on biosensor technologies to detect relevant compounds in fermented beverages. By developing enzyme-based sensors that are operated by a dedicated highly-integrated microchip on a Point-of-Need test platform, researchers are designing tools that ensure high accuracy but at the same time user-friendly application. Enzyme immobilization strategies are a key focus to guarantee stability and selectivity in these systems.

Biomarkers are revolutionizing the way we detect diseases and evaluate product quality. By advancing diagnostic tools from hospitals to food processing plants, acib's work demonstrates the broad potential of biotechnology in everyday life – and signals a future where faster, safer, and more precise decisions can be made thanks to the power of molecular signatures.

Dr. Petra Heidinger
Area manager „Disruptive Bioeconomy"

Dr. Christiane Luley
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CBmed

Biomarker Research for Cancer Cell Survival Based on Immune Cell Lipid–Tumor Interactions

CBmed is a leading research center dedicated to advancing translational biomedical research. By integrating world-class research infrastructure, scientific expertise, medical knowledge, and national as well as international industry partnerships, CBmed is driving innovation at the interface between discovery and clinical application.

Our biomarker research in oncology focuses primarily on solid tumors, with a particular emphasis on identifying and validating biomarkers for cancer cell survival. One of our latest projects investigates the role of immune cells in lipid-tumor interactions that contribute to tumor persistence. Emerging evidence shows that lipid-loaded immune cells play a critical role in tumorigenesis by supporting and prolonging tumor cell survival. CBmed is particularly focused on these mechanisms in glioma, one of the most challenging brain cancers.

To advance this work, CBmed leverages its close collaboration with Austrian clinical centers for neurology and leading biobanks, including Europe's largest, Biobank Graz, and the European Biobank Network BBMRI-ERIC. These partnerships provide unparalleled access to high-quality patient samples, enabling the discovery and validation of clinically relevant biomarkers.

One pillar of CBmed research is the ex-vivo compound screening platform, a groundbreaking technology that allows us to assess therapeutic agents directly on patient-derived tumor material. This enables deeper insights into cancer cell survival mechanisms and facilitates the identification of biomarkers that can guide personalized therapy strategies.
As a direct outcome of our biomarker research, CBmed is an active partner in the ATTRACT project ("Personalized Targeted Glioblastoma Therapies by Ex Vivo Drug Screening: Advanced Brain Tumor Therapy Clinical Trial"). Funded through the Ludwig Boltzmann Society, this initiative demonstrates our strong commitment to improving glioblastoma treatment by providing patients nationwide with access to innovative, biomarker-driven therapeutic options through a network of all neurological clinical sites across Austria.

Austria's role in biomedical innovation is further strengthened by the integration of the CBmed screening platform into EU-OPENSCREEN, Europe's leading research infrastructure for chemical biology and early drug discovery. This milestone enhances Austria's position as a central hub for biomarker research and fosters progress in precision oncology across Europe.

About CBmed

CBmed is a leading research center at the forefront of precision medicine, uniquely positioned at the interface of clinical and biomedical research. With a commitment to advancing translational research, CBmed integrates world-class infrastructure and global collaborations to pioneer individualized solutions, reshaping therapeutic approaches beyond traditional one-size-fits-all models. For more information about CBmed, please visit www.cbmed.at.

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Find out more about the ATTRACT Project:
https://innere-med-1.meduniwien.ac.at/unsere-klinischen-abteilungen/onkologie/forschungsschwerpunkte/attract-advanced-brain-tumor-therapy-clinical-trial/

Learn more about EU-OPENSCREEN:
https://www.eu-openscreen.eu/

AIT

Electrochemical quantification of rapid lateral flow tests

Lateral flow immunoassay (LFIA) are rapid, single-step diagnostic tests that use capillary force to move a liquid sample across a strip with immobilized antibodies, enabling the detection of specific target analytes and providing results within minutes. LFIA first entered the market in 1988 as home pregnancy test, demonstrating the potential for rapid, reliable diagnostic testing outside clinical laboratories.

The technology gained renewed global prominence during the COVID-19 pandemic, when lateral flow antigen tests were rapidly developed, mass-produced, and distributed as an essential tool for large-scale screening, allowing individuals to test themselves at home.

Today, lateral flow tests continue to evolve, with ongoing research focusing on digital readers, multiplexed assays, and integration into smartphone-based diagnostics. These innovations aim to improve sensitivity, enable quantitative analysis, and expand applications across healthcare and beyond.

