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ENLIGHT – “The European Network for Light Ion Therapy”

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Cancer is a major societal problem and it is the main cause of death between the ages of 45 to 65 years. In the treatment of cancer, radiotherapy (RT) plays an essential role.

RT with ions, due to their unique physical and radiobiological properties, offers several advantages over photons. In particular, they penetrate the patient with minimal diffusion, they deposit their maximum energy at the end of their range, and they can be shaped as narrow focused and scanned pencil beams of variable penetration depth.

Hadron beams allow highly conformal treatment (where the beam conforms to the shape of the tumour) of deep-seated tumours with great accuracy, while delivering minimal doses to surrounding tissues. RT with ions thus has great prospects for being used in early stages of tumour disease not amenable to surgery. It is likely that, besides its more impressive effect on radio-resistant tumours, post-treatment morbidity will be lower in patients treated with ions due to the lower dose and toxicity to normal tissues.

Visionary physicist and founder of Fermilab Robert Wilson first proposed the use of hadrons for cancer treatment in 1946. This idea was first put into practise at the Lawrence Berkeley Laboratory (LBL) where 30 patients were treated with protons from 1954–1957. Since then the total number of patients treated with hadrons in the World now exceeds 48000 and almost 5000 new patients were treated last year.

Several dedicated hospital-based centres with significant capacity for treating patients are now taking the place of the first R&D facilities hosted by the physics research laboratories (e.g. LBL, GSI). Europe is playing a key role in the development of light ion therapy facilities with five financed centres using actively scanned carbon ions (of which two are under construction in Heidelberg and Pavia) and several proton therapy centers which will become operational soon. In the US two proton therapy centers are running and four more are under construction. In the Far-East, in particular Japan but also Korea, and China are investing in hospital-based hadrontherapy centres.

The European Network for Research in Light-Ion Hadron Therapy (ENLIGHT) was established in 2002 to co-ordinate European efforts in radiation therapy using light-ion beams. ENLIGHT has been instrumental in bringing together different European centres to promote hadron therapy, in particular with carbon ions. ENLIGHT created a multidisciplinary platform, uniting traditionally separate communities so that clinicians, physicists, biologists and engineers with experience in ions. The success of the network has encouraged the scientific community to promote more inclusive collaboration between the researchers and regional activities and to enlarge the collaboration to include the proton community. Hence ENLIGHT++ continues the vision started by ENLIGHT.

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