



Life Sciences Report 2024 | 2025

Biotech | Pharma | Medtech | Digital Health
in Berlin-Brandenburg

THE GERMAN CAPITAL REGION
excellence in life sciences & healthcare



HealthCapital
BERLIN BRANDENBURG

Joint cluster management for a strong healthcare region

The management team for the HealthCapital Berlin-Brandenburg Cluster at Berlin Partner for Business and Technology and Economic Development Agency Brandenburg (WFBB) is driving forward networking and technology transfer. Furthermore the team is supporting regional companies and international corporations interested in relocating their business, research, or development to the German capital region.

For more information about the cluster HealthCapital Berlin-Brandenburg: healthcapital.de
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HealthCapital Berlin-Brandenburg: Top life sciences location with high impact on global health

The future of health and medicine holds immense promise but is not without challenges. We now have the opportunity to provide patients with more efficient and personalized treatments. However, we face limitations in financial resources and skilled professionals. It's clear that modern life sciences, the smart use of data, and artificial intelligence will be key to achieving better outcomes.

Today's Life Science Report 2024|2025 allows us to confidently state: Germany's HealthCapital is ready to grow and will become an even more significant life sciences hub. Life sciences companies based in Berlin-Brandenburg are responding to new and emerging markets by making strategic investments in expansion and innovation. These investments not only enhance their international competitiveness but also reflect a shared commitment to advancing the life sciences sector as a whole.

Cell and gene therapies have the potential to profoundly reshape medicine. They offer new opportunities to treat previously incurable diseases and significantly improve patients' quality of life. As research and technology progress, these therapies are becoming safer, more effective, and more accessible, signaling a bright future for healthcare. Berlin is positioning itself as a leading hub for these advances in Germany and Europe. This was highlighted by two significant milestones: In June 2024, the Berlin Institute of Health at Charité (BIH) presented the National Strategy for Gene- and Cell-Based Therapies, and shortly afterward,

Charité and Bayer unveiled their vision for a Translational Center for Gene and Cell Therapies to key federal and regional leaders including the Federal Chancellor and Berlin's Governing Mayor.

Our newest Life Sciences Report for Berlin-Brandenburg offers an impressive overview of the region's dynamic and innovative ecosystem. It highlights six key areas with particularly strong research and translation activities: in addition to cell and gene therapies, we focus on computational biology and medical informatics, precision diagnostics, medical technologies, digital health, and technologies for prevention, rehabilitation, and care.

We firmly believe that success in the global healthcare industries depends on finding the right partners to transform new knowledge into innovation. We are dedicated to supporting our partners and further expanding the region's international presence, ensuring Berlin-Brandenburg becomes the leading center for healthcare industries and life sciences – both in 2025 and beyond.



Dr. Kai Bindseil

Berlin Partner for Business and Technology

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Excellent framework for innovation and growth

With its unique number of scientific institutions, clinics, infrastructure facilities and the growing number of innovative companies and start-ups, the region offers the best conditions for innovation and economic growth. A key success factor for this development is the close networking between science and business. Together with its international attraction for talent and entrepreneurs, the Berlin-Brandenburg capital region has developed into one of the leading life science regions in Europe.

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Emerging gene and cell therapy hub

Gene and cell-based therapies are regarded as the medicine of the future. Berlin builds on its tradition and excellent biomedical infrastructure to become a hot spot of advanced and personalized therapy approaches. A number of ambitious initiatives aim at establishing a vibrant ecosystem for gene and cell therapies that will further improve the opportunities for start-ups.

19 | Precision medicine / Diagnostics

Precision diagnostics: Deep insights into health and disease

Laboratory-based diagnostics form the backbone of modern medicine. In recent years, a burst of innovation in bioanalytical techniques has opened a new chapter in biological and health research. Ultra-sensitive mass spectrometry, liquid biopsy and single cell analysis: This guide presents innovative approaches and players that drive precision medicine in the Berlin-Brandenburg region.

25 | Data Science / Computational Biology / Medical Informatics**Making biomedical and health data ready for translation**

With its mix abundance of scientific institutes, biotech and IT companies as well as medical institutions, the Berlin-Brandenburg metropolitan region has become a hotspot for computational biology and medical informatics.

31 | Medical technologies / Health technologies**From telemonitoring to precision surgery:
Shaping the future of healthcare with innovative medical devices**

Berlin-Brandenburg is one of Europe's leading medical technology regions. Many products from the mostly medium-sized companies developing and manufacturing medical devices are market leaders in their respective field. This chapter highlights the regional strengths in the areas of orthopedics, cardiovascular medical technology, minimally invasive surgery and hygiene solutions.

36 | Digital Health**Building a unique digital health ecosystem**

Berlin is one of the hotspots for the digital health sector in Germany and Europe. The high density of relevant players along the value chain has led to the emergence of a thriving digital health ecosystem. Numerous health tech start-ups and established industry players can benefit from the excellent research and clinical landscape. They are all united by the goal to bring a clear benefit to patients, caregivers and healthcare professionals.

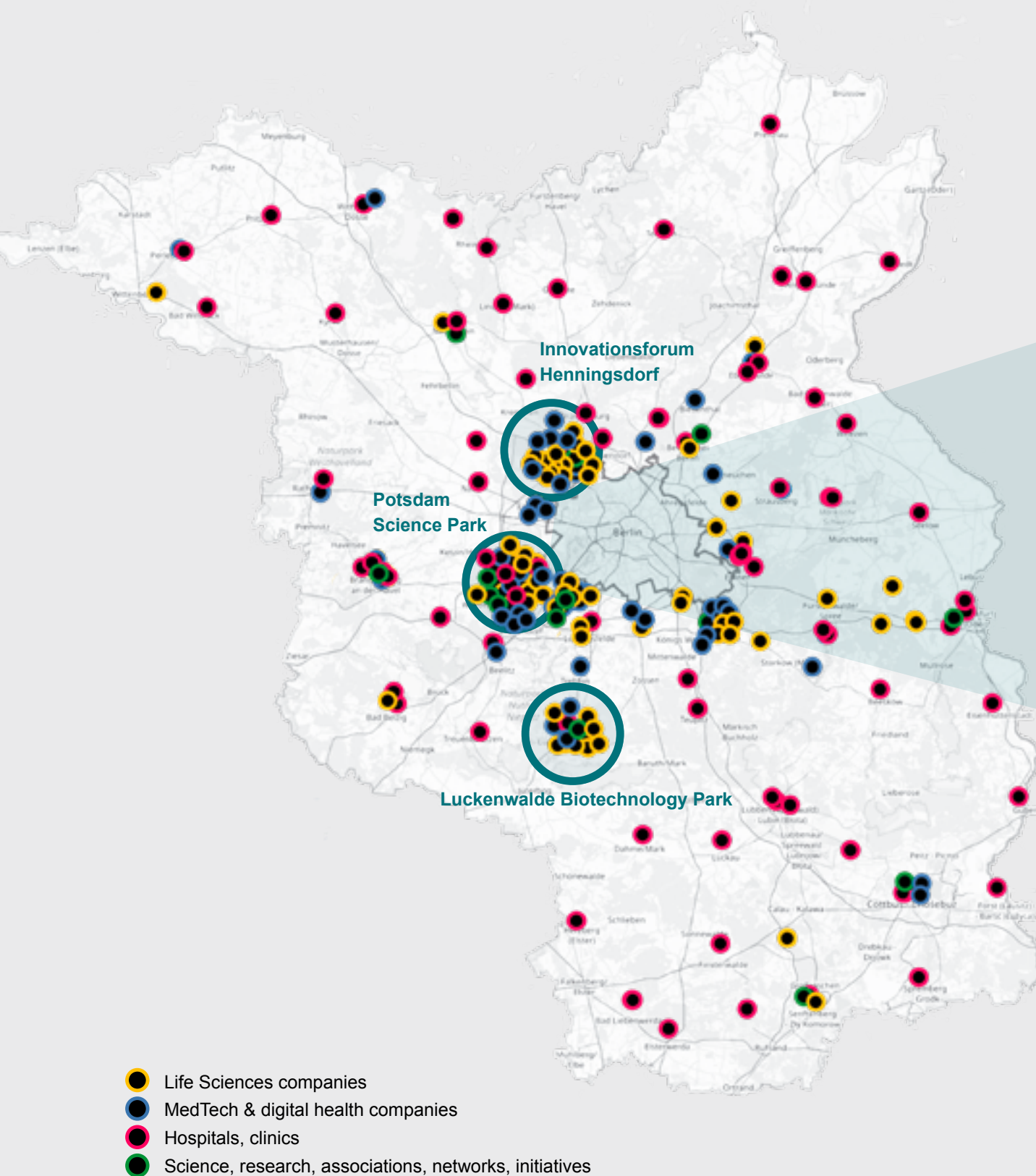
42 | Innovative technologies in prevention, rehabilitation and care**Smart tools advancing prevention, rehabilitation and care**

Digitalization and artificial intelligence (AI) continue to drive innovation in healthcare. Novel medical devices and digital tools will help to address challenges such as demographic change and the shortage of skilled workers. A growing number of research institutes, clinics and technology companies in Berlin and Brandenburg are working together to develop and to integrate their innovations into the existing healthcare system and lead it into the future.

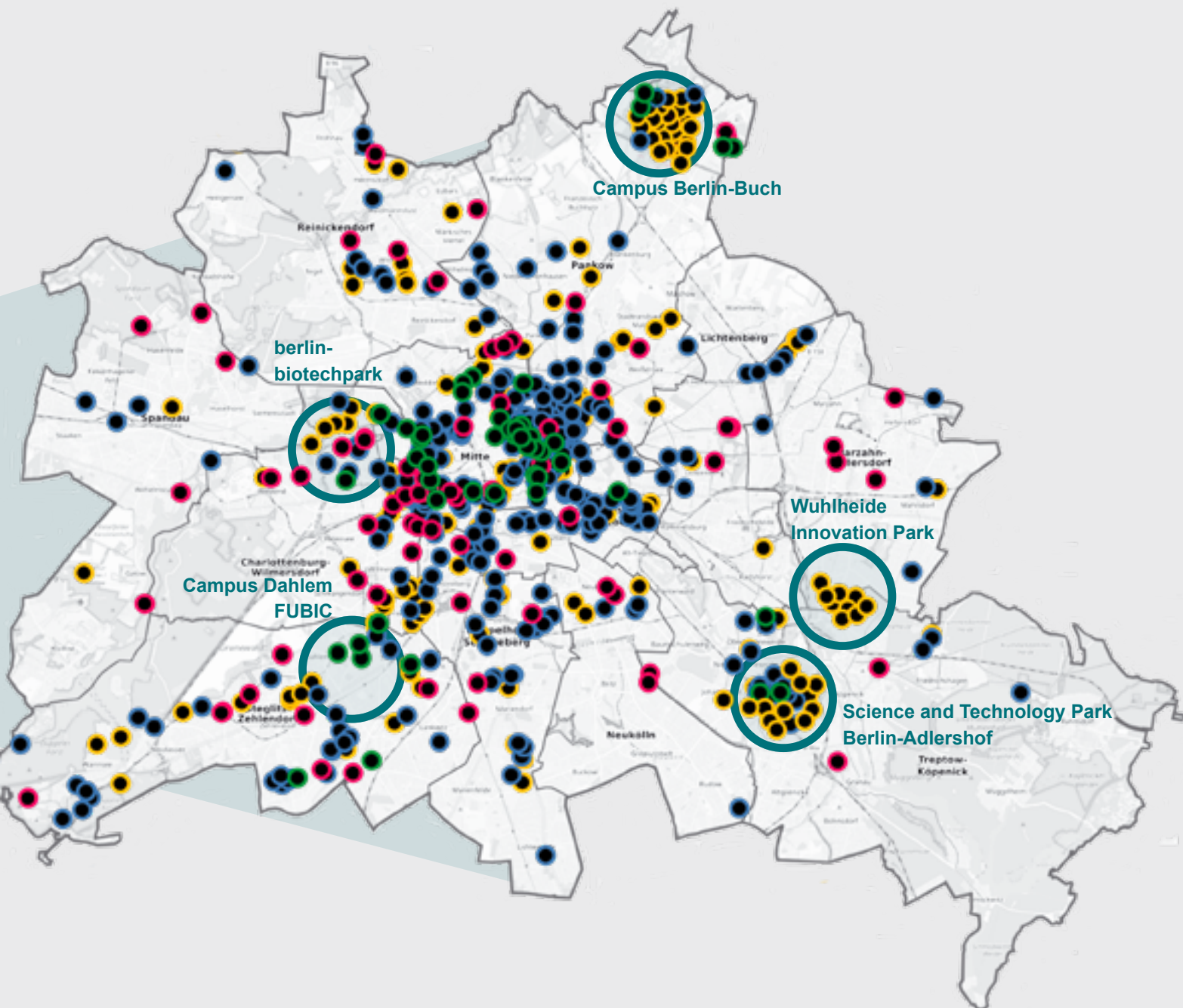
By scanning the QR Code you will find an overview of more than 760 stakeholders of industries, startups and research institutions in the HealthCapital region Berlin-Brandenburg.



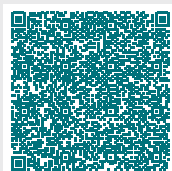
Hotspots of Life Science and Healthcare Industries in Berlin-Brandenburg



Brandenburg



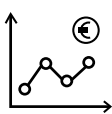
Find our interactive map healthcare industries in Berlin-Brandenburg here.



Berlin Economy Overview Map

- Companies in different sectors
- Universities and colleges
- Associations and political decision-makers
- Infrastructure data

Healthcare Industries Cluster Berlin-Brandenburg – HealthCapital

 Companies¹	~22,000	Largest university hospital in Europe  Charité – Universitätsmedizin Berlin
 Employees²	~410,000	
 Euros in revenue¹	~34 billion	

Sectors³

 Pharmaceutical	 35	 13,000
 Biotech	 303	 8,178
 Medtech & Digital Health	 383	 16,884
	721 Companies	38,062 Employees

 Hospitals ¹	151	 35,142
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Technology parks focusing on life sciences  8	Large research facilities and institutions of higher learning focusing on life science  40	Health-related programs of study (incl. online study programs)  312
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Europäischen Union



POTSDAM
SCIENCE
PARK

Potsdam-Science Park © Standortmanagement Golm GmbH/sevens[+]maltry

Excellent framework for innovation and growth

With its unique number of scientific institutions, clinics, infrastructure facilities and the growing number of innovative companies and start-ups, the region offers the best conditions for innovation and economic growth. A key success factor for this development is the close networking between science and business. Together with its international attraction for talent and entrepreneurs, the Berlin-Brandenburg capital region has developed into one of the leading life science regions in Europe.

Spatial infrastructure – a success story

With a total of eight technology parks in the life sciences, this infrastructure is unique in Germany in terms of its size and diversity. The parks include **berlinbiotechpark Charlottenburg**, **Biopark Luckenwalde**, **Campus Berlin-Buch**, **Campus Dahlem FUBIC**, **Innovationspark Wuhlheide**, **Potsdam Science Park**, **Technologiepark Hennigsdorf** and the **Technology Park Adlershof**. They cover a total area of around 250,000 square metres. Scientific institutes, technology-oriented and research-related companies, as well as start-ups, find ideal conditions at these locations. The companies and start-ups are provided with modern laboratories and rooms to meet their needs, thus contributing to success and growth in the region. The close proximity



Technology Park Adlershof: Forum Adlershof © WISTA Management GmbH/Mathias Schormann

of science and business makes the parks melting pots for interdisciplinary technology development.



Agnes von Matuschka
CEO, Standortmanagement Golm GmbH
Potsdam Science Park Site Management

“At the Potsdam Science Park, we are committed to expanding this thriving innovation hub for Life Sciences and Biotechnology in the capital region. 53,000 square meters of state-of-the-art lab space are currently in development; our neighbourhood is a growing innovation district. Next to our world-class Fraunhofer and Max Planck research and the University of Potsdam we will establish up to 100 forward-thinking businesses and start-ups and create 1000 jobs. We support our research and entrepreneurial community with tailored community services, events, knowledge transfer as well as access to funds for growth and development.”

© Standortmanagement Golm GmbH/sevens[+]mally

This success story is set to continue, as demand for additional space grows and sites will continue to expand and invest in new facilities. The new **BerlinBioCube** building complex on the Berlin-Buch campus has created 8,000 square meters of space for around 400 new workplaces specifically for start-ups and spin-offs, primarily from the local scientific institutions. Over the next few years, the **FUBIC** will be set up as a new location in close proximity to Freie Universität Berlin, which will create a further 50,000 square meters of new space for life science companies. The first office and laboratory building, named **FUHUB**, was inaugurated in 2024, marking a first milestone.

