# 5 YEARS
# BIH Digital Health Accelerator
# - Demo Day 2022 -

May 31, 2022

BIH Berlin Institute of Health @Charité

BIH CHARITÉ DIGITAL HEALTH ACCELERATOR

CHARITÉ UNIVERSITÄTSMEDIZIN BERLIN

# Welcome to 5 Years of BIH Digital Health Accelerator and Demo Day 2022!

The mission of the Berlin Institute of Health at Charité (BIH) is medical translation: Transferring biomedical research results and inventions into novel solutions for personalized prevention, prediction, diagnostics and therapy; while conversely using clinical observations to inform new research. The aim is to deliver medical benefits to patients and the population at large.

As the translational research unit of Charité – Universitätsmedizin Berlin, the BIH is also building a comprehensive translational ecosystem, promoting a system-view understanding of health and disease and driving change in biomedical research culture.

The BIH was founded in 2013 and is funded 90 percent by the German Federal Ministry of Education and Research (BMBF) and 10 percent by the State of Berlin. In 2021, the BIH was integrated into Charité, maintaining close ties with the Max Delbrück Center for Molecular Medicine in the Helmholtz Association as a privileged partner.

The BIH Digital Health Accelerator (DHA) program is operated by Digital Labs, a unit of Charité BIH Innovation, the joint technology transfer office of Charité and BIH. It supports innovators from research and clinical practice at Charité and BIH from idea to prototype and product development of innovative, regulated and clinically validated digital health solutions for transfer to the healthcare market and into medical application.

The DHA program defines Digital Health as the intersection of life sciences and healthcare with emerging digital technologies such as augmented reality, machine learning, robotics and sensors.

Key elements of the DHA program include: A robust framework for developing digital health/medical products, project funding including protected time from clinical obligations, mentoring by accomplished subject matter experts in collaboration with the German Accelerator Life Science (GALS) and other ecosystem partners, access to talent pools, industry and investors, and a dedicated co-working space close to Charité Campus Mitte.

Considering its scope and key elements, the BIH DHA program to date is a unique program in the German and broader European hospital landscape.

The timing of this Demo Day could not have been more suitable. With 37 projects supported to date, seven spin-off companies already graduated from the DHA program and more are in development. After its pilot in 2017, the DHA has taken root over the past five years as the go-to program for clinical digital health innovation in Berlin.

Please join us in celebrating this success and thanking in particular those researchers and clinicians who develop digital health solutions in addition to their day jobs in advancing medical science and delivering world-class healthcare.

For the future, the BIH seeks to expand the DHA network across the region Berlin-Brandenburg by further deepening cooperation with other academic institutions and corporate partners.

In addition, the BIH is open to sharing insights into developed DHA structures, processes and know-how with other academic hospitals to help drive medical translation in digital health at an increased scale in Germany for increased patient and societal benefit.

We hope you enjoy the BIH DHA Demo Day 2022!

Sincerely yours,

**Prof. Dr. Christopher Baum**
Chairman of the Board of Directors, BIH, and Chief Translational Research Officer, Charité

**Dr. Michael Frieser**
Administrative Director, BIH

# BIH Digital Health Accelerator: Celebrating 5 Years

2022 marks the fifth anniversary of the BIH Digital Health Accelerator program. We look back at the program's beginnings and venture a glimpse into the future.

Based on the vision of BIH leadership to tackle the missing link between medical research and medical application – product development – and supported by dedicated federal funding, the BIH Digital Health Accelerator was conceptualized in late 2016.

The DHA team piloted the program right away embracing the principle: Building the plane as we fly. What may seem haphazard at first in fact applied sound guidance for any innovation unit: Gather senior leadership support around a clear vision and success metrics, activate the resources needed to get going, and learn by doing: Don't be afraid to make mistakes, but if you do, make new ones.

## Pilot Phase

In 2017, an external committee selected four projects to form the pilot DHA cohort. All projects considered either the heart or the brain with their product development ideas; in hindsight maybe no coincidence.

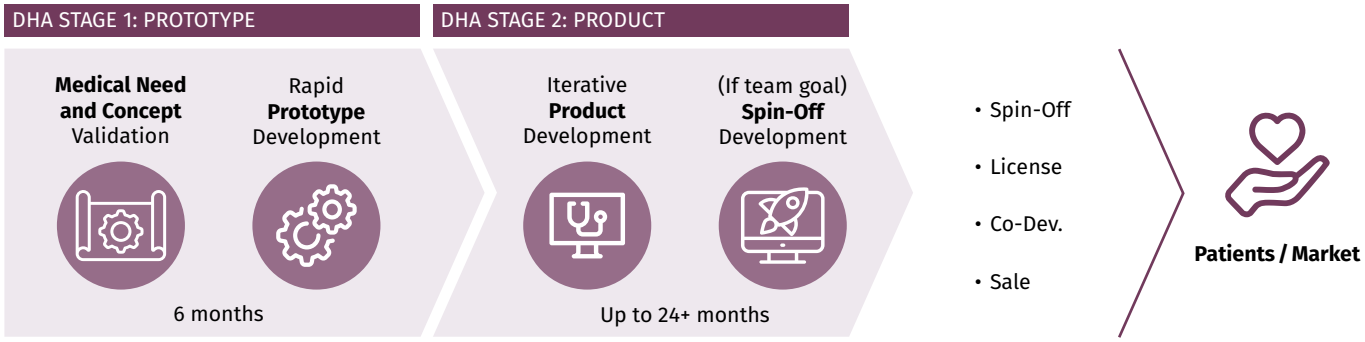
Based on best practices in product development, the core elements of the program were implemented that are still valid today: Co-working in an interdisciplinary work environment away from daily routine; mentoring by subject matter experts and seasoned professionals; and iterative product development to ensure future solution-need or product-market fit.

At the first Demo Day, the four projects presented their prototypes and the program received the green light from BIH leadership and political decision makers to take root.

## Proof of Concept Phase

Between 2018 and 2022, the program grew steadily, from six new teams in 2018 to eight in 2019 to ten new teams in 2020. The program diversified in medical fields, research domains, and digital technology areas. 2021 caused the program to slow down temporarily due to acute clinical duties of project teams and clinical study prioritizations.

## BIH Digital Health Accelerator Program



The program evolved into the two stages: Stage 1 to validate the medical need and the core technology, to prototype and iterate rapidly, and to get a basic understanding of regulatory, business, and reimbursement matters. Stage 2 to develop regulated, clinically validated digital medical products for diagnosis or therapy, digital platform solutions, or digital tools to improve drug development. In this stage, teams around clinicians and researchers grow in size and entrepreneurship knowledge, and prepare to bring their products to the healthcare market and medical application, e.g., via licensure or spinoff formation.

Over time, the following key success factors manifested themselves. One critically important success factor is the breadth and depth of knowledge and guidance by mentors, which has kindly been supported by the German Accelerator Life Sciences (GALS) and other networks.

**Funding** including up to 50 % protected time from clinical obligations

**Structured Process** for digital health/medical product development

**Mentoring** by subject matter experts, industry professionals and seasoned founders

**Community** of digital health innovation peers and access to talent pool

**Network** of potential transfer partners in industry and (corporate) venture capital

**Co-Working Space** for interdisciplinary work at BIH Digital Labs

Equally important and somewhat unique to working at a university hospital turned out to be team completion: Finding, matching, and supporting new team members with needed skills sets, e.g., in product development, regulatory affairs, and new venture development.

In 2020, through the emergence of the first set of digital health spinoffs from the DHA program, tangible proof of concept was achieved.

To date, seven spinoffs have emerged from the DHA program. Having developed and launched their medical products and digital health solutions, they have created over 100 jobs in the region. Thirteen new solutions are currently under development.

## Outlook: Growth Phase and Broader Opportunity

By 2022, the BIH DHA program has developed standardized structures and processes, a program curriculum around a robust digital health product development framework, and know-how that could support the translational ecosystem at Charité and BIH permanently by fuelling the development and transfer of digital health innovations. In addition, the BIH DHA program is also open to exploring ways to cooperate with additional university hospitals to foster digital health innovation more broadly for the benefit patients and society at large.

