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## Radionuclide based intraoperative irradiation - Current and future approaches

The possibility to use ionizing radiation in form of X-rays for therapeutic purposes was recognized early after their discovery by Wilhelm Conrad Roentgen. Therapeutic irradiation can be applied mainly in three different ways: External beam radiation, sealed source radiation and unsealed source radiation. The most significant medical applications of irradiation therapies are in the field of cancer treatment. The cell-killing biological effects of the irradiation are utilized to minimize the risk of cancer recurrence after surgical tumor removal or to directly irradiate the tumorous tissue. In the case of breast surgery, external beam radiation therapy is often performed post-operatively in multiple fractions. This leads inevitably to damage of healthy tissue along the beam path and is also stressful for the patient due to repeated attendance in the hospital. To overcome these problems, new approaches to deliver the irradiation doses to the tumor side were devised. Based on radionuclides, which emit ionizing radiation in a finite range around the source, therapeutic radiation can be delivered directly to the tumor within or immediately after surgery via special applicators. Tumor removal and irradiation could be completed in one session. These intraoperative approaches can lead to less trauma and bed time for the patient with the same therapeutic outcome. Concepts for intraoperative radionuclide based irradiation approaches are presented in this work. Different applicators and operation room settings are discussed as well as current developments for the systems of the future.

### Biography

Alexander van Oepen completed his studies at the age of 25 years and graduated with a Master of Science from the University of Luebeck, Germany. He is a research associate of Prof. Dr. Michael Friebe at the Chair for Catheter Technologies and Image guided Interventions of the Otto-von-Guericke University in Magdeburg. His research topics are focused on the field of nuclear medicine and biomedical optics for cancer treatment.

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