With **Hybrick Berlin**, a completely new location for the life sciences is being created in Marienpark in the south of Berlin. On more than 20,000 square metres, Hybrick Berlin will be part of an innovative quarter for urban working environments and a platform for the establishment of modern, future-proof and sustainable business models.

There are already concrete expansion plans for the coming years at the berlinbiotechpark Charlottenburg, Potsdam Science Park with the building projects iQspaces, THE SODA and QUADRATUM POTSDAM and Technologiepark Hennigsdorf locations.

In addition to these expansions, smaller locations with a technological focus are being created: the **SEE:LAB** (the ‘Competence Centre for Biomaterials Teltow-Seehof’), which focuses on the development of new biomaterials and covers over 2,000 square meters; and the **Chemical Invention Factory**, of similar size, which focuses on green

chemistry at the Technische Universität Berlin. These sites are intended for spin-offs from their respective fields.

Technology transfer as a success factor

The exchange of ideas, knowledge and technologies is a key success factor for the ability to innovate. The transfer of knowledge and technology between science and industry is of particular importance here. A functioning technology transfer is a key factor for new products, services and sustainable growth.

With more than 40 life science research institutions, the region has outstanding potential and offers local companies a wide range of points of contact for joint developments. These include, to name but a few, the **Charité - Universitätsmedizin Berlin**, the **Brandenburg Medical School Theodor Fontane**, the **Berlin Institute of Health (BIH)**, the **Max Delbrück Center for Molecular Medicine in the Helmholtz Association (MDC)**, the **Robert Koch Institute**, the **Deutsches Herzzentrum der Charité (DHZC)** and other renowned **Fraunhofer**, **Helmholtz**, **Leibniz** and **Max Planck Institutes in Berlin and Brandenburg**.

All institutions have specialised contact points and platforms for translating scientific research and for targeted networking with the industry.

For example, the task of the **ECRC (Experimental and Clinical Research Center)**, a joint development platform of the MDC and Charité Berlin, is to expand and strengthen the interdisciplinary activities between basic and applied research clinicians/scientists while shortening the path from discovery to clinical application. These core activities are pursued in 88 independent research groups and supplemented by twelve clinical research groups.



Berlin BioCube © Peter Himsel/Campus Berlin-Buch GmbH



FUHUB Berlin © Studio by Zeynep Oba

The planned **'Berlin Center for Gene and Cell Therapies'**, a cooperation between Charité – Universitätsmedizin Berlin and Bayer AG, aims to make the treatment options of these groundbreaking technologies available to patients more quickly and at the same time establish a leading biotech ecosystem for novel therapies in Berlin. The center aims to accelerate the transfer by supporting start-ups in bringing their innovative approaches for gene and cell therapeutics into clinical development. To this end, an incubator with fully equipped laboratory space and a production area certified according to Good Manufacturing Practice (GMP) standards is planned.

Another notable translation platform is the **BIH Digital Health Accelerator (DHA)**, whose program is unique in Germany. The aim is to develop new digital health solutions together with researchers and clinicians from Charité, as well as users and other institutions. The spectrum ranges from clinical support systems, in-silico diagnostics and digital therapeutics to augmented/virtual reality applications.

In addition to these representative institutions, the scientific institutions and clinics as a whole offer a variety of excellent cooperation opportunities for companies to further develop and exploit their products and technologies with academic expertise in close cooperation with the companies. This is reflected in the large number of joint projects between science and industry.

Focused support for start-ups

With more than 500 start-ups founded every year, the capital region is Germany's undisputed start-up metropolis and is extending its nationwide lead. The capital region is particularly attractive to founders from the creative industries and the technology sector.

The starting conditions are favorable: Berlin attracts young, highly qualified people from all over the world. The high quality of life with a comparatively low cost of living, the vibrant scene with a wide range of networking opportunities, the venture capital landscape and the international environment are good reasons for young entrepreneurs to realize their business ideas here.

Start-ups from the life sciences sector also benefit from this start-up dynamic, with new companies in the biotech and medtech sectors and an increasing number of digital health start-ups emerging every year. They can draw on a wide range of support services to professionalize and accelerate the start-up process.

There are over 100 accelerators, incubators and coworking spaces that support start-ups in the early stages, many of which specialized in the life sciences. For example, the **Vision Health Pioneers Incubator**, a Berlin-based early-stage start-up program, supports first-time founders with a



“At RoX Health, we are proud to be part of the vibrant Health & Life Sciences ecosystem of the German capital region, which provides an ideal environment for entrepreneurs in the digital health space. As a startup innovation studio and a subsidiary of Roche, we have been privileged to support promising young startups in achieving successful launches and have also built and founded our own ventures. The dynamic nature of Berlin's ecosystem fosters collaboration, innovation, and growth, making it a key hub for advancements that drive improvements across the entire healthcare system.”

Dr. Olivier Flückiger
Co-Founder & Chief Medical
and Market Access Officer at RoX Health GmbH

focus on health with training, free coworking spaces, business opportunities and grants.

Another example of the variety of support services is **RoX Health**, which helps start-ups to make digital healthcare solutions available to everyone. Together with partners, start-ups in the fields of oncology, neurology and women's health are supported in organizational and portfolio development, market access and commercialization.

In addition to the private accelerators/incubators, scientific institutions also offer a wide range of services for academic spin-offs. For example, Berlin's universities have bundled their start-up support in the 'Science & Startups' initiative. **'Science & Startups'** offers access to the joint programs and resources of Berlin's universities for the successful founding and development of companies. These resources include innovative research, infrastructure, incubator rooms, scientific mentors, knowledge exchange with co-founders, funding and coaching.

The **SPARK** program at the BIH also deserves special mention. SPARK is a mentoring program that supports early-stage academic inventions through training, mentorship and funding. Its aim is to accelerate the translation of academic inventions into outstanding medical products, including novel drugs, repurposing drugs, advanced therapy medicinal products such as cell and gene therapies, diagnostics and medical devices.

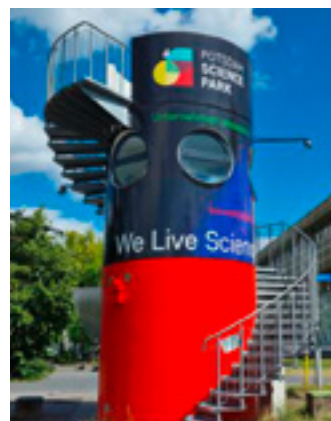
Commercializing innovative ideas naturally requires funding. The capital region is exceptionally positioned for this. The attractiveness of the location has not only drawn many

VC companies to Berlin, but many international investors also recognize the location as an investment destination. According to the **EY Startup Barometer Germany 2024**, almost 40% of all German investment capital for startups across the industry, or around 2.4 billion euros, has flowed into Berlin. This alone is impressive proof of the attractiveness and innovation potential of the location. Two public institutions have made an important contribution to this. The two **public banks of Berlin (IBB) and Brandenburg (ILB)** play an important role in financing with their funding programs and their investment companies **IBB Ventures and Brandenburg Kapital**. They provide start-ups with the necessary grant or equity capital and supplement these funds with commitments from private investors or even provide initial access to such investors.

Networks create synergies

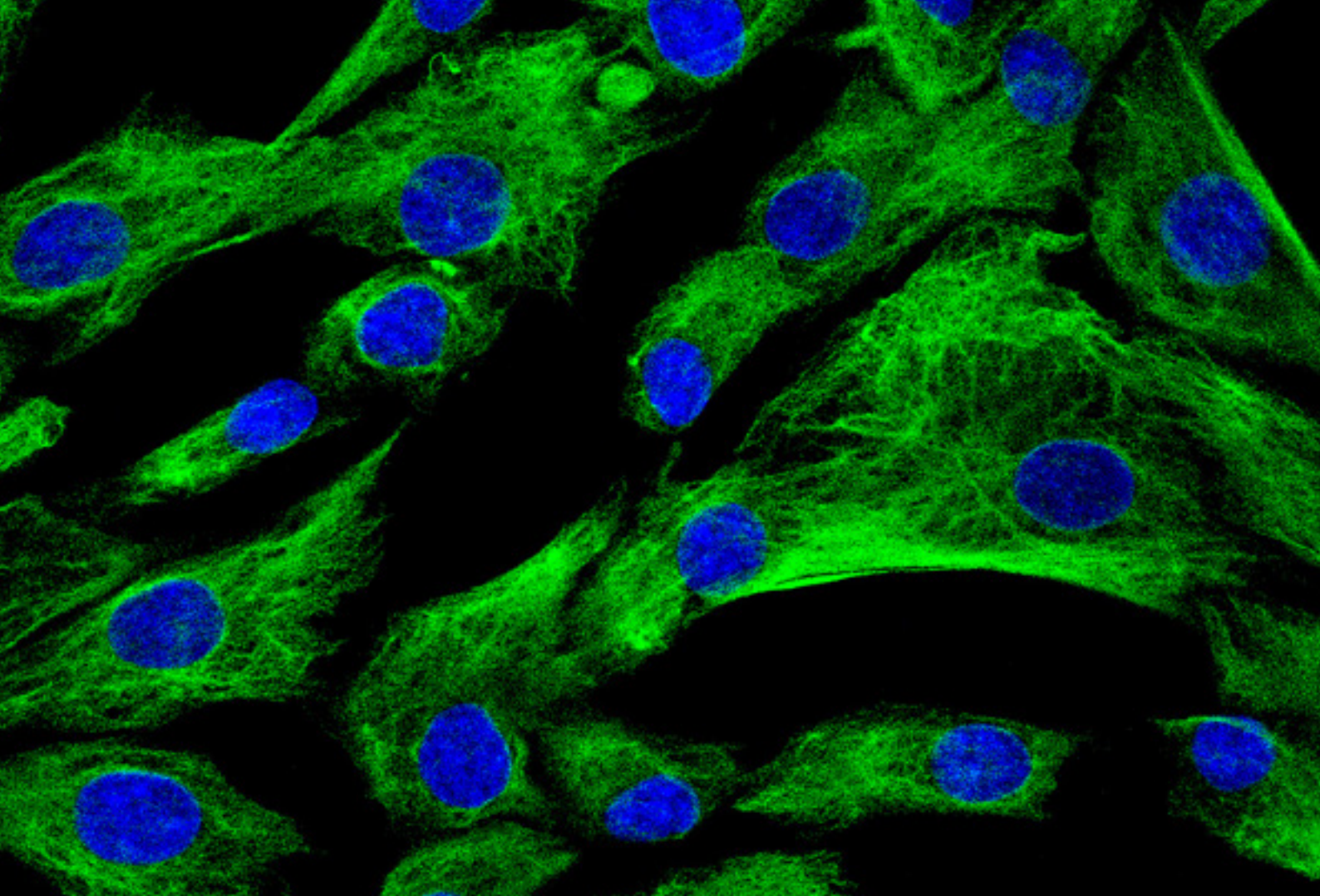
Cooperation networks in the capital region also play an important role in the development of innovations. Many joint networks have been established to intensify the exchange between players from scientific institutions and companies in order to develop new technical solutions and benefit from mutual synergies. In the German capital region, there are a number of topic-specific networks in which players along the entire value chain work together. These include the **Bio-PAT network, DiagnostikNet Berlin-Brandenburg, glyconet Berlin-Brandenburg and NetPhaSol**.

The **IT security network Berlin-Brandenburg** it's.BB, **KI Park e.V., SIBB e.V. and the Digital Urban Center for Aging and Health DUCAH eG** offer interesting contact points and networking opportunities for start-ups in the field of digital and connected health. Medical technology research and development in the capital region benefits from the **Innovation Network for Advanced Materials (INAM)** as well as the activities of the **Network for Additive Manufacturing Berlin-Brandenburg (AMBER) and MGA Medical - Mobility goes Additive e.V.**



Tiniest office: Potsdam Science Park tower © Standortmanagement Golm GmbH/Karen Esser

The combination of entrepreneurial spirit and established industry as well as the extensive networking between science and business provide an exceptional infrastructure for innovation and business growth in Berlin and Brandenburg.



PHSats: Primary Human Satellite cell derived muscle stem cells © Dr. Eric Metzler, MyoPax

Emerging gene and cell therapy hub

Gene and cell-based therapies are regarded as the medicine of the future. Berlin builds on its tradition and excellent biomedical infrastructure to become a hot spot of advanced and personalized therapy approaches. A number of ambitious initiatives aim at establishing a vibrant ecosystem for gene and cell therapies that will further improve the opportunities for start-ups.

Gene and cell therapies (GCT) are among the most important innovations in biomedical research and modern health-care. They have the potential to fundamentally change the way cancer, autoimmune diseases, neurodegenerative diseases and many rare genetic diseases are treated. Their remarkable efficacy in diseases with great medical need has spurred the interest of the pharmaceutical industry and has also attracted the attention of the capital market.

Because each therapy is a complex procedure tailored specifically to the patient, cell therapy developers still face numerous challenges. While basic research and application-oriented technology development for GCT are already being successfully carried out in Germany, the translation, i.e. the transfer of promising research approaches from research and development to patient care, remains a particular challenge. As a location that is home to nationally

and internationally esteemed institutions for biomedical research and the health industry, the Berlin-Brandenburg region offers an excellent environment for an emerging ecosystem paving the way for the next generation of cell and gene therapies.

Excellent infrastructure in healthcare and biomedical research

The only cell therapy that has been in clinical routine use for decades is blood stem cell transplantation in order to treat blood cancers such as leukemia. There are three big hospitals in Berlin and three in the Federal State of Brandenburg that have specialized in this procedure. One of the biggest stem cell transplantation centers in Europe is the **Stem Cell Facility of Charité – Universitätsmedizin Berlin**.

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Prof. Dr. Maïke Sander, Scientific Director and Chair of the Board of Directors of the Max Delbrück Center

“Molecular and cell-based approaches are central to biomedical research at the Max Delbrück Center. As a leader in innovation, we continuously adapt and advance new technologies to tackle challenges related to human disease.”

Recently, another cutting-edge approach has become available at a number of clinics at the Charité: CAR-T cells. Here, the patient's own immune cells are genetically modified so that they are able to recognize and combat cancer cells.

The mission of the **Berlin Institute of Health BIH** as the translational research unit at Charité is to translate findings from biomedical research into such novel approaches that enable personalized prediction, prevention, diagnostics and therapy. On behalf of the Federal Ministry of Education and Research (BMBF), the BIH has developed the **National Strategy for Gene and Cell-Based Therapies (GCT)**. Resulting from a multi-stakeholder process, the strategy sets out specific measures to ensure that the results of basic research are translated into clinical practice more quickly. Around 150 experts from various stakeholder groups have developed the paper as well as a roadmap for improving patient care and strengthening Germany's position in the field of gene and cell-based therapies. Numerous experts from the Berlin-Brandenburg region were involved in the creation of the National Strategy for GCT.

Regenerative therapies seek to use cells transplanted into the patients to restore the impaired functions of living tissues and organs. The **BIH Center for Regenerative Therapies (BCRT)** is an interdisciplinary translational center. Here, several teams are conducting research on the body's own healing processes and developing new therapies and diagnostic tools. Cell-based medicinal products containing living cells which are expanded in the lab and/or genetically modified during manufacture are legally classified as Advanced Therapy Medicinal Products (ATMPs) in the European Union. Bringing these kinds of cell-based therapeutics into clinical practice is the central aim of the **Berlin Center for Advanced Therapies (BeCAT)**.

The **Max Delbrück Center** for Molecular Medicine in the Helmholtz Association is another major player in translational research. “Molecular and cell-based approaches are central to biomedical research at the Max Delbrück Cen-

ter. As a leader in innovation, we continuously adapt and advance new technologies to tackle challenges related to human disease,” says Maïke Sander, Scientific Director and Chair of the Board of Directors of the Max Delbrück Center. Sander, a stem cell and diabetes researcher, emphasizes that the center's mission is to revolutionize the future of medicine by translating cutting-edge approaches like single-cell analyses, genome editing, and cell therapy into clinical practice.

A unique translation center in the heart of Berlin

In June 2024 Bayer AG, together with Charité, unveiled their joint plans for the construction of the **Berlin Center for Gene and Cell Therapies** on the Bayer campus at Berlin Nordhafen. This center aims to accelerate the translation of promising gene and cell therapeutics into clinical care, while creating a leading biotech ecosystem for innovative therapies in Berlin.

