

Healthcare industry BW

Berlin-Brandenburg Academy Prize for Lena Maier-Hein

Lena Maier-Hein from the German Cancer Research Center (DKFZ) helps physicians get better vision during minimally-invasive surgery. Using novel methods of image analysis, she wants to provide additional image information for surgeons. Thus, they can better differentiate tumors from healthy tissue and execute safer surgical tumor therapies. Maier-Hein now receives the Prize of the Berlin-Brandenburg Academy of Sciences and Humanities, which is donated by the Monika Kutzner Foundation.



Prof Dr. Lena Maier-Hein from the German Cancer Research Center (DKFZ) helps physicians get better vision during minimally-invasive surgery. © Tobias Schwerdt/DKFZ

Lena Maier-Hein and her co-workers are working at the interface of computer sciences, medicine and medical technology. Their goal is to develop computer-aided assistance systems that will help surgeons plan and execute surgical interventions better. The DKFZ researcher and her team are developing novel image analysis methods that will enable physicians to remove tumor tissue completely during minimally-invasive surgery without injuring healthy organs, blood vessels and nerves.

When performing minimally invasive surgery, surgeons are faced with major challenges: They need to reach a target region precisely without injuring nearby organs. Additionally, they need to differentiate reliably between malignant tissue and healthy tissue and remove tumor tissue completely in order to prevent the tumor from recurring. So far, physicians have used white light to illuminate the target area inside the body. The endoscopic cameras then deliver only poor contrasts and little depth of vision.

Therefore, award-winner Maier-Hein and her team (Sebastian Wirkert, Thomas Kirchner, Anant Vemuri, Janek Gröhl) have combined standard endoscopic imaging with a technology called multispectral optical and photoacoustic imaging in order to provide additional information for physicians. Using their new image analysis methods that are based on machine learning, the scientists reconstruct important characteristics of the tissues under examination directly during surgery. "This enables us to assess not only the three-dimensional surface of tissues, but additionally to visualize the details that are hidden beneath, such as the structure of blood vessels, blood supply and oxygen saturation in the target region," Maier-Hein explains. "These are important clues for physicians about potential malignant tissue alterations."

During surgery, the surgeon has images of the organ and tissue surfaces plus the additional information provided by the imaging technology. The individual patient's anatomy, which is calculated based on prior CT and MRI scans, can also be superimposed in 3D on these images. In collaboration with Heidelberg University Hospital, the innovative methods are being evaluated in computer-assisted endoscopic examinations of the bowel and stomach. Any enhancement in these commonly performed surgical procedures would benefit many people. For this research, Maier-Hein now receives the Academy Prize, which will be presented during the annual festive session at the Academy's Einstein Day celebration on December 1, 2017.

Lena Maier-Hein, born in 1980, studied computer sciences at the Karlsruhe Institute of Technology (KIT) and at the Imperial College in London and attained her qualification to give lectures ('Habilitation') at Heidelberg University in 2013. Since 2009, she has been pursuing research at the DKFZ, where she has been leading an independent junior research group since 2012 and, since fall 2016, the Division of Computer-Assisted Medical Interventions. Maier-Hein has already been distinguished with several science awards including the 2013 Heinz Maier Leibniz Award of the German Research Foundation (DFG) and the 2016 Dr. Emil Salzer Prize. In 2015, she received a Starting Independent Researcher Grant from the European Research Council (ERC).

The Prize of the Berlin-Brandenburg Academy of Sciences and Humanities has been awarded annually since 1998 and is sponsored by the Monika Kutzner Foundation. The prize honors young researchers who have made outstanding achievements in cancer research. It comprises €10,000.

To DKFZ

The German Cancer Research Center (Deutsches Krebsforschungszentrum, DKFZ) with its more than 3,000 employees is the largest biomedical research institute in Germany. At DKFZ, more than 1,000 scientists investigate how cancer develops, identify cancer risk factors and endeavor to find new strategies to prevent people from getting cancer. They develop novel approaches to make tumor diagnosis more precise and treatment of cancer patients more successful. The staff of the Cancer Information Service (KID) offers information about the widespread disease of cancer for patients, their families, and the general public. Jointly with Heidelberg University Hospital, DKFZ has established the National Center for Tumor Diseases (NCT) Heidelberg, where promising approaches from cancer research are translated into the clinic. In the German Consortium for Translational Cancer Research (DKTK), one of six German Centers for Health Research, DKFZ maintains translational centers at seven university partnering sites. Combining excellent university hospitals with high-profile research at a Helmholtz Center is an important contribution to improving the chances of cancer patients. DKFZ is a member of the Helmholtz Association of National Research Centers, with ninety percent of its funding coming from the German Federal Ministry of Education and Research and the remaining ten percent from the State of Baden-Württemberg.



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