

AI solutions from the DKFZ set new standards in medical image processing

Researchers at the German Cancer Research Center (DKFZ) have achieved outstanding success at this year's world-leading forum for medical image processing and computer-assisted intervention. Two DKFZ departments competed in eight international AI competitions – and won seven of them. The successes cover key areas of oncology – from early detection and diagnosis to therapy support and follow-up care.

International competitions play a crucial role in advancing AI-based analysis of medical images. Similar to how new drugs are tested in randomized controlled trials, the competitions provide an objective and transparent framework for comparing and evaluating algorithmic solutions.

The competition winners were announced at this year's MICCAI (Medical Image Computing and Computer Assisted Intervention) conference: In seven of the eight competitions in which DKFZ researchers participated, they achieved first place with their algorithms. These covered a broad spectrum of relevant oncological issues: from early detection (breast cancer on MRI images, detection of suspicious lesions in whole-body PET/CTs) to diagnostics (e.g., visualization of liver tumors in CT images and esophageal cancer in endoscopy images) to therapy support and follow-up care (prediction of treatment success in breast cancer, therapy planning for pancreatic cancer, reduction of the complication rate in gallbladder surgery).

"AI competitions of this kind are initiated by medical societies, for example, and selected by interdisciplinary expert groups in a review process," explains AI expert Lena Maier-Hein from the DKFZ. All participants are evaluated using the same, previously unknown data sets. This enables a fair comparison of the methods and represents an important step in external validation. The aim is to test whether an algorithm that works well in a specific environment can also be transferred to new data and real clinical conditions. Such independent benchmarking procedures are an essential step on the path from academic innovation to clinical application.

"It was particularly challenging to achieve consistent results with our algorithms given the wide variety of imaging devices and clinical protocols from more than 50 clinics on six continents," explains Amine Yamlahi, head of the team from Lena Maier-Hein's division that won this year's surgical Lighthouse Challenge. "We are proud of our teams! Their successes show that we combine cutting-edge AI research with outstanding AI engineering, putting us in the international top league," says Klaus Maier-Hein, head of the DKFZ's Medical Image Processing division.

The successes of the DKFZ teams underscore Germany's impressive role in the development of reliable, generalizable, and clinically relevant AI. Every year, the international MICCAI competitions attract the world's leading academic and industrial research groups and set standards for excellence in medical image processing.

The importance of such AI competitions is also demonstrated by the success story of the nnU-Net algorithm developed at the DKFZ in Klaus Maier-Hein's division, which won the prestigious Medical Segmentation Decathlon Challenge in 2018. The publication of this self-learning algorithm, which automatically adapts to new medical imaging tasks, became one of the most cited DKFZ publications in recent years. After gaining widespread attention as the winner of an internationally recognized competition, nnU-Net has been integrated into numerous commercial and academic AI products. It is thus making an important contribution to the advancement of medical image analysis and is already benefiting patients.

Klaus Maier-Hein summarizes the successes: "The results of the MICCAI competitions in 2025 reinforce the DKFZ's commitment to translating artificial intelligence into practical tools that improve the diagnosis and treatment of cancer."

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Further information