To operate the incubator, Bayer and Charité will establish a joint public-private, non-profit company with limited liability. As part of the private-public partnership between Bayer (33% of the shares) and the Charité (67%), a new ten-story building is being constructed, where fully equipped and scalable laboratory space will provide room for 15 to 20 biotech start-ups as tenants. Another core element of the center will be a production area certified according to the standards of good manufacturing practice (GMP). The project is largely funded and supported by the Federal Ministry of Education and Research and the State of Berlin. Together, the partners involved are investing more than 100 million euros in the development of the translation center. Construction is scheduled to begin in 2025, and operations are expected to start as early as 2028.



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“Our vision with the Berlin Center for Gene and Cell Therapies is to establish a biotech ecosystem in the heart of Berlin that brings together numerous players with international appeal far beyond Berlin's borders. We can bring the vision of Boston on the Spree to life here.”

Stefan Oelrich, Member of the Board of Management and President of Pharmaceuticals Division of Bayer AG



“Our combined offering of equipped lab and office space, access to Bayer expertise, and facilitated integration within the broader ecosystem creates a launchpad for early-stage companies who seek physical space and growth acceleration opportunities today.”

Ruth Shah, Head of Bayer Co.Lab Berlin

© Bayer AG

The close spatial connection between research and production planned for the Berlin Center for Gene and Cell Therapies is unique in Germany to date. “Our vision with the Berlin Center for Gene and Cell Therapies is to establish a biotech ecosystem in the heart of Berlin that brings together numerous players with international appeal far beyond Berlin’s borders. We can bring the vision of Boston on the Spree to life here,” said Stefan Oelrich, Member of the Board of Management and President of Pharmaceuticals Division of Bayer AG, at the center’s kick-off event in Berlin.

Heyo Kroemer, Chairman of the Board of Charité, said: “We are convinced that Berlin is the ideal location for this translation center, which is also part of the National Strategy for Gene and Cell-Based Therapies.” The intensified partnership between Charité and Bayer is intended to put Berlin at the forefront of this pioneering technology, both nationally and internationally, he said.

Start-ups working in life sciences and developing innovations today do not have to wait until 2028. Launching in November 2024, **Bayer Co.Lab** will be a purpose-built biotech incubator in Berlin, with a focus on gene and cell therapies as well as breakthroughs in oncology. “Our combined offering of equipped lab and office space, access to Bayer expertise, and facilitated integration within the broader eco-

system creates a launchpad for early-stage companies who seek physical space and growth acceleration opportunities today,” says Ruth Shah, Head of Bayer Co.Lab Berlin.

Start-ups driving the next generation of gene and cell therapies

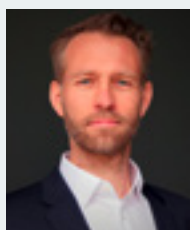
A number of start-ups in the capital region are developing the highly sought-after GCTs. Berlin-based **T-knife Therapeutics** belongs to the dynamically growing club of companies worldwide developing novel T cell immunotherapies to treat cancer. As a powerful alternative to CAR-T cell therapy, the T-knife team is teaching a patient’s T cells to identify cancer cells as invaders by equipping them with new T-cell receptors (TCR). These supercharged T cells can potentially attack even solid tumors. After securing US\$ 110 million in a series B financing round in 2021, the spin-off of the Max Delbrück Center and the Charité has recently refocused its R&D pipeline and is preparing clinical trials. Another player in the T cell immune-oncology space is **Captain T cell** (see info box for more on page 16).

Epilepsy is one of the most common chronic disorders of the central nervous system, but difficult to treat with medication. The start-up **EpiBlock Therapeutics**, founded by Charité virologist Regine Heilbronn and neurobiologist Christoph Schwarzer, has developed a gene therapy that maintains a high level of neuropeptide dynorphin, which is able to suppress seizures only when needed. The team received support for the start-up from the SPARK-BIH initiative, and a 3.3 million Euro funding for the preclinical studies via the GO-Bio program of the Federal Ministry of Education and Research (BMBF). “The GO-Bio funding enabled us to optimize the vector design and validate the final vector format. This allows us to take the next steps: dose determination, GMP production as well as further approval-relevant investigations for the first clinical trial,” says Regine Heilbronn.



Berlin Center for Gene and Cell Therapies: View from Nordhafen on the planned building © Bayer AG

Captain T Cell on track



Captain T Cell is a biotech spin-off from the Max Delbrück Center for Molecular Medicine in the Helmholtz Association. The start-up is developing a toolbox for next-generation TCR-T cell therapies for the treatment of patients with solid tumors. In early 2024, Captain T Cell raised 8.5 million euros in a seed financing round. In addition, the German Federal Ministry of Education and Research (BMBF) is supporting the company as part of its GO-Bio program. In preclinical in vivo models, the start-up has been able to completely eradicate aggressive tumors using their efficacy-enhanced T cells. Felix Lorenz, CEO of Captain T Cell, says: “We are steadfast in our mission to progress our lead candidate towards the clinic and to establish our platform as a leader in off-the-shelf solid tumor therapeutics.” With their location service, financing service and innovation service, the economic development agencies of Berlin and Brandenburg, together with HealthCapital, have supported the start-up from the beginning. In 2024, Captain T Cell moved to its new site in Berlin-Schoenefeld.

© Captain T Cell

In 2022, **BlueRock Therapeutics**, a wholly owned subsidiary of Bayer, began setting up its new site for cell therapy innovation on Bayer’s campus in Berlin, representing the first European site of the company that has its headquarters in Cambridge, United States. A multidisciplinary BlueRock team has been formed to provide clinical development and operational support for Europe. The team will expand as the company’s clinical pipeline of innovative cell therapies progresses. In 2024, BlueRock announced promising data from a phase I clinical trial for its lead candidate Bemdaneprocel (BRT-DA01), an investigational cell therapy for people living with Parkinson’s disease. A phase II clinical trial is in preparation.



Seth Ettenberg, President and CEO of BlueRock Therapeutics



“Berlin is an emerging European hub for pioneering gene and cell therapies,” says Seth Ettenberg, President and CEO of BlueRock Therapeutics. “Our BlueRock site here at the Bayer Campus enables us to extend the reach of our advancing pipeline of novel cell therapies to patients globally.”

© BlueRock Therapeutics

“Berlin is an emerging European hub for pioneering gene and cell therapies,” says Seth Ettenberg, President and CEO of BlueRock Therapeutics. “Our BlueRock site here at the Bayer Campus enables us to extend the reach of our advancing pipeline of novel cell therapies to patients globally.”

Networking initiatives on the European and national level

One of the major challenges for ATMP developers is the fragmented European market, which requires them to clarify the market access and reimbursement in each EU member state. High development costs are therefore accompanied by high approval costs. The EU-funded consortium **JOIN4ATMP** is aiming at improving this situation. It brings leading European players from the ATMP field together. It was launched in 2024 under the coordination of Charité – Universitätsmedizin Berlin, with support from the BIH.



Dr. Elke Luger, Head of Network Office for Gene and Cell Therapies (GCT)

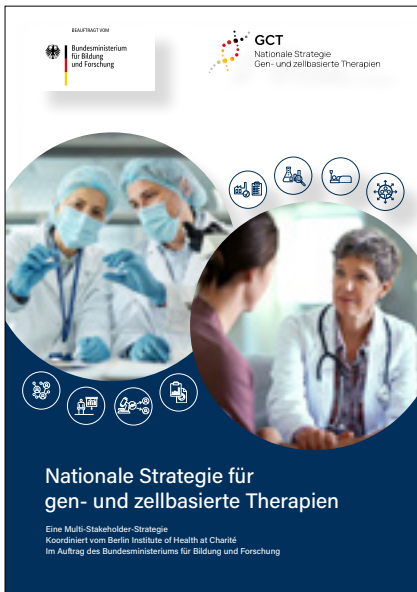


“GeneNovate is designed to empower innovators and entrepreneurs in the field of gene and cell therapies. The program provides both early career and experienced scientists and physicians with sound knowledge in the field of entrepreneurship.”

© Thomas Ratajzyk

The project, slated to receive about three million euros over a three-year period, aims to identify the obstacles standing in the way of these new treatments. “Our goal is to devise concrete recommendations for how patients in Europe can gain access to innovative gene and cell therapies faster,” says Professor Annette Künkele-Langer of the Department of Pediatric Oncology and Hematology at Charité, who is leading the consortium.

On a national level, the **National Network Office for Gene and Cell Therapies (GCT)** was established as part of the National Strategy for Gene and Cell Therapies in 2023. “Our mission is to build a national GCT community, and we see ourselves as a platform for GCT-related communication, information, cooperation matching and events training,” says Head of the Network Office Elke Luger.



National Strategy for Gene and Cell Therapies



From left to right: Ina Czyborra, Franziska Giffey, Prof. Karl Lauterbach, Olaf Scholz, Prof. Heyo K. Kroemer, Astrid Lurati, Kai Wegner, Judith Pirscher, Stefan Oelrich © Bayer AG

How do the stem cell therapy approaches work, which MyoPax has developed as a spin-off from the Max Delbrück Center (MDC) and Charité?

At MyoPax, we originate from a large university specialist Outpatient Clinic for Muscle Disorders and an associated expert translational research group. Our focus is on treating muscle diseases caused by congenital disorders, traumas, gene mutations, inflammatory conditions, or aging. The groundbreaking technology developed at our mother institutes allows us to manufacture highly regenerative muscle stem cells. These cells are capable of building healthy muscle tissue and restoring muscle function in the long term. Our stem cell-based therapies, enhanced with advanced gene engineering when appropriate, are designed to tackle the root causes of these devastating conditions.

What steps in the company's development have been important recently?

Regionally, we have received ProFit funding from the Investitionsbank Berlin and the EU EFRE program. In this start-up program we collaborate with leading researchers and clinicians from the Charité's surgery and neurosurgery departments. This boosts innovation in our specific field and may stimulate the entire ecosystem. Internationally, we succeeded in obtaining the US FDA orphan drug and rare pediatric disease designation, which offers a number of benefits in clinical development and after market approval. It is also our honor to participate in the Bio-Innovation Institute's incubator through our Danish entity,



Three questions to...
Dr. Verena Schöwel-Wolf
 CEO and Co-Founder at
 MyoPax GmbH



© Thomas Rafalzyk

which facilitates early internationalization. And lately, the MyoPax scientists have obtained very compelling preclinical data that further substantiate our therapy platform.

How has Berlin recently developed as a biotech location – also for GCTs?

In academia, there's increasing support for transferring research into tangible products and conducting proof of concept. The Helmholtz initiatives support validation work and business plan development, so do governmental grants and support from foundations like the EKFS. One innovation driver is also the SPARK-BIH program, which has been invaluable to me even personally. The initiative of the Berlin Center for Gene and Cell Therapy is huge and flanked by new start-up platforms like the BioCube (Berlin-Buch campus) and Bayer's Co.Lab. These promising developments reflect the growing biotech sector in Berlin. But they must serve as a catalyst, not a capstone. We only lead in innovation by simplifying bureaucracy, speeding up decisions, and building public trust in innovation.

For example, the team has started setting up a database for the GCT community that will bundle information about clinics, research institutions, GMP facilities and contacts for patients, students, and researchers in an online GCT-Atlas. Another pioneering format pushed by the Network Office is GeneNovate: The first Germany-wide Entrepreneur-

ship program in the field of gene and cell therapies aims at empowering innovators and entrepreneurs in the field of GCT. Berlin, alongside Mainz and Munich, is one of the locations for a pilot of the future entrepreneurship program, with more to come. Interested researchers can apply via regular calls for the program.



T cell attacking cancer (AI generated) © Ben - stock.adobe.com

Other relevant stakeholders from Berlin-Brandenburg:

CARTemis Therapeutics is a spin-off of the Max Delbrück Center in Berlin, developing novel CAR-T cell therapies to treat hematologic malignancies.

CellDot is a provider of biotechnologies needed to obtain individualized pluripotent stem cells suitable for cell therapy.

Cellbricks combines synthetic biology and 3D bioprinting to replicate human tissue.

CheckImmune offers consulting and laboratory services to support clinical development of immuno therapeutics via biomarker studies.

CO.DON: A pioneering developer and manufacturer of personalized cell therapies for the treatment of cartilage defects. Co.don has a production and development site in Teltow.

Emmanuelle Charpentier: The Nobel Prize winner's laboratory at the Max Planck Unit for the Science of Pathogens (MPUSP) continues to drive forward the development of the CRISPR-Cas gene editing system.

German Stem Cell Network (GSCN) pools national expertise in stem cell research and translation and cooperates closely with the Berlin Institute of Health (BIH).

GrOwnValve is a pre-clinical stage medical device company, developing a unique heart valve prosthesis system using patient-donated tissue.

GQ Bio Therapeutics, with its R&D site in Luckenwalde, is focused on the development of gene therapies for the treatment of osteoarthritis and intervertebral disc degeneration.

Hemafund Europe is a start-up establishing an innovative biobank for postnatal human cells and tissues at Wildau.

TheryCell develops and manufactures tumor specific T cells for future individual tumor therapies.

Xolo: Berlin-based specialist in 3D-printing, including printing of cells using a technology dubbed xolography.

Precision diagnostics: Deep insights into health and disease

Laboratory-based diagnostics form the backbone of modern medicine. In recent years, a burst of innovation in bioanalytical techniques has opened a new chapter in biological and health research. Ultra-sensitive mass spectrometry, liquid biopsy and single cell analysis: This guide presents innovative approaches and players that drive precision medicine in the Berlin-Brandenburg region.

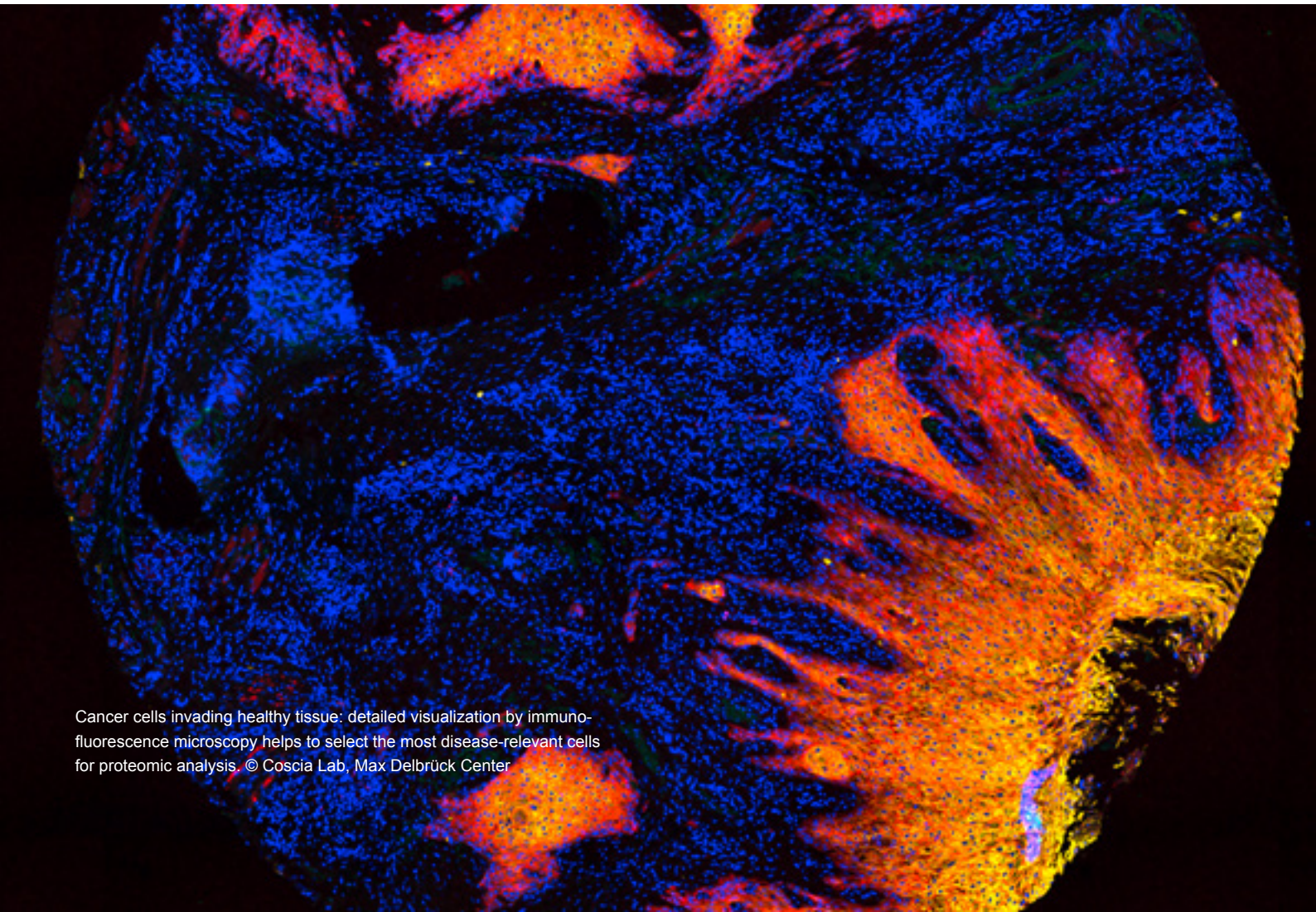
In vitro diagnostics are a crucial part of modern evidence-based medicine. Laboratory-based tests performed on biological samples provide information that is key for the prevention, treatment and management of disease. This is particularly relevant for the concept of precision medicine, which aims at treating patients according to their individual molecular make-up.

