

HEALTHY LONGEVITY GLOBAL COMPETITION

2023 Catalyst Awardees

Sponsor: EIT Health of the European Union

A smart biosensor for prostate cancer screening

Principal Investigator	Sergio Occhipinti, PhD
PI Primary Affiliation	NIB biotec
Co-Investigator(s)	Fabio Di Nardo, PhD; Mirella Giovarelli, PhD.

PROJECT DESCRIPTION

To date, the diagnosis of prostate cancer is posed following a biopsy examination indicated in men with suspected results in a preliminary blood exam.

However, the poor specificity of the current test has led to an excess of unnecessary procedures with related side effects and to the lengthening of the diagnostic path with an enormous impact on the economic level and on the quality of life of citizens, indicating the absolute need for a more efficient screening test.

Furthermore, social determinants can influence the possibility of accessing diagnostic pathway. For example non-urban areas and low-income countries residences may negatively impact prostate cancer outcomes due to limited access to healthcare services.

The ideal mass screening strategy should be low-cost, but even efficient, minimal labour-intensive and non-invasive.

NIB biotec own a patent that claims the use of urinary molecules as biomarkers for prostate cancer, with better diagnostic performance compared to the current standard of care. We have developed ScreeNIB, a smart biosensor that can rapidly provide information about the presence of prostate cancer by an urologist at a patient site in order to improve the diagnostic path and decentralize first-line exams outside the hospitals and towards local areas.

Our ScreeNIB test combines appropriate disease biomarkers to a smart point-of-care technology that could help to reduce health and social costs of the prostate cancer diagnostic pathway and to achieve equity by mitigating disparity in accessing health care.

A-View method: the life saving balloon

Principal Investigator	Arno Nierich, M.D., PhD.- Cardiac Anesthesiologist & Intensivist
PI Primary Affiliation	Stroke2Prevent B.V.
Co-Investigator(s)	George J. Brandon Bravo Bruinsma, M.D., PhD; Hein Kemperman, CPA; Pauline Nierich, QMR; Colin Rutgers, BSc; Nicolas Harpe, Account manager A-View DeRoyal Industries

PROJECT DESCRIPTION

Symptomatic stroke occurs in up to 6% of patients after cardiac surgery and is higher in elderly patients. Memory disorders may even occur in more than 60%. This is caused mainly by particles of atherosclerosis that end up in the brain during cardiovascular procedures creating small or large brain infarctions. The use of Trans

Esophageal Echocardiography (TEE) in screening patients for the presence of atherosclerosis who are undergoing Cardiac Surgery does not allow for a full visualization of the distal ascending aorta (DAA), the so-called 'Blind Spot' of TEE. For the first time, this area can be fully visualized real-time by TEE with the use of a fluid-filled catheter called A-View® placed into the patient's trachea.

The A-View® innovation is centred around peri-operative imaging and it resolves the blind spot during ultrasound imaging of the main blood vessel coming from the heart, the Ascending Aorta and Aortic Arch. A-View® is the device that enables clinicians to have real-time information enabling them to tailor the surgical strategy to the best benefit of the patient. The use of A-View® in a large observational study has demonstrated a > 30% mortality reduction in patients in which A-View® was used.

34% of the global healthcare expenditure is spent on treating stroke patients. The routine use of A-View® prevents one in every 47 patients from developing a stroke, producing a saving of 3300\$ per patient. In summary: By saving the heart, you might lose your brain. Our mission is to prevent this disaster.

Accelerate patient recovery by providing a portable and effective healing environment

Principal Investigator	Eef Lamers, Msc
PI Primary Affiliation	Micro-Cosmos B.V.
Co-Investigator(s)	Skip van de Kandelaar; Mart Bekkers

PROJECT DESCRIPTION

More than half of inpatients experience poor sleep, sleeping on average 93 minutes less than they do at home, despite the critical role sleep plays in the recovery process. Common disruptions such as noise and light from medical devices, other patients, or nurses can significantly impact their rest. At Micro-Cosmos, we address these challenges by offering a solution that provides patients with a private and secure environment, enabling them to sleep better and facilitating a faster recovery.

Our dome's benefits extend beyond general inpatient care; it also offers a significant improvement in day/night rhythm for individuals with dementia. By reducing stimuli and creating a secure environment, our dome helps dementia clients experience fewer nighttime awakenings, leading to decreased instances of getting out of bed. This not only enhances their overall well-being but also lessens the workload for night shifts in nursing homes.