Quantitative reading of rapid tests is highly preferable to visual interpretation with the naked eye because it reduces subjectivity and increases accuracy. Human evaluation can be influenced by factors such as lighting conditions, individual eyesight, fatigue, or faint test lines that are difficult to detect consistently.

Research teams from the Competence Unit Molecular Diagnostics at the AIT Austrian Institute of Technology in Vienna and Infineon Technologies Austria AG, Development Center Graz, have developed a prototype of a modified LFIA which allows the electrochemical quantification of the test results within 15 to 20 minutes, and the display of the result on a smartphone.

The four components of the prototype are i) a lateral flow test strip manufactured with standard methods also used in LFIA industry, ii) a low-cost printed electrochemical sensor, iii) a customized cassette that allows the simple assembly of the components and reliable test results, and iv) a highly integrated microchip driving the sensors and enabling wireless communication with the smartphone.

As a showcase, LFIAs were developed to detect C-reactive protein (CRP), which is a well-established inflammation marker in blood. The quantification of CRP in the clinically relevant concentration range was demonstrated using blood serum samples,

Given the well-known flexibility of LFIAs to be adapted for different biomarkers, this technology has the potential to form the basis for a variety of quantitative and rapid diagnostic tests. The test readout can be adapted to suit the specific application, ranging from stationary devices (e.g. for use in laboratories or doctor's practices) to fully integrated mobile testing devices (e.g. for home use).

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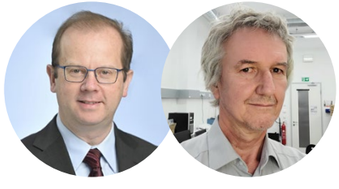
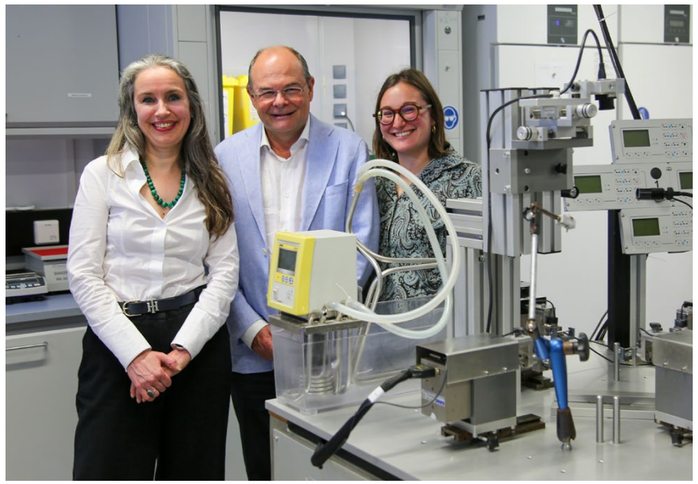


TU Graz

Graz Researchers Discover What Stiffens the Aorta



Oksana Tehlivets, Gerhard A. Holzapfel and Francesca Bogoni (from left), together with partners from the Medical University of Graz, have discovered that high levels of the amino acid homocysteine in the blood make the aorta stiffer and less elastic.

In addition to cholesterol, the amino acid homocysteine also plays a role in aortic stiffening. Researchers from Graz University of Technology, the University of Graz and the Medical University of Graz were able to prove this in a new study.

Cardiovascular diseases remain the most common cause of death worldwide. In Europe, they account for over 40 percent of all deaths. However, known risk factors such as high cholesterol levels or high blood pressure cannot fully explain the high mortality rate or the number of cardiovascular diseases. Scientists in Graz have now investigated a new factor that is closely linked to cardiovascular mortality. Elevated levels of the amino acid homocysteine in the blood led to a stiffer and less elastic aorta in an animal model. These findings contribute to the current understanding of the development of cardiovascular diseases such as atherosclerosis, in which the role of cholesterol has previously been more in focus.

Focus on the aorta

The aorta is the largest blood vessel in the human body. With each heartbeat, it must contract and expand to transport oxygen-rich blood from the heart to the organs. “Many cardiovascular diseases have their origin in aortic dysfunction,” explains Gerhard A. Holzapfel from the Institute of Biomechanics at Graz University of Technology (TU Graz). Together with Francesca Bogoni (TU Graz) and Oksana Tehlivets from the Institute of Molecular Biosciences (University of Graz), he is conducting research on the mechanical properties of the aorta.