Applying a set of top-notch bioanalytical techniques to single cells and integrating this data in a multi-omics approach has opened up new avenues to biomedical research and translation. All these techniques are embedded into the ongoing digitalization and automation of diagnostic laboratories. Players in Berlin-Brandenburg are at the forefront of these developments.

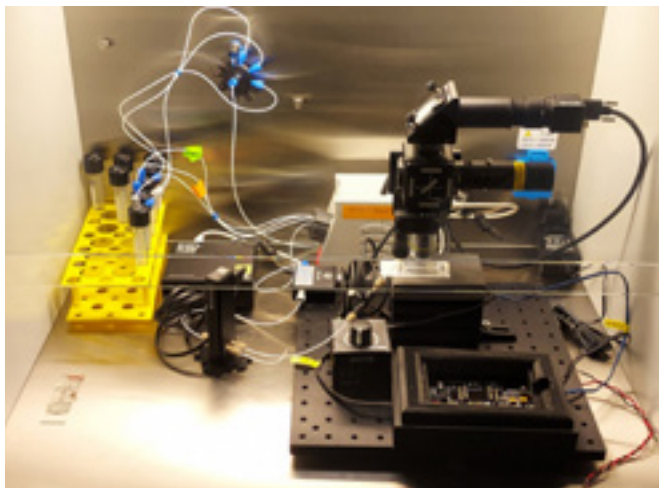
Boosting high-throughput mass spectrometry

Mass spectrometry (MS) enables the analysis of a range of biomolecules. This technique can provide deep insights into molecular compositions, such as the proteome, of individuals under healthy as well as diseased conditions. Recently, MS technologies have taken a major leap in terms of speed, sensitivity and depth of coverage.

To give mass spectrometry in systems medicine a boost, the Berlin research core **MSTARS** has received 10 million euros in funding from the Federal Ministry of Education and Research (BMBF). It is pooling the regional expertise in mass spectrometry for precision medicine and aims to implement these in clinical routines.



Cancer cells invading healthy tissue: detailed visualization by immunofluorescence microscopy helps to select the most disease-relevant cells for proteomic analysis. © Coscia Lab, Max Delbrück Center



Microfluidic system to automate the culturing and treatment of cancer cells
© Dr. Martin Forbes, Proteomics & Metabolomics Platform, Max Delbrück Center

Research teams from the Charité and the Max Delbrück Center are part of MSTARs. The network combines a broad range of complementary proteomic, metabolomic and imaging-based technologies with computational approaches for next-level patient care. The acquired data is integrated to identify biomarkers or signatures that predict the treatment response in each individual patient, with a focus on therapy resistance in cancer and inflammatory diseases. “We are paving the way for high-throughput proteomics and metabolomics approaches that will have a major impact on precision medicine of the future,” says Professor Markus Ralser, Director of **Charité’s Institute of Biochemistry** and one of the four coordinators of the alliance. Apart from promising results in the field of oncology, the proteomics work of MSTARs has also contributed a lot in the fight against COVID-19. For example, proteomic analysis of blood samples taken from COVID-19 patients has revealed markers predictive of disease severity and outcome.



„In MSTARs, we are paving the way for high-throughput proteomics and metabolomics approaches that will have a major impact on precision medicine of the future.“

Prof. Markus Ralser,
Director Institute of Biochemistry at Charité –
Universitätsmedizin Berlin



Prof. Dr. Alexander Meissner
Director at Max Planck Institute
for Molecular Genetics and
Co-Founder of Harbinger Health

“For the early diagnosis of cancer, we look at cancer-specific methylation patterns in the blood. As our liquid biopsy test is not focusing on mutations in a specific DNA region, but on thousands, we have a 1000-fold greater chance of detection in the blood volume taken.“

Liquid biopsy for early cancer diagnosis

Another advanced diagnostics approach that is particularly relevant for precision oncology is liquid biopsy. This minimally invasive technique is used to detect cancer biomarkers via analyzing circulating tumor DNA or cells from bodily fluids. Combined with improvements in omics technologies and AI-enhanced analytics, liquid biopsy provides deeper insights into directing an individual's cancer treatment. Several players in Berlin-Brandenburg have specialized in liquid biopsy technologies and equipment: Potsdam-based **GILUPI** has developed a system to collect and isolate the rare tumor cells from the blood stream. Also active in this field is Berlin-based **Invicol** and **QuIP**, the German service provider for quality assurance in pathology.



Prof. Dr. Nikolaus Rajewsky
Director of Berlin Institute for
Medical Systems Biology of the
Max Delbrück Center (MDC-BIMSB)

“Understanding the spatial relationships among cells in diseased tissues is crucial for deciphering the complex interactions that drive disease progression. We want to translate pioneering technologies like spatial single-cell biology into everyday clinical practice.“

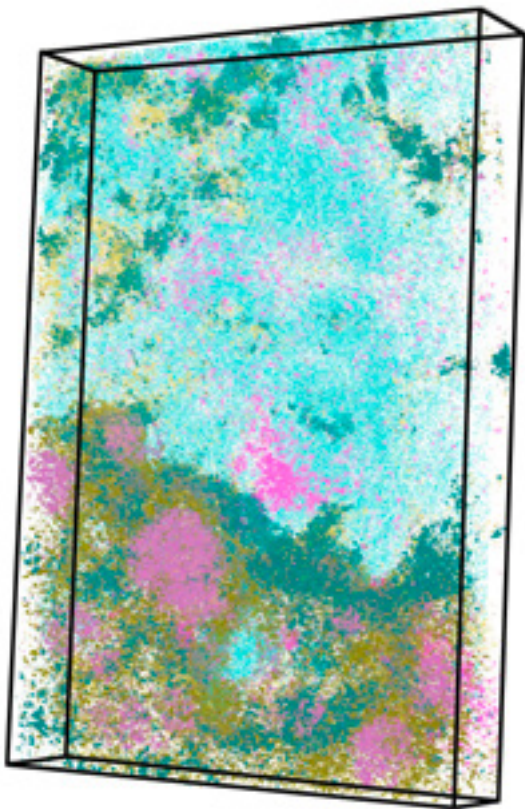


“Our ‘industry-on-campus’ model with Bruker aims to sustainably develop an innovation ecosystem that attracts further technology development and application partners. Several academic and industry organizations are already interested in collaborating.”

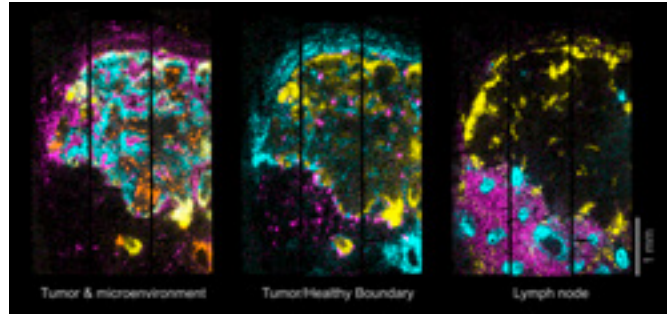
Marie Vidal, PhD-MBA
Industry and Innovation manager at the MDC-BISMB

© MaxDelbrückCenter

Alexander Meissner is a Director at the Max Planck Institute for Molecular Genetics in Berlin. His biotech spin-off **Harbinger Health** based in Boston succeeded in raising US\$ 140 million in funding in 2023. The start-up is developing a liquid biopsy test that detects cancer-specific DNA methylation patterns in the blood. “For the early diagnosis of cancer, we look at certain CpG islands. The DNA of normal, non-cancerous cells is not methylated here at all, but that of cancer cells clearly is,” says Meissner. “As we are not focusing on mutations in a specific DNA region, but on thousands, we have a 1000-fold greater chance of detection in the blood volume taken.” A validation study of the liquid biopsy test with 10,000 patients is currently underway.



3D virtual tissue block. Colors indicate expression of select genes
© AG N. Rajewsky, Max Delbrück Center



2D map of gene expression in the metastatic lymph node

© AG N. Rajewsky, Max Delbrück Center

Spatial biology: Measuring molecular profiles of cells in 3D

A burst of innovation in bioanalytical techniques in recent years has opened a new chapter in biological and health research: Spatial biology – or Spatial omics – is widely heralded as the new frontier in the life sciences. Spatial omics are methods capable of measuring the molecular characteristics of cells in their native 3D context.

Researchers in Berlin are among the driving forces of this revolutionary approach: The **Berlin Institute for Medical Systems Biology of the Max Delbrück Center (MDC-BISMB)** combines single-cell technologies, artificial intelligence and organoid technologies to pioneer the field. Researchers have developed innovative single-cell sequencing and spatial technologies that enable scientists to map cells within tissues in 2D and 3D.



The new “Center of Excellence for Single Cell Omics” will be located at MDC-BISMB in Berlin-Mitte. © David Ausserhofer, Max Delbrück Center

For example, researchers in the Systems Biology Lab of Professor Nikolaus Rajewsky have developed a spatial transcriptomics platform, called Open-ST, that enables scientists to reconstruct gene expression in cells within a tissue in three dimensions. The platform produces these maps with such high resolution that researchers are able to see molecular and subcellular structures that are often lost in traditional 2D representations. Recently published in the top journal *Cell*, the new method opens up entirely new opportunities for discovering reliable biomarkers and therapeutic target molecules. “With Open-ST, we have achieved a completely different level of precision,” says Rajewsky, who is also Director of MDC-BIMSB. The researchers have made the entire experimental and computational workflow freely available to enable widespread use to democratize the technology and accelerate discovery.

Understanding biology and disease at the single-cell level

Bringing single cell technologies into clinical applications started with the joint research focus “Single cell approaches for personalized medicine” of the Berlin Institute of Health (BIH), Charité and Max Delbrück Center. Back in 2020, the Berlin partner institutions laid the foundation by jointly recruiting four junior research groups, each bridging with a Charité clinic, to make highly innovative single-cell approaches clinically usable for effective translation as quickly as possible.

Another important initiative that is supported by the Berlin Senate and the Einstein Foundation is the **Einstein Center for Early Disease Interception**. It aims to position itself as a leading international pioneer in the innovative field of precision medicine. Apart from the players Charité, Max Delbrück Center and BIH, the three Berlin universities, two Max Planck institutes, the ICN business school



Panel discussion with (f.l.t.r.): Frauke Hein (Scienion), Simon Haas (Max Delbrück Center), Kai Uwe Bindseil (host), Maike Sander (Max Delbrück Center), Nikolaus Rajewsky (Max Delbrück Center) and Gary Kruppa (Bruker) © Felix Petermann, Max Delbrück Center

and the Museum für Naturkunde will take part in the center (see interview with Angelika Eggert for more). In July 2024, the Max Delbrück Center and analytical instruments specialist Bruker kicked off a strategic partnership to build an innovation hub for systems medicine: The **MDC-Bruker Center of Excellence for Single Cell Omics**. Located at the MDC-BIMSB in Berlin-Mitte, the center’s focus is on the development and application of mass-spectrometry based single-cell and multi-omics technologies. The first joint R&D project aims at creating a broadly applicable platform to simultaneously profile proteins and metabolites as well as lipids to understand disease processes at the level of single or a few cells.

Ultimately, the aim is to develop a multi-omics workflow that could be applied in diverse clinical settings. “Our ‘industry-on-campus’ model with Bruker aims to sustainably develop an innovation ecosystem that attracts further technology development and application partners. Several academic and industry organizations are already interested in collaborating,” says Marie Vidal, Industry and Innovation manager at the MDC-BIMSB.

Organ and disease models as test systems

Organoids – tiny stem cell-derived 3D cell culture systems – are formidable models of human development and disease processes. That is why these “mini organs” have become extremely popular tools for translational medicine. Organ-on-a-chip systems, which involve culturing the organoids on microfluidic biochips, have emerged as excellent drug testing systems that can help reduce the number of animal experiments.

Combining such organ chips, 3D-cell cultures and bioprinting will be the focus of **Der Simulierte Mensch, Si-M** (the simulated human), a research center in Berlin’s Wedding district. A brand-new research building with a spectacular open design is due to open its doors in autumn 2025. It will be the centerpiece of a new joint Charité and TU Berlin biotechnology and medical technology campus. At Si-M, scientists and engineers from TU Berlin and Charité will work side by side to develop new models in order to better understand the human body and its diseases.

Berlin-based company **TissUse** uses its Multi-Organ-Chip technology platform for toxicity testing and drug development, cosmetics, food and nutrition and consumer products. The team has specialized in combining multiple organoid systems on a biochip. These miniaturized constructs closely simulate the activity of multiple human organs in their true physiological context. Using an automation platform allows for the operation of up to 24 Multi-Organ-Chips in parallel.



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© Markus Scholz

**Three questions to:****Prof. Dr. med.
Angelika Eggert**Director Department of Pediatric
Oncology and Hematology at
Charité – Universitätsmedizin Berlin**What roles do technologies such as liquid biopsy or single-cell analysis play for your team in researching neuroblastoma, a malignant tumor?**

Liquid biopsy analyses of tumor markers in blood and bone marrow are already being used in clinical practice as companion diagnostics in the context of clinical trials on neuroblastoma. Currently, it is already possible to monitor the disease response and progression in real-time in some patients. We are optimistic that the results of liquid biopsy analyses will soon be utilized for personalized therapy adjustments and the early detection of disease recurrence. We apply various innovative single-cell technologies in our new Collaborative Research Center (CRC), “Decoding and Targeting Neuroblastoma Evolution”, to investigate the heterogeneity of tumor cells at the cellular level within tumor tissue and its microenvironment.

What is behind the concept of cell-based interceptive medicine?

“Cell-based Interceptive Medicine” refers to an innovative approach in medicine aimed at detecting and halting diseases as early as possible at the cellular level before they progress to advanced stages. By using technologies such as (spatial) single-cell analyses and

liquid biopsies, abnormal cellular changes and disease processes can be identified at a very early stage. This molecular-preventive approach has been developed by Nikolaus Rajewsky and colleagues at the MDC-BIMSB. It enables targeted therapeutic interventions to be initiated before severe clinical symptoms occur. This is opening up entirely new options in personalized medicine. The extended concept of cell-based medicine also includes the development and use of cellular therapies such as CAR-T cell therapy.

The Einstein Foundation provides the funding for the establishment of the Einstein Center for Early Disease Interception (EC-EDI). Please outline this new initiative.

With the proposed EC-EDI, coordinated by Nikolaus Rajewsky and myself, the biomedical and data science community of Berlin aims to position itself as a leading international pioneer in an innovative field of precision medicine. Perfectly aligned with the concept of cell-based interceptive medicine, the focus of the future EC-EDI is on the rapid transfer of new single-cell key technologies, patient-derived preclinical models and novel AI solutions into innovative precision diagnostics and drug development. We aim to establish the EC-EDI as the overarching structure, networking platform and incubator enabling barrier-free interdisciplinary cooperation between 11 Berlin-based institutions. The new center will also set new standards in innovative teaching and education formats, as well as in science communication. The funding of the EC-EDI will be embedded into the larger strategy of the planned midterm establishment of the “Berlin Cell Hospital”.