## By the Numbers

**106**
**Applications** evaluated

**36**
**Projects** funded to date

**7**
**Spin-offs** graduated

**23**
**Fields** of medicine, research

**13**
**Projects** currently in program
(Stage 1: 7, Stage 2: 6)

**100+**
**Jobs** created by spin-offs

# Agenda

**6:30 – 6:40 pm**

**Introduction**

**Marc Filerman**
Managing Partner, German Accelerator Life Sciences | Moderator

**6:40 – 6:45 pm**

**Welcome Message**

**The Importance of the BIH Digital Health Accelerator Program for Charité**
**Prof. Dr. Heyo Kroemer**
Chief Executive Officer of Charité – Universitätsmedizin Berlin

**6:45 – 6:50 pm**

**Opening Remarks**

**BIH Digital Health Accelerator Program – 5 Years of Successful Medical Translation**
**Prof. Dr. Christopher Baum**
Chairman of the Board of Directors of BIH, and Chief Translational Research Officer of Charité – Universitätsmedizin Berlin

**6:50 – 7:10 pm**

**Keynote**

**Startup Founder vs. Machines – Who's Learning More?**
**Hedi Razavi, PhD**
Managing Partner, German Entrepreneurship

**7:10 – 7:20 pm**

**Celebrating 5 Years BIH Digital Health Accelerator**

**Translating Medical AI Research into Clinical Application in Germany: AIgnostics and Beyond**
**Prof. Dr. Frederick Klauschen**
Co-Founder of First Spin-off AIgnostics, Director of the Institute of Pathology, LMU Munich

**7:20 – 8:30 pm**

**BIH Digital Health Accelerator Pitch Session**

**mucoaid: AI-Powered Solution to Detect Oral Mucosal Lesions Early to Fight Oral Cancer**
**Prof. Dr. Tabea Viktoria Flügge**
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**VirtuCueR: A VR-Based Treatment to Reduce Relapse & Craving For Alcohol-Dependent Patients**
**Dr. Miriam Sebold · Philipp Stepnicka**
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# Agenda

**MatchGraft.AI: Donor-Patient Matching Tool for Stem Cell Transplantations and Beyond**
**PD Dr. Lena Oevermann · Dr. Jonathan Groß**
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**RadioEye: The Autopilot in Diagnosing Misleading Radiology Cases Correctly**
**PD Dr. med. Katharina Erb-Eigner**
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**GYDE: Patient-Centered Therapy Solution for Sexual Distress in Women**
**Dr. Laura Hatzler · Selina Marie Kronthaler**
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**SangoRT: Making A Change for Clinical Trials in Oncology**
**Iris Wing To Lam**
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**METATRON - A Wearable Sensor Platform for the Early Detection of Peripheral Artery Disease**

**PD Dr. Federico Collettini**
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**Celebrating 5 Years BIH Digital Health Accelerator** — **8:30 – 8:35 pm**

**Bartosz Reinhold**
CEO and Co-Founder of Newest Spin-off, Nephrolytix

**Thank You and In Memoriam** — **8:35 – 8:40 pm**

**Closing Remarks** — **8:40 – 8:45 pm**

**Prof. Dr. Axel Pries**
Dean of Charité – Universitätsmedizin Berlin

**Networking Reception and Meet the Teams** — **8:45 – 10:45 pm**

# mucoaid: AI-Powered Solution to Detect Oral Mucosal Lesions Early To Fight Oral Cancer

Oral cancer with a death rate higher than those of cervical cancer, Hodgkin's disease, brain, liver, and skin cancer, is considered among the most deadly. One of the real dangers of this cancer is that in its early stages, it can go unnoticed since it frequently is not causing pain. The worldwide prevalence of oral mucosal lesions is as high as 25 %. Around 5 % of these lesions transform into cancer if untreated or not detected at an early stage.

The key to effective treatment and long-term survival is the early detection and distinction of malignant from chronic or incidental benign lesions. For dentists, it is often a "black box" as they are not specialized in diagnosing oral lesions early, which often leads to multiple visits and referrals of patients. If malignant, they must visit as fast as possible specialist clinics, but treatment is often delayed.

muco**aid** detects and classifies oral mucosa lesions in photographs taken by dentists using machine learning algorithms for diagnostic decision support. The application shortens the interval between the onset of symptoms and the start of treatment, while also guiding patients and dental professionals throughout diagnosis, treatment, and aftercare. mucoaid supports the observation of chronic diseases, assists in cancer aftercare, and includes patient-reported data to lower the risk of malignant transformation and/or recurrence. How does the solution work? Images acquired with an intraoral camera integrated with the dental unit, photo camera, or other devices taken by dentist, joint with anamnestic data by the dental professional are uploaded to our application, and processed with our transformer network approach.

Team muco**aid** is powered by the expertise of a senior clinician and researcher in the field of digital imaging and computer-aided treatment planning in oral and maxillofacial surgery, dentists, and physicians, supported by a machine learning and a business expert from Charité and Einstein Center Digital Future, Berlin. Oral health is the key to general health. Oral diseases are amongst the most common chronic diseases and pose public health issues due to their prevalence, expense of treatment, and impact on individuals and society. Our goal is to improve prophylaxis in oral health in DACH and beyond.

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mucoaid

KEYWORDS
Dentistry, Digital Imaging, AI, Decision Support Tool, Oral Cancer, Oral Surgery

ASK
- Partnership with insurance companies (public, private with supplementary dental insurance) for feasibility study and real-word testing to validate the solution
- International partners for multi-ethnical data acquisition
- Team members: Product/software, business, regulatory affairs, and market access
- Co-development with industry partners to explore further use cases

# VirtuCueR: A VR-Based Treatment to Reduce Relapse & Craving For Alcohol-Dependent Patients

In Germany alone, 1.6 million people are alcohol dependent. Affected individuals often suffer from health issues, unemployment, and social exclusion. The indirect costs for the economy due to loss of productivity are estimated to be 30 billion Euros. Crucially, alcohol dependence is characterized by a chronicity, with relapse rates up to 80 percent after rehabilitation treatment. This fact points to a fundamental deficit in the current care path for alcohol-dependent patients.

Craving is defined as a strong urge and desire to consume alcohol; it is one of the hallmark mechanisms contributing to relapse in alcohol dependence. Craving is often experienced in situations that remind the individual of alcohol intake, e.g., the local pub or informal gatherings of social groups. However, most therapies for alcohol dependence do not incorporate these real-life situations in the therapeutic process. Thus, after therapy many patients have not learned how to handle and cope with high-risk situations that make them particularly prone to relapse.

VirtuCueR developed a solution to overcome this limitation by using virtual reality technology to expose affected individuals, in treatment, to personalized high-risk situations that elicit cravings. During their treatment patients wear a head-mounted display that exposes them to alcohol-associated environments. This "real" experience and the interaction with the environment can be controlled and adjusted by a nearby therapist. The overarching aim of the treatment is that patients can acquire specific skills to overcome the craving. Since the treatment will be cost-effective and easily applicable, various professionals (e.g. social workers, psychotherapists, nurses) can administer it. The treatment will be designed for different steps along the care path such as outpatient settings, counseling, and rehabilitation centers to contribute to relapse prevention.

The VirtuCueR is a multi-professional team, consisting of psychiatrists, psychologists, and addiction experts from Charité, supported by its technology partner neomento GmbH, a specialist for the development of VR-based medical products for psychiatry.

ASK

- Team members: project management, business
- Collaboration with the German pension insurance, health insurances to validate
- Collaborations with DACH rehabilitation clinics for feasibility studies and user testing
- Collaborations with national and international patient support groups such as AA to explore the development of use cases also outside of clinical settings and the DACH region

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VirtuCueR

KEYWORDS
Alcohol Addiction, Exposure Therapy, Virtual Reality, Relapse, Craving

# MatchGraft.AI: Donor-Patient Matching Tool for Stem Cell Transplantations and Beyond


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KEYWORDS
Oncology, Transplantation, Stem Cells, AI, GvHD, Donor-Matching, Malignant, Non-Malignant


Stem cell transplantation (SCT) remains the only curative treatment option for many hematologic diseases in children and adults. The number of performed SCTs has almost doubled in the last ten years with 3,600 SCTs in Germany and 20,000 SCTs in Europe per year. Despite major improvements over the last decades, donor-patient matching is still slow and insufficient. SCT holds severe, possibly life-threatening complications such as Graft-versus-Host Disease (GvHD), relapse of malignant disease, rejection, and infections.

In GvHD, transplanted immune cells recognize the recipient's organs as foreign and attack them. Due to insufficient donor-patient matching as well as unsatisfactory first-line treatment and a lack in the standard of care for a second-line GvHD treatment, up to 50 % of the patients undergoing SCT will develop GvHD resulting in high morbidity, mortality (up to 90 % for severe GvHD) and treatment costs after SCT.

MatchGraft.AI will revolutionize donor matching by building and applying an AI-based tool. Our first use case is the prediction of the development of a GvHD after matching to decrease the rate and severity of the disease by optimizing GvHD prophylaxis and facilitating earlier treatment. Based on a SCT Biobank cohort, first, we have built a machine learning-based algorithm with a predictive performance comparable to the literature, showing the feasibility of this approach. Our tool will be the first in clinical use to combine risk factors and algorithms in a novel way.