In a recent publication, the scientists, together with partners from the Medical University of Graz, investigated the effects of homocysteine on the aorta. This “cell poison” is produced as an intermediate product during the metabolism of another amino acid, methionine. “If it is not broken down quickly, homocysteine accumulates. This is often observed in older people. A high-fat diet and lack of exercise may also contribute to an increase in homocysteine levels in the blood,” explains Oksana Tehlivets.

Too much homocysteine makes the aorta stiff

The researchers focused their studies on the role of this amino acid. “We deliberately left out the influence of cholesterol, as we already know that too much of it thickens the blood vessels. However, the fact that elevated homocysteine levels make blood vessels stiffer and less elastic was previously less recognized as a risk factor,” explains Francesca Bogoni.

The research findings lay the foundation for a better understanding of the mechanisms that cause atherosclerosis and cardiovascular disease in general. The research was funded by the Austrian Science Fund (FWF) and BioTechMed-Graz, the joint health research network of the University of Graz, the Medical University of Graz and the Graz University of Technology.

Publications:
Bogoni et al. Homocysteine leads to aortic stiffening in a rabbit model of atherosclerosis. Acta Biomaterialia, 2025. DOI: 10.1016/j.actbio.2025.06.003

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JOANNEUM RESEARCH

From Signals to Solutions: Biomarkers in Wound Care

Why do some wounds heal fast, while others stubbornly refuse to close? This question still challenges doctors, researchers, and patients. Wound healing is not simple – it is a very complex process. Many factors such as immune cells, growth factors, metabolites, and microRNAs have to work together in the right order and at the right time. Normally, inflammation clears the damage, new tissue forms, and the skin can close again. But if this balance is disturbed, wounds can stop healing. Then they may stay open for weeks or even months, cause pain, risk infections, and put a heavy burden on patients and the healthcare system.

This is where biomarkers can help. Biomarkers are measurable signals from the body – molecules, metabolites, or even digital signs such as wound surface temperature. They give us insight into what is really happening inside a wound. They can act like fingerprints of healing: they tell us if inflammation is under control, if new tissue is forming, or if a wound is stuck in a non-healing state. For doctors, such information could make a big difference. Instead of only looking at the wound from outside, biomarkers can show how well a therapy is working, help detect problems earlier, or guide the choice of treatment.

In our research, we look for new ways to find and study these signals. One tool we use is open flow microperfusion (OFM). This technique allows us to “listen” to the chemical communication happening in wounds in real time. With this method, we saw that healing and non-healing wounds show very different metabolic patterns. These changes give us important information about the needs of the wound in different healing stages. In the future, such knowledge could help doctors select the best therapy for each patient – a step towards truly personalized wound care. Biomarkers are also important in other wound types. In burn injuries, for example, time is critical. Our studies on microRNAs showed that they can give early signals about how severe an injury will become. This is valuable because doctors often cannot see the full damage immediately. With such biomarkers, treatment decisions could be made faster and with more confidence.

The vision is clear: if we manage to decode the language of biomarkers, we can predict how a wound will develop, follow its progress more precisely, and adjust therapy to the individual patient. For people with chronic or severe wounds, this could mean faster healing, fewer complications, and a better quality of life. For healthcare systems, it could also save resources and improve outcomes. Biomarkers are not only interesting for science – they are keys that may open a new era in wound care.

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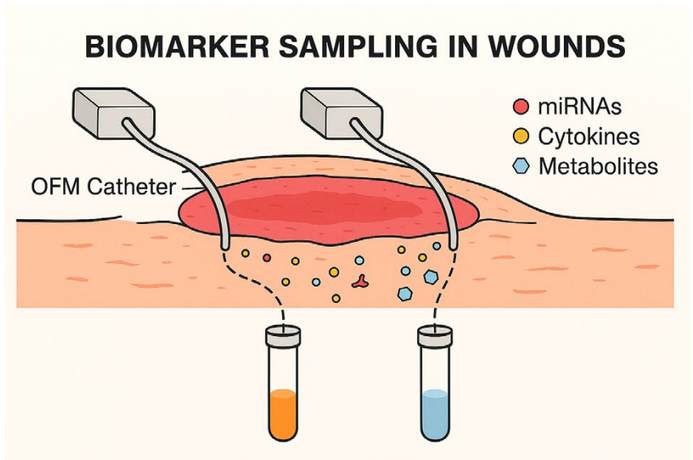

