

## **Current status of the accelerator based BNCT facility at Helsinki University Hospital**

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Helsinki University Hospital is going to start BNCT treatments in near future. Commissioning of the accelerator-based BNCT facility manufactured by Neutron Therapeutics Inc. started mid 2018 at Comprehensive Cancer Center of Helsinki University Hospital in Finland. The 2.6 MV electrostatic proton accelerator is designed to operate at 30 mA, and the neutrons are produced by a rotating lithium target. The nuBeam treatment suite includes an image guided robotic patient positioning system, and a treatment planning software designed for BNCT. The treatment facility is also equipped with a high-purity Ge gamma spectrometer for neutron activation analysis, Mg(Ar) and TE(TE) ionization chambers with water and PMMA phantoms, and an inductively coupled plasma optical emission spectrometry (ICP-OES) device for blood boron concentration analysis.

After the bunker construction was completed, Radiation Safety Authority of Finland, STUK, approved the facility for neutron beam operation. The first neutron beam measurements were performed with Mn and Au activation foils, and preliminary activation data is consistent with design goals. Also, treatment room activation was measured and recorded by the Radiation Safety Authority, and continuously after each irradiation by the users. Measurements showed low activation level at all studied locations in the treatment room, including no exposure to staff (>20  $\mu\text{Sv/h}$ ) during normal operation.

When the commissioning of the neutron beam, patient positioning robot and the CT scanner is finished and approved by the local authorities, the first clinical trial will be initiated on patients with inoperable recurrent head and neck cancer using BPA-F as boron carrier.