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Conceptual design of a compact synchrotron-based facility for cancer therapy and biomedical research with helium and proton beams

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Thanks to their superior dose conformality and higher radiobiological effectiveness with respect to protons, helium ions are considered as the new tool of choice in the fight against cancer using particle beams. A facility to produce helium beams at therapeutical energy can also accelerate protons, at energies permitting both standardised treatment and full body radiography, and heavier ions for treatment of shallow tumours and for research. Equipped with FLASH extraction, it will be able to couple the protection to healthy tissues provided by Bragg peak and FLASH effect.
This paper will present the basic layout of a facility based on a compact synchrotron of new design that can accommodate a wide research programme with patient treatment, sharing the beam between two treatment rooms and an experimental room. The linac accelerator may be designed to allow a programme for production of new radioisotopes for therapy, diagnostics and theragnostics using helium ions, in parallel with the operation as synchrotron injector.
Overall cancer and conventional radiotherapy statistics, along with an estimate on the number of patients that can benefit from this facility will be presented for the case of the Baltic States, a candidate for hosting the facility.

Funding Agency

Footnotes

I have read and accept the Privacy Policy Statement

Yes

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