

# **BIOLOGICAL ASPECTS OF BORON COMPOUNDS, BIODISTRIBUTION OF BSH, A LITERATURE REVIEW**

Tessa Hartog, Wilko Verbakel

NRG, Petten / VUmc Academic hospital, Amsterdam; the Netherlands

## **ABSTRACT**

In BNCT, the dose delivered to the tumour and to the healthy tissue is largely determined by the (micro) distribution of the boron. Brain is protected from substances in blood by the Blood Brain Barrier (BBB). This barrier is permeable to certain molecules and closed to others, much dependent on the size, charge and lipophilicity of the molecule. Uptake of boron compounds by brain is determined by the BBB. Other tissues do not have such barrier and will exhibit different uptake characteristics. At the side of a brain tumour, the BBB can be partially or entirely disrupted, ensuring that most molecules can easily pass and enter the tumour. The several mechanisms of molecules to enter brain will be addressed in this presentation and in special, the mostly used boron compounds BSH and BPA will be discussed. Results of several studies of measuring boron concentrations from BSH in brain and tumour show large differences between studies and between patients. In vivo measurements with the gamma-ray telescope during BNCT has provided consistent data for 5 patients, showing no uptake of BSH by normal brain. At a boron concentration in blood of 30 ppm, the concentration averaged over several tens cm<sup>3</sup> of normal brain tissue varied between 1.5 and 3 ppm. Superficial tissue like skin and muscle contained concentrations between 15 and 25 ppm. The boron concentration in the target volume (at the tumour site, after debulking) varied largely between patients.

See also NRG-report 20715/03.54003/P. For more information: [verbakel@nrg-nl.com](mailto:verbakel@nrg-nl.com)