

KOREA'S FIRST PROTON THERAPY CENTER

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center/)



Doctors at the National Cancer Center (NCC) of Korea (<http://www.ncc.re.kr/english/index.jsp>) are using protons as a realization of the Korean government's 10-year plan to improve the country's cancer outcomes.

History

In March 2007, the National Cancer Center (NCC) in Ilsan, Korea, treated its first patients. Until then, cancer patients had to travel to Japan for proton therapy treatment, but in 2002, the Health and Welfare Ministry committed to constructing a proton therapy center as a key component in Korea's 10-year plan to improve cancer outcomes. "NCC Korea is playing essential roles as the national center in the fight against cancer through research, medical care, support for national cancer control programs, education and training," said Dr. Kwan Ho Cho, M.D., Director of the center. "It is now able to provide state-of-the-art radiotherapy for cancer patients, including proton beam therapy, image-guided radiotherapy (tomotherapy), intensity modulated radiotherapy and three-dimensional conformal brachytherapy".

The facility, the only one of its kind in Korea, is located in Ilsan, north of Seoul, and includes two gantries, which are massive 90-ton rotational frames that deliver a prescribed dose of protons at precise angles in the body to maximize tumor destruction and minimize radiation-related side effects for the patient.

The first patient at the NCC Proton Therapy Center was treated for prostate cancer but the center, using both proton therapy and other treatment modalities, including image guided radiation therapy, intensity modulated radiation therapy and stereotactic radiation therapy to treat cancer, also treats breast, liver, lung, head and neck, hepatobiliary and pancreatic cancer and pediatric cancer. Joo-Young Kim, M.D., a pediatric radiation oncologist at the center, says that proton therapy, which allows to save a lot of normal tissue, is actually the only option for children younger than 3, as they cannot be treated with x-rays because their central nervous system is not mature enough to counter the negative effects of radiation on healthy cells.

NCC today

Today, protons continue to play an important role in delivering comprehensive cancer care to children and adults at the National Cancer Center of Korea (NCC). NCC treated 148 new patients with protons in 2011, 34 of them children. Radiotherapy and chemotherapy are sometimes used concurrently with protons, depending on individual patient needs. Protons have been used at NCC since 2007 and have been used to treat many adult tumors and pediatric central nervous system tumors.

NCC clinical staff members are anticipating the arrival in early summer of Pencil Beam Scanning (PBS), which will be installed in one of the center's two gantry rooms. PBS offers slice-by-slice irradiation of the target tumor with millimeter precision. "We are hoping to have commissioning of our Pencil Beam Scanning system completed by June of this year," says Joo-Young Kim, "We look forward to working with the system — treatment will be less cumbersome because we will not need to use compensators or apertures, and technicians will not need to go in and out of the treatment room."

Kim anticipates that PBS will prove to be particularly optimal for treating complex cases, such as large-volume tumors and skull-based chordomas, and for situations where craniospinal irradiation is necessary. "With skull-based chordomas, we need a conformal dose distribution, either with Pencil Beam or IMPT (intensity-modulated proton therapy)," says Kim. "These are very complicated and, as with skull-based tumors, require intense treatment planning."

Variety of studies under way

Clinical studies at NCC cover a range of topics, including the efficacy of protons. For example, researchers at NCC and at other medical institutions compared dosimetric parameters and the risk of secondary cancer produced by proton beam therapy using the scattering mode, with that of tomotherapy and 3D-CRT in 10 pediatric patients receiving craniospinal irradiation. The resulting paper, "Craniospinal irradiation techniques: A dosimetric comparison of proton beams with standard and advanced photon radiotherapy," was published in the November 2011 issue of the International Journal of Radiation Oncology•Biology•Physics. The paper also noted that, in the chest and abdomen, average doses of proton beams were lower than those of 3D-CRT or tomotherapy. According to the paper's authors, this suggests protons cause fewer side effects in children than the other two techniques. And organ equivalent dose-based risks of secondary cancers in the stomach, lungs, thyroid and pancreas were higher when 3D-CRT or tomography was used, compared with proton beams.

Current clinical research at National Cancer Center of Korea

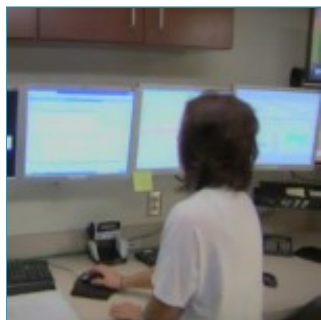
1. Phase I Dose Escalation Study Using Proton Beam Therapy for Recurrent Chordomas, Chondrosarcomas, and Atypical or Malignant Meningiomas After Previous Radiotherapy
2. Phase I Dose Escalation Study Using Proton Beam Therapy for Chordomas, Chondrosarcomas, and Atypical or Malignant Meningiomas

3. Prospective Study of Proton Beam Craniospinal Radiotherapy in Children With Newly Diagnosed Medulloblastoma — Assessment of Acute and Long-Term Sequelae and Quality of Life
4. Para-aortic LN Irradiation Using Proton Beam Radiotherapy for Isolated Para-aortic Recurrence of Gynecologic Cancer
5. A Prospective Observational Study for Investigation of the Role of Postoperative Proton Beam Therapy in Korean Pediatric Patients with CNS Ependymoma
6. Evaluation of the Treatment-Related Toxicities of Proton Beam Craniospinal Radiotherapy (CSRT) in Patients With Brain Tumors
7. Phase II Hypofractionation Study Using Proton Beam Therapy for Prostate



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