PRESS

2024/026
19.06.2024

Research into novel cancer therapy receives award

- **VDE DGBMT and Klee Family Foundation award Klee Prize 2024 to Dr. Johanna Winter from Klinikum rechts der Isar (Munich)**
- **The use of microbeam therapy can achieve better results in cancer treatment with fewer side effects and lower treatment costs**
- **New methods for diagnosing lung failure and the significance of skin changes in diabetes are the focus of the work of 2nd and 3rd place winners**

(Frankfurt a. M., 19.06.2024) Radiotherapy is one of the central pillars of cancer therapy. However, its effectiveness reaches its limits with aggressive types of cancer if nearby radiation-sensitive risk organs are damaged too severely. In order to improve treatment, Dr. Johanna Winter, who works at the Klinikum rechts der Isar of the Technical University of Munich and the Helmholtz Zentrum Munich, investigated in her dissertation how microbeam therapy can be used more precisely. She has now been awarded the Klee Prize, endowed with 5,000 euros, for her work. The German Society for Biomedical Engineering in the VDE (VDE DGBMT) awards the prize annually together with the Klee Family Foundation to promote young scientists. Winter explains: "My aim was to irradiate tumors in a more targeted way and at the same time expose patients to fewer side effects. In addition, the duration of treatment with microbeam therapy is shorter, which reduces costs." To pave the way for this, a suitable microbeam source had to be identified and a suitable irradiation plan developed.

X-ray tube instead of particle accelerator: source for microbeams

Until now, there have only been a few large particle accelerators in the world that are capable of generating microbeams for cancer treatment. Their use was therefore limited to preclinical research projects. In her dissertation, Winter worked on identifying a compact source that could ultimately be used in everyday clinical practice. To make this possible, she took up the idea of a so-called line-focus X-ray tube. The trick is to generate 50 micrometer narrow beams at the

VDE Verband der Elektrotechnik Elektronik Informationstechnik e. V.
V.i.S.d.P. Head of Brand, Marketing and Communication: Regina Schnathmann
Merianstraße 28
63069 Offenbach am Main
www.vde.com
presse@vde.com

required density without generating excessively high temperatures. Winter explains: "To generate microbeams, we direct an electron beam at high speed onto a rotating metal wheel made of tungsten – conventional solutions could produce so much heat that the metal wheel melts. This is the case at 3,400 °C." Using computer simulations, Winter was able to optimize the guidance of the beam and the heat development in such a way that it became possible to realize the project. In the meantime, she and her team have built a prototype that generates microbeams with a high dose rate.

Radiation planning: fighting the tumor, leaving the surrounding tissue intact

Another aspect of Winter's dissertation is the development of radiation plans that can be used with the new treatment method. The algorithms used to date, which are necessary for planning radiotherapy on the basis of a three-dimensional dose calculation, cannot be transferred 1:1 to micro-radiotherapy. "We have a striped pattern with very high doses and weaker doses that must be taken into account in the calculation." In order to prepare for clinical trials, Winter has developed calculation models and calculated dose distributions for various tumor types, which show that high efficacy with low side effects can be expected. "With the prototype and the basic calculations, we have made two good steps forward. There is still a lot of research to be done, but our goal is to put this form of treatment into practice and launch a series product," says Winter.

2nd and 3rd place: Diagnostics for lung failure and skin changes in diabetes

The DGBMT and the Klee Family Foundation awarded 2,000 euros and second place to the dissertation by Dr.-Ing. Tobias Menden from RWTH Aachen University, who now works for Pulsar Photonics in Herzogenrath. He investigated the question of how pneumonia, atelectasis or edema in the lungs can be diagnosed at an early stage in order to prevent lung failure or treat it as quickly as possible. The time-differential electrical impedance tomography (EIT) used to date provides little information in this regard. Menden has therefore developed an approach for using multifrequency EIT for lung monitoring in everyday clinical practice, as it can display spectral tissue properties and thus provide differentiated information about lung pathologies.

Third place and 1,000 euros went to Nikolina-Alexia Fasoula from the Technical University of Munich (TUM) for her dissertation on the connection between skin changes and systemic complications in diabetes. Using RSOM (Raster-Scan Optoacoustic Mesoscopy), a novel imaging technique, Fasoula examined the microanatomical and vascular structures of the skin of people with diabetes and healthy individuals. Through this study, she identified biomarkers such as the thickness of the epidermis or the blood volume of the dermis. They change in patients with diabetes when neuropathy or atherosclerosis reach an advanced stage.

Conversely, as a non-invasive examination method, RSOM potentially provides early information about complications associated with diabetes and any treatment outcomes.

About the German Society for Biomedical Engineering within VDE (VDE DGBMT)
The German Society for Biomedical Engineering in the VDE (VDE DGBMT) is the scientific and technical society for medical technology in Germany. It was founded in Frankfurt am Main in 1961.

The DGBMT in the VDE brings together experts from all areas of technology applications in medicine and deals with the entire range of topics in biomedical technology. It organizes conferences and workshops for expert audiences and is the sponsor of two international scientific journals: Biomedical Engineering and Current Directions in Biomedical Engineering published by Walter de Gruyter. Position papers, statements and expert contributions discuss current topics independently and neutrally. In addition, the DGBMT awards promotional prizes for young scientists, for scientific excellence and innovation, and for patient safety in biomedical engineering. Last but not least, it represents German biomedical engineering in international bodies.

For more information, visit www.vde.com/dgbmt

About VDE:
VDE, one of the largest technology organizations in Europe, has been regarded as a synonym for innovation and technological progress for more than 130 years. VDE is the only organization in the world that combines science, standardization, testing, certification, and application consulting under one umbrella. The VDE mark has been synonymous with the highest safety standards and consumer protection for more than 100 years.

Our passion is the advancement of technology, the next generation of engineers and technologists, and lifelong learning and career development “on the job”. Within the VDE network more than 2,000 employees at over 60 locations worldwide, more than 100,000 honorary experts, and around 1,500 companies are dedicated to ensuring a future worth living: networked, digital, electrical. Shaping the e-dialistic future.

The VDE (VDE Association for Electrical, Electronic & Information Technologies) is headquartered in Frankfurt am Main. For more information, visit www.vde.com

Press contact: Jennifer Bounoua, Phone +49 151 14600477, presse@vde.com