



Narodowe Centrum Badań Jądrowych  
National Centre for Nuclear Research  
Świerk

# Accelerator for Intra Operative Radiation Therapy (IORT)

*Accelerators  
& Detectors*



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INNOVATIVE ECONOMY  
NATIONAL COHESION STRATEGY



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EUROPEAN REGIONAL  
DEVELOPMENT FUND





Intraoperative radiation therapy (IORT) is an innovative method of cancer treatment that can be applied to all solid tumors. IORT brings high dose radiation capability into the operating room, where it delivers a large single fraction dose of electron radiation directly to a surgically exposed tumor or tumor bed, when normal tissue and organs are removed from the field. By allowing the treated area to receive a higher dose of radiation, IORT may increase local control of cancer. IORT is also a shorter and less harmful treatment procedure than external radiotherapy, which is administered to patients in multiple fractions after a few months of adjuvant chemotherapy. IORT is an especially promising treatment for early-stage breast cancer, which may make it possible for many women avoid mastectomies.

A specially constructed highly-mobile electron accelerator for IORT is now under development at NCBJ (National Centre for Nuclear Research) in Świerk, Poland. This mobile accelerator is being designed for use in an unshielded operating room, in a way that will be safe and comfortable for doctors and for patients.

The features of the new IORT accelerator include:

- A high mobility treatment head, which is installed on a robotic arm assembly that allows doctors to freely choose the direction to administer irradiation. The robot is installed on a motorized platform that can be moved easily between operating rooms,
- An energy range of 4 to 12 MeV, which makes it possible to irradiate tissue effectively up to a depth of 4 cm,
- A high dose rate of irradiation – up to 10 Gy/min – which makes it possible to completely irradiate the affected area in less than 2 minutes,
- Electron applicators available in diameters from 3 cm to 12 cm, which allows the doctors to choose the applicator that is most compatible with area of the patient's body that is to be treated.
- Treatment head construction that is compatible with non-cylindrical applicators, which can be attached to treatment head using either “soft” or “hard” docking technology, depending on the doctor's preferences, and
- A fully automatic, easy to use beam control system.



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