

BNCT, a new-generation radiation treatment, is effective in advanced head and neck cancer

March 4 2011

Biologically targeted BNCT treatment is based on producing radiation inside a tumour using boron-10 and thermal neutrons. Boron-10 is introduced into cancer cells with the help of a special carrier substance (phenylalanine), after which the tumour is irradiated with lowenergy neutrons. The latter react with the boron to generate high-LET radiation, which may destroy the cancer cells. One to two BNCT treatment sessions may be sufficient to destroy a tumour, while keeping the impact of radiation on surrounding healthy tissue to a minimum.

A research reactor is currently used as the [neutron source](#), but dedicated neutron accelerators being designed for BNCT.

Clinical trials to assess the efficacy and safety of BNCT in the treatment of locally recurrent head and neck cancer have been carried out at the Department of Oncology at Helsinki University Central Hospital (HUCH). Apart from palliative chemotherapy, conventional treatment was no longer considered possible for the patients treated in the BNCT trials.

A total of 30 patients referred to HUCH's Department of Oncology from hospitals around Finland took part in the trial. 76% of patients responded well to the treatment and 30% were still alive two years after treatment; although only one patient has survived 55 months. The results of the study, conducted by Professor Heikki Joensuu, have recently been published in the *International Journal of Radiation Oncology, Biology, Physics*.

BNCT treatment is provided by Boneca Corporation, which is based at the main campus of Helsinki University Central Hospital and is the world's only provider of radiation safety audited BNCT treatment. Owned by Clinical Research Institute HUCH Ltd, Sitra, Finnish Innovation Fund, and VTT Ventures Ltd., Boneca works closely with HUCH's Department of Oncology, and treatment-related decisions are taken jointly with the hospital's [otolaryngology](#), [radiation therapy](#) and oncology specialists. Boneca is responsible for administering the treatment, which is given at a special facility adjacent to the research nuclear reactor used at the VTT Technical Research Centre of Finland.

"The positive results that we have achieved in treating head and neck tumours have convinced us of the benefits of further developing BNCT treatment and the services needed to administer it," says the Chairman of Boneca's Board of Directors, Seppo Pakkala, MD, PhD.

"As BNCT saves healthy tissue, this promises to make it a good choice as a first-line therapy for patients with large head and neck tumours, avoiding the need for extensive surgery. Additional studies will be needed, however, before BNCT can be adopted for this use. We would also like to extend the use of BNCT to treating tumours in other anatomical areas for which there are no forms of treatment currently available."

BNCT treatment has been given to over 200 patients to date, the majority of whom had recurred head and neck cancer or malignant brain [tumour](#). Approximately 6% of patients have come from abroad as a result of international interest in BNCT.

"We have sufficient capacity to treat more patients and are very interested in collaborating with hospitals outside Finland that would like to offer the option of BNCT treatment for their patients," says Boneca's CEO, Markku Pohjola.

Provided by University of Helsinki

Citation: BNCT, a new-generation radiation treatment, is effective in advanced head and neck cancer (2011, March 4) retrieved 25 April 2024 from <https://medicalxpress.com/news/2011-03-bnct-new-generation-treatment-effective-advanced.html>

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