

# Semmelweis University

Budapest, Hungary

## Tradition and Innovation in Medicine and Health Care



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### The university at a glance

Founded in 1769, Semmelweis University is the oldest medical school in Hungary. The faculty became an independent medical school after the Second World War and developed into a university that teaches medicine, dentistry, pharmacy, health sciences, health management as well as physical education and sport sciences. The university is named after Ignác Semmelweis (1818-1865), the famous obstetrician who discovered the cause of puerperal fever in the 1840s and therefore is also known as "the savior of mothers".

Today, Semmelweis University is widely recognized as **one of Europe's leading centers of medicine and health sciences**, combining innovation and a time-tested tradition in three main areas: education, research and health care.

The university is a **truly international community**, embracing over 11,000 students from 60 nations over five continents. Its five faculties (schools) offer a wide range of courses from undergraduate to doctorate level in Hungarian, English and German. Foreign students account for close to 20% of the total community.



Students celebrating graduation



Picturesque Budapest by night

Besides educating foreign students, the university maintains extensive relations with over 100 higher education institutions abroad, including the State University of New York (USA), Heidelberg University (Germany), the Karolinska Institute (Sweden) and Saitama Medical University (Japan).



Work at a university laboratory

Semmelweis University is **the largest health care institution in Hungary** with over 8,000 employees covering approximately 6% of the health care needs of the country's population.

### Science and research

With a 238-year-old tradition of academic excellence, Semmelweis University ranks among the most prestigious Hungarian research institutions where more than 1,300 staff members in approximately 80 departments are involved in R&D activities. Research projects in the preclinical and clinical departments are supported by both Hungarian and international programs. Contract research sponsored by pharmaceutical companies is also an important part of scientific activity. Selected research groups are supported jointly by the university and the Hungarian Academy of Sciences.

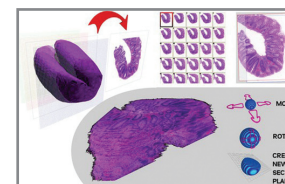
Striving for the best exploitation of international and national grant schemes, the university set up the Directorate of Tender Applications and Innovation in 2003. As a result, the total number of running R&D projects funded by international and national grants has steadily increased over the past years, to reach 300 in 2007.

Research at Semmelweis University has achieved an international reputation in the following fields: **Neurosciences, Oncology, Molecular Genetics, Molecular Immunology, Metabolism, Cellular and Molecular Physiology, Molecular Pathology, Pediatrics, Nephrology, Gastroenterology and Endocrinology.**

Semmelweis University is also among the leading universities in Hungary regarding the number of research papers published in high quality peer-reviewed international journals. The School of Doctoral Studies serves as an umbrella for a new generation of researchers.

### A revolutionary invention: 3D virtual microscopy

Researchers at Semmelweis University have recently developed a 3D virtual microscope. The technology requires a fast, high-resolution slide scanner that is able to scan automatically up to 300 slides in one run (6 cassettes, 50 slides/cassette). It detects the location of the sample, reads the optional barcode and groups the slides accordingly, carries out scanning with constant revision of focus value and loads and unloads the slides with the feeder. The 3D viewer creates a spatial reconstruction of the serial specimen. The 3D virtual microscope takes the rotation and location of each section into account when building the corresponding three-dimensional image. This replica can be rotated, sliced and sectioned arbitrarily.



3D virtual microscopy

### Market-driven innovation

Realizing the increasing need for cooperation with the industrial sector and encouraged by a favorable legal and business environment, **Semmelweis Innovations Ltd. was launched in 2007 as a university venture.** Semmelweis Innovations Ltd. is responsible for industrial partnerships and technology transfer at the 110 research groups of the university. It provides the following services:

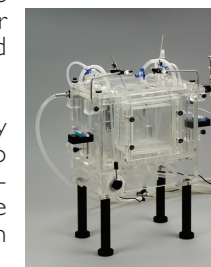
- Protection of intellectual property by submitting patents and registering know-how.
- Handling of material transfer and non-disclosure agreements and other legal matters related to intellectual property of the university.
- Virtual incubation of university spin-off companies by providing office space, business development and training services.
- Specialized services to industrial partners, especially biotechnology and pharmaceutical companies.
- Nationwide agency for connecting young, innovative enterprises with international markets or investors.

Additionally, it provides easy access to the university's core facilities and arranges individual contracts with experts in specific areas.

### A successful interagency cooperation

The **Szentágotthai János Knowledge Center (SJKC)** is a center of excellence initiated by Semmelweis University and supported by the National Office for Research and Technology. The consortium also includes Richter Gedeon Ltd., a leading Hungarian pharmaceutical company, the Faculty of Information Technologies of Pázmány Péter Catholic University and the Institute of Experimental Medicine (Hungarian Academy of Sciences). SJKC develops prototypes (such as the illustrated isolated organ system), new technologies and drug candidate molecules using biomedical research and informational technologies. One of the success stories of SJKC is the new **MR Research Center (MRRC)** equipped with a 3T Achieva (Philips) scanner, which is used for basic and applied research in the field of sensory motor functions, teaching and clinical work.

MRRC researchers recently developed a technique to estimate brain temperature, a method to optimize hypothermic therapies in neonates.



Isolated organ system

**Selected services available at Semmelweis University for industrial partners and university spin-off companies**

### Core Facilities – available by the hour for experienced users

Fluorescent cell analysis by flow cytometry or confocal microscopy. Single nucleotide polymorphism experiment planning and execution. Human or small animal fMRI.

### Molecular biology – diagnostics

Gene-expression, (q)PCR, ELISA, fluorimetry, luminometry, 2D gel-electrophoresis, Western blotting, affinity-chromatography, FISH, sequencing, cell culture, stem cells research.

### Small animal experiments – animal house, surgical and other procedures

GMO-SPF animal-house, (micro) surgery, renal transplantation, full range of cardiovascular in vivo and in vitro models, brain trauma and neurology.

### Instrumental analytics – bioanalytics

HPLC, capillary electrophoresis, LC-NMR, NMR 600, UV-VIS-LC, GC, thin-layer chromatography, LC-MS, GC-MS, endotoxin measurements (LAL Test), turbidimetric, and other enzymatic measurements.