Biotech company **CELLphenomics**, based at Campus Berlin-Buch, is combining tumor organoid technology with a multi-omics approach and automation to boost research of sarcoma, which are rare tumors that originate either in bone or soft tissue. The continuously growing biobank comprises more than 500 complex in vitro models from more than 20 tumor entities and offers the world's largest collection of complex in vitro models of rare and ultra-rare tumors like sarcomas or thymomas.

Precision diagnostics networks

In the capital region, new ideas, products and diagnostic services can emerge from a highly dynamic innovation ecosystem. The high concentration of players in the in vitro diagnostics field is represented by the **Netzwerk Diagnostik Berlin-Brandenburg e.V. (Diagnostik-Net BB)**. Founded in 2007, it bundles the competencies of diagnostics companies, users from clinics and laboratories as well as scientific research institutes predominantly from the Ber-

lin-Brandenburg region. The network accelerates the transformation of ideas into marketable innovations along the entire value-added chain. Additionally, professional event and trade fair management as well as a variety of training measures for the diagnostics industry are offered.

From 2024, the Federal Government and the State of Berlin fund the establishment of the **National Center for Tumor Diseases (NCT) Berlin**. The NCT Berlin is one of six sites of the NCT throughout Germany and represents a major extension of the Charité Comprehensive Cancer Center. Charité, the BIH and the Max Delbrück Center, in collaboration with the German Cancer Research Center (DKFZ), seek to further intensify Berlin's research activities in single-cell analysis, data science, and patient-reported outcome measures (PROMs). The Senate is supporting the funding of a new NCT building at Charité Campus Virchow-Klinikum, which will house state-of-the-art laboratories, an outpatient clinic dedicated to personalized cancer medicine and an information center for cancer patients.

More companies and research centers active in in vitro diagnostics and drug testing

Attomol Molekulare Diagnostika develops, produces and distributes medical diagnostics in the field of molecular genetics, infectious and autoimmune diseases.

BASF Metabolome Solutions: Berlin-based expert service provider of mass spectrometry-based biological analytics for customers within and outside of BASF.

BioGenes: service provider of custom antibody and immunoassay development, and an expert in complex analytical services.

biotechrabbit: supplier of ultra-pure enzymes and high-quality antibody services for diagnostics and reagents for molecular biology and proteomics.

Charité 3R: Charité network that aims at fostering research, education and public understanding for alternative methods to animal experiments according to the 3R principle (Replace, Reduce, Refine).

Einstein Center 3R: Berlin-wide alliance founded in 2021 that has a 3R-driven research focus on 3D tissue models.

FyoniBio: Spin-out of Glycotope GmbH's bioanalytics service businesses for biopharma developers founded in 2022.

GA Generic Assays: independent family company located in Dahlewitz that focuses primarily on products for the differential diagnosis of autoimmune diseases.

INVITEK Molecular develops and commercializes tailor-made nucleic acid purification solutions, among others for liquid biopsy.

KNAUER Wissenschaftliche Geräte: The family-owned manufacturer of high-tech laboratory equipment is renowned for its liquid chromatography systems and components.

NeuroMiR publicly funded research alliance in the Berlin-Brandenburg region that aims at routinely measuring microRNAs in blood samples of patients together with conventional protein markers.

SCIENION: The Berlin-Adlershof based company is the market leader for precision dispensing of ultra-low volumes.

SEQSTANT: Software provider that offers packages for the live analysis of pathogens and metagenomic diagnostics.



The IBS lab develops small, individual, mobile, and wearable neurotechnology to continuously measure specific brain network activities. © BIFOLD/Kevin Fuchs

Making biomedical and health data ready for translation

With its mix abundance of scientific institutes, biotech and IT companies as well as medical institutions, the Berlin-Brandenburg metropolitan region has become a hotspot for computational biology and medical informatics.

Digitization is transforming biomedical research and health-care. Bioanalytic techniques such as genome sequencing and other high-throughput technologies, imaging and smart wearables deliver huge sets of data. Handling and process-

ing of such big data sets requires new infrastructures and standardized IT solutions.

Machine Learning and generative AI have become disruptive technologies in translational research and personalized medicine applications. This overview shows how the vibrant computational community of biology and medical informatics is coming together to unlock the informative power of biomedical and health data.



The BIMSB building at the MDC site in Berlin-Mitte © Noshe

Bioinformatics and medical informatics research landscape

Integrating data obtained by high-throughput bioanalytics with large-scale computational capacities and powerful theoretical approaches – this is the profile of the **Berlin Institute for Medical Systems Biology (BIMSB)**, an interdisciplinary department of the Max Delbrück Center

located in Berlin-Mitte. Research at the BMSB focuses on understanding gene regulation and predicting its function in health and diseases.

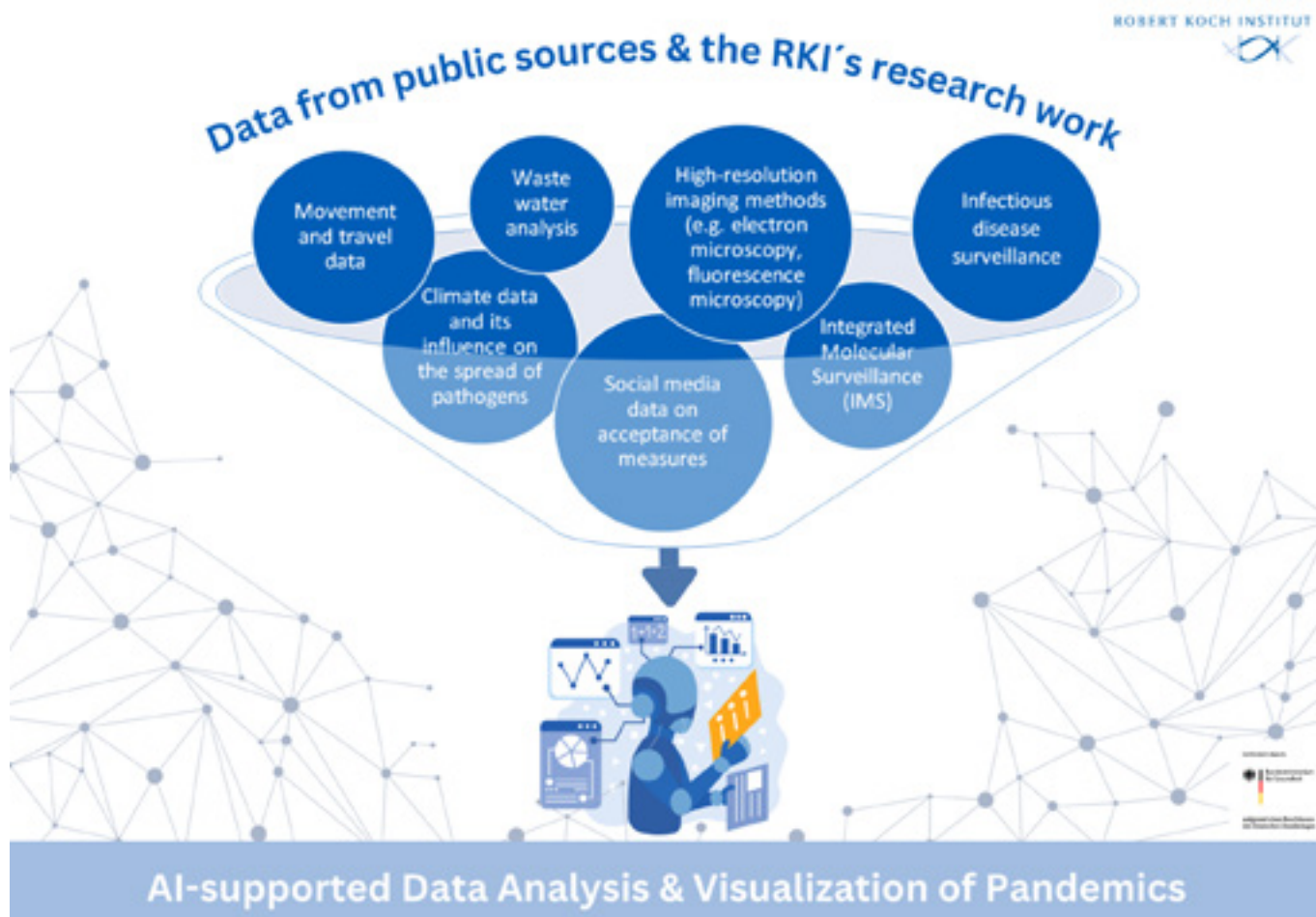
Another hot spot of Computational Biology is the **Max Planck Institute for Molecular Genetics**. In the Bioinformatics department led by Professor Martin Vingron, scientists develop computer models and bioinformatic tools to manage omics-based data to understand the regulation of gene activity.

A “Medical Bioinformatics” working group that is based at the **Zuse Institute Berlin** deals with applied mathematics and data-intensive high-performance computing. The **Fraunhofer Heinrich Hertz Institute (HHI)** and the **Robert Koch Institute (RKI)** also have their own departments and research groups for computational biology.

The Charité – Universitätsmedizin Berlin combines the bioinformatics and data analysis expertise at its translational research unit, the **Berlin Institute of Health (BIH)** with the **Core Unit Bioinformatics (CUBI)**. Among other things, the

scientists are researching genetic variations, biomedical challenges and how data can be converted into clinically applicable results. The **Hub for Innovations in Digital Health (HiDiH)** has evolved into one of Germany’s leading hubs in digital health, boosting innovative developments and applications in the life sciences and clinical care (see interview with Peter Robinson for more).

The **Center for Artificial Intelligence in Public Health Research (ZKI-PH)** of the Robert Koch Institute (RKI) is a new and rapidly expanding research facility located to the southeast of Berlin. “The ZKI-PH brings together the RKI’s traditional expertise in infectious and non-communicable diseases with the core methodological elements of machine learning,” says Katharina Ladewig, Managing Director of the ZKI-PH. The new research center is based at the Wildau Technology and Science Park. It employs over 45 researchers in five units who are engaged in a diverse range of projects. These include for example phylogenomic analysis to decipher the evolutionary processes of modern pathogens, the development of algorithms for faster image and video data analysis, AI-supported moni-





Dr. Katharina Ladewig
Managing Director of the Center
for Artificial Intelligence in Public
Health Research (ZKI-PH) of the
Robert Koch Institute (RKI)



“The Center for Artificial Intelligence in Public Health Research combines the traditional expertise of the Robert Koch Institute in the field of infectious and non-communicable diseases with the core methodological building blocks of machine learning.”

© EIT Health Germany

toring of pathogens through wastewater-based epidemiology, and the creation of digital models and early warning systems to strengthen societal resilience to climate-related health risks.

Annual Symposium: Current Topics in Bioinformatics

Organized by HealthCapital Berlin Brandenburg, the annual symposium Current Topics in Bioinformatics offers an excellent networking opportunity for bioinformatics practitioners and digital health experts from both academia and industry in the Berlin-Brandenburg area. With the steering committee including representatives from Merantix Momentum, Humboldt Universität, the Max Delbrück Center (MDC) and the Max Planck Institute for Molecular Genetics, the event addresses interesting trends and attracts renowned international speakers. Recent agenda items include artificial intelligence, health data management and the latest advancements in single-cell and spatially resolved technologies, which are reshaping our understanding of biological data. “The Current Topics in Bioinformatics symposia demonstrate the power of informatics in our vibrant life sciences ecosystem. And they are an excellent place for networking,” says Edda Klipp, Professor for Theoretical Biophysics at Humboldt-Universität zu Berlin.

Academic training in Computational Biology takes place at almost all universities and colleges in the Berlin-Brandenburg region. To bridge the gap between computer science and medicine, the **Hasso Plattner Institute (HPI)** at the University of Potsdam, for example, has developed a Digital Health master's degree.

All the major universities in Berlin and the Charité have their distinctive bioinformatics degree programs. This is also the



Steering committee and selection of speakers of “Current Topics in Bioinformatics” 2024



“The Current Topics in Bioinformatics symposia demonstrate the power of informatics in our vibrant life sciences ecosystem. And they are an excellent place for networking.”

Prof. Dr. Edda Klipp
Professor for Theoretical Biophysics at
Humboldt-Universität zu Berlin

© Humboldt Universität Berlin

case at the Technical University of Wildau and the BTU Cottbus-Senftenberg. The Carl-Thiem-Klinikum Cottbus is currently being transformed into a university medical center and will assume the role of a Digital Lead Hospital in Brandenburg.

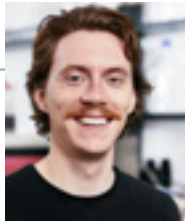
A top academic institution for artificial intelligence (AI) research and big data management is the **Berlin Institute for the Foundations of Learning and Data (BIFOLD)** at **Technische Universität Berlin**. It is one of five national AI competence centers receiving institutional funding as part of the federal-state AI strategy implementation funding program. Through a partnership with Charité, BIFOLD is set to become a cross-university central institute.

Life science companies with AI-enabled technology platforms

As a major global provider of DNA sequencing and array-based technologies, **Illumina Inc.** has started early to integrate in-house-developed AI solutions into the entire genomic workflow. This holds immense potential to bolster

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Mitchell Duffy, Co-Founder and CEO of Cambrium GmbH



“We are leveraging generative AI for novel protein design and data-driven metabolic engineering, to rapidly create high-performance, sustainable biomaterials.”

© Cambrium GmbH

drug discovery efficiency, provide deeper clinical insights and more accurate genetic risk prediction. One example is PrimateAI-3D, an AI algorithm that predicts disease-causing genetic mutations in patients with unprecedented accuracy. The Illumina Solutions Center Berlin, located at Potsdamer Platz right in the heart of the German capital, is providing access to Illumina’s newest technologies and applications as well as a training facility.

The bioindustrial start-up **Cambrium** positions itself as a pioneer in AI-driven biotechnology. With two sites in Berlin-Mitte and at the BerlinBioCube in Berlin-Buch, Cambrium creates innovative biomaterials for use in various industries, including cosmetics, fashion, and beyond. “We are leveraging generative AI for novel protein design and data-driven metabolic engineering, to rapidly create high-performance, sustainable biomaterials,” says Mitchell Duffy, Co-Founder and CEO of Cambrium.

Their first product launched in the Beauty & Personal Care sector is NovaColl™, a vegan collagen produced by microbial fermentation. “Expect to see it hitting shelves soon”, says Duffy. After securing 8 million euros in seed financing with global, climate tech and AI investors, the synthetic biology start-up welcomed a handful of new investors on board in summer 2024. Cambrium is also the winner of the Deep Tech Award 2024 in the “Artificial Intelligence” category, which is presented by the Senate Department for Economic Affairs, Energy and Public Enterprises.

Health data ecosystem builders

Establishing an interconnected and standardized digital health infrastructure and transforming big data into clinically actionable knowledge is a major aim of medical informatics experts and data scientists in Berlin-Brandenburg.

One example is **Data4Life**, a non-profit organization with offices in Potsdam and Berlin. “Together with renowned partners we’re working to make health data ready for research in standardized, interoperable formats,” says Cor-

nelius Remschmidt, Chief Medical Officer at Data4Life. The NGO is an initiative of the Hasso Plattner Foundation and uses digital engineering to enhance health data in public health and personalized medicine. One current project is SensorHub, a platform that empowers researchers to design, conduct, and manage remote health studies of any size. It streamlines the collection and storage of data from digital questionnaires and a wide range of sensors and wearable devices, creating a single harmonized dataset. Another project is MEx: This digital platform maps meta-data on research activities and research data at the Robert Koch Institute in a transparent way aiming to facilitate the reuse of this data.

The lack of standardization and shortcomings in the currently used coding systems prevent a targeted analysis of health data. A highly renowned advocate of interoperable information and standardization of health data is Professor Sylvia Thun, who is the Director of the **Core unit eHealth and Interoperability at BIH**. With her team, she is striving to implement the international structural standard Health Level 7 – Fast Healthcare Interoperability Resources (HL7 FHIR).



“

“Within the HiGHmed network, we have contributed to the central achievement that all university hospitals in Germany can exchange healthcare data for research purposes in a semantically and syntactically interoperable way.”

Prof. Dr. Roland Eils
Director of the BIH Center for Digital Health

© BIH/David Ausserhofer

The **Virtual Research Environment (VRE)** at Charité is a data management cloud platform for biomedical research. It provides an infrastructure for researchers to store, process and share sensitive health data. “The VRE makes it easier to find and securely access health data – in particular imaging data,” says Petra Ritter. The BIH Johanna Quandt Professor for Brain Simulation is responsible for implementing the VRE.

In the future, healthcare will increasingly be based on secure and cross-sector data networking. Roland Eils, founding director of the BIH Center for Digital Health, is the coordinator of the **HiGHmed consortium**, which is part of the federally funded Medical Informatics Initiative (MII). Its core element are data integration centers that facilitate analyses across different university hospitals. “Within

the HiGHmed network, we have contributed to the central achievement that all university hospitals in Germany can exchange healthcare data for research purposes in a semantically and syntactically interoperable way,” he says.

Towards a European Health Data Space

Gaia-X is a joint European project laying the groundwork for the next generation of data infrastructure: an open, transparent and secure digital ecosystem that meets the highest requirements for digital sovereignty. This is the goal of the **HEALTH-X dataLOFT** platform, a project under the con-

sortium leadership of Charité, funded with 13 million euros by the Federal Ministry for Economic Affairs and Climate Action.

“In HEALTH-X dataLOFT, citizens are no longer just recipients of services, but decisive and active partners in the healthcare system. You gain control over your health data and decide what happens to your sensitive data, how it is used and who is allowed to use it,” says Roland Eils, who is also spokesperson for HEALTH-X. Sovereignty concerning data usage lies in the hands of citizens via a data wallet. This ensures the secure and trustworthy use of data in the European Health Data Space.

© Private



Three questions to...

Prof. Peter Robinson 

Alexander von Humboldt
Professor of Artificial Intelligence
at the Berlin Institute of Health at
Charité

Can you briefly describe the Human Phenotype Ontology (HPO) that you have developed? What questions can it answer in medicine?

An ontology in artificial intelligence is essentially a formal vocabulary for representing knowledge. It defines concepts, their properties, and relationships between them, creating a structured framework that allows AI systems to understand and reason about information. The HPO is an ontology of the clinical manifestations of all human diseases. The HPO project also produces a database that assigns clinical manifestations of approx. 8,500 genetic diseases to the corresponding gene mutations and syndromes. With the HPO, we have specified around 17,000 symptoms as terms – so-called “ontology terms” – for the computer in such a way that they can be used for AI.

What do you think an AI-powered precision medicine of the future will look like?

The approach of precision medicine is to precisely iden-

tify subtypes of a disease, to adapt the treatment to them and thus to tailor it to the respective patient, because a specific therapy is usually more successful. This is now a common approach in the treatment of breast cancer in women and has already saved many lives. However, with a few exceptions, this is not yet the case for other diseases. I believe that in the coming decades, AI will make it possible to better understand the subgroups of diseases and thus apply precision medicine to most diseases. Both AI and big data will be used extensively to make this process possible.

How important are the BIH and your research focus for the Berlin AI ecosystem and the HealthCapital healthcare industries cluster?

Our aim is to test and advance artificial intelligence and algorithms in close proximity to clinical practice, which is comparatively easy to do here at BIH as part of the Charité. I am already liaising with clinical groups at the Charité to collaboratively test the application of AI in medical research. My colleagues at the BIH are performing research at the highest level, and this also applies to my research area. I think that the BIH, with its research in the Berlin AI ecosystem, can be one of the drivers for the broader application of AI in medicine.

AI generated © Bartek - stock.adobe.com



Other relevant players present in Berlin-Brandenburg:

AICURA Medical develops ecosystem solutions to implement AI applications in hospitals and to use healthcare data for innovation and new business models.

Alacris Theranostics is a systems medicine company based in Berlin that uses – amongst other tools – digital twins to model the tumor response to specific therapy combinations.

ATLAS Biolabs is a Berlin-based service provider of complex bioanalyses in molecular genetics.

Exazyme is a Berlin-based start-up that harnesses bioinformatics and AI to engineer enzymes for industrial and therapeutic applications.

German Research Center for Artificial Intelligence (DFKI) is a leading national research center on AI applications with laboratories in Berlin.

Limebit: The Berlin-based software company develops AI-powered solutions to optimize clinical trials, enhancing efficiency and accelerating drug development.

Lucid Genomics provides AI-powered solutions for analyzing and interpreting genomic data for accelerated drug discovery.

MicroDiscovery is a provider of innovative and certified software solutions for innovative diagnostics, individualized medicine and molecular biology research.

Nostos Genomics has developed an AI-driven genetic variant interpretation platform to give more people with genetic diseases a clear and fast diagnosis.

Omiqa Bioinformatics is a Berlin-based bioinformatics company specialized on data analysis on all sequencing platforms and types.

Pheiron utilizes detailed phenotypic data and AI to predict disease development and inform drug discovery and development.

QuantGene combines deep genomic sequencing and AI to detect disease in cell-free DNA fragments in blood samples and is headquartered in Santa Monica/USA and Berlin.

Silica Corpora uses generative AI to design the next generation of therapeutic antibodies.



Treffpunkt Medizintechnik 2024 © Konstantin Gastmann / Berlin Partner

From telemonitoring to precision surgery: Shaping the future of healthcare with innovative medical devices

Berlin-Brandenburg is one of Europe's leading medical technology regions. Many products from the mostly medium-sized companies developing and manufacturing medical devices are market leaders in their respective field. This chapter highlights the regional strengths in the areas of orthopedics, cardiovascular medical technology, minimally invasive surgery and hygiene solutions.

As a leading European region in medical technology, Berlin-Brandenburg has demonstrated a high growth dynamic for many years. Around 380 medtech companies with approx. 16,900 employees exist in the German capital region. While these companies tend to be small and medium-sized, their products are among the leaders in their fields of business. The focus areas in which the region's innovative companies are active range from telemedicine and digital health, medical imaging technologies, minimally invasive solutions and organ support or replacement systems for indications in oncology, cardiology and more.

Innovative solutions for orthopedics and trauma surgery

Orthopedics and trauma surgery are among the classic

areas of application for medical technology. **Merete** is one of the established players in the field. For more than 25 years, the family-owned business has been developing innovative medical devices for joint surgery and pediatric orthopedics. They offer high-quality implants and instruments, such as the BioBall® system, which was introduced in 1990 and has since become a standard brand in hip endoprosthetics. Headquartered in Berlin, Merete's products are marketed in more than 33 countries worldwide.

A long-standing global leader in the design and manufacturing of medical devices and instruments, including high-quality forgings and critical components for total hip arthroplasty, is **Aristotech Industries**. The Luckenwalde-based company manufactures its products using the latest machining technologies such as closed-die forging, coating techniques for bone in-growth, and 3D metal printing.

Aristotech specializes in contract manufacturing and supplies standard and custom medical devices to Original Equipment Manufacturers (OEMs) worldwide.

Medical devices for trauma surgery make up the portfolio of Berlin-based **aap Implantate**. Their product range includes a state-of-the-art anatomical plating system for application in shoulder, elbow, wrist, knee and ankle procedures, as well as cannulated screws. Innovation is a core value for the public company, which has also developed an antibacterial silver surface treatment with a broad application range for implants. The technology promises to reduce infection risks associated with surgical procedures.

Zimmer Biomet Deutschland is the German subsidiary of the American parent company Zimmer Biomet Inc. Zimmer Biomet is active in the research, development, production and marketing of medical devices, primarily for orthopedic and traumatology requirements. The product portfolio ranges from joint implants and bone fracture treatment to bone cement and surgical accessories. At its Berlin site, the company maintains a center of excellence to produce forged parts. Here it employs more than 180 people and invests continuously.



“We believe our walking aid is the next generation of mobility solutions.

Seeing the children standing in the walker for the first time, making their first steps and seeing the sparkle in their eyes – these are our most beautiful moments.”

Maria Enge, Co-Founder of RooWalk Mobility GmbH

© Eric Obriegat

The start-up company **RooWalk Mobility** is developing an electrically powered walking aid that enables the user to stand and walk upright and hands-free. It is designed for people whose movement, balance, or control is significantly impaired due to injury, stroke, disability or age, and was initially developed for children with neuromuscular disorders. The underlying technology has similarities to a Segway, i.e. a self-balancing drive, and the device follows the movements of the user automatically. As a result, it requires less body strength than traditional walkers. “We want to provide only as much support as necessary with our walking aid, and as little as possible,” explains co-founder Maria Enge. “We believe this is the next generation of mobility solutions,” she says.

Orthopedics specialist **Ottobock** is developing customized orthoses and prostheses. The Duderstadt-based company has been systematically expanding its presence in Berlin, where the company was founded more than 100 years ago. At the site of the former Böttzow Brewery, the company established its Digital Office. Here, developers are working on software and sensors to digitally scan residual limbs after amputation, create digital twins of patients, and models for 3D printing prosthetic parts. They analyze the gait of users, virtually connect the prosthetics and digital platforms and optimally adapt them to the body. „Our mission drives



RooWalk Technologiecampus Marzahn, October '23 © RooWalk - Amin Akhtar



Dr. Larisa Wewetzer,
Head of Digital Health Solutions
at Ottobock SE & Co. KGaA



“Our mission drives us to help people maintain or regain their freedom of movement. Located in the metropolis of Berlin, our Böttzow site is the ideal place to work with international talent to develop creative ideas and digital solutions for the medtech industry.”

© Ottobock SE & Co. KGaA

us to help people maintain or regain their freedom of movement. Located in the metropolis of Berlin, Böttzow is the ideal place to work with international talent to develop creative ideas and digital solutions for the medtech industry,” says Larisa Wewetzer, Head of Digital Health Solutions.

Pioneering cardiovascular medical technology

The German capital region is also home to several market leaders in the field of cardiac support systems and cardiovascular technology.

The Berlin site of **B. Braun Group's Vascular Systems** focuses on producing innovative devices like catheters, stents, and drug-coated balloons for minimally invasive vascular procedures, serving as a key European hub for B. Braun's interventional vascular therapy solutions.

Headquartered in Berlin-Neukölln, **BIOTRONIK** is one of the largest medical technology manufacturers in the German capital region. The company develops and manufactures a wide range of medical devices, including pacemakers, implantable cardioverter defibrillators (ICDs), cardiac monitors, ablation catheters, and stent systems. BIOTRONIK has a strong emphasis on innovation and remote monitoring solutions for patient care with significant investments in research and development. A recent innovation of the company, the BIOMONITOR IV insertable cardiac monitor, uses AI to precisely detect and classify cardiac arrhythmias, while minimizing false positives. The device thus reduces unnecessary alerts, helping healthcare providers focus on critical cases.

Berlin Heals, a Swiss company operating an R&D subsidiary in Berlin, is focused on developing innovative treatments for heart failure, specifically through its proprietary Cardiac Microcurrent Therapy Device (C-MIC). This small implantable device aims to reverse cardiac muscle deterioration by delivering a constant, low-level electrical current. The company is currently conducting clinical studies in Europe and the United States to further validate its device.

Headquartered in the southwest of the capital, **Berlin Heart** develops, manufactures and markets mechanical circulatory support systems for patients with heart failure. The so-called ventricular assist devices provide support to patients of every age and size, from infants to adults. The systems enable critically ill heart patients to recover and bridge the often very long waiting periods for a donor heart. To date, Berlin Heart produces the only device of its kind available for babies and children with severe heart failure.

Pioneering developments in telemonitoring

Players from Berlin-Brandenburg are among the pioneers in telemedicine for patients suffering from heart failure. Through model projects (e.g. **FONTANE**, **Telemed5000**) and clinical studies – such as the groundbreaking TIM-HF2 study conducted at the Charité – they have contributed to the evidence-based proof of the medical efficacy and health economic benefits of telemonitoring in this indication. Since 2022, telemonitoring for heart failure has been included in the standard care provided by statutory health insurance. Since then, patients with advanced heart failure have been entitled to telemedical care. Practicing cardiologists receive compensation for providing remote care to their patients, and the market for telemedical care of cardiac patients is growing.



“When we and our partners were setting up InCareNet HF, the Berlin-Brandenburg region and the healthcare industry cluster were the deciding factors for us. There is a lot of support here for companies and institutions involved in digital innovation, and efforts are being made to build networks and bring projects together. This climate has made it possible to find regional partners and fill InCareNet HF with life.”

Michael Scherf, CEO of GETEMED Medizin- und Informationstechnik AG

© GETEMED

GETEMED Medizin- und Informationstechnik, based in Teltow, is active in the fields of cardiological functional diagnostics, the monitoring of high-risk newborns and telemonitoring. Together with partners such as Biotronik, GETEMED has developed InCareNet HF, a platform for providing telemedical care for heart failure. Michael Scherf, CEO of GETEMED, says: “When we and our partners were setting up InCareNet HF, the Berlin-Brandenburg region and the healthcare industry cluster were the deciding factors for us. There is a lot of support here for companies and institutions involved in digital innovation, and efforts are being made to build networks and bring projects together. This climate has made it possible to find regional partners and fill InCareNet HF with life.”

Another player that is active in the telemonitoring space is the start-up **Noah Labs**. The team has developed an AI-based cardiovascular telemonitoring software that combines intelligent biosensors, machine learning and a mobile

application for patients. It enables the monitoring of relevant vital parameters to assess and predict patient health. Called Noah Labs Ark, the telemonitoring software connects patients with cardiovascular diseases to their health-care providers for remote, data-driven care and research. In April 2024, Noah Labs Ark has secured Class IIa medical device approval under the European Union Medical Device Regulation (MDR). Noah Labs receives significant funding from the European Regional Development Fund (ERDF) and the state of Brandenburg.

Paving the way for precision surgery

Among the medtech players in Berlin-Brandenburg, several companies are making significant strides in minimally invasive surgery and microsurgery technologies: **W.O.M. WORLD OF MEDICINE** is a leading manufacturer of medical devices for minimally invasive surgery. The company, which is part of the Novanta group, specializes in developing and producing insufflators, pumps, and camera systems used in laparoscopic procedures. **XION Medical** manufactures devices, endoscopes and instruments for minimally invasive diagnostics and therapy. All devices are manufactured at the production facility in Berlin. Their product portfolio includes high-definition camera systems, light sources, and specialized endoscopes for various medical specialties.

Making surgery smarter and safer is the mission of **Caresyntax**. The surgery intelligence company, headquartered in Berlin and San Francisco, aims at transforming surgery by implementing a scalable, end-to-end software and AI platform. The platform is interoperable and allows the capture and use of novel data and applications to enhance surgical precision and patient safety. It connects the operating room with the hospital information system (HIS). Caresyntax's technology aims to reduce surgical errors, optimize

workflows, and enhance training for surgeons performing minimally invasive and microsurgical procedures. In August 2024, Caresyntax announced that it had secured US\$180 million through a series C financing extension and growth debt expansion round. Björn von Siemens, Co-Founder and Managing Director of Caresyntax: "At Caresyntax, we are working towards deploying precision surgical tools, empowered by data and AI, to improve patient outcomes. We believe in the power of smart data and AI usage in the operating room. It's the future of surgery."

High-end solutions for medical device reprocessing

Medical devices often require thorough reprocessing after use, including cleaning, disinfection, sterilization, and functional safety verification, to ensure their safe and effective reuse in clinical settings. Several Berlin-based companies and researchers are active in this field and offer professional hygiene solutions for the medical sector and beyond. With about 70 years of experience, the family business **BANDELIN** electronic is now a leading manufacturer of high-quality ultrasonic cleaning equipment. The company offers high-performance ultrasonic devices, accessories as well as cleaning and disinfection products for professional cleaning in industry, medicine and laboratories. **MELAG Medizintechnik** is a global leader in the production of medical devices and quality leader in the field of instrument reprocessing for medical practices and clinics. Since the 1950's, the family business offers products such as hot air and steam sterilizers. Also, effective cleaning procedures for robotic surgical devices are important for the prevention of hospital-acquired infections. In the BMBF-funded (BMBF – Federal Ministry of Education and Research) **RobiClean project**, a research network including scientists from the Technical University of Berlin is investigating the basic principles for infection-preventive, optimized cleaning of highly complex robotic instruments. Their data can also be used to derive design recommendations for surgical instruments for robot-assisted surgery.



Björn von Siemens, Co-Founder
and Managing Director of
Caresyntax GmbH



"At Caresyntax, we are working towards deploying precision surgical tools, empowered by data and AI, to improve patient outcomes. We believe in the power of smart data and AI usage in the operating room. It's the future of surgery."

A choice of further relevant medtech players

botiss biomaterials develops and manufactures biomaterials for dental bone and soft tissue regeneration, offering products including membranes, bone substitutes, and soft tissue grafts.

Carl Zeiss Meditec, headquartered in Jena with a significant presence in Berlin, develops and manufactures innovative medtech solutions for ophthalmology and microsurgery, including surgical microscopes and intraocular lenses.

