

The national center for oncological hadron therapy: status of the project and future clinical use of the facility

Roberto Orecchia¹, Piero Fossati², and Sandro Rossi³

¹Università di Milano, European Institute of Oncology, National Center for Oncological Hadron therapy; ²Università di Milano, National Center for Oncological Hadron therapy; ³National Centre for Oncological Hadron therapy, Milan, Italy

ABSTRACT

Aims and background. Hadron therapy is an advanced radiotherapy technique that employs charged particle beams. Several particles (pions, oxygen, neon and helium ions) have been investigated in the past, but at present only protons and carbon ions are used in clinical practice. Hadron therapy has been used for more than 50 years, more than 50,000 patients have been treated worldwide, and many new facilities are being built. Indications are still a matter of debate. The Italian National Center for Oncological Hadron Therapy (CNAO) is under construction in Pavia and will begin to treat patients in the near future.

Methods. The CNAO will be a center capable of using both protons and carbon ions. In the first phase, three rooms with vertical and horizontal fixed beams will be available, subsequently the center will be upgraded with two more rooms equipped with a rotating gantry. The facility will use active scanning delivery systems and state-of-the-art immobilization and setup verification devices. One additional room will be devoted to physical and radiobiological research. The CNAO will be a high-patient-throughput facility capable of treating more than 3,000 patients per year. Seven areas of interest have been identified: lung cancer, liver cancer, head and neck malignancies, pediatric solid cancers, eye tumors, sarcoma and central nervous system cancers. A disease-specific working group has been created for each area and has defined selection criteria and protocols to be used at the CNAO. Two more working groups are being set up on gynecological and digestive (pancreas, biliary tract and rectum) tumors. All the patients will participate in clinical trials to establish with sound evidence the real indications for hadron therapy. National and international cooperation networks are being set up to facilitate patient referral and follow-up. A medical service is already operative to assist patients and in selected case to refer them abroad.

Conclusions. The CNAO will be the only carbon ion facility in Italy and will have an international basin. Close cooperation with existing oncological centers is of paramount importance to fully exploit its potential.

Key words: carbon ion radiotherapy, hadron therapy, proton therapy.

Correspondence to: Piero Fossati, Fondazione CNAO, Servizