

## Pilot studies on NCT feasibility to treat neurotoxic protein aggregates

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AD is a form of neurodegenerative amyloidosis associated to an abnormal production of insoluble aggregates of A $\beta$  protein which deposit in the brain as senile plaques. The aging of world population is expected to increase AD cases implying huge socio-economical costs and heightens the concern about the lack of therapeutic tools.

The effectiveness of External Beam RadioTherapy (EBRT) in the treatment of TracheoBronchial Amyloidosis (TBA) was described in the 1990's, suggesting EBRT application to AD. A physico-chemical, DNA-independent process of A $\beta$  aggregates depolymerisation by low dose, long term fractionated radiotherapy was suggested to match the brain tolerance.

Boron-NCT is a radiotherapy based on the nuclear capture reaction induced by low energy neutrons on <sup>10</sup>B isotope, emitting two high LET secondary charged particles, an alpha particle and a <sup>7</sup>Li recoil ion. Thanks to their short ranges in water (<10  $\mu$ m), the damages are localized within the <sup>10</sup>B loaded cell, allowing a selective treatment of diffused or infiltrating tumors. Similarly, GdNCT is based on the dose deposited selectively by the Auger electrons emitted after thermal neutron capture on <sup>157</sup>Gd. In this case, the minimum ranges are of few tens of nm.

Pure or <sup>10</sup>B-enriched water solutions of Bovine Serum Albumin and A $\beta$  were irradiated using standard radioactive sources or the thermal neutron field of Pavia research nuclear reactor. Some preliminary results of these studies will be presented.

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