ULICE: Union of Light-Ion Centres in Europe

In cancer management, the efficiency of radiation therapy can be greatly improved by better physical selectivity and by improving the radiobiological selectivity of the irradiation. To this point, progress in radiation therapy has mainly improved the use of photon beams. However, more recently, breakthroughs have been made using particle beams to focus on the tumour sparing surrounding tissues. The EU-funded project ULICE is encouraging further research in this field by connecting light-ion centres across Europe and boosting the latter's role in this field.

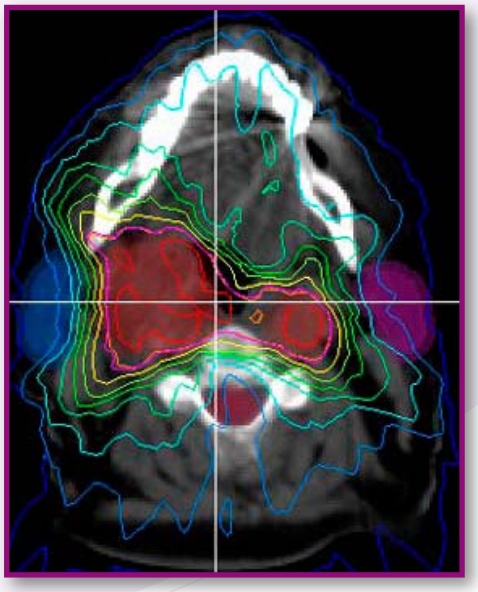
LEADING THE GLOBAL CHARGE

In the USA there is no carbon ion facility. In Japan hadron-therapy facilities provide carbon ion beams with passive delivery systems for all body districts. However, in Europe facilities have active scanning delivery system. Thus far only relatively fixed tumour sites have been fitted with such technologies, which are more precise but also more prone to error. Up to this point patients' individual sensitivity has not been taken into consideration in treatment planning. While patient treatment is most advanced in Europe, it is not yet living up to its full potential. Strategies to cope with organ motion and individualised treatment plans are necessary to take full advantage of active spot scanning.

As such, the European hadron community needs large-scale research infrastructures given the complexity of the field. These structures have to be designed and established in view of the new hadron therapy facilities in Heidelberg and Pavia. Such infrastructures would enable all interested researchers and facilities to participate in and contribute to the development of hadron therapy.

TOOLS FOR RESEARCH

To create such an infrastructure, work is needed in research centres across Europe. The appropriate instruments for applying particle therapy in the best possible conditions needs to be developed. This means the adjustment of particle energy and beam delineation to cover totally and selectively the target volume. To this end, active beam scanning will need to be further developed and widely used. There is also a need for 3D and 4D imaging techniques.



Furthermore, as the technology, instruments and infrastructures needed are so complex and expensive, collaboration is necessary between research centres. The work currently being completed in Heidelberg and Pavia will serve as models for other centres across Europe through the creation of standardised protocols.

ULICE is working to achieve these goals through a variety of means. Researchers are developing methods to better target radiation in cancer therapy. Work is also underway to improve four-dimensional particle beam delivery through the development of new software and hardware tools that can

SEVENTH FRAMEWORK PROGRAMME

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predict organ motion. In addition, researchers are working to better identify tumours that are in difficult locations close to critical structures. This will allow cancer radiation therapy to be more effective and cause less damage to healthy tissue.

Moreover, ULICE will connect research centres involved in cancer radiation therapy. This will allow centres to share best practices, technology and data, allowing light-ion therapy to grow and improve across Europe. Moreover, centres will be opened up to researchers from across the globe, allowing European technology to benefit all researchers interested in radiation therapy. ULICE will produce a report of recommendations for strategically optimal locations for future research institutes and methods for training new users.

ULICE will provide transnational access to research facilities through a series of clinical trail programmes. Such programmes will allow researchers to visit facilities and conduct radiobiological and physics experiments. Such experiments will work to reinforce Europe's role in the global light-ion field.

Project acronym: ULICE

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