

The Department of Radiation Oncology is located at campus Gasthuisberg, the main location of University Hospitals Leuven (UZ Leuven). About 2500 patients are being treated on a yearly basis. The department is equipped with five linear accelerators, a HDR and a PDR afterloader and 2 CT simulators. Amongst the linear accelerators there are two TrueBeam™, one TrueBeam STX™ and two Halcyon™ systems, all from Varian Medical Systems. The first Halcyon™ was installed in October 2017 and as such UZ Leuven was the first centre in Europe to treat patients on this innovative cancer treatment system. The department is also one of the main partners involved in the exploitation of the Particle Therapy Interuniversity Center Leuven (ParTICLe), which is located on the same campus. The Laboratory of Experimental Radiotherapy is fully equipped, including a high-precision small animal irradiation device, to perform *in vitro* and *in vivo* radiobiology research.

Furthermore, the Radiation Oncology department is also embedded in the Leuven Cancer Institute (LKI), which was established as part of KU Leuven and UZ Leuven, and covers all aspects of oncology.

### **Research axes & Expertise**

The department of Radiation Oncology has a long standing tradition in clinical trials and research on (functional) image-guided and/or adaptive radiotherapy, response prediction as well as optimization of radiation delivery techniques (e.g. SBRT, gating, tracking,...). More recently, also clinical research on proton therapy is being performed.

The Laboratory of Experimental Radiotherapy has profiled itself as a translational, radiobiology research lab and is very strongly tied to the clinical Department of Radiation Oncology. This intense collaboration allows to perform real “from bench to bedside, and back” research.

In LKI, cancer researchers, cancer specialists and care providers unite their expertise and experience in the fight against cancer. LKI combines and integrates research, therapy and care to boost interaction between these domains, thereby fostering interdisciplinary collaboration in research. Hence, advances in basic science can easily be translated into innovative approaches in clinical practice.

### **Application fields**

Clinical research

- Several ongoing clinical trials (e.g. dose-escalation, dose-painting, response prediction, PROMs...)
- Implementation of functional imaging (FDG PET/CT, DCE MRI, DW-MRI) in head and neck, prostate and rectal cancer.
- Prospective gating using the coached free-breathing technique for breast cancer patients
- Stereotactic bodyframe with abdominal compression for SBRT of liver metastases
- Treatment of oligometastatic disease
- Tracking for extreme hypofractionation schemes

- Comparative planning studies (proton – photon irradiation)

#### Radiobiological/Translational research

- Unravelling DNA-repair mechanisms in head and neck cancer
- The role of HPV in oropharyngeal cancer
- Identification of radiosensitizers in head and neck, rectum and prostate cancer
- Identification of predictive and prognostic biomarkers/models in patients with head and neck, prostate, lung, rectum, breast and oesophageal cancer.
- Establishment of biobanks for scientific research: collection of tissue, blood, saliva and urine of patients with head and neck, prostate, lung and rectum cancer included in clinical studies.

#### Major projects/partnerships/collaborations

The department has several collaborations, both internal (e.g. the departments of Radiology, Nuclear Medicine, Pathology, Urology, Abdominal Surgery, Head and neck Surgery, Urology,...) as well as external with both academic (UCL, UZ Gent,...) and non-academic partners (ESTRO, EORTC, Belgian Cancer Registry, SCK-CEN, Varian Medical Systems, IBA...).

#### Key figures

- High-tech infrastructure: Halcyon™ systems (Varian Medical Systems), small animal radiation research platform (SARRP; XStrahl)
- 12 staff members, nine clinical residents, seven medical physicists, five dosimetrists, 2 engineers and 30 nurses are responsible for daily patient care.
- 11 PhD students, three post-doctoral researchers and 2 lab technicians
- Participation in more than 20 clinical phase II and phase III trials
- Scientific output: over 550 publications in the last five years

#### Contact

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