



# Researchers saving priceless time for tumor patients with AI

## Customer

Medical University of Vienna

## Products and Services

Azure

Azure Cognitive Services (AI)

## Industry

Health Provider

## Organization Size

Large (1,000 - 9,999 employees)

## Country

Austria



A talented team of researchers at the Medical University of Vienna—or “MedUni Vienna”—recognized that tumor characterization was lagging behind other specialisms when it came to artificial intelligence (AI). While fields such as radiological research were benefitting from machine learning solutions for CT and MRI scanning technologies, tumor analysis was reliant on outdated processes, creating a painful and drawn-out patient experience. Since working alongside Microsoft, the university has found a partner and platform to pursue its vision of accurately categorizing tumors, potentially without biopsies.

Medical University of Vienna, or “MedUni Vienna,” is one of the best of its kind, known for its excellence in research, education, and patient care. Its researchers regularly publish industry-shaping work in top journals across the globe, cementing the institution as a true thought leader in medicine. One such research team—a collaboration between the Center for Medical Physics and Biomedical Engineering, consisting of medical physicist Professor Thomas Beyer and PhD candidate Laszlo Papp, and the Division of Nuclear Medicine, clinical director Professor Marcus Hacker—has been working on pioneering new approaches to tumor characterization.

“Cancer is the second leading cause of death worldwide,” explains Papp. “So, what we want to do in principle is to generate predictive models, based on hybrid, anato-metabolic imaging, without needing to take biopsy samples from patients. This is because, on the one hand, a biopsy is not a pleasant experience, and on the other hand, it’s just not precise. Hybrid imaging, on the other hand, particularly PET/CT (Positron Emission Tomography/Computed Tomography), gives an overview of the whole tumor in 3D. We can learn crucial information about the biology of tumors.”

Beyer, Hacker, and Papp chose to work with Microsoft because of its enthusiasm for the project’s potential. “When we approached Microsoft with our ideas and needs, they listened to us,” Papp explains. “They believed in our project. They understood why it’s so important.”

## Harnessing AI to analyze tumors better than ever before

The routine diagnosis of tumors is typically performed through invasive biopsy sampling, where medical imaging is incorporated to visually interpret and detect lesions and to guide biopsies. But since no form of cancer is the same as any other, this process is complex, labor-intensive, and not always completely accurate. With so many roadblocks to effectively examining tumors, something needs to be changed.



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"Currently, cancer treatment is successful in half of the patients worldwide," Papp explains. "The treatment is generally expensive, costing up to 100kEUR per year and patient."

Through the Microsoft Azure infrastructure as a service (IaaS) platform and Microsoft Azure Cognitive Services, the team is now able to put AI power behind its hybrid imaging methods to understand tumors better than ever before.

"We have many ongoing projects that are built on the results of our Microsoft-powered research, focusing on tumors such as cervical, prostate, or breast cancer. The knowledge we're gaining and the outcomes we're generating are very exciting," adds Hacker.

Research is becoming faster, more accurate, less time-consuming and, most importantly, is being applied directly to improving patient care.

## Using predictive modeling to save precious patient time

In current standard practice, biopsies can take up to two weeks to produce a result, in which time, fast-growing tumors can get progressively worse. Meanwhile, waiting for news is a horrible experience for people to go through. But Beyer, Hacker, and Papp believe that predictive models can help physicians outrun such aggressive types of cancer. And speeding up the process is not all that predictive modeling can potentially do for patients. The time saved can literally be life changing.

As Papp explains, "Imagine being confronted with your doctor telling you about a lesion that could be cancerous. You go to the hospital and get a hybrid imaging exam. Following that, instead of going through a painful, inaccurate biopsy analysis, followed by a long decision-making process about your therapy, by the time the scan is finished and you get off the imaging bed, an artificial intelligence has already performed an in-depth analysis of your medical images. This

is relayed almost instantly to your attending doctor, who can then put together a personalized therapy plan.”

The accuracy, ease of use, and lack of stress associated with such an AI approach make for a far better patient experience than what has historically been a long and painful process. Beyer adds, “Cancer is a scary prospect, so anything that can be done to make the diagnostic process a better experience for people affected has a huge impact on their mind and on healthcare in general.” All three experts reason that their approach to a clinical decision support system will help create better patient experiences and lead to dramatic cost reductions long term.

## Providing computing power for seamless data analysis

In order to teach the models to predict patterns in hybrid images effectively, the research team recognized that gathering the “extreme amount of data” it needed to work with was going to be a challenge.

“For such high-level computation, typically we need a lot of CPUs, GPUs, and maybe hundreds of thousands of GPU cores, and this is just not available in a university environment,” Papp notes. In addition, the Azure platform is a versatile landscape able to hold huge amounts of data that are currently impossible to manage with standard, in-house IT systems. This development of processing and infrastructure ability could unlock broader transformation across this project.

## Transforming medicine to transform lives

Working with Microsoft, Beyer, Hacker, and Papp can continue to unravel the complexities of tumor characterization, shortening the path from diagnosis to treatment for patients across the globe.



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Their vision of a world where AI and clinicians work together to transform patient care is one that could change the face of medicine. As they put it, “We believe that our combination of AI and hybrid imaging for cancer care will help enhance the chances of survival and ultimately, the quality of life for our patients.”

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—Laszlo Papp: PhD Candidate, Medical Physics & Biomedical Engineering and Division of Nuclear Research team  
Medical University of Vienna

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Medical University of Vienna