By focusing on improving sleep and providing a comforting environment, we aim to make a positive impact on patients' lives, promoting faster healing and better outcomes across various healthcare settings.

eBreathie Smart-Inhaler

Principal Investigator	Ana Rita Constante, MD
PI Primary Affiliation	Breathing Solutions, Lda
Co-Investigator(s)	Ana Filipa Rebelo, MSc; Ana Rita Rebelo, MSc; Alexandre Costa, MSc

PROJECT DESCRIPTION

eBreathie stands as a pivotal innovation in respiratory health, offering a transformative approach to asthma management. Central to eBreathie is its smart-inhaler device, which reimagines the traditional inhaler as a technologically advanced, digitally connected tool. Through sophisticated sensors, the device not only records when medication is administered but, crucially, measures the inhalatory profile of each user. This objective measurement holds the promise of ensuring that medication reaches the lung effectively, addressing a longstanding challenge in asthma care.

The comprehensive mobile application accompanying eBreathie's smart inhaler acts as a real-time interface for patients. It provides access to their individual inhalation profiles, allowing them to track medication efficacy and adherence. Additionally, patients can log symptoms, access information about air quality and allergens, and receive prompt reminders for pending medication doses.

Augmenting the system's capabilities is the "Asthma Preview" AI algorithm. By processing patient-specific data, this feature can predict potential asthma triggers and provide early alerts for deteriorating conditions, enabling preemptive interventions even before symptoms manifest.

The project also introduces a dedicated patient management platform tailored for healthcare providers. Here, professionals can gain a clinical overview of patient data, including therapeutic adherence metrics and insights into disease progression. A seamlessly integrated communication channel further facilitates telemedicine consultations, bridging distances in care provision.

In sum, eBreathie's initiative melds the precision of technology with the nuances of patient-centered care. By ensuring medication efficacy through objective measurements and leveraging predictive algorithms, it ushers in a new paradigm in asthma management.

Innovative clinical grade level genetic tests for cancer precision prevention

Principal Investigator	Peeter Padrik, MD, PhD
PI Primary Affiliation	Antegenes
Co-Investigator(s)	None

PROJECT DESCRIPTION

Antegenes is an Estonian health technology company developing and implementing genetic tests for clinical use based on polygenic risk score technology. These tests effectively identify individual genetic risk components for breast, prostate, colorectal cancers, and skin melanoma and include clinical recommendations for personalised cancer prevention. As CE-marked in vitro medical devices, the tests comply with EU regulatory standards. Based on the tests and integrated services, we enable the implementation of accurate, personalized cancer screening programs. Our comprehensive approach has the potential to contribute to a 30-40% reduction in mortality rates for these prevalent diseases, transforming the landscape of cancer prevention and care.

IPLEXMED-Resp - Point-of-care and at-home digital device for non-invasive diagnosis of clinical and resistant respiratory infections

Principal Investigator	Bruno Almeida, PhD, CEO
PI Primary Affiliation	IPLEXMED
Co-Investigator(s)	Neide Vieira, PhD; Joana Guerreiro, PhD; Jérôme Borne, PhD,

PROJECT DESCRIPTION

The increasing prevalence of Chronic Respiratory Diseases (CRDs) in recent decades has altered morbidity and mortality trends, making them the third leading cause of death worldwide. CRD patients, numbering 1 billion worldwide, are highly prone to respiratory infections, which are often resistant to antimicrobials, contributing to irreversible lung damage and premature death. Currently, there is a lack of easy-to-operate, fast, and accurate first-line molecular diagnostic tools for these infections and their antimicrobial resistance (AMR) profile. These tools are greatly needed at the point-of-care (POC) and for at-home monitoring. As a result, patients are often treated with broad-spectrum drugs, and therapy is adjusted 2-7 days later, upon the availability of microbiology/molecular analysis, when required. IPLEXMED's breakthrough solution enables fast and reliable detection of multiple infectious agents and their drug resistance profiles at the point-of-care and at home,

empowering personalized treatment and real-time disease monitoring. This can prevent or reduce morbidity and mortality in CRD patients and save healthcare providers costs by avoiding unnecessary hospitalizations and antibiotic prescriptions. Our product will contribute to decreasing the 112 million disability-adjusted life years (DALYs) caused by CRDs. Furthermore, considering that aging is a risk factor for the development of chronic respiratory diseases and that this risk is being exacerbated by the trend toward an aging world population, our solution can promote healthier aging and improve disease management for the elderly.

