UniBE Foundation

MedTech Hub Bern: Leader in Clinical Translational Research, Product Piloting and Entrepreneurship

University of Bern
With the ARTORG Center for Biomedical Engineering Research, the Center for Artificial Intelligence in Medicine (CAIM), Centre Suisse d'Electronique et de Microtechnique (CSEM), the BFH Engineering Labs, and sitem-insel, Bern is a strong incubator for MedTech innovation.

The Bern medical technology research and industry cluster is transforming healthcare through latest technology including artificial intelligence, surgical robotics, and organs-on-chip. With a unique clinical embedding, the Swiss capital region creates cutting-edge solutions for prevention, treatment, rehabilitation, and chronic disease monitoring with internationally renowned success. Poised to become the leading Swiss MedTech Hub by 2030, Bern is already impacting care and improving the quality of life for patients.

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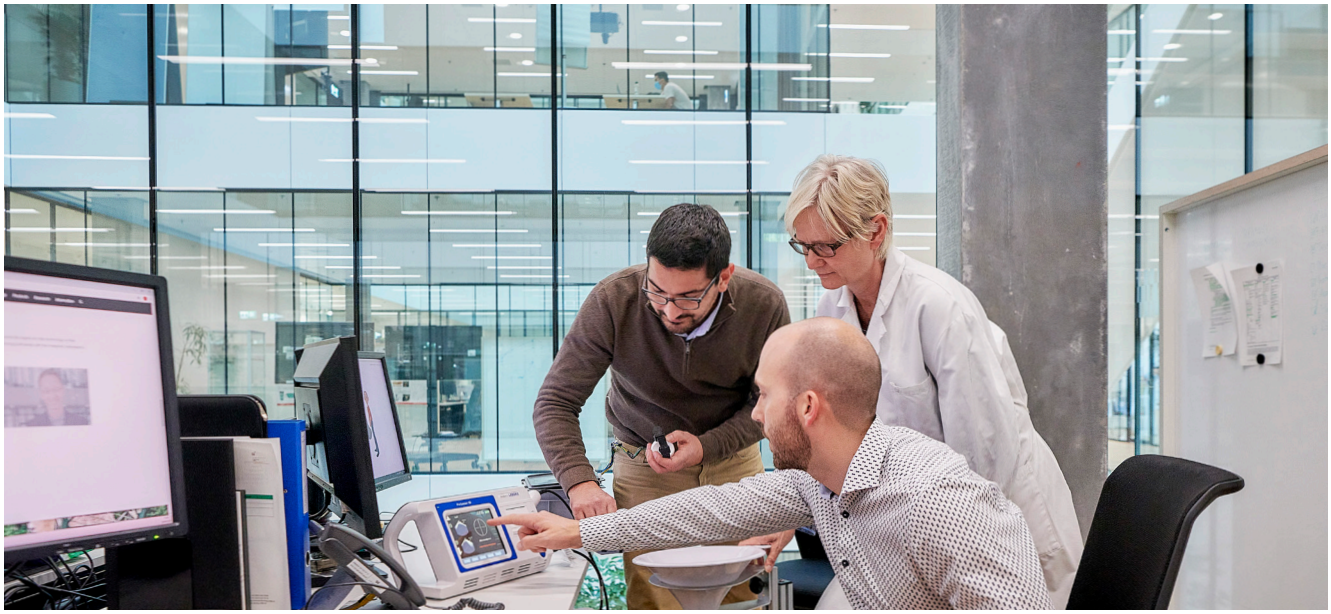

Short distances and a common language for clinicians and engineers generate sustainable MedTech innovation in Bern (here at sitem-insel).

Background It began with a vision in the 1960s. Maurice E. Müller, then Head Orthopedic Surgeon in Bern, had a brilliant idea: The latest technology should be used to develop better interventions for patients and improve what medicine could achieve for public health.[1] Since then, engineers have been working hand in hand with doctors and nurses to innovate diagnosis, therapy, and rehabilitation for patients at the Bern Medical Campus with great success.

Technology alone, however, is not the driver behind sustainable change in healthcare. Transformative innovations need to respond to unmet clinical needs, and this is very well understood in Bern. Through long-standing and close collaboration its clinicians, engineers, physicians, and computer scientists have developed a common understanding of the challenges healthcare faces today. This allows to employ technology for a more targeted, yet affordable healthcare, tackling expert shortage and the rise of chronic diseases straining systems.

True to this early spirit of collaboration and entrepreneurship, Bern forms an unparalleled biomedical engineering hub at the heart of Switzerland, the only one with direct clinical embedding.[2]

The University of Bern's ambitious vision As the central turntable in the MedTech Hub of Switzerland's capital region, the University of Bern together with its partners in clinic and industry has set the course for taking healthcare to the next level. The vision is to create a future where health data can provide new insights, health risks are recognized earlier, patients are empowered and the quality of care is further improved through targeted technology use.

The institutional extension of Bern's MedTech infrastructure has been accompanied by the installation of various specialized professorships, such as AI in Medicine, Emergency TeleMedicine, Digital Pathology, Diabetes Technology, Interdisciplinary Rehabilitation, and Neuromorphic Systems, all testifying to the strong portfolio in digital healthcare.

The mission The MedTech Hub Bern brings together cutting-edge expertise to:

- Push the boundaries of medicine through education, research, development, and implementation;
- Underpin patient-centered care, health literacy, and patient empowerment;
- Promote data-based prevention, therapy, monitoring, and rehabilitation;
- Tackle current and future healthcare needs and challenges;
- Support start-up incubation and sustainable economic growth.

Shaping the future of medicine The MedTech Hub Bern is supported by experienced partners such as the ARTORG Center for Biomedical Engineering Research (discovery, piloting & education), CSEM and CSL Behring (microtechnology & biotherapeutics) and the Swiss Institute for Translational and Entrepreneurial Medicine sitem-insel (translation & start-up incubation).

Prof. Dr.
Manuela Eugster

„In Bern, we embrace diversity to offer specialists and patients innovative healthcare solutions that work in practice."

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[1] https://www.uniaktuell.unibe.ch/2023/medizinwerkstatt/

[2] https://ggba.swiss/en/berns-thriving-ecosystem-for-life-sciences-innovation/

Transforming healthcare

Bern has a strong portfolio in digital healthcare ready to develop further disruptive medical technologies through clustered research excellence around artificial intelligence, sensor technology, virtual reality, and telemedicine.

All expertise in one spot The internationally recognized know-how of its experts is complemented by cutting-edge technology infrastructure to gain totally new insights into the origins and progression of diseases. Specialized research facilities[3] include, among others:

- NeuroTech Research Hub – latest sensor technology to better understand and treat neurodegenerative diseases such as Alzheimer's;
- Translational Imaging Center – unique 7 Tesla MRT for ultra-high resolution in brain research;
- Europe's first Dynamic Imaging Center to advance treatment of musculoskeletal diseases.

Seeing further with data and AI Advanced machine learning unleashes the full potential of the abundant health-related data generated around Switzerland's biggest public hospital complex for research, prevention and personalized therapy. AI analytics allow clinicians further insights in diagnostics and therapy planning, free more time for core interpersonal patient care and support hospital resource planning.

Artificial Intelligence research is set to improve individual health risk assessment and allow earlier intervention. Patients gain more freedom in chronic diseases by remaining independent for longer and being empowered to monitor their own health through systems such as eyesight tracking with AI & VR, AI-supported nutrition monitoring, or neural health improvement through serious games.

Innovation encompasses solutions for surgery, chronic disease management, diagnostics, and drug development and conditions of the aging population. Special focal points are eye care, neurological disorders and interventions and cancer therapy.

Robotics for surgery and simulation Robotic systems have become an indispensable tool in modern medicine. Their improved safety, security, and reliability make them invaluable in difficult surgical interventions even within the smallest or most vulnerable of anatomies. Bern has developed the world's first robot for cochlear implantation and is pioneering surgical robotics to improve the precision, efficiency, and safety of neurosurgery.

Through integrated computer vision and real-time navigation, robotic systems can perform surgical tasks near extremely vulnerable areas. Current projects include eye, ear, and brain interventions, spinal and cancer surgery. In addition, 4D simulation developed in Bern allows surgeons to train and perfect their skills under real-life conditions for individual patient cases.

Creating new drugs and treatments the sustainable way Another pivotal area is Bern's organs-on-chip research. Cultivating human cells in realistic environments on microchips, this technology allows to develop drugs without animal experimentation and to test the success of a planned cancer therapy for each patient. The miniature lung-on-chip model is also used to study the effects of nanoparticles and air pollution on lung health. Another branch of this research technology is currently being refined in order to better understand complex processes in microvessels, for example in the spread of cancer cells and resulting metastases. Results could help improve the risk assessment for a milder or more severe cancer progression.

New insights and lasting implants Supercomputing and complex experimental simulation of physiological processes as well as technological advances for ever smaller diagnostic and interventional devices enable Bern to conquer the next frontier of medical conditions already at the micrometer level.

To make implants that last, Bern is studying the behavior and mechanical properties of medical implants in vivo in various areas ranging from artificial heart valves to dental implants to hip replacements. The goal is to gain insights to make implants more durable and prevent adverse health effects.

Startup incubation Bern's MedTech startups are the key turntable to bring technological innovation to patients, healthcare professionals and hospitals. In addition, they support the local economy through attractive career options from both an academic and an economic background.

Prof. Dr.
Raphael Sznitman

„With Artificial Intelligence we can push the boundaries of medicine towards holistic prevention, personalized therapies and patient-empowered disease monitoring."

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[3] https://sitem-insel.ch/en/community

Competitive advantage

Diverse teams as key to success A key factor for these accomplishments is the diversity of the developing teams. The University of Bern has ingrained this heterogeneity in its strategy. This includes concrete measures to address the existing gender gap in the STEM field, such as Master's studies scholarships for biomedical engineering and AI in medicine, as well as mentoring programs to avoid glass ceiling and leaky pipeline effects along the professional path.

For the University, the various perspectives of its members are a vital ingredient in its excellence in research, teaching, and translation. For its MedTech developments, the University of Bern thus not only profits from synergies between technological innovation and clinical expertise via institutional embedding but is also poised to leverage the high performance capacity of diverse teams. Equal opportunities in STEM fields are a declared goal and mixed teams a reality in most specialized groups.

Excellent track record The interdisciplinary understanding and solid scientific foundation which characterize any Bernese MedTech development have lead to ground-breaking innovations already impacting patients. Bern is specifically strong in incubating healthcare start-ups. This translational power of the MedTech Hub Bern is attested by the impressive list of competitive successes in the sector over the last decade.

The success of Bern's medical technology, co-developed with medical professionals, is evident in the national recognition by three MedTech award wins within the last decade for solutions developed at the ARTORG Center for Biomedical Engineering Research.

MedTech Award 2022: Alveolix

With strong alliances to local and national industry and renowned research institutions, Bern is poised to become the leading Swiss MedTech Hub by 2030.

UniBE Foundation
The UniBE Foundation encourages and supports the University of Bern so that a new generation of researchers can develop pioneering and globally acclaimed solutions for the economy of the future, sustainable habitats, and an ethical standard of living. The Foundation orients its funding according to the University's strategy, placing particular emphasis on excellence, innovation, and potential for the future.

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