Researchers from left to right: Sarah Sedik, Martin Hönigl and Stella Wolfgruber

Medical University of Graz

Project “GALActIC” starts:
How to prevent fungal infections with biomarkers

How can critically ill patients be protected from other diseases? This is the question addressed by the GALActIC study team, which includes researchers from Medical University of Graz. The project focuses specifically on the treatment of high-risk patients with influenza-associated pulmonary aspergillosis (IAPA). Funded by the European Partnership for Personalised Medicine, the study aims to validate genetic biomarkers as risk factors for this disease and thus enable personalized care. In this way, patients at high risk of contracting IAPA can be identified more quickly and better protected from infection. Martin Hoenigl from the Division of Infectious Diseases at Med Uni Graz talks about the project.

A fungus in the lungs

Aspergillosis is an infectious disease caused by the Aspergillus fungus, which is able to take root in the lungs. Patients typically experience coughing (sometimes with bloody sputum), chest pain, and difficulty breathing. Over time, the fungus can spread to other organs such as the liver or kidneys, potentially causing organ failure.

“Aspergillosis (IAPA) is a frequent complication, especially among patients requiring intensive care due to influenza. It occurs in about 20% of these patients,” emphasizes Martin Hoenigl, who leads the study team in Austria.

High mortality due to late diagnosis

IAPA occurs particularly in critically ill influenza patients and has a high fatality rate of up to 50%. Delayed diagnosis and insufficient antifungal treatment contribute significantly to this poor prognosis. Early identification of high-risk patients is therefore essential so that targeted measures—especially antifungal prophylaxis—can be initiated in time.

Study goal: validating new biomarkers

The GALActIC study examines genetic variants in the LGALS3 gene that may serve as predictive biomarkers for IAPA. This research aims to facilitate personalized antifungal prophylaxis—targeting those patients who would benefit most from early treatment. The molecular mechanisms through which LGALS3 influences immune response will also be investigated.

International cooperation and innovative methods

Universities and hospitals from Austria, Belgium, the Netherlands, Portugal, and France are participating in this multicenter study. It will run for three years and include both prospective and retrospective patient data.

Blood, serum, and bronchoalveolar lavage (BAL) samples are collected for analysis. The main laboratory in Braga (Portugal) performs genetic analyses using targeted exome sequencing. The Medical University of Graz and other participating universities are conducting other comprehensive multi-omics analysis, including transcriptomics, proteomics and metabolomics, to explore the underlying biological mechanisms of the disease.

Personalized medicine to reduce mortality and costs

The findings of the GALActIC study could represent an important step toward personalized medicine. Identifying high-risk patients more precisely should reduce the high fatality rate of IAPA and allow for more efficient use of healthcare resources.

“We are very happy and grateful that so many institutions in Styria and across Austria have agreed to participate in this study to improve outcomes for patients with severe influenza in the long term,” explains Martin Hoenigl.

Under the direction of the Medical University of Graz team, four medical universities and intensive care units throughout Austria are participating in the GALActIC project. The core team in Graz—comprising Martin Hoenigl, Sarah Sedik, and Stella Wolfgruber—coordinates collaboration with participating medical institutions.

Participating alongside the Medical University of Graz are the Medical University of Vienna, Johannes Kepler University Linz, and the Medical University of Innsbruck. In Styria, LKH-Graz II West and LKH East Styria (at its Fürstenfeld, Feldbach, and Hartberg sites) are also involved.

Project data:
Name: GALActIC
Project start: 1 April 2025
Duration: 3 years
Funding: EUR 1,745,674 for the overall project (EP PerMed) and EUR 449,752 (FWF) for Med Uni Graz
Funding authorities: European Partnership for Personalised Medicine (EP PerMed) and Austrian Science Fund (FWF)

Cooperation partners:
- Laboratory for Clinical Infectious and Inflammatory Disorders, KU Leuven
- Intensive Care Medicine, UZ Leuven
- Translational Mycology Unit, Division of Infectious Diseases, Med Uni Graz
- Department/Division of Internal Medicine, Radboudumc Community for Infectious Diseases
- Life and Health Sciences Research Institute (ICVS), Medical Faculty, University of Minho
- Centre for Biomedical and Healthcare Engineering, École Nationale Supérieure des Mines de Saint-Étienne

Website:
www.galactic-project.eu/about-the-project/

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Following his habilitation on systemic fungal infections in 2012, Martin Hoenigl spent several years at the Division of Infectious Diseases at the University of California, San Diego. Since 2021, he has been an Associate Professor of Translational Mycology at the Medical University of Graz. Professor Hoenigl is the author of more than 300 scientific publications.

SPECIAL

MIH

The Microfluidics Innovation Hub: A European Success Story in Biomarker-Based Diagnostics

Biomarkers are at the heart of modern diagnostics, guiding decisions from routine health checks to critical care. Detecting them rapidly and accurately requires technologies that can handle small sample volumes, integrate multiple analytical steps, and deliver results at the point of care. This is where microfluidics comes in. By enabling true "lab-on-a-chip" systems, microfluidics has the potential to address key global health challenges such as pandemic preparedness and ageing populations, which demand decentralised, rapid testing to keep hospitals unburdened.

Despite this promise, turning microfluidic concepts into market-ready products is far from simple as companies often face hurdles in integrating disparate manufacture technologies and scaling-up. To address these barriers, the Microfluidics Innovation Hub (MIH) was established under the EU Horizon OITB initiative as a single-entry point for companies to access advanced technologies, expertise, and funding. Through its Open Call, MIH attracted over 50 enterprises across Europe—ranging from start-ups to large players—of which 17 were awarded funded projects.

A standout case involves Genspeed Biotech GmbH, a key Austrian MIH partner. Genspeed has commercialised a microfluidic point-of-care platform for diagnostics including COVID-19 antibody detection, Vitamin D testing, and tick-borne encephalitis, now available in pharmacies across Austria. The flexibility of the Genspeed R2® system allows adaptation to virtually any protein or nucleic acid biomarker and is offered as an OEM solution for assay transfer to the point of care.

Three Open Call projects focused on assay transfer to the Genspeed system, supported by MIH partners such as Joanneum Research (Austria), Inmold (Denmark), and Microresist Technology (Germany) who advanced roll-to-roll manufacturing of disposable chips, and Scienion (Germany), who provided critical expertise in biomolecule piezoelectric deposition and immobilisation. The outcomes were novel diagnostic assays addressing urgent medical needs:

- Chronic kidney disease monitoring – a diagnostic tool able to quantify immune complement fragments as indicators of inflammation and disease severity (Hycult Biotech, Netherlands).
- COVID-19 severity assessment – a critical care device using a biomarker panel, including CRP and suPAR, to improve triaging in acute care (Virogates, Denmark).
- Von Willebrand disease diagnosis and monitoring – a tool quantifying von Willebrand factor and assessing its function via binding assays, critical to diagnosing and monitoring the disease (Technoclone, Austria).

Here, MIH's value was clear: it identified the path of least resistance from concept to market by leveraging existing platforms and assembling the right partners, sparing costly and lengthy development cycles. Within a year, these companies moved from benchtop assays to rapid point-of-care solutions, now entering clinical testing.

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elyte diagnostics

The Critical Role of Potassium and the Need for Better Monitoring

Potassium (K^+) is a vital electrolyte essential for bodily functions like nerve signalling and muscle contractions, particularly cardiac function. Fluctuations in serum potassium concentrations can lead to life-threatening cardiac arrhythmias. For high-risk populations such as patients with chronic kidney disease (CKD) or chronic heart failure (CHF) and combinations, routine monitoring is crucial. The current standard of care, which relies on centralized laboratory testing, is often slow and creates significant barriers. elyte diagnostics is introducing a disruptive technology to solve these problems by providing a rapid, precise, and convenient in vitro homecare diagnostic system.

Traditional potassium testing, from sample collection to result delivery, can take a day or more, delaying crucial treatment decisions for patients who require frequent monitoring.

A common and serious issue with traditional blood draws is haemolysis, the rupture of red blood cells. Since potassium is highly concentrated inside these cells, their breakdown releases potassium into the plasma, leading to a false high reading. This can cause unnecessary alarm and result in a second blood test, further delaying diagnosis and treatment. In fact, a significant percentage of blood samples are haemolyzed, making this a frequent source of error.

The Breakthrough with elyte diagnostics

The technology developed by elyte diagnostics provides a revolutionary solution to these challenges. Our portable, microfluidic system analyses a finger-prick blood sample in under 60 seconds within the home environment.

