

Is this Europe's most modern biobank?

Breaking ground in personalized medicine and oncology research in Hungary

Internationally ranked, the University of Szeged is one of Hungary's leading research institutions with a long history of pioneering scientific achievements. The medical school is named for Nobel Prize laureate Albert Szent-Györgyi, recognized for his discovery of vitamin C. For generations, the university's scholars have been focused on collecting and storing biological samples for educational purposes as well as for clinical, biomedical, and physiological research.

“Discovery is seeing what everybody else has seen and thinking what nobody else has thought.”

— Albert Szent-Györgyi, Nobel Prize laureate and namesake of the medical school at Szeged

In early 2020, the university began the building phase of a fully automatic biobank with a capacity of 19 million samples. Now nearly complete, the facility is expected to contribute to personalized medicine, more effective oncology research, and other therapeutic developments.

The structural establishment of the Szeged Biobank was supported by the senior management of Dr. Judit Fendler and Dr. László Rovó, working closely with Dr. Zoltán Veréb, the operational head of the biobank. This project would not be possible without the support of the international biobanking community, including the Biobanking and

BioMolecular Resources Research Infrastructure–European Research Infrastructure Consortium (BBMRI-ERIC). The project also gained the backing of the European Cancer Moonshot Lund Center. And in recognition of the biobank's potential educational, health care, and research and development activities, the Hungary-based Spartacus Cancer Foundation donated a world-class, modern, fully automated -80°C sample storage system.



The biobank is within walking distance of the hospital's pathology and dermatology departments and clinical facilities. The Biological Research Center is nearby on the opposite bank of the Tisza River.

Getting much closer to a cure

The biobank is situated within walking distance of the pathology department and dermatology department, headed by Dr. Lajos Kemény and close to the Biological Research Center of Szeged. Dr. István Balázs Németh makes use of the centralized university campus. A dermatologist who began his career in pathology, Dr. Németh can operate, take a tissue sample, make the short trip to the pathology lab to check the slides himself, and make a diagnosis for the patient.

“The advantage of our clinic is that basically we have everything in one building. Downstairs, we have outpatient exams. If there are any questions, or you want to take a sample immediately, you can go upstairs to surgery. We also have a cryostat so we can make a rapid diagnosis. Within hours, we can identify biomarkers on the protein level, such as BRAFV600E for targeted therapy,” says Dr. Németh.

For clinicians like Dr. Németh, who are also immersed in research, the proximity of departments encourages collaboration. Dr. György Marko-Varga, head of the European Cancer Moonshot Lund Center, first met Dr. Németh as he was coming out of surgery and on his way to pathology. The two have worked together throughout the planning stages of the biobank.



Dr. István Balázs Németh, Assistant Professor, Faculty of Medicine, University of Szeged

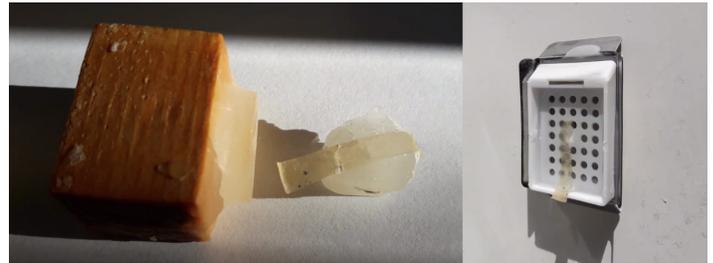


Dr. György Marko-Varga, Head of the European Cancer Moonshot Lund Center

Personalized medicine: timeless in its approach

The biobank adds another dimension to diagnosis, allowing clinicians to look back in time. “The biobank should be active, enabling us to provide bedside information for patients and choose a treatment right away,” says Dr. Németh. He recounted one such case. A patient presented with a large tumor and a prior history of cancer. Twenty-eight years

earlier, she had been diagnosed with a melanoma. Clinicians were able to retrieve the sample of the primary tumor, which had been stored in paraffin on a wooden block. It turned out that her melanoma had been latent for nearly three decades. “We were able to obtain new slides and provide useful information the next day for the BRAFV600E protein state of the tumor.”



