

PRESS RELEASE

Italy in the vanguard of cancer treatment in Europe and the world:

On Nov. 13 the first patient was treated with a carbon ion beam at the National Hadrontherapy Center for Cancer Treatment (CNAO) in Pavia. The patient was suffering from cancer of the salivary glands. The CNAO is currently the fourth Centre in the world treating patients with Carbon Ions after those already operating in Japan and Germany. Carbon ion treatment started at CNAO one year after the first patient was treated with protons. The treatment of solid tumors with carbon ion beams is particularly effective for the cure of radio-resistant and difficult to treat pathologies.

Tumor "bombarded" with carbon ions for the first time in Italy

Excellence in Pavia:

The National Hadrontherapy Center for Cancer Treatment (CNAO) has begun clinical trials on humans with carbon ion beams. Since September 2011, 42 patients have been successfully treated with protons in clinical trials approved by the Ethics Committee and the Ministry of Health. From November 13, 2012 the clinical trial program using carbon ion beams, which increases the potential for cure of the Centre and reduces the duration of treatment, has been underway. During 2013 the experimental protocols with protons and carbon ions will be completed and the system will become fully operational from 2014, when it will be able to treat about 2,000 patients each year in some 20,000 treatment sessions. The new technique, based on the action of beams of carbon ions and protons accelerated by a synchrotron, bombards the tumor more selectively and efficiently while sparing the nearby healthy tissues and organs and allows a better monitoring of the disease and an increased rate of survival compared with conventional techniques.

Pavia, Tuesday, November 13, 2012

Beams of infinitesimal particles aimed at human bodies and travelling at the speed of light in an interstellar vacuum. No, this is not a science fiction movie but Hadrontherapy, a cancer treatment that "burns" radio-resistant solid tumors close to vital organs that do not respond to conventional techniques, with extreme precision and efficiency. From today, "Deep" Hadrontherapy has arrived in Italy with the treatment of the first patient suffering from cancer of the salivary glands with a carbon ion beam. This new "quantum scalpel" was launched during an experimental stage at the National Hadrontherapy Center for Cancer Treatment (CNAO) in Pavia, the fourth such Centre in the world after similar institutions in Chiba, Hyogo and Gunma in Japan, and Heidelberg in Germany.

CNAO, which is an Italian centre of excellence in health and research, was created and is managed by the CNAO Foundation, established by the Ministry of Health in 2001 and incorporated into the regional framework of excellence of the Lombardy Region. In addition to CNAO the framework comprises, as founding members, five IRCCS hospital foundations from Lombardy (IRCCS stands for Institute for Hospitalization and Treatment of Scientific Care). The original five institutes are: the Ospedale Maggiore of Milan, the Policlinico San Matteo in Pavia, the Milan National Cancer Institute, the European Institute of Oncology of Milan and the Besta Neurological Institute in Milan, and the Foundation for Hadron Therapy Radiation (TERA) of Novara.

"The CNAO center was built between 2005 and 2010 at reduced cost thanks, in large measures, to the collaboration provided by the National Institute of Nuclear Physics, the Universities of Milan, Pavia and Turin, the Polytechnic of Milano, the Ministry of Health, the Lombardy Region, the Cariplo Foundation, the Municipality of Pavia and the Province of Pavia, said Erminio Borloni, President of CNAO. "The assistance of the National Institute of Nuclear Physics was especially important as they co-directed the establishment of the high technology (Synchrotron). CNAO began clinical trials and treatments on humans at the end of 2011 with proton beams. In addition to patients treated with protons, pre-clinical tests with carbon ions were completed in 2012 and on November 13 the first patient was treated with these particles which are more powerful than protons and which will be used for those tumors that are radio-resistant and do not respond to conventional techniques. At full capacity, expected in 2014, the Centre will provide Hadrontherapy treatment, 5 days a week for 13 hours a day to about 2,000 out-patients a year, with about 20,000 sessions being performed annually in three treatment rooms with four beam lines. An experimental room dedicated to radiobiological and clinical research which will also be added."

The Center is a leading hospital and research facility, unique in Italy, created to treat with Hadrontherapy patients with radio-resistant and unresectable solid tumors. Hadrontherapy is a form of radiation therapy based on particular types of hadrons – i.e. beams of carbon ions and protons - able to penetrate into the human body and hit the most deeply located tumours. These subatomic particles release most of their energy just inside the tumor mass, causing more intense damage to the targeted tumor with minimal or no collateral damage to nearby organs and healthy tissue. Carbon ions are also more precise and effective than the protons themselves and therefore can better treat radio-resistant tumors. It takes only two or three minutes of radiation and an average of about ten sessions lasting 30 minutes, to cure an increasingly important variety of pathologies.

"The results of the treatments carried out so far with protons on 42 patients are excellent and confirm the predictions of doctors and the expectations and hopes for this innovative technology. The treatments are painless and with the introduction of the carbon ion beams, greatly expand the spectrum of pathologies that are treatable at CNAO, and will reduce the number of sessions required to treat patients. However, this therapy does not replace conventional radiotherapy", says Roberto Orecchia, Scientific Director of CNAO "but it's one more weapon available to doctors and patients that can be used, in addition to or instead of, the more traditional treatment whether these are pharmacological, surgical or radiation therapy. Of the more than 120,000 patients treated each year with radiotherapy, it is estimated that about 5 percent of cases can be cured with hadron beams. Hadrontherapy can be used in the treatment of sarcomas, pediatric tumours, cancer of the lung, pancreas, liver, prostate, eye, salivary gland, brain, spinal cord and on certain head of pelvic area cancers".

"The particle beams used for Hadrontherapy are produced by a synchrotron, a particle accelerator equipped with two sources able to generate carbon ions and protons", says Sandro Rossi, Secretary General and Technical Director of CNAO. "The carbon ions are 12 times heavier than protons and therefore release a greater amount of energy in the tissues thus managing to target and kill the more resistant cancer cells. The accelerating machine that generates the carbon ion beams is the same that is used for protons, but is operated in a higher regime of energy and electromagnetic fields. The technique used for administering the dose to the tumor cells, however, is the same and is based on an "intelligent" system that "guides" in a targeted and selective manner the particle beam onto the target in the patient's body".

The creation of the CNAO enables existing Italian patients who could benefit from Hadrontherapy to receive treatment in country rather than travelling abroad, and this availability will increase in the future. Evaluation of the effectiveness and cost of the therapy is one of the objectives of the clinical trials but it is nevertheless affordable within the National Health Service. To date 100,000 patients worldwide have been treated with protons and another 10,000 with carbon ions with excellent results and new hadrontherapy centers are currently being designed or constructed in several countries.

"The CNAO project, which was 'homemade' with an approach that allowed savings on construction costs and at the same time facilitated the acquisition of high level professional skills, is a prototype that has inspired many as a model to imitate", says the CNAO President Borloni. "The Austrian project Med-AUSTRON, has already acquired the CNAO project plan to construct a twin center near Vienna, and has also recently commissioned CNAO to implement the ion beam guidance system for tumour targeting. In this time of crisis that we are experiencing, it is important to recognize these important effects on productivity and economic competitiveness. The CNAO is an example of scientific research in cancer treatment who's priority should be advanced, something which has been recognized and referred to recently by the President of the Republic Giorgio Napolitano", concluded the CNAO President.

CNAO Foundation Communication link:
[Silvia Meneghello 0382-078.603 - comunicazione@cnao.it](mailto:comunicazione@cnao.it)