We are already working together with the central German matching service ZKRD and Charité HLA lab in Berlin and will receive further data from transplant centers in Germany, EU and the Fred Hutchinson Cancer Research Center as one of the Top 5 transplant centers in the US. Further close collaborations with hospitals and transplant labs are essential especially for multiethnical data-sets.

Our goals are to find better matches faster, improve clinical decision-making and reduce mortality for children and adults. Our tool will increase the quality of life of SCT survivors and decrease the health care burden of SCT complications such as GvHD. Our vision is to improve the health of all transplant patients globally by making transplants safer, faster, and more effective.

MatchGraft.AI is built by an experienced team in clinical hematology, oncology, and stem cell transplantation, supported by a senior machine learning expert, and scientific advisors in industry and clinics.

ASK
- Cooperation with national and international partners for data sharing and development (e.g. hospitals, donor matching platforms, transplant coordination centers)
- Team members: senior product manager, senior project manager, senior machine learning specialist (up to two positions), regulatory manager
- Partnership with health insurances for feasibility study

# RadioEye: The Autopilot in Diagnosing Misleading Radiology Cases Correctly

Interpretation of radiological images is core in diagnostic radiology. However, the medical world has grown in terms of complexity and broadness. Furthermore, the workload of radiologists increased three-fold compared to the workforce (Statement by the BRC Radiologists, 2020), resulting in less time to interpret each radiological case.

In 10-35 % of daily cases, the radiologist consults various sources for reference to be able to interpret the image correctly. In most cases the radiologist ends up searching on radiological websites. These solutions are mainly text-based search functions and offer only a small amount of images that display only the standard appearances of the respective diseases. Finding the correct diagnosis is an extremely time-consuming and laborious process in daily clinical practice. Finally, if the radiologist is not able to diagnose the lesion on the image, the radiology report just describes image features of the lesion. This will lead to a costly and potentially follow up examination, e.g. a risky biopsy - that delays the diagnosis, is a burden for the patient and results in high costs for the healthcare system due to hospitalization, surgery, and medical staff costs.

RadioEye closes this gap by offering diagnosis support with the help of a reference tool designed as an interactive case collection, providing curated information and a vast database of reports and radiological images of cases. RadioEye offers an AI-based image-search functionality to find similar cases based on image features alone and by ranking narrowing potential diseases down. The radiologist can swipe through images and compare them to the case at hand. RadioEye has started with an eye and eye socket module and will expand its database to contain radiological images of the whole spectrum of diseases in the entire human body.

A curated radiology database that covers the real-world variance of disease presentation together with a powerful image-search functionality is unique and will improve quality and efficiency in diagnostic radiology worldwide.

RadioEye is powered by an interdisciplinary team with years of experience in radiology and specialized radiology, AI and software development, as well as UX/UI design. The team also works closely with expert advisors in regulatory affairs, business and market access.

ASK

- Team members: software development, business, regulatory affairs
- National and international Clinical co-operation partners for development and testing the solution
- Partnership with industry to test integration options

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KEYWORDS
Radiology, Specialized Radiology, AI, Ophthalmology, Diagnosis Support, Image Analysis

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GYDE

KEYWORDS
Womens Health, Sexual Medicine, Gynecology, FemTech, Sexual Dysfunction, Digital Health, Patient-Centered

# GYDE: Patient-Centered Therapy Solution for Sexual Distress in Women

For the millions of women in Germany and the EU affected by gynecological conditions, such as endometriosis, breast cancer, gynecological cancers, lichen sclerosus, vulvodynia, or menopause, up to 90% of them will also then be affected by a secondary condition, sexual distress. This secondary, life-impacting condition, while caused by the first cannot be cured by using the same therapies, interventions, or approaches. Sexual distress has wide-reaching implications for the women; it takes them out of their society, off family life, and relationships, and often out of work. It increases the likelihood of pain medication use and depression and is the reason for many healthcare and social costs that could be avoided.

There is an evidence-based treatment for sexual distress that should be offered to all of these women but simply isn't. Only a few physicians will talk about sexual distress with women, even fewer can deliver the therapy. Women are left without guidance or help on how to get to this therapy and their medical costs rise as they search for their answers themselves.

Our clinic at Charité- Universitätskrankenhaus Berlin is one of only 3 in Germany equipped with a team of professionals to deliver sexual distress therapy to women. While we can effectively treat our patients, clinics like ours shockingly see only 1% of the women who are actually looking for help. That means 99% of women suffer for a prolonged time and it could be avoided.

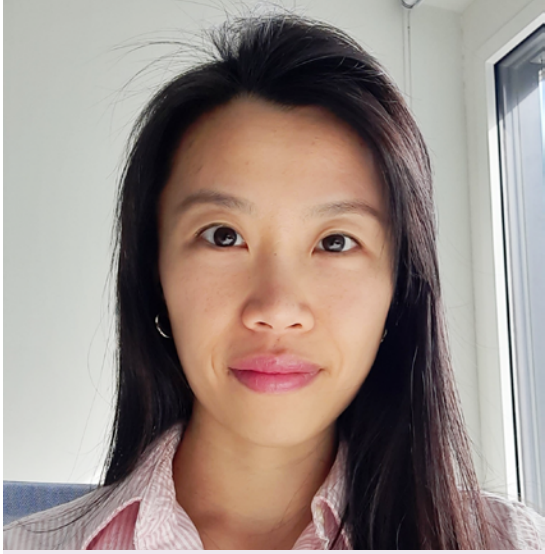
We have developed GYDE to take our therapy approach out to the women who don't find their way to us. We have made our evidence-based therapy digital so it is accessible to women, wherever they are. GYDE is therapy beyond the clinic and was developed for all women looking for proper medical care for their medical condition. Our first version of

GYDE will focus on just one gynecological condition and treatment of the related sexual distress condition: Endometriosis. We will then expand the product to offer therapy to more gynecological conditions and serve the 66 million women looking for help for sexual distress every year in the EU. Our product is designed to be there from the very beginning of the women's concern through to treatment based on their gynecological treatment and back to a satisfied and fulfilled life.

GYDE is developed by an interdisciplinary team of experts in sexual medicine, gynecology, and psychology. Together, they have many years of experience treating one of the major consequences of gynecological conditions.

ASK
- Team members: product manager, business, market access, UX/UI designer
- Partnerships with insurance companies to run feasibility study
- Co-operations with outpatient gynecologists for feasibility study
- Individuals and patient groups for product iteration

# SangoRT: Making A Change for Clinical Trials in Oncology



Clinical trials are instrumental for bringing new treatments to patients. Despite the need to develop effective new treatments and sizeable budgets allocated to clinical trials, just less than 5% of eligible patients participate in clinical research. In addition, up to 20% of trials are either withdrawn due to patient recruitment problems or completed with a reduced number of participants from the target population. These problems greatly impair the quality of trial data, prolong the timeline, and as a result add to the overall costs of trials.

Studies have shown that one prevalent cause of these problems is the disturbance of patients' daily life due to the time-consuming visits at trial sites. Frequent travelling to and from trial sites is especially challenging for the elderly, children or patients who are extremely ill and vulnerable to infections. As patients' blood has to be monitored frequently and closely during clinical trials, Clinical Trial Organizations (CROs) resort to home-nurse visits, which are not cost-effective solutions.

SangoRT is tackling these challenges by developing a cost-effective, home-based IVD medical device for remote monitoring of blood counts and common side effects of drugs. By automating and optimizing the workflow of blood tests for side-effect monitoring, the team is working towards enabling virtual and hybrid clinical trials, e.g., in oncology. The team's goals are to increase the right patient recruitment and retention rates by reducing the burden of clinical trials on the patients, and to enrich the data insights by enabling more frequent sample collection. Our mission is to optimize clinical trials in order to get new effective treatments to patients faster and more cost-effective.

SangoRT is an interdisciplinary team composed of a clinical researcher, a medical doctor, a computational biologist supported by an oncologist/ hematologist. In the long-term, SangoRT aims to deploy its solution in remote patient monitoring to help patients live an easier, fuller life with their conditions while also improving the efficiency of healthcare systems around the world.