Eckert & Ziegler Group, founded and headquartered in Berlin, the company is one of the world's largest providers of isotope technology for medical, scientific and industrial use.

Fiagon, with its headquarters in Henningsdorf, develops and manufactures electromagnetic surgical navigation systems for surgery.

Limmer Laser specializes in developing, producing, and distributing high-quality laser devices for medical applications.

Magnosco provides innovative solutions for non-invasive skin cancer diagnostics, combining laser spectroscopy and artificial intelligence to improve dermatological screening and detection.

Christoph Miethke based in Potsdam, the medtech company specializes develops and manufactures innovative neurosurgical implants, particularly hydrocephalus valves and shunt systems, to improve the treatment and quality of life for patients with hydrocephalus.

KARL STORZ is a major endoscope specialist. The Berlin site provides sales support and customer service for the region, while also hosting a visitor and training center for medical education and product demonstrations.

OHST medical technology located in Rathenow, the family-owned company specializes in the production of high-quality joint implants and surgical instruments for endoprosthetics.

Olympus Surgical Technologies Europe develops and manufactures minimally invasive medical technology with high frequency technology at its site in Teltow.

Osypka Medical develops and manufactures external cardiac pacemakers, non-invasive monitoring systems and pacing system analyzers for cardiovascular applications.

roclub provides teleoperation solutions and enables MRI/CT scans to be carried out remotely, and they offer support and training for radiographers at their workplace.

smedo is a Brandenburg-based start-up that offers a novel generation of contactless cardiological monitoring systems based on radar technology.

SOMATEX Medical Technologies, a Hologic Company, develops and manufactures single-use medical devices focused on breast tumor localization, including clip and wire markers, to simplify diagnoses and therapies in oncology.

UniWearables develops a wearable sensor pad for continuous patient monitoring in hospitals, providing real-time vital sign data to improve healthcare quality and efficiency.



EU Project TEF-Health „Testing and Experimentation Facility for Health AI and Robotics“ © TEF-Health

Building a unique digital health ecosystem

Berlin is one of the hotspots for the digital health sector in Germany and Europe. The high density of relevant players along the value chain has led to the emergence of a thriving digital health ecosystem. Numerous health tech start-ups and established industry players can benefit from the excellent research and clinical landscape. They are all united by the goal to bring a clear benefit to patients, caregivers and healthcare professionals.

The particular strength of the German capital region Berlin-Brandenburg lies in its unique research and clinical landscape and the close connection between players from research, clinical practice and industry. At the interface with the IT industry, the region offers best conditions for the development and application of digital health solutions.

With more than 40 academic institutions, 151 clinics, around 30 inpatient rehabilitation facilities and 700 digital health start-ups, the digital health ecosystem is constantly changing and very dynamic.

<https://www.healthcapital.de/mediathek/bestandsaufnahme-digital-health-oekosystem/>



Digital Health Ecosystem Berlin-Brandenburg: An Insight Report

The ecosystem in the German capital region is characterized by renowned technology providers of patient portals, hospital information systems, digital health platforms and applications with an international reputation. In order to give the very dynamic and fast-growing digital health ecosystem more visibility, the HealthCapital cluster has identified its strengths, characteristics and development potential in a survey with experts from the German capital region. The brochure provides a good overview of the ecosystem, its characteristics, digital health players and networking events in the capital region.



A hub for digital health apps

To advance the digitization of the healthcare sector in Germany, the federal government has introduced a whole raft of digitalization laws. One important aspect: members of the statutory health insurance funds are entitled to access digital health applications (Digitale Gesundheitsanwendungen, DiGA). These applications can be prescribed by physicians and psychotherapists and are reimbursed by the health insurers.

The so-called “app on prescription” is subject to stringent requirements. DiGAs must be certified as medical devices and their benefits and medical efficacy must be demonstrated based on clinical evidence. In addition, the manufacturer must prove that its application complies with data protection regulations. Only then will they be included in the list of reimbursable applications, which is maintained by the Federal Institute for Drugs and Medical Devices (BfArM). More than 60 apps have been listed in the DiGA directory

”

Prof. Dr. med Alexander Meyer,
Co-Founder and Managing
Director of x-cardiac GmbH



“With the help of AI, our software x-c-bleeding recognizes the pattern of postoperative bleeding or kidney failure after heart surgery and warns before serious complications such as organ damage can even occur.”

since its launch in 2020, the majority being mental health applications.

Berlin has emerged as a DiGA hotspot: according to the BARMER Arztreport (doctor’s report) published in 2024, the city-states Berlin, Bremen and Hamburg are the federal states with the most prescribed DiGAs across Germany. Many DiGA developers are based in the capital region. With five DiGAs on the market, Berlin-based **Selfapy** is one of the largest providers of these medical products on the German market. In addition to online therapy programs for people with mental illnesses, there is also an offer for chronic pain: Since 2023, the pharmaceutical company Pfizer has been supporting Selfapy in the market launch and marketing of the app “Selfapy’s online course for chronic pain” as part of a cooperation.

With offices in Berlin and Prague, **Vitadio** has developed a DiGA for patients with type 2 diabetes that aims to improve diabetes control by empowering users to improve their self-management and lifestyle. **Mindable Health** from Berlin focuses on mental health with its certified medical devices. Two different Mindable apps support those affected by panic disorders and social phobias. They offer psychoeducation and exercises tailored to individual needs. **Vivira** is a Berlin-based exercise therapy DiGA for the treatment of back pain caused by non-specific low back pain or osteoarthritis of the spine. The Potsdam-based start-up **Oviva** has developed an app-based weight loss therapy for people who are severely overweight. The multimodal basic therapy, consisting of nutrition, exercise and behavioral therapy, was permanently included in the DiGA directory in August 2023.

AI-based approaches in diagnostics

With three university hospitals and a high density of excellent academic research institutions in the life sciences, Berlin-Brandenburg has proven to be the optimal breeding ground for spin-off AI companies that focus on diagnostics. The innovative platform created by the Berlin-based Charité spin-off **Nia Health** is the world’s first clinical diagnostic and therapy system for the continuous digital support of patients with chronic skin diseases. Nia Health has been able to establish partnerships with Pfizer, Sanofi and LEO Pharma, among others.

After heart surgery, patients in the intensive care unit are connected to numerous devices, and a large amount of data is routinely collected. The Deep-Learning-based software from **x-cardiac** uses this data to predict whether serious complications will occur. “With the help of AI, our software x-cardiac-platform recognizes the pattern of postoperative bleeding and kidney failure after heart surgery and



Clinical decision support in cardiac intensive care units © x-cardiac

informs the clinicians before serious complications such as organ damage may even occur,” explains Alexander Meyer, co-founder and one of two managing directors of x-cardiac. After successful tests in intensive care units of Deutsches Herzzentrum der Charité (DHZC), and the launch of the first medical device generation “x-c-bleeding” in 2021, the second product generation “x-cardiac-platform” has been approved under MDR as a medical device in 2024. The x-cardiac-platform includes two algorithms (plug-ins) to predict acute kidney injury and postoperative bleeding, two of the major complications after cardiothoracic surgery, says Meyer, who is a board certified cardiac surgeon and also a Professor of Clinical Applications of AI and Data Science at Charité.

Aignostics is a spin-off founded by scientists at the Institute of Pathology at Charité – Universitätsmedizin Berlin and Technische Universität Berlin. Their digital imaging

analysis system evaluates microscopic images of suspicious tissue biopsies. The AI-powered software has learned to differentiate between tumor tissue and healthy tissue. It provides explanations for its decisions, helping pathologists to understand and trust its judgments. The system is already in clinical use and reliably identifies lung, breast and colon cancer as well as other diseases that cause visible changes in tissue. The software can also be used for the discovery and validation of biomarkers, thereby supporting the development of companion diagnostics for personalized medicine. For example, Aignostics recently entered into a strategic research alliance with Bayer to identify target molecules for the development of precision oncology therapeutics. To date, Aignostics has raised more than 20 million euros from leading venture capital investors and maintains offices in Berlin and Boston, USA.

Osteoporosis is a widespread disease that affects millions of people around the world. For a long time, preventative actions and therapies have not effectively reached patients – in large part due to the lack of early and accurate diagnosis of osteoporotic fracture risk. Potsdam Science Park-based **POROUS**, a spin-off of Charité – Universitätsmedizin Berlin, has developed an innovative solution: “Our patented quantitative ultrasound technology allows us to measure bone quality at the bone wall at microscopic level without radiation exposure,” says CEO Julia Eschenbrenner. “This is a true innovation in the field: an early diagnostic to open a window for preventative and therapeutic action before bones actually become brittle.” For its work in early osteoporosis detection, POROUS is receiving funding of 2.5 million euros through the European Innovation Council Accelerator Grant. Over the next few years, POROUS will be testing and validating its technology in a large-scale, multicenter clinical evaluation.



“Our patented quantitative ultrasound technology allows us to measure bone quality at the bone wall at microscopic level without radiation exposure. This is a true innovation in the field: an early diagnostic to open a window for preventative and therapeutic action before bones actually become brittle.”

Dr. Julia Eschenbrenner, CEO Porous GmbH



Nikolay Kolev, Managing Director Germany and member of the global Executive Board, Doctolib GmbH

“The acquisition of Aaron.ai is part of Doctolib’s AI strategy and aligns with our commitment to further expand our offering in Germany to meet the needs of doctors and patients.”

Innovative chatbots as game changers

When the US company OpenAI opened access to its language-model-based chatbot ChatGPT in November 2022, AI was tested and used by millions of users for the first time. Since this milestone in AI development, generative AI has become the number one technology topic. Chatbots are software programs that provide automated responses to user input. Conversational AI is usually based on large language models and helps to create a natural, human-like conversational experience. They are learning systems that adapt and learn from interactions. Chatbots and conversational AI are also playing an increasingly important role in healthcare, opening up innovative ways to improve communication between patients, healthcare providers and medical systems.

One application example is communication in medical practices: The majority of patient inquiries are still handled by telephone, sometimes only after several calls or a long time on hold. Berlin-based Aaron.ai has developed an AI telephone assistant that helps practice teams to simplify and improve communication with patients over the phone. At the same time, patients benefit from more flexibility and telephone access to the practice, even outside of consultation hours. Aaron.ai's AI solution is already used by more than 3,500 healthcare providers in Germany. In May 2024, Aaron.ai was acquired by the healthtech company **Doctolib**. "Doctolib is currently investing in expanding its AI technology expertise, and we will launch our own AI-based solutions this year starting in France," said Nikolay Kolev, Managing Director Germany and member of Doctolib's global Executive Board, when announcing the takeover. "The acquisition of Aaron.ai is part of Doctolib's AI strategy and aligns with our commitment to further expand our offering in Germany to meet the needs of doctors and patients."

The chatbot ISA ("Intelligent Speedy Assistant") from pharmaceutical company **Berlin-Chemie** utilizes generative AI.



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It was created in collaboration with **IBM iX** and is based on scientifically substantiated data relating to COPD (chronic obstructive pulmonary disease) that can be used to support therapy. The ISA chatbot allows COPD patients to ask specific and typical questions about their disease – from symptoms to treatment options – and receive answers that are tailored to their needs. The start-up **Mexb.ai** has developed a Mental Health chatbot. Named Ora, it is the EU's first multilingual video AI avatar, also offering audio sessions, powered by in-house developed models.

Shaping international standards for the use of AI

The areas of AI and robotics are set to have a far-reaching impact on the healthcare sector. In the European Union, they have to meet strict requirements, but there is still a lack of testing infrastructure and of so-called Notified Bodies which develop standards, validate innovations, and certify new products.

This is precisely where the **Testing and Experimentation Facility for Health AI and Robotics (TEF-Health)** comes in. The new project aims to facilitate and accelerate the validation and certification of AI and robotics in medical devices. Kicked-off in 2023, TEF-Health is supported by the European Commission and national funding agencies with a total of about 60 million euros. Professor Petra Ritter, Head of the Brain Simulation Section at the Berlin Institute of Health (BIH), coordinates the consortium. In total, 52 academic and private partners from nine European countries are involved in the project, integrating existing infrastructures as well as building new ones.

"With TEF-Health we mainly support SMEs with testing their AI systems in real-world scenarios," says Ritter. The project partners additionally plan to develop new regulatory and ethical requirements, such as standardized test-



"The consortium TEF-Health aims to facilitate and accelerate the validation and certification of AI and robotics in medical devices. We mainly support SMEs with testing their AI systems in real-world scenarios."

Prof. Dr. Petra Ritter Head of the Brain Simulation Section at the BIH



Three questions to...

Jutta Klauer

Director Strategic
Digital Partnerships at
MSD Sharp & Dohme GmbH



Kirsten Hoyer

Executive Director Public Affairs,
Communications & Sustainability
at MSD Sharp & Dohme GmbH



What digital health projects is MSD currently working on?

Jutta Klauer: In Germany, MSD has partnerships with several digital health companies – with projects ranging from diagnosis and therapy decision support, patient care navigation, and therapy companions to remote patient monitoring and clinical trial matchmaking. All external digital health innovation projects and solutions must provide a measurable benefit to patients, caregivers, and healthcare professionals. For example, with the company Elektra Kaiku, we are implementing an AI-enabled remote monitoring tool for lung cancer patients that can predict symptoms prior to onset. Another partner, the startup luvando, offers a platform that combines personal service and an AI-supported digital matchmaking solution to match cancer patients with the most suitable and nearest clinical trials.

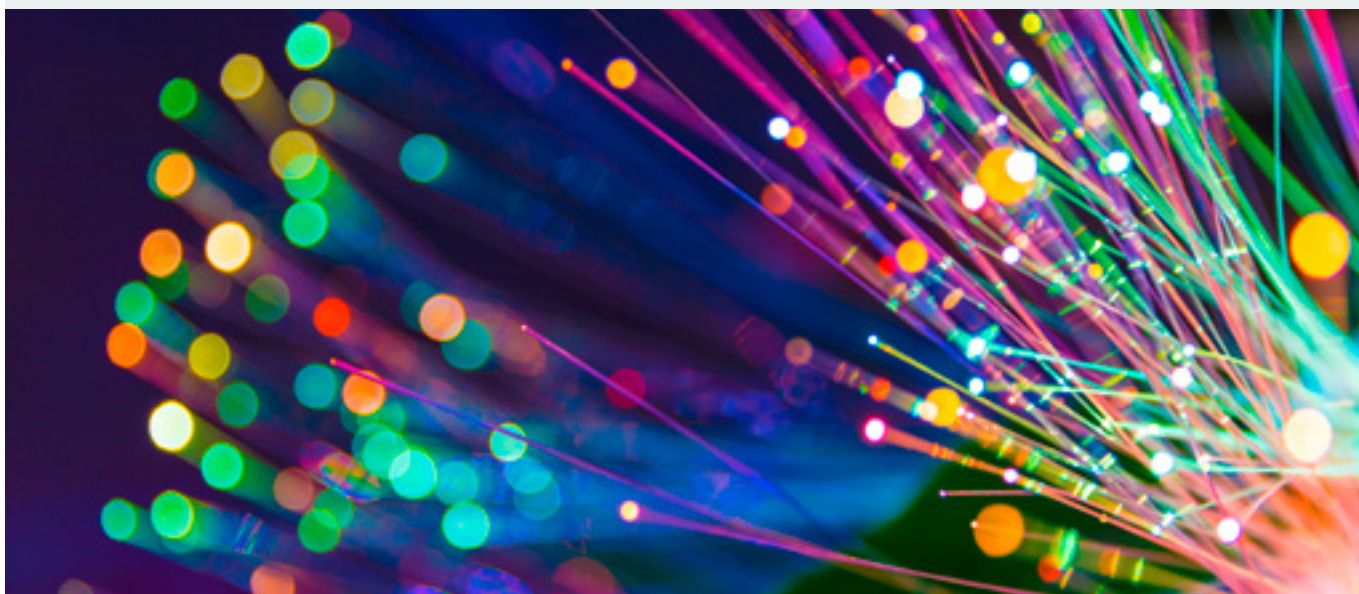
The MSD Idea Studio Europe was recently launched in Berlin. Who is behind it and what will be the focus of the studio?