Clinicians were able to compare a melanoma diagnosed 28 years ago with cells from a new mass and provide a patient-specific prediction on the tumor tissue level for the targeted therapy.

The university has more than 300,000 of these paraffin tissue blocks, dating as far back as the 1950s. Likewise, the modern biobank under construction will serve patients and researchers for decades into the future.

Dr. Németh sees the biobank as an important tool to better understand the latent period of cancers such as melanoma. “What are the ways these dormant cells could reactivate and cause the death of the patient? That’s our main task, to solve that.” He explains, “In the treatment of patients, sometimes we feel like we’re just running after metastatic melanoma disease. Earlier timing for systemic treatments is now on the table for clinical studies.”

Currently, the latent disease phase is largely lost time in the fight against disease progression. Dr. Németh continues, “If metastases are developing, it’s a run for their life. There is an unmet need to find biomarkers for responders to both targeted therapies and immunotherapies, which are really expensive. The reality is that approximately half the patients show no response or limited response.”

Data provided by biobanking could lead to new treatment protocols. “At the primary tumor stage, we don’t have enough biomarkers, we don’t have enough information. Our task is to shift the timing of therapy, to find the responders, to identify the biomarkers by which we could more accurately assess the clinical behavior, and find the proper timing of treatment options,” Dr. Németh says.

Thermo Fisher Scientific shares our research vision

“Right now, we are at the final stages of building a high-capacity biobank. And next to that, we have a powerhouse of a laboratory for cancer research. To help us get to this point, Thermo Fisher Scientific has been a strategic partner,” says Dr. György Marko-Varga.

“What we’ve built here in Szeged is unique. There is a commitment to biobanking. Here, the biobank functions at the heart of the hospital’s operations. Patient samples go to the biobank. As the patients are treated, the samples are going in and out to the departments to provide the latest updates. There’s a traffic—you use the biobank for the benefit of the patient,” Dr. Marko-Varga says. “This is the type of operational clinical work that the whole organization is building up toward.”

Dr. Marko-Varga appreciates the complexity of both the problems they are trying to solve and also the tools they are using to solve them. “A machine is a machine. A robot is a robot, but it’s nothing on its own. You have to combine it into a workflow, and you need all those steps to work together optimally. And we’ve built that up in Lund over the past nine years with the help of Thermo Fisher. And now we’ve copied that in Szeged. You need software; you need robotics; you need hardware. You need a complete system solution, and I think Thermo Fisher is good at that,” says Dr. Marko-Varga. “They are open. I can get on the phone and say, ‘We’ve got new data. Check this out. Should we do this? Should we do that?’ It’s a give and take. That’s how they grow their business, and that’s how we create new avenues for patients. It’s very interactive.”

“This laboratory is a hot spot. With the right technology, together with Thermo Fisher as a partner, we will make a difference. What matters is that we are able to push the limits, look at the problem a new way, and provide ways forward that no one has been able to before,” says Dr. Marko-Varga. “We are pretty active. We are patenting. We are publishing quite intensively.”

Researchers in Szeged are working in collaboration with the US National Institutes of Health and the Cancer Moonshot initiative on promising directions in melanoma therapies. Dr. Marko-Varga reports, “Right now we are discussing opportunities to utilize all the infrastructures of the biobank here in Szeged to do a pilot study of an add-on treatment for late-stage melanoma patients.”

A view to the future of biobanking

The new biobank will satisfy the biological sample storage needs of the university in the coming decades. Dr. Németh envisions the biobank aiding in prognosis, the identification of new tissue markers for diagnosis, new tissue targets for treatments, novel treatment platforms, and new applications of existing methodology. Given the biobank’s tremendous capacity and convenient access, it’s expected that researchers in Szeged, like Szent-Györgyi before them, will “think what no one else has thought” to make their own discoveries that transform patient care.



Szeged, Hungary

Data points: Szeged biobank

The expanded and improved sample storage capabilities of the university strengthen local and international ties:

- The first institution in Hungary to join BBMRI-ERIC
- Expanded role at the European University Alliance for Global Health
- Resource for the Hungarian Centre of Excellence for Molecular Medicine

Find out more at thermofisher/biobanking.com