

"BNCT as a global and interdisciplinary research thematic relying on large scale consortiums: the example of RENOVA TE"

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Boron neutron capture therapy (BNCT) has the potential to eradicate single tumor cells without damaging surrounding healthy cells. Successful tumor treatment can be achieved by combining a selective uptake of ¹⁰B in tumor cells and irradiation with epithermal neutrons.

The basic principle of BNCT was first suggested in 1936 by physicist G.L. Locher only a few years after the neutron was discovered by James Chadwick in 1932. However, since then, appropriate epithermal neutron sources delivering neutrons with energies slightly above the thermal level remained scarce and resulted in a major limitation of the method. While some of them were available for BNCT, they were usually located at some distance from the treating hospital and only available for patient treatments during limited periods. These limiting conditions prevented the treatment of large patient cohorts required to provide statistically relevant data.

Despite multiple efforts over decades, up to now, BNCT could, therefore, not be established as a routine clinical treatment due to the limited access to neutron sources designed for BNCT in hospitals. This fundamental limitation could be recently overcome as numerous breakthroughs in accelerator technologies were performed. Nowadays, the BNCT community may benefit of commercially available accelerator-based neutron sources, installed in hospitals and cheaper than proton therapy systems. Now the time has come to rapidly develop this innovative and promising cancer treatment modality within large scale international efforts specifically focused to overcome the fundamental limitations of conventional RT. Relying on those new accelerators technologies, a renewed and now growing interest has emerged from the medical community. A substantial body of clinical experience has been gathered but highest quality evidence of efficacy of BNCT is still missing.

The RENOVA TE research initiative is ambitious as it is specifically focused on "renovating" the BNCT concepts world-wide and implementing a new mindset on advancing the clinical use of BNCT. This goal will be reached by creating a strong global dynamics and momentum around BNCT: it is expected to connect extensive clinical expertise in Japan with strong basic research activities around the world. To implement an effective BNCT treatment two major components should merge in a single approach: namely a drug able to carry ¹⁰B selectively into tumor cells and a suitable neutron beam. As a result, a major goal of RENOVA TE is to establish and promote preclinical research for the development and testing of improved boron compounds in Europe. It will also put new approaches in neutron dosimetry at the forefront of this visionary medical technique. Special efforts will be made to develop standards with respect to further clinical developments focusing on reporting, clinical trial strategies and radiation protection.

Achieving success requires the participation of a number of experts from different fields from basic sciences, to clinical research and engineering. RENOVA TE is thus a very interdisciplinary consortium bringing together experienced international teams able to perform translational research in all required domains, taking developments from the laboratory to technical realization at the hospital bed in a coordinated and systematic manner.

To include substantial skills and know-how in such an interdisciplinary initiative, the RENOVA TE consortium has been designed as fully global and includes 43 partners, each continent has representatives. Critical mass should be reached and expertises around the world are required. As a first step in generating the RENOVA TE dynamics, a RENOVA TE application for support has been submitted for EU funding (Marie-Slodowska-Curie Action) in May 2020. It is mainly focused on "secondments" funding aimed at creating new/renewed connections between all partners. This will enable weaving of a resilient global network able in further development steps to apply for actual research oriented projects. Coordinating such a consortium is challenging and for remaining in line with the RENOVA TE objectives, a range of specific actions will be made to strengthen the management tasks. Among them, a Steering Committee (SC) will be appointed. It will consist of all WP leaders selected among the Consortium participants in view of their previous experience of management and coordination of European and/or large National projects, but also to involve closely the non-EU partners. The Committee will constantly support the Coordinator in the network management and will continuously monitor the smooth progress of secondments, both from logistic and scientific viewpoints.