Kirsten Hoyer: The MSD Idea Studio Europe was established to fund and collaborate with digital health entrepreneurs. The venture capital investment from the MSD Idea Studio Europe will be funded by our MSD Global Health Innovation Fund. Our joint objective is to system-

atically build and foster scalable digital health solutions through funding, collaboration and partnerships. We offer entrepreneurs the opportunity to leverage MSD's deep health care expertise to grow their business, while achieving meaningful impacts for patients. Oncology and vaccines will be the initial focus areas, and we are looking for solutions that address patient-centered issues related to prevention, health literacy and equity, early detection, diagnosis, remote patient monitoring, and streamlining clinical trial processes.

As MSD has based the Idea Studio in Berlin: How do you look at the digital health ecosystem in the capital region and what do you hope to gain from having a presence here?

Jutta Klauer: We will be partnering with digital health businesses across Europe, with the MSD Idea Studio Europe strategically located in Berlin. Berlin offers a wide range of outstanding life science, technology and innovation hubs that will provide an entrepreneurial environment to facilitate the exchange of ideas and foster innovation. Here, we can build on a thriving digital health ecosystem and a network of agile players. We are eager to engage in this dynamic entrepreneurial and healthcare ecosystem in Berlin to play a significant role in shaping the region's digital transformation in healthcare.



ing protocols and certification schemes. The newly created evaluation resources and infrastructure are made available to industry in the future in the form of fee-based services. “Widespread use of these comprehensive testing and evaluation tools will not only accelerate market access for innovative AI and robotics technologies but will also ultimately boost public confidence in these new developments,” explains Ritter.

To develop the necessary standards and recommendations for using AI to provide universal healthcare, the **Global Initiative on AI for Health (GI-AI4H)** was officially launched in

2023. The World Health Organization (WHO), the International Telecommunication Union (ITU), and the World Intellectual Property Organization (WIPO) will work together under the newly formed initiative to improve healthcare worldwide through the use of AI. Key goals include standardization, global collaboration and on-the-ground implementation. Experts from **Fraunhofer Institute for Telecommunications, Heinrich-Hertz-Institut (HHI)**, will take a leading role in the work of GI-AI4H.

More players active in the digital health ecosystem:

Ada Health is a Berlin-based digital health company that uses artificial intelligence to provide personalized symptom assessment and health information to users through a mobile app, aiming to improve access to healthcare globally.

Asterisk Womxn’s Health: AsteriskDAO is building female-specific platforms to collect first-hand experiences and data on disorders that disproportionately affect women.

Cerner Health Services Deutschland is building an open healthcare platform with intelligent tools for data-driven, human-centric healthcare experiences to connect consumers, healthcare providers, payers, and public health and life sciences organizations.

dentalXrai offers a solution for an AI-based X-ray evaluation in dentistry through automated analysis of pathologies and restorations.

Fraunhofer Center for Digital Diagnostics (ZDD) is developing technologies and solutions for decentralized bioanalytical data acquisition, secure data communication, and intelligent data interpretation to improve healthcare in rural areas.

molecule is a decentralized biotech protocol that creates a web3 marketplace for research-related intellectual property, facilitating funding and governance for biotech projects through community-driven decentralized autonomous organizations (DAOs).

Likeminded created an online platform that connects employees with mental health professionals for individual and group therapy sessions, workshops, and on-demand resources to improve workplace mental wellbeing.

LIMAA Technologies develops a fully automated and scalable tissue-preserving end-to-end 3D histopathology platform for clinical use.

mama health technologies is a health tech start-up that facilitates peer-to-peer interaction among patients with chronic conditions, enabling them to share experiences and insights while also collecting valuable data to improve medical research and treatment options.

Pendulum Health is a Berlin-based software developer specialized in walking analysis tools to facilitate the work of clinicians, therapists, and coaches.

pi4_robotics is developing and manufacturing service robots for healthcare applications, including nursing assistance, to help alleviate staffing shortages and improve care quality in medical facilities.

Scalable minds is a software engineering company with a strong focus on solutions utilizing powerful AI methods and are experts for large scale image analysis.

MX Healthcare (Vara) is a start-up developing machine-learning-based web solutions for the automated diagnosis of breast cancer based on the analysis of radiological images.

WHO Hub for Pandemic and Epidemic Intelligence, established 2021 in Berlin, the hub seeks to improve data, analytics and decision-making to minimize the impacts of pandemic and epidemic threats.



Humanoid robot Pepper in the customer service department of a financial services provider © Daniel Fürstenau

Smart tools advancing prevention, rehabilitation and care

Digitalization and artificial intelligence (AI) continue to drive innovation in healthcare. Novel medical devices and digital tools will help to address challenges such as demographic change and the shortage of skilled workers. A growing number of research institutes, clinics and technology companies in Berlin and Brandenburg are working together to develop and to integrate their innovations into the existing healthcare system and lead it into the future.

Using smartphones, wearables and tablets, some patients are already benefiting from personalized medical solutions in their own homes. Soon, advanced care robots, AI-based tools for risk stratification, documentation and planning, digital information-sharing platforms, and chatbots will find their way into care facilities and ease the burden on caregivers. Innovations like these have the potential to help mitigate the effects of an aging population and attract more skilled workers to the medical sector.

In recent years, Berlin has established itself as a hub for groundbreaking technological innovation, particularly in the healthcare sector. Innovators collaborate closely with clinics, patients, and caregivers to ensure that their solutions meet people's needs and make a difference to their lives.

Especially AI-based technologies have huge potential in the care sector. They could support medical staff in the entire care process, from clinical assessment through to evidence-based care planning. However, integrating these solutions into the existing healthcare system is complex. To achieve this goal, key stakeholders from a range of sectors and interdisciplinary research teams are working closely together. The concentration of technology companies and start-ups, clinics, research institutions, and policy makers in Berlin-Brandenburg provide an ideal ecosystem for this challenge. Paving the way for innovations such as sensors, wearables and AI solutions for better health, the region benefits from the close cooperation of the healthcare cluster with players from the strong networks in optics & photonics, and ICT.

Center for care research and learning hub

The **Digital Urban Center for Aging and Health (DUCAH)** is a people-focused research center that specializes in care, health, and social economy. It also serves as a healthcare learning hub. Towards the goal of “living better for longer”, the interdisciplinary cooperative promotes the development of digital and social innovations that address the challenges of an aging population. One research focus is the design of future residential areas that allow people to lead active lives in their homes for longer. “Our organization's objective is to develop a new, innovative approach that integrates digitalization, urbanization, and health”, states Professor Thomas Schildhauer, scientific director and co-founder of DUCAH and director of the **Alexander von Humboldt Institute for Internet and Society (HIIG)**. To achieve this goal, the cooperative brings together the political, healthcare, social, real estate, financial and digital sectors in a holistic way. The Cluster HealthCapital Berlin Brandenburg supports DUCAH as a network partner alongside partners like research institutions, healthcare organizations and solution providers from Germany, Europe and America.

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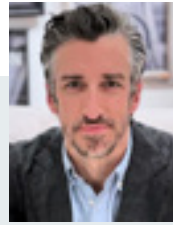
Prof. Thomas Schildhauer,
Scientific Director and Initiator of
the DUCAH



“Our organization's objective is to develop a new, innovative approach that integrates digitalization, urbanization, and health.”

Berlin's tech scene drives cutting-edge prevention solutions

Many local start-ups are at the forefront of medical innovation, developing intelligent solutions to prevent illness and injury. One example is the Berlin-based start-up Lindera, which developed a mobile application that uses AI for fall prevention. Particularly for the elderly, falls are a significant and often preventable healthcare issue. Lindera is part of the research project **Ai4Care**, in which scientists from **Charité – Universitätsmedizin Berlin**, the **Berliner Hochschule für Technik (BHT)**, and other partners are exploring machine-learning-based solutions for fall risk prediction and aiming to lay the groundwork for AI in nursing. For



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“Around 200 million ankle injuries occur worldwide, and we feel a deep responsibility to protect athletes at every level. The adaptive ankle brace technology developed by Betterguards is world-class German engineering at its finest.”

Tony Verutti, CEO & Managing Director at Betterguards Technology GmbH

© Betterguards Technology GmbH

example, Ai4Care has piloted new methods to create synthetic nursing data, allowing the privacy-preserving sharing of data beyond the confines of one clinic or nursing home.

The Berlin-based start-up **My Paramedic** offers an intelligent AI solution designed to mitigate the risk of recurrent cardiac events. Their mobile application serves as an at-home digital cardio therapy assistant. The solution facilitates patient recovery by analyzing health indicators, creating personalized recovery plans, offering educational resources, and providing motivational support.

The mission of the Berlin-based company **Betterguards Technology** is to protect and enhance athletic performance. As part of the NBA launchpad in 2022, the start-up developed adaptive ankle support braces that prevent common ankle injuries without restricting mobility. In 2023,



Ankle brace © Betterguards Technology GmbH

Tony Verutti joined Betterguard as Chief Executive Officer to spearhead the company's rapid growth and global expansion. "Around 200 million ankle injuries occur worldwide, and we feel a deep responsibility to protect athletes at every level. The adaptive ankle support technology developed by Betterguards is world-class German engineering at its finest," says Verutti.

AI-assisted technologies free up time for human care

Innovative AI-solutions developed in Berlin and Brandenburg can relieve the burden on nursing staff. An example is "voize", an app for voice-controlled care documentation on smartphones. This app uses artificial intelligence (AI) to support nursing staff in documenting care reports, vital signs and other relevant information. The technology was developed by the Potsdam-based start-up **voize**. The company coordinates the **PYSA** network, which includes partners such as the **Charité – Universitätsmedizin Berlin** and the **German Research Center for Artificial Intelligence**. Together, they want to introduce, test and develop the technology for everyday practice in collaboration with multiple care facilities.

The care robot "Oscar", developed by the start-up **Bearcover**, provides invaluable support for nursing staff, especially during night shifts. Oscar is equipped with radar sensors that



Assistant "Oscar" for nursing staff on the night shift © Bearcover GmbH

can detect unusual patient positions and movements through closed doors. The robot uses advanced AI technology to determine when help is needed, for example, if a patient falls. In this case, the robot immediately alerts staff via a messenger app. "In the long term, the robot will become an integral part of routine tasks and enable carers to concentrate on their most important task — human care," Bearcover's founder Daniel Flynn explains. The internationally networked team is based in Berlin and closely collaborates with a clinic in Brandenburg. Location is key to their success: "When working on innovations with deep tech, there are constant challenges. Berlin offers the opportunity to assemble a team with specific skills in a very short time," say the founders.

An AI-based telephone chatbot (Voice Bot) developed at the **Medizinische Universität Lausitz – Carl Thiem** in Cottbus will help dementia patients to train their abilities to communicate. A team from **Thiem-Research** and **Ubitec** is developing a telephone chatbot as part of the "Dementia VoiceBot" project. This chatbot will call patients and hold conversations, encouraging them to speak regularly. This application is intended to positively influence the course of the disease and reduce the burden on carers and relatives.

AI is a promising solution for a wide range of challenges in the care sector. However, it still plays a minor role in day-to-day care. The BMBF-funded **ProKIP** project – "Process support and development for the use of AI in nursing care" – is investigating how AI solutions can be successfully integrated into nursing practice. "ProKIP is an important effort to understand the landscape of AI in nursing in Germany. It follows eight funded projects in nursing AI in Germany that either build specific AI solutions or make data available that are a necessary base for model training later on," says Daniel Fürstenau, Head of Data Ecosystems and Care Analytics research group at the Institute of Medical Informatics at **Charité – Universitätsmedizin Berlin** (see interview for more). Further local ProKIP project partners are the **Berliner Hochschule für Technik** and **The Humboldt Institute for Internet and Society (HIIG)**.

Local innovators are breaking new ground in rehabilitation

Modern digital treatment solutions developed in the German capital could revolutionize the way people recover from injury, illness, and even prevent health issues: "Our innovative approach combines the best of digital technology with personalized care," explains Maximilian Michels, founder and CEO of **Caspar Health**. The services offered by **GOEHA** Berlin are not purely digital. They integrate individual digital therapy with personal one-to-one care from healthcare professionals. Doctors and therapists manage



Daniel Flynn
CEO of Bearcover GmbH



"When working on innovations with deep tech, there are constant challenges. Berlin offers the opportunity to put together a team with specific skills in a very short time."



“Our innovative approach combines the best of digital technology with personalized care”

Maximilian Michels, Founder and CEO Caspar Health

the therapy and stay in contact virtually, allowing patients to receive care at home and at flexible times. This blended care model ensures high-quality therapy which is accessible to people regardless of their location, thereby making training, exercise, and knowledge available in flexible ways. While rehabilitation aftercare is currently the most prevalent form of blended care, there is also significant growth in prevention and a trend towards digital rehabilitation. The medical staff benefit as well, as the profession becomes more interesting and includes more facets in the digital setting. Therapists also see the progress of their respective patients due to close and ongoing contact facilitated by digital means.



Three questions to...

**Prof. Dr.
Daniel Fürstenau**

Head of Research Group Data Ecosystems and Care Analytics at Charité – Universitätsmedizin Berlin; Professor at Freie Universität Berlin



How can AI tools particularly help to improve the future of care?

Software-related AI technologies can be particularly useful in three areas: risk stratification and therapeutic support, documentation and planning. Machine learning algorithms are very good at classifying. In nursing this could be applied to determine an individual's risk of falling, delirium or decubitus ulcers, but also for personalized medication management. We should also not overlook the large potential for better documentation and planning solutions, given the nursing shortage and the need to provide substantial improvements to the nursing process. Most profoundly, AI will simplify note taking or care plan generation via generative AI solutions.

As part of the BMBF-funded ProKIP project, you are investigating how AI solutions can be successfully integrated into nursing practice. What are the main findings so far?

ProKIP is an important effort to understand the landscape of AI in nursing in Germany. It follows eight funded projects in nursing AI in Germany that either build spe-

State-of-the-art rehabilitation devices that help patients to regain their ability to move are offered by the team of **Reha-Stim Medtec**, Berlin. The company group is headquartered in Switzerland and develops cutting-edge electromechanical and robotic devices for therapy assistance. These help patients to recover from conditions such as stroke or incomplete paraplegia. One of the company's flagship products is the FLOAT, a 3-dimensional overground gait training system that allows people to practice daily tasks such as climbing the stairs without the risk of falling.

The Berlin-based start-up **ReMoD** has developed a sensory orthosis that helps patients with central nervous system disorders – such as stroke, hemiparesis, infantile cerebral palsy or MS – to improve their posture and movement control. Anna Vonnemann invented the technology 2005 to help her daughter with the symptoms of her hemiparesis. With the support of investors, industry partners and researchers at the **Technische Universität Berlin**, they developed the prototype into a market-ready approved medical device. The orthoses detect deviations from the ideal body posture and send electro-tactile signals to the patient's skin to help correct it.

cific AI solutions or make data available that are a necessary base for model training later on. The first learning from it is that progressively more effort will be needed to make nursing data available for useful AI applications in a privacy-preserving, ethically sound manner. There is also a huge need for data standardization. ProKIP also mapped out the numerous legal, administrative, and organizational challenges to creating AI solutions in nursing. Finally, there's also an important insight on end-user participation, as AI readiness is very different across different care homes, wards, and clinics.

You are involved in the development of AI applications for very different use cases. Could you give one example where they could be used in future day-to-day care?

Another project funded by the BMBF is called AI4care. The primary goal of this alliance is to make nursing-related data available. The second goal is to create machine-learning-based solutions for fall risk prediction. For example, in the field of risk stratification, we have made important progress in identifying the most significant attributes and risk factors related to falls. We are also collaborating with Lindera, a German medium-sized company focused on nursing therapeutics, to create prototypes integrating the insights. These solutions could soon be used for more precise risk stratification for people at risk of falls, especially severe falls and their consequences.

More companies active in prevention, rehabilitation and care

AssistMe: A Berlin-based company developing intelligent digital products for the care sector that increase the efficiency of care processes, improve working conditions for staff and ensure a high quality of life for patients.

media4care: The company is specializing in digital solutions for senior care and has developed an app that supports care staff in their day-to-day work and offers seniors games and exercises to train their cognitive abilities.

Synapticon: The Berlin-based company developed the brain training app NeuroNation MED that can help to counteract the symptoms of mild cognitive disorder by creating a personalized training plan to improve brain function.

NursIT Institute: Their smart AI-based nursing software careIT streamlines and automates documentation, identifies potential health risks, and recommends effective care interventions.

BeMoved: The diagnostic gait and running analysis developed by Charité, Julius Wolff Institute and Center for Musculoskeletal Surgery is a tool for orthopedics to identify the cause of a patient's pain in muscles, tendons and joints.

Life Sciences Directory Berlin-Brandenburg



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