OaCP: Rapid and Precise Innovative Diagnostics.

Principal Investigator	Enrico Di Oto, BS, MD, PhD
PI Primary Affiliation	OACP IE LTD
Co-Investigator(s)	Simone Di Giacomo, PhD; Andrea Faviere, EMBA; Feliziano Ballardori.

PROJECT DESCRIPTION

OACP is a life-saving force, accelerating essential DNA tests for cancer and infections, enhancing speed and accessibility. As a pioneering biotech startup, OACP is revolutionizing cancer diagnosis through its medically-approved technology. With an initial market opportunity of USD2B, the company has achieved a significant global footprint across 17 countries, boasting esteemed partnerships with industry giants like Roche. Under the leadership of a team with a collective experience of over a century, OACP presents an alluring investment prospect within the thriving biotech domain. Supporting OACP translates to advancing the well-being of cancer patients while reaping the rewards of an innovative startup.

In the realm of genetic testing for cancer and infectious disease diagnosis, precision and time are paramount. OaCP is at the forefront of transformation with its cutting-edge chemical reagents. These reagents optimize DNA reactions in three critical dimensions: enabling DNA double helix denaturation, fostering DNA-biomarker hybridization, and refining the reaction environment. Yet, OaCP's contributions extend further. Its products seamlessly complement commercial biomarkers, slashing testing duration by an impressive 97% and reducing overall expenses by a remarkable 50%. Envision the capability to diagnose life-threatening illnesses within just two hours, defying the conventional span of days or weeks.

OaCP's revolutionary technology, coupled with an extensive product range, empowers laboratories to deliver speedier, more precise diagnoses, all while achieving significant time and cost savings. The benefits radiate throughout, constituting a triumphant outcome for all stakeholders involved.

oBreathe - A dynamic patient-specific implant for chest wall reconstruction

Principal Investigator	Donato Monopoli MSc
PI Primary Affiliation	Osteobionix
Co-Investigator(s)	Belinda Mentado, MSc; Francesco La Palombara, MSc

PROJECT DESCRIPTION

People who need extensive chest wall reconstruction due to tumoral lesions, congenital malformations, severe trauma or post-operative complications are subject to impairment of physiologic breathing, discomfort, pain, deformity and severe risk of infection and re-intervention. oBreathe is an industry-first, patent-protected, clinically validated, patient-specific dynamic chest wall reconstruction implant, developed with Instituto Tecnológico de Canarias, a public research institute in Spain, and skilled thoracic surgeons, which allows for physiologic breathing and restores chest wall shape and function. Successfully implanted in Spain, Italy, Austria, Germany, the Netherlands and the USA, oBreathe has improved the life standards of 80+ patients to date. Case studies have been published on international peer-reviewed scientific journals.

Personalised Medication: Healthy Longevity Thanks to the Power of Omics

Principal Investigator	Herna Muñoz-Galeano Dipl.Ing. Dipl.Inf.
PI Primary Affiliation	HMG Systems Engineering GmbH
Co-Investigator(s)	PGXperts Team

PROJECT DESCRIPTION

Although life expectancy at birth has increased significantly, we will most likely be ill and taking medications for about 20% of our lifetime. Elderly chronically ill patients are typically multimorbid and have a complex diagnosis and medication regimen. Healthcare professionals are challenged to prescribe the right medication in a safe and effective manner, as pharmacology becomes more complex and there is limited time to assess each patient.

The CDSS PGXperts System is a comprehensive decision support system to optimise complex medication scenarios based on demographic and diagnostic data, determination of drug interactions risks and non-predictive genomics data. The interpretation of the individual genetic makeup enables a tailor-made pharmacotherapy with regard to the patient's diagnosis and medication.

With its PGXperts System, HMG has succeeded in significantly reducing the complexity involved in interpreting pharmacogenomics data. The innovative medical software solution enables a joint view of complex data that previously had to be considered completely separately. It enables large volumes of pharmacogenetic data to be processed, interpreted, stored and reported in a simple and highly automated manner and makes the translation of scientific insights in pharmacogenetics into clinical routine a reality.

HMG is a technology scale-up based in Fuerth (Bavaria, Germany). In the implementation of PGXperts, the company excels in complexity management and establishing innovation processes. PGXperts System realises the vision of personalised medication, incorporating 'omics' data in the clinical routine, opening groundbreaking opportunities for patients, physicians, laboratories, hospitals and healthcare providers as well as for the pharmaceutical industry and research centers.

PeryView to prevent people from blindness

Principal Investigator	Hubert Dyba PhD
PI Primary Affiliation	Reon sp. z o.o.
Co-Investigator(s)	Radosław Nagay MSc, Radosław Brzeziński MSc, Grzegorz Zadrożny BSc, Patryk Grygierczyk MA, Daria Wróbel M.P.M.

PROJECT DESCRIPTION

One in 20 people around the world will lose their vision in the next 20 years. Some of the cases (eg. glaucoma, diabetic retinopathy and AMD) could be treated but there are diagnosed too late because prevention is limited. And this is where PeryView comes. It is a user-friendly web saas application that enables visual field testing in the comfort of a patient's own home, including for individuals aged 60+.

Rapid diagnostic tests for precision respiratory medicine

Principal Investigator	Roberto de la Rica, PhD
PI Primary Affiliation	Nanodecal
Co-Investigator(s)	Antonio Clemente, PhD; Steven Russell, BA

PROJECT DESCRIPTION

Nanodecal is developing a rapid diagnostic test for preventing incurable lung infections. The test detects the superbugs responsible for the infection in less than 10 minutes by the bedside. This will help clinicians prescribe the right antibiotic for killing the superbug before the infection becomes permanent. Our unique patented technology allows us to rapidly detect pathogens and biomarkers in respiratory samples obtained with non-invasive methods, thus overcoming the current bottlenecks in respiratory disease diagnostics. They combine the excellent sensitivity and specificity of PCR with the rapid, decentralized, and inexpensive analysis afforded by antigen tests. Our market includes over 300 million people suffering from chronic obstructive pulmonary disease (COPD), who are at risk of suffering an incurable infection. Moreover, our platform technology can be easily adapted to diagnose other respiratory conditions that currently lack rapid diagnostic options, such as asthma, pneumonia, and lung cancer. These cohorts would also benefit from personalized therapies according to biomarkers measured with a rapid test, which Nanodecal can provide. This feature, along with the excellent diagnostic precision of our tests, will make Nanodecal the new global standard for precision respiratory medicine.

Revolutionizing Personalized Organ Generation for a Healthier Future

Principal Investigator	Rodrigo Valdoeiros e Silva, MD
PI Primary Affiliation	Orgavalue
Co-Investigator(s)	None

PROJECT DESCRIPTION

Introducing Orgavalue, a revolutionary bioengineering marvel poised to transform the landscape of personalized human organ generation. Our state-of-the-art technology draws inspiration from evolutionary biology, culminating in the creation of intricately detailed human native-like organ scaffolds through cutting-edge decellularization techniques. These meticulously fashioned scaffolds serve as the canvas upon which our innovation truly shines. By introducing organ-specific human cells, we harness the innate adaptability of these cells, allowing them to seamlessly integrate, adhere, and thrive within our bioengineered structures. This harmonious amalgamation ensures the optimal functionality and immunogenicity of the resulting organs. While our primary focus lies in the creation of personalized livers, the potential to bioengineer lungs, pancreases, hearts, and kidneys, and potentially other internal organs promising a comprehensive solution to the dire scarcity of transplantable organs. One of the hallmarks of our approach lies in the prevention of adverse reactions and post-transplant rejections. This results in not only enhanced compatibility but also a significant reduction in organ wastage. Perhaps most strikingly, our groundbreaking process is executed within a remarkably swift timeframe. This efficient yet highly effective method stands as a beacon of hope for the countless patients across the globe who face the harrowing prospects of life without organ transplantation. Orgavalue stands as a testament to the remarkable achievements that emerge at the intersection of cutting-edge science, precision engineering, and compassionate healthcare solutions. With its potential to revolutionize organ transplantation, Orgavalue paves the way for a brighter, healthier future for individuals worldwide.