ASK
- Partnerships with CROs and pharmaceutical companies to explore the application in virtual, and hybrid clinical trials
- Team members for product development, regulatory affairs and UI, UX design and software development
- Co-development and, or cooperation partnerships for assay development

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**SangoRT**

KEYWORDS
Oncology, Hematology, IVD, Medical Device, Blood Analysis, Virtual Clinical Trials, CROs, Pharma

# METATRON: A Wearable Sensor Platform for the Early Detection of Peripheral Artery Disease

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METATRON

KEYWORDS
Radiology, Sensors, Peripheral Artery Disease, Early Detection, Disease Management Program

Peripheral artery disease (PAD) is one of the most prevalent, complex and fatal diseases worldwide. As the population ages, the prevalence of PAD continues to increase taking on the proportions of a global burden of disease. In Germany alone, approximately 2.3 million people suffer from PAD, resulting in exorbitant costs for the national health system. Endovascular recanalization with balloon angioplasty and stenting are the therapies of choice that result in favorable patency rates. The timeliness of revascularization is crucial as delayed treatment increases the risk of major surgery, including amputation.

Today, treatment is delayed due to inadequate referral between specialists, limited health care provider infrastructures especially in rural areas, and – perhaps most importantly – unrecognized disease progression by the patients.

METATRON is a wearable, non-invasive sensor device placed on the calf of PAD patients. After initial setup with a vascular specialist, the patient would need to actively utilize the wearable for only a few minutes each week. The system reliably detects deterioration of limb perfusion, serving as an “early warning system” for worsening PAD. With growing use, we aim to analyze perfusion patterns using a dedicated machine-learning algorithm in order to detect PAD deterioration before it manifests.

METATRON is powered by an experienced and highly motivated interdisciplinary team of interventional radiologists, sports and data scientists with complementary core competencies and a shared understanding of how to improve the management of PAD patients. The team has a broad network of international research partnerships within industry, academia, and hospitals.

ASK
- Team member product development, hardware and software
- Team member project management and regulatory affairs
- Partnerships/cooperations with national and international clinical institutions for solution testing


BIH Digital Health
Accelerator
Demo Day

# BIH Digital Health Accelerator

Since 2017, the BIH Digital Health Accelerator Program has supported innovators from research and clinical practice at Charité - Universitätsmedizin Berlin, including the Berlin Institute of Health, in bringing their research results and inventions in the field of digital health to patients through product development and support in transfer to medical applications and market.

The broad spectrum of disciplines represented, unmet needs addressed, digital technologies used, and concrete areas of application ranging from prevention to prediction, diagnostics, therapy, and management to stakeholder empowerment and public health are evidence of the immense innovation potential. Coupled with their substantial efforts, alongside professional commitments in research and clinical settings, these teams create new solutions that benefit patients and our society.

# 2017


## Cohort 2017

**Exploration of Heart Disease and Cancer Using Fractal Analysis Technology**
Dr. Florian Michallek, Institute of Radiology, Charité

**Heart Disease Risk App and Automated CT Analysis**
Prof. Dr. Marc Dewey, Institute of Radiology, Charité

**Predicting Stroke Risk with Artificial Intelligence**
Dr. Dietmar Frey / Dr. Vince Madai, Neuro Surgery, Predictive Modeling in Medicine, Charité

**Prediction of Post-operative Complications in the Intensive Care Unit (Spin-off X-Cardiac)**
Dr. Alexander Meyer / Prof. Dr. Volkmar Falk, Department of Cardiothoracic and Vascular Surgery, Charité & DHZB

## Demo Day – January 24, 2018

# 2018

## Cohort 2018

**BodyTime: A New Diagnostic Assay to Assess the Internal Clock ( Spin-off BodyClock)**
Prof. Dr. Achim Kramer, Institute for Medical Immunology - Chronobiology, Charité

**Cardio Prime: Diagnosis and Therapy Planning Platform for Patients with Cardiovascular Diseases**
Prof. Dr. Titus Kühne/ Kai Brosien, Institute for Imaging Science& Comput. Modelling in Cardiovascular Medicine, Charité

**Computational Pathology (Spin-off AIgnostics)**
Prof. Dr. Frederick Klauschen, Institute for Pathology – Clinical Pathology, Working Group System Pathology, Charité

**DentalXr.AI: Deep Learning for Dental Image Diagnostics (Spin-Off: DentalXr.ai)**
Prof. Dr. Falk Schwendicke/ Departement of Restorative and Preventive Dentistry, Charité

**LingPed: An Innovative Monitoring Platform for Post-Surgical Rehabilitation.** PD Dr. Serafeim Tsitsilonis/ Kaya Nevda, Center for Musculoskeletal Surgery, Charité

**mTOMADY: A Transaction Platform for Accessible and Affordable Healthcare (Spin-off mTOMADY)**
Dr. Julius Emmrich, Dr. Samuel Knauss, Departement of Neurology and Experimental Neurology, Charité

## Demo Day – December 11, 2018

# 2019


## Cohort 2019

**3D Histopath: Bringing Histopathology from 2D to 3D**
Dr. René Hägerling, Institute of Medical Genetics and Human Genetics, Charité

**ARCAS: AI for Life Sciences. Best Treatment Possible for Every Cancer Patient (STAGE 2)**
Dr. Altuna Akalin, Institute for Medical Systems Biology (BIMSB), Max-Delbrück Center for Molecular Medicine (MDC)

**AKICHECK: Clinical Decision Support System to Identify Acute Kidney Injury (Spin-off Nephrolytix)**
Prof. Prof. hc. Dr. Markus van der Giet, Department of Nephrology and Medical Intensive Care, Charité

**Diagnosis and Therapy Optimization in Implant Infections**
PD Dr. Andrej Trampuz, Center for Musculoskeletal Surgery, Charité

**Open.IU: A Diagnosis and Therapy Solution for Adolescents with Internet Gaming Disorder**
PD Dr. Olga Geisel/ Prof. Dr. Christoph Correll, Department of Child and Adolescent Psychiatry, Psychosomatic Medicine and Psychotherapy, Charité

**PREFREE: For Reducing Uncertainty in Pregnancy – A Decision Support Tool and Home Monitoring Solution (STAGE 2)**
Prof. Dr. Stefan Verlohren, Department of Obestrics Maternal-Fetal Medicine, Charité

**Siloa: Solution for Digital Early Detection of Alzheimer's Disease**
Dr. Herlind Megges/ Dr. Silka Dawn Freiesleben, Department of Psychiatry, Geriatric Medicine – Memory Clinic, Charité

**SUMUS: A Trustable Psychotherapy Guide for Patients Affected by Muscle Diseases**
Prof. Dr. Simone Spuler/ Dr. Elisabetta Gazzerro, Clinic for Muscular Disorders, Charité/MDC

## Demo Day – November 26, 2019

# 2020 / 2021

## Cohort 2020

**Aurelia: Monitoring Brain Perfusion During Anesthesia and Improving Perioperative Outcomes**
Dr. Michael Nordine/ Prof. Dr. Sascha Treskatsch Clinic for Anesthesiology and Intensive Care Medicine, Charité

**DAGI: Keeping Your Child With Congenital Heart Disease Safe at Home**
Prof. Dr. med. Katharina Schmitt, Dr. Florian Gross, Department of Pediatric Cardiology and Congenital Heart Disease, Charité/DHZB

**MetaboKin: A Virtual Cell for Modeling Liver Metabolism (Spin-off Doppelganger Biosystems)**
PD Dr. Nikolaus Berndt/ Dr. Johannes Eckstein, Laboratory Computational Systems – Biochemistry, Charité

**MutationSearch: A Full-Service Platform Solution for Whole Exome Sequencing (STAGE 2)**
Prof. Dr. Dominik Seelow, Bioinformatics and Translational Genetics, BIH

**MyaLink: A Monitoring Platform Solution for Oprhan Diseases in Neurology**
Dr. Sophie Lehnerer/ Dr. Lea Gerischer, Department of Neurology and Experimental Neurology, Charité

**PerMitrA: Optimization Tool for Heart Valve Surgery**
PD. Dr. Simon Sündermann, Clinic for Cardiovascular Surgery, Charité

**rAIdiance: AI-Based Radiology Solutions to Improve ICU Care (STAGE 2)**
Dr. Keno Bressem / PD. Dr. Dr. Stefan Niehues, Clinic for Radiology, Charité

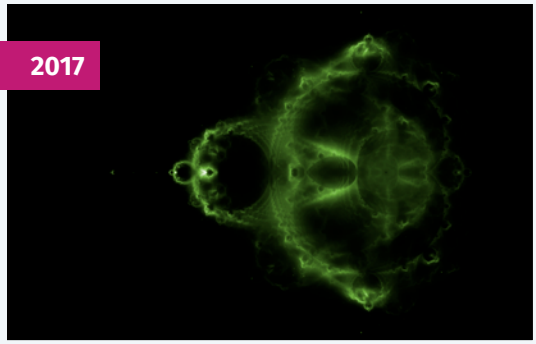
**Recovery Cat: Keeping Patients With Chronic Mental Disorders Safe (STAGE 2)**
Dr. Jakob Kaminski, Department of Psychiatry and Neurscience, Charité

**TimeTeller: Circadian Clock Profiling for Cancer Treatment Timing (STAGE 2)**
Prof. Dr. Angela Relogio, Institute for Theoretical Biology, Charité

**WePath: A Platform-Based Global Network for Pathology Expertise**
Prof. Dr. Peter Hufnagl, Digital Pathology IT, Institute of Pathology, Charité


## Demo Day – May 19, 2021

2017



# Exploration of Heart Disease and Cancer Using Fractal Analysis Technology

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KEYWORDS
Radiology, Cardiology, Oncology, Fractal Analysis

In Europe alone, approximately 3 million heart catheters are performed every year. While about one third of these cases represent coronary artery disease and benefit from the procedure, the remaining cases suffer from small vessel disease or do not represent coronary disease. Thus, an estimated 2 million heart catheters are performed every year with the related risks of this invasive procedure and high costs to the healthcare system.

