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Perspectives in BNCT and open research problems

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Boron Neutron Capture Therapy (BNCT) is facing an exciting new era with the development of accelerator-based neutron sources that can be placed in hospitals and will favor the increasing of clinical trials worldwide. With the new developments, there is the possibility of improving BNCT in different aspects.

One of them is the reduction of unwanted radiation in the beam, such as gamma and fast neutron radiation, which contributions may differ depending on the particle energy selected and the beam shaping assembly designed. They will also play a role in radiation protection and in the whole body effective dose received by the patient.

Another very important problem is the reduction of uncertainties in dosimetry and treatment planning, from (i) the measurement of some reaction cross section not well known, (ii) the determination of more accurate and tissue-dependent radiobiological dose weighting factors, (iii) the description of the statistical distribution of the cellular boron uptake, and (iv) the development of real time imaging and dose monitoring during treatments. All these research topics will be discussed in this talk.

Of course, the development of more effective boron compounds and nanoparticles is probably the most active field of research in BNCT. Here it will be shown our work for testing them in vitro.

Finally, the project NeMeSis (Neutrons for Medicine and Sciences) of the University of Granada and the University Hospital Virgen de las Nieves for Pre- and Clinical BNCT will be described.