Simple Sample, accurate results:

By analysing whole blood samples directly on a microfluidic strip, the elyte system overcomes any sample manipulation and centrifugation, which are common causes of haemolysis.

Enabling Medication Titration:

This technology allows for the routine titration of medications influencing potassium homeostasis. In conditions such as heart failure or chronic kidney disease, clinicians can now confidently adjust a patient's medication dose, as potassium concentrations can be assessed instantaneously. This immediate feedback optimizes therapeutic outcomes while reducing the risk of adverse effects.

By overcoming the limitations of traditional testing, elyte diagnostics is fundamentally revolutionising chronic disease management, facilitating a paradigm shift from reactive care to proactive, patient-centred treatment.

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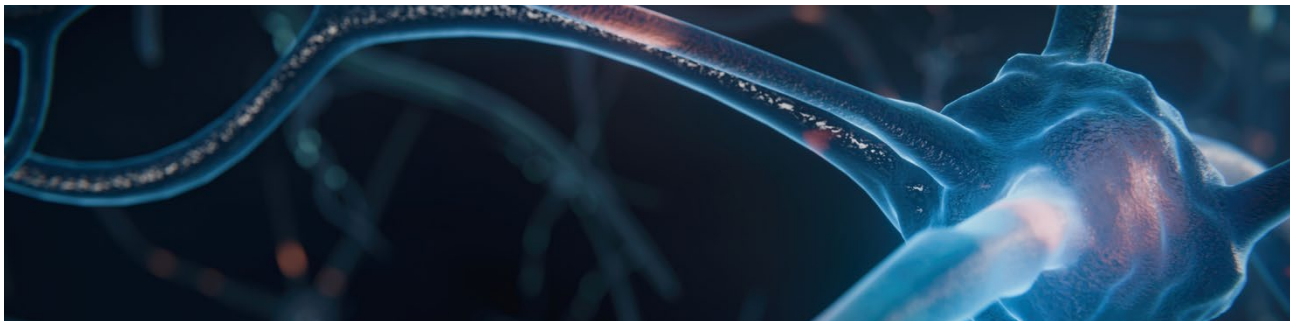

Roche Diagnostics

Hitting a nerve: Enrolling biomarkers for neurodiagnostics

Current challenges...

The neurology field has been rapidly evolving in the recent decade, drastically improving patient outcomes. Nonetheless, the scarcity of easily-accessible, scalable, and cost-efficient biomarker assays for diagnosis or disease monitoring are a major bottleneck in the current patient journey. Roche is committed to address these patient needs by providing best-in-class therapeutics, novel agents, and expanding the diagnostic tool kit for neurologists.

Alzheimer's disease (AD) is the most common cause of dementia and not only affects countless patients and families but will also be a major stressor for the Austrian health system. While novel therapies bear the potential to delay cognitive decline by about 30% [1,2], early detection for example by blood-based biomarkers (BBBMs) is of utmost importance to gain the maximum clinical benefit [3]. Frequently discussed BBBMs for AD are the disease-causing amyloid beta 42 but also more robust and more feasible biomarkers such as pTau181 or pTau217 [4]. Another option are non-pharmaceutical therapies such as cognitive training which also require disease recognition by the patient and its social surroundings. Thus, democratizing availability of assays for AD holds a huge potential to broaden access to these pharmaceutical and non-pharmaceutical therapies and are the first step in assuring optimal support for people with AD-related cognitive symptoms.

Similar therapeutic advances have been achieved for Multiple Sclerosis (MS) patients. New therapies such as B-cell-depleting antibodies have tremendously improved the clinical outcomes of MS patients [5, 6]. Yet, a timely and accurate detection of therapy response and disease relapse is essential to personalize therapies and foster optimal decision making [7-9]. Hence, monitoring easily accessible biomarkers for disease worsening in blood can pave the way towards optimized treatment concepts for MS patients. In this respect numerous international but also Styria-based research studies are ongoing.

... and the future perspective

Roche is committed to developing and improving therapeutic as well as diagnostic innovations to optimize the well-being and outcome of people with neurologic conditions and accelerate clinical decision making. These improvements will hopefully also shift the way we as a society are perceiving, thinking, and talking about often ignored neurological diseases to generate awareness, broaden access, and support those affected.

Author:
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