Fractal analysis is a technology to non-invasively assess a patient's disease based on medical images prior to an invasive procedure and determine if the patient really needs it. Building on the characteristics of self-similarity and scale-invariance, this technology can be used to analyze patterns of blood supply, thereby for instance separating coronary artery disease from small vessel disease. Fractal analysis technology promises to enable new diagnoses and inform therapy choice also beyond heart disease, e.g., for breast, liver, and prostate cancer.

The team, consisting of highly experienced radiologists and researchers, has developed working prototypes and achieved proof of concept, is pursuing patent protection, and is clinically validating the technology across potential fields of application.

2017

## Heart Disease Risk App and Automated CT Analysis

# Heart Disease Risk App and Automated CT Analysis

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KEYWORDS
Radiology, Cardiology, Cardiac Risk Assessment, App, CT, Deep Learning, Image Analysis

This project consists of two complementary projects in the radiology space.

The Cardiac Risk App targets the annually 20 million stable chest pain patients in Europe, of which only an estimated 50 % receive per-guideline care as prediction rules for cardiac risk assessment in paper format and tables are underused. The mobile phone app aims to allow a targeted analysis in a highly accessible way in most care settings, thereby aiming to improve the rate of per-guideline care for stable chest pain patients.

Cardiac CT analysis (CTA) today is a complex, manual analysis by experienced radiologists to quantify stenosis and characterize plaque. Given this complexity, manual analysis is time-consuming and costly. The intended solution aims at utilizing machine learning technology for automated image analysis as input for analysis and final assessment by the radiologist.

The team consists of highly experienced radiologists and researchers, in addition to machine learning experts and software developers.

2017

# Prediction 2020: Predicting Stroke Risk with Artificial Intelligence

PREDICTioN2020

Stroke is one of the major causes of death and disability. The lifetime risk for stroke is 1 in 4. Once a first stroke occurred, the risk of a second devastating stroke is high. However, stroke risk factors are well known. 15 % are potentially preventable secondary strokes.

The team Prediction 2020 developed an AI-based image analysis solution to predict the individual risk of stroke. Furthermore, the team developed a simulation of the brain vascular system to predict outcomes of therapy alternatives to enable physicians and patients to make informed therapy choices.

The Prediction 2020 team consists of a neurosurgeon and lawyer, computational neurologists, AI experts and senior software developers. After the BIH Digital Health Accelerator Program, the project was part of Startupbootcamp Digital Health Berlin and was invited to join the "Readiness Program" of the German Accelerator Life Sciences, and was partner in several national and international research grants with industry and academic solutions.

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2017

Successful Spin-Off

# X-Cardiac: AI-based prediction of complications in ICU

x-cardiac

Intensive care units (ICU) are highly challenging environments that present clinical teams with a demanding caseload, data or input overload, and require rapid decision making, often in reactive behavior once problems become apparent. Post-operative complications can significantly increase mortality for 100.000 patients per year in Germany, and can result in recurrent surgeries, and longer stays at the intensive care unit, which causes a substantial economic burden for hospitals.

To solve this challenge, the team x-cardiac developed a real-time AI-based platform solution to recognize postoperative complications, e.g., severe internal bleeding, enabling ICU staff in real-time to intervene before the devastating consequences manifest.

The team's vision is to break the "deadly triad of cardiac surgery" to improve patient care, reduce mortality, and reduce the length of stay at intensive care units (ICU), thereby improving health system economics, and enable healthcare professionals.

The team consists of a cardiac surgeon/computer scientist, experienced machine learning experts, and software developers. The resulting company, X-cardiac, spun off in 2021 and is based in Berlin. Their internal bleeding module is clinically validated in a study with 10.000 patients, published in The Lancet Respiratory Medicine, and is CE certified. The team is currently developing its second module to predict renal failure.

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2018

Successful Spin-Off

# AIgnostics: Computational Pathology

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KEYWORDS
Digital Pathology, AI/ML, Cancer Diagnosis, Toxicity Screening, Clinical Trials

Histological image analysis, performed by pathologists, is a crucial step in diagnosing many autoimmune, degenerative and infectious diseases. Given our aging population and the increase of cancer cases worldwide, a global shortage of pathologists is expected.

To address this challenge, team AIgnostics has developed a patented "Explainable AI" (layer-wise relevance propagation) to assist pathologists in standardized and automated qualification and quantification of tissue features. This solution is more accurate and faster than today's manual gold standard. The system can also be applied to drug development. Pharmaceutical companies can augment histomorphological assessments in preclinical animal studies or in clinical trials to stratify patients in order to further improve drug efficacy and toxicity analyses.

Prof. Federick Klauschen, Viktor Matyas, Dr. Maximilian Alber founded in cooperation with Prof. Klaus-Robert Müller, a globally renowned expert on machine learning from Technical University Berlin, AIgnostics in 2020. The Berlin-based company is funded by Boehringer Ventures and HTGF and has over 40 employees with interdisciplinary expertise to date.

2018

Successful Spin-Off

# BodyTime: A New Diagnostic Assay to Assess the Internal Clock

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KEYWORDS
Chronobiology, Chronomedicine, Internal Clock, Sleeping Disorders, Companion Diagnostic, Clinical Trials, Patient Empowerment

An aligned circadian clock is essential for health. Misalignment or disruption of an individual's inner time relative to their environment, which is highly prevalent in the fast-paced and globalized lifestyles of modern society, are associated with numerous common diseases such as sleep disorders, psychological disorders, metabolic syndromes, rheumatic disorders, cardiovascular diseases, and cancer.

In the emerging field of chronomedicine, team BodyTime addresses this medical need with a blood test to determine the individual's body time by profiling selected genes with specific lab equipment and a bioinformatics algorithm. While as accurate as currently established tests, this solution promises to be less complex, faster and more cost-effective.

Bodytime consists of experts in the field of chronobiology, medicine, and data-analysis/software development and spun off in 2021 as Bodyclock Technologies GmbH. They are providing the first RNA hair test for identify the individual internal clock.

2018

# Cardio Prime: Diagnosis and Therapy Planning Platform for Patients with Cardiovascular Diseases

## Cardio Prime

The care path for cardiovascular patients, ranging from symptom detection to diagnosis to therapy and disease management is fragmented. Providing each patient with the right type of care at the right place of care is a key challenge for each healthcare system. In a fragmented cardiovascular care protocol, quality and efficiency of care suffers.

Team Cardio Prime develops an innovative Digital Health platform for diagnosis and therapy planning to inform and improve the care path for patients with cardiovascular diseases. The solution enables physicians working in cardiovascular and other specialties at hospitals and make more informed care path decisions. The first application is a stress test of cardiac and heart valve function without pharmaceutically or physical activity-induced stress. Other opportunity areas are complementary cardiovascular analyses and decision-support systems for cardiovascular diagnosis and therapy planning. Due to regulatory requirements on clinical validation, the development path turned out not to be feasible.

Team Cardio Prime consists of an interdisciplinary team of experts in cardiovascular disease diagnostics and treatments, physicists, engineers and software developers.

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KEYWORDS
Cardiovascular Diseases, Care Path
Improvement, Prevention, Platform
Solution

2018

Successful Spin-Off

# DentalXr.AI: Deep Learning for Dental Image Diagnostics

dentalXr.ai

Dental diseases are among the most prevalent of humankind, burdening billions of individuals with pain, impaired chewing movements, impaired speech and aesthetics. To manage these diseases, early detection and regular monitoring with supportive therapy is needed.

Team DentalXr.AI is developing an artificial intelligence (AI)-based decision-support system for dental images, intended to help dentists to systematically and comprehensively assess X-rays, document these assessments, and form evidence-based decisions. The envisioned solution enables faster, more precise and more reliable assessments of dental X-rays. This will save examination time for patients, improve diagnostics and treatment choices, increase the ease of assessment and documentation, and improve patient inflow and management.

Team DentalXr.AI consists of senior clinicians, machine-learning experts and software developers and spanned off 2020. By now they are used by dentists in the DACH area and offer a fully-automated digital analysis and integrated reporting of dental images (CE certified) to improve therapy recommendation and reduce time.

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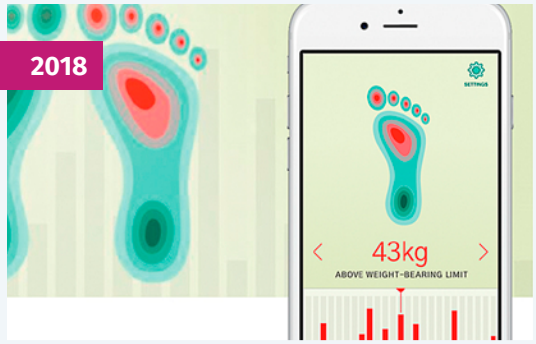
KEYWORDS
Dental Image Diagnostics, AI/ML,
Dentist Decision-Support System

2018




# LingPed: An Innovative Monitoring Platform for Post-Surgical Rehabilitation

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KEYWORDS
Foot Surgery, Post-Surgery, Rehabilitation, Monitoring System, Sensor-based Solution, App

Today, a patient's rehabilitation after a foot surgery is not continuously supervised by medical professionals. Instead, the responsibility to control and manage weight load per foot rests with the patient. As medical outcomes depend on both, quality of surgery and quality of rehabilitative process, poor rehabilitation can negatively affect long-term patient outcomes, is dissatisfying for surgeons, and expensive for healthcare systems.

Team LingPed is closing this gap in post-surgical rehabilitation with a monitoring system for patients after foot surgery. The system consists of an insole for use e.g. in postoperative shoes (orthoses) to collect data, and an app for patients as feedback mechanism to monitor and, if needed, adjust their behavior during recovery. This solution intends to reduce the risk of re-surgery, shorten the rehabilitation process for each patient, and reduce healthcare system costs.

Team LingPed consists of trauma surgeons of Charité and has finished its technical testing and is currently preparing its feasibility study within the Charité. In 2019 Lingped was a finalists for the 1A-Award sponsored by 1A Pharma and the Deutsche Apothekerzeitung

# mTOMADY: A Transaction Platform for Accessible and Affordable Healthcare

Successful Spin-Off

mTOMADY

More than 1 billion people in low- and middle-income countries lack access to basic healthcare. The majority of affected people do not have access to savings mechanisms and are at risk for unexpected expenses and even medical impoverishment.

Building on the globally present mobile phone infrastructure, team mTomady has developed a digital health wallet – a mobile transaction platform for healthcare credits. Healthcare sponsors can contribute to individuals' healthcare accounts, which in turn can only be used at accredited clinics within defined reimbursement ranges. This solution promises reduced "leakage" of aid funding by international aid organizations, quality improvement and cost-control for governments and healthcare providers, and – most importantly – increased access to affordable, quality healthcare for patients. mTomady has launched with a pilot in Antananarivo in cooperation with the Government of Madagascar.

Team mTOMADY consists of two neurologists of the Charité – Universitätsmedizin Berlin and a team of technology, software development and public health experts. In December 2020 the team founded the mTOMADY gGmbH, and won the same year the idea competition oft he Global Health Hub Germany (GHHG). The team managed to raise further public funding to support their activities in Madagascar and beyond. Since 2022 mTOMADY is scaling its activities to Ghana.

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KEYWORDS
Accessibility of Care, Affordability of Care, Global South, Healthcare System Transformation, Financial Leakage, Mobile Transaction Platform

2019

3DHISTOPATH

# 3D Histopath: Bringing Histopathology from 2D to 3D

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KEYWORDS
Pathology, 3D Microscopy, Tissue Staining, AI-Software

No cancer diagnosis without histopathology. Histopathology refers to the preparation and examination of tissue samples in order to study symptoms of a disease. However, today's histopathology process is restrained. Information on 2D structures such as blood or lymphatic vessels cannot be seen entirely, and pathologists need to examine the sample via "eyeballing," a process requiring a very high level of specialization.

3D Histopath can address this need by developing an end-to-end histopathology pipeline for improved diagnoses and therapy decisions. The 3D Histopath solution consists of two core components: A staining solution and a software solution. The staining solution includes a new staining technology using Nanobodies able to penetrate large tissue samples much faster than traditional staining agents. The software component in development entails a visualization functionality for pathologists to see 3D structures such as vessels, and an indication-specific AI-based analysis functionality to highlight key sample areas. In the future, other use cases will be implemented. Based on these benefits, 3D Histopath aims to improve and speed up the clinical histopathology process for better diagnoses and therapy decisions. 3D Histopath is currently developed by a medical doctor and researcher in human genetics and his research team at Charité/BIH. The project needed further research and is currently funded by Exist Forschungstransfer.

2019

AKICHECK

Successful Spin-Off

# AKICHECK: Clinical Decision Support System to Identify Acute Kidney Injury

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KEYWORDS
Nephrology, Acute Kidney Injury, Laboratory Test, ICU

1.7 million deaths per year are caused by Acute Kidney Injury (AKI) globally. AKI is a frequent clinical event occurring in up to 20 % of all hospital patients. Patients with AKI have a significantly higher risk of developing or exacerbating a chronic kidney disease. As of today, an early detection tool for AKI is not available.

AKICHECK aims to close this gap of early detection with an easy-to-use tool for rapid and precise kidney function measurements. Translating scientific expertise in kidney function measurements to clinical routine, AKICHECK utilizes a proprietary database, a protocol for contrast agent measurement, and a software to diagnose AKI within the first two to seven hours – reducing the time needed by over tenfold. AKICHECK is easy to integrate into today's clinical workflow everywhere and, given low component costs, promises a step-changing improvement in both patient outcomes and healthcare system performance.

Team AKICHECK unites deep expertise in clinical medicine with focus on nephrology, biomedical and laboratory expertise, biostatistics and machine learning. The project spun off in 2022 as Nephrolytix GmbH to reach their aim to uncover the AKI blind spot.

# ARCAS: AI For Life Sciences, Best Treatment Possible for Every Cancer Patient

Stage 2

2019

Cancer - a disease of the genome - is the second leading cause of death globally. To make cancer treatments more effective it needs to be personalized from diagnosis to treatment. In today's clinical practice, however, the information from the genome is either not used or is used inefficiently.

Team Arcas is building an AI-based diagnostic decision support system for cancer. At the core, the system analyzes complex genomic information: Every cancer biopsy is sequenced not only for mutation detection, but also for large-scale alterations, gene expression, and epigenetic changes. Arcas is using a multi-level deep learning approach to integrate clinical, genomic, and pharmacological data. With this system, Arcas can predict patient cancer subtypes, survival outcomes, and personalized drug response, more precisely. Arcas has shown promising results for colon, breast, and lung cancer.

Team Arcas consists of international experts in the field of bioinformatics, omics data science, from the Institute for Medical Systems Biology at Max Delbrück Center for Molecular Medicine in Berlin and is supported by a season business expert from Pharma industry. Arcas has tested its algorithm with real word data and is currently looking for partnering options with Pharma and Biotech industry.

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KEYWORDS
Oncology, Genomic Data, Artificial Intelligence and Machine Learning, Decision Support Tool

# Open.IU: A Diagnosis and Therapy Solution for Adolescents with Internet Gaming Disorder

2019

In our digitalized world, a rising number of adolescents are affected by internet gaming disorder (IGD). The WHO defines IDG as the inability to stop playing even though it interferes with other areas of a person's life. IGD is a distressing medical condition, which leads to daily life dysfunction, is associated with psychological and psychiatric issues, and thus needs qualified care.

Team Open.IU has developed an online solution to provide diagnosis and treatment of IGD and co-occurring psychiatric conditions to parties involved. Open.IU consists of an online counseling and therapy tool. The tool provides access to licensed therapists and to modules based on cognitive behavioral therapy. This solution is a low-threshold, easy-to-use service, and makes mental health care accessible for everyone at any time.

Open.IU consists of an interdisciplinary team of experts in psychiatric and psychosomatic diseases, diagnostics and therapy for children and adolescents from Charité – Universitätsmedizin Berlin and School of Medicine at Hofstra/ Northwell in New York as well as software developers and designers. In 2020 Open.IU became second at the 'Digitale Gesundheitspreis' sponsored by Novartis and Sandoz.

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KEYWORDS
Internet Gaming Disorder, Mental Health, Addiction, Diagnosis, Therapy, Online Intervention

2019

Stage 2

# PREFREE: For Reducing Uncertainty in Pregnancy – A Decision Support Tool and Home Monitoring Solution

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KEYWORDS
Obstetrics, Preeclampsia, Digital Test, Remote Monitoring Solution

Maternal mortality is unacceptably high. As a leading cause of maternal mortality, preeclam-psia and related hypertensive disorders of pregnancy claim the lives of nearly 76,000 mothers and 500,000 babies worldwide every year.
Prefree is an AI-based decision support tool for physicians to identify pregnant women at risk for pregnancy complications, especially preeclampsia. The solution aims to support physicians to identify the individual risk for preeclampsia, to decide whether to hospitalize patients in need and to allow patients with low risk to return to their homes. The decision support solution will be complemented by a remote monitoring system that enables women returning home to closely monitor their signs and symptoms with their physicians.

Prefree intends to reduce the risk of false diagnosis, to avoid unnecessary hospitalization, and to reduce healthcare costs by patient-centered remote care in the convenience and support system at home.

Team Prefree is powered by medical doctors of the Department of Obstetrics and Gynocology from Charité, machine learning and software development experts as well as business support. In 2022, Prefree has finished its feasibility study, was able to publish it beneath others in the Am J Obstet Gynecol, and is working towards spinning off.

2019

# siloa: Solution for Digital Early Detection of Alzheimer's Disease

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KEYWORDS
Alzheimer's Disease, Early Detection, Digital Test, Real-Time Monitoring

Worldwide, at least 50 million people are believed to be living with dementia; a number projected to reach 82 million in 2030 and 152 million in 2050. Dementia is a syndrome associated with deterioration of memory, thinking, behaviour, and the ability to perform everyday activities. Early detection and lifestyle interventions are believed to improve quality of life.

Team siloa is working on a digital test for the early detection of Alzheimer's disease to intervene in the disease progression. For the test, the team is developing a digital biomarker, combining software-based tests that engage brain areas known to be affected in very early stages of Alzheimer's disease. The test will be initiated by a physician and then conducted by the patients in the comfort of their homes for 15 minutes per day over the span of a month. An Alzheimer's probability score will then be transferred directly to the physician to maximize certainty for their patients and their caregivers. Siloa wants to enable a future where early detection of Alzheimer's disease.

Team siloa consists of clinicians and researchers in geriatric medicine at the Memory Clinic at Charité.

# SUMUS: A Physiotherapy Guide for Patients Affected by Muscle Diseases

Muscular dystrophy (MD) is a progressive condition is often at first affecting a particular group of muscles and then deteriorates them over time. Some types of MD eventually affect heart muscles or breathing-related muscles, at which point the condition becomes life threatening.

In Germany and Europe, only a few physiotherapists are trained to provide this expert service. Patients affected by muscle dystrophy need personalized and engaging physiotherapy to maximize their quality of life and potentially decelerate the progressive condition.

Team SUMUS is developing a virtual physiotherapist tool to engage and correctly guide muscle patients to a well-balanced life with the right amount of training. The individualized training syllabus is devised by a physician and a physiotherapist in close coordination with the patient. Part of the solution is the SUMUS Smartwatch application that tracks any active movement of the patient's arms (initial prototype) in daily life and then suggests to the patient whether to train, which exercises to use, and to what extent. This mutual feedback feeds into a self-learning algorithm to ensure continuous optimization of the patient's fatigue monitoring and training.

SUMUS combines interdisciplinary expertise in neurology, muscle dystrophy diagnosis and therapy research at Charité and MDC, physiotherapy, computer-aided medical robotics, and game-based learning. Sumus is currently in the process of founding a company.


SUMUS

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KEYWORDS
Muscular Dystrophy, Guided Physiotherapy, Digital Health Solution, Home Monitoring

2020 / 2021

AURELIA

# Aurelia: To Monitor Brain Perfusion during Anesthesia and Improve Perioperative Outcomes

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KEYWORDS
Anesthesiology, Perioperative
Monitoring, MedTech

During surgery, the anesthesiologist is the guardian of patient safety and protects physiological homeostasis. Currently, this is done via various invasive and non-invasive devices that monitor physiological biosignals. Unfortunately, millions of patients undergoing mid to high-risk surgery experience perioperative complications, which only emerge later after the anesthesia wears off.

Although the anesthesiologist is equipped with multiple monitors, no system currently exists to track global brain perfusion non-invasively and effectively. Charité Anesthesiology and their technology partner SectorCon have developed Aurelia, a prototype sensor-based system that non-invasively tracks brain perfusion. This system can provide vital information and be a powerful asset for the everyday anesthesiologist, enabling them to implement personalized hemodynamic strategies, maintain adequate brain perfusion, and ensure optimal physiological homeostasis.

Project Aurelia is powered by an interdisciplinary team of anaesthesiologists that are pushing for pioneering the development of non-invasive anesthesia monitoring for the digital age. Aurelia aims to be the go-to solution in every operating room to reduce perioperative complications. The team went back to conduct further research on the tech and modeling side.

2020 / 2021

DAGI

# DAGI: Keeping Your Child With Congenital Heart Disease Safe at Home

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KEYWORDS
Pediatric Cardiology, Congenital,
Heart Disease, Remote Monitoring

Congenital heart disease is the most common birth defect in humans, affecting 1 in 100 newborns. Advances in cardiovascular medicine and surgery have led to a steep decline in mortality in Western Europe in the past three decades. Improved survival leads to new challenges: Children with the most severe heart defects need close medical surveillance and therefore stay in hospital for several weeks, months, or even years. This prolonged hospitalization is associated with significant costs for health insurances, hospitals, as well as a high emotional burden for affected children and their families.

In order to improve care for these vulnerable patients, we are developing a remote patient monitoring app called DAGI, facilitating earlier discharge and ensuring medical surveillance at home. The DAGI app is tailored to the specific needs of patients with congenital heart disease and combines daily monitoring of vital parameters, medication plan, information & chat function with a state-of-the-art interface for health professionals.

Our mission is the improvement of medical care and quality of life for children with congenital heart disease. Our executive team combines passion for medical innovation with world leading clinical and scientific expertise.

# MetaboKin: A Virtual Cell for Modeling Liver Metabolism

2020 / 2021

Successful Spin-Off

MetaboKin

Non-alcoholic fatty liver disease (NAFLD) affects more than 25 % of the world's population. Metabolic syndrome manifests in the liver as NAFLD and develops into more severe disorders like non-alcoholic steatohepatitis (NASH). Despite pharmaceutical companies' significant efforts in recent decades, there is still no available drug treatment for NASH.

Team MetaboKin has developed virtual cells that simulate central metabolism with kinetic properties from approximately 400 metabolic enzymes and transporters. Over the last four decades, biochemists gathered kinetic data which, today, enables realistic in silico representations of organ metabolism.

MetaboKin is the ideal tool to characterize metabolic changes in NASH, improve drug target identification, further differentiate between mechanisms of action, and support patient stratification. The tool analyzes proteomics data from tissue samples and provides functional insights into central metabolic pathways, which enables the comparison between clinical and pre-clinical samples. The project spun off in 2022 and is offering services in the field of next-gen proteome profiling for diverse disease areas.

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KEYWORDS
Proteomics, Metabolism, Kinetic Models, Simulation, NASH, Pharma R&D

# MutationSearch: Making Whole Exome Sequencing Accessible

2020 / 2021

Stage 2

MUTATION SEARCH

Whilst most of the 6,000+ single gene disorders are rare, more than 200 million humans suffer from any of them. Due to their rareness, they are difficult to diagnose.

High-throughput sequencing technologies such as Whole Exome or Genome Sequencing (WES/WGS) allow the identification of disease-causing DNA mutations with a single assay. With the falling costs of these approaches, they will become a routine diagnostic procedure in the very near future.

With MutationSearch we aim to bring WES/WGS to clinics and industry, as a one-stop shop for the discovery of the molecular causes of genetic disorders. We will provide certified software that analyses raw data from DNA sequencers, finds variations from the reference genome (~40,000/patient in WES and ~4,000,000/patient in WGS), and predicts their pathogenicity, even without a clinical diagnosis. Medical doctors can provide as much information about the patient's phenotype as they have, thereby allowing the software to focus on variants in genes which are likely to cause the disorder. MutationSearch will automatically print a report including all information needed by physicians for a molecular diagnosis.

Our interdisciplinary team combines expertise in bioinformatics, computer science, molecular medicine, biochemistry, and machine learning. The team is currently working on their business case and is looking for partnering possibilities with industries in the field of whole genome sequencing.

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KEYWORDS
Whole Exome or Genome Sequencing (WES/WGS), Bioinformatics, Translational Genetics

2020 / 2021

# MyaLink: A Monitoring Platform Solution for Orphan Diseases in Neurology

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KEYWORDS
Remote Monitoring, Telemedicine, Digital Platform Solution, Myasthenia Gravis, Orphan Disease; Empowerment

Team MyaLink has developed a solution to provide better care for patients with neurological orphan diseases. MyaLink believes that every patient—no matter the rarity of disease—should have access to a specialist when they need one. Physicians should be able to monitor patients over time and react to acute events when necessary.

The team has developed a platform solution for neurological orphan diseases that remotely monitors patients' vital parameters and tracks their condition daily. Over time, physicians can get a better overview of disease progression, rather than a quick snapshot during an in-person visit. MyaLink can help prevent expensive crises and ICU stays through the early detection of severe situations. The real-world data can also be very valuable for novel orphan drug development and post-market surveillance.

MyaLink is powered by a team of neurologists and researchers and is part of the largest nationally certified integrated myasthenic center in Germany. MyaLink works with German Myasthenia Association. MyaLink won the Health-i Award 2021 powered by TK and Handelsblatt.

2020 / 2021

# PerMitrA: Optimization Tool for Heart Valve Surgery

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KEYWORDS
Heart Valve Surgery, Artificial Intelligence, Therapy Simulation, Decision Support Tool

In Europe, mitral valve regurgitation is a heart condition that affects 2.4 % of adults over age 40. As the heart contracts, blood flows into the systemic circulation, but for those with this condition, blood also problematically flows backward into the atrium because the valve can no longer close. As the condition progresses, heart failure and dyspnea are the consequences. The standard therapy is surgery. Here, annuloplasty rings can be used to reduce the valve's diameter to allow the valve leaflets to close again.

PerMitrA was developed to support surgeons' choice of the optimal ring model/size, streamline clinical decision-making, and improve patients' outcomes postprocedure. PerMitrA combines image-based models of a patient's unique heart structure with digital models from commercially available annuloplasty rings. The key technology is a fast geometric simulation that shows how a particular ring model would change the anatomy of a patient's heart. This tool allows surgeons to simulate personalized strategies before surgery and to visually demonstrate them for discussion, both with the team and with the patient.

PerMitrA is powered by a team of cardiac surgeons and AI experts with complementary core competencies and a shared understanding of how to improve cardiac interventions. Due to liability questions on the legal and procurement side, the development path turned out not to be feasible.

2020 / 2021

QoL-O-Mat

# QoL-O-Mat: Establishing a Health-Related Quality of Life Software-As-Service Assessment Platform

The German PROMIS® National Center is presently projected to provide more than 27,000 Patient Reported Outcomes assessments in the next 5 years. It has become evident that the unmet need is the lack of a proficient software solution. In 2016, the PI established the GPNC at the BIH-Charité. This implies, in cooperation with the US Department of Mental Health and PROMIS® Health Organization (PHO), the FDA validated translation of >1200 questions for over 30 domains of life into German, the establishment of the German PROMIS® National Center and exclusive distribution rights for German speaking countries.

The lack of a proficient software-as-a-service solution for PROMIS® has become evident in cooperation with industrial and non-industrial partners with hospitals and patient advocates alike. This is critical, as the PROMIS® system is the only system that validly assess people of all ages, diseases and nations alike (presently translated into English, Dutch, Spanish, Chinese and German), efficiently. The NIH and FDA ratify and prefer PROMIS®, but quality standards apply also to the mode of assessment and presentation in German for old and young alike.

The QoL-O-Mat Team has been working on building a software solution to fill the gap to collect real word evidence on the QoL in Germany. The team is currently working on translating and validating patient repoted outcomes further and clarifying legal pre-conditions.

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2020 / 2021

Stage 2

rAIdiance

# rAIdiance: AI-Based Radiology Solution to Improve ICU Care

Radiographs play an important role in answering diagnostic questions in medicine. In the intensive care unit, patients may receive a new radiograph every day. However, if expertise is lacking, the error rate is correspondingly high. It would be desirable if the radiologist would immediately assess every image, but this is not the case in many hospitals. As a result, on-site medical staff who do not have the knowledge of a radiology expert must perform image interpretation.

With the AI tool developed, team rAIdiance aims to help physicians in the intensive care unit with image interpretation when radiologic expertise is not available. The goal of team rAIdiance is to make physicians better and more confident in analyzing radiology images. We are developing an AI solution to help image interpretation by highlighting important image areas and quantifying findings, particularly focusing on the intensive care unit.

rAIdiance is an interdisciplinary team of experts with several years of experience in radiology and AI development. rAIdiance technology is based on a high quality annotation set of over 4.000 images so far. The team is looking for interested parties in their thechnology stack.

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KEYWORDS
Radiology, AI, Decision Support Tool, ICU, ER, Medtech

2020 / 2021

Stage 2

# Recovery Cat: Keeping Patients with Chronic Mental Disorders Safe

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KEYWORDS
Psychiatry, Remote Monitoring, Mental Health, Chronic Mental Illness, Decision Support Tool, Digital Therapy, Adherence

Recovery Cat is a digital application providing decision support for outpatients with severe mental diseases (schizophrenia, bipolar disorder and recurrent depression) and their physicians. Unfortunately, many drugs only work for a few patients. For the clinical decision whether a patient responds to a drug and the treatment should therefore be continued or changed, physicians have to disentangle the time course of life events, symptoms, side effects and drug intake.

Recovery Cat provides a digital decision support tool for outpatients with severe mental disorders and their physicians to achieve more collaborative and data driven decisions. By tracing patients' individual target symptoms, drug intake and side effects, Recovery Cat aims at early detection of non-response, side-effects, and determining patients at risk. Recovery Cat is a customizable patient monitoring and therapy support app in its core and is directly integrated into a running therapy. It enables patients and doctors to make a decision together with the help of the evaluation dashboard. It helps patients and doctors to closer collaborate in finding the right medical treatment fast. Recovery Cat is a highly interdisciplinary and experienced team from psychiatrists, psychotherapists, product strategists, over techies and UX/UI designers. The product is currently tested in a feasibility study in two psychatrics clinics, whilst the team is preparing its company company foundation, and is actively fundraising.

2020 / 2021

Stage 2

# TimeTeller: Circadian Clock Profiling for Timing Treatment in Cancer

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KEYWORDS
Circadian Clock, Oncology, Computational Biology

The circadian clock is our internal time-generating system that rules our sleep/wake cycles and molecular processes like metabolism and cell division. We all have our own personal circadian clock, which means metabolism and cell division happen at different times of day for each of us. Furthermore, over 50 % of FDA-approved drugs target 24h-rhythmic genes, but currently these circadian rhythms are not taken into consideration in clinical care.

The TimeTeller team has developed a non-invasive method to profile the personal circadian rhythm using an easy, risk-free at-home test, you send your samples to TimeTeller for analysis and predicting the optimal time windows for a given drug.

The TimeTeller platform can ultimately be applied across clinical indications, from cancer to neurodegenerative diseases, diabetes and more, from pharma to clinic. The team is currently participating in clinical studies on ovarian and colon cancer and started studies in the field of pedriatic leukemia and Parkinson's Disease.

Team TimeTeller combines the expertise of systems- and molecular biologists, computational scientists, a clinical trials assistant and a product developer. Timeteller is currently running a feasibility study at the Charité. Furthermore, the team is actively fundraising, looking for partnering in Pharma, and preparing to spin-off by the end of this year.

# WePath: A Platform-Based Global Network for Pathology Expertise

Pathology is the study of human disease, and this specialty is therefore central to medicine. In recent years, the workload of pathologists has steadily increased, and the complexity of their work is going up because of precision diagnostics and personalized therapies. The number of oncology studies with a need for histopathological expertise is rising.

The WePath platform helps the pathology community to use these new opportunities by providing instant access to the collective expertise worldwide. This takes pathologist collaboration to an entirely new level where incoming and outgoing cases together with integrated real-time or asynchronous conversations are available at their fingertips.

At the same time, this community also opens up entirely new, vast potential for conducting preclinical and clinical trials as well as for the clinical validation of AI solutions. For digitized studies, cases and their specimens together with the generated data are available and fully managed within the platform. This minimizes the organizational burden and assures regulatory compliance. At the same time, pharmaceutical and AI software companies gain reliable access to the clinical expertise of human diagnostic pathologists in all subspecialties, regardless of workload and time constraints.

In the interdisciplinary WePath team, pathologists, mathematicians, biochemists and computer scientists are working together to build the WePath platform.

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KEYWORDS
Pathology Diagnostics, 24/7
Expertise, Platform, Digital Trials, AI
Validation

# Notes

# NEXT CALL FOR APPLICATION IN FALL 2022!

Stay up to date:

**www.bihealth.org/de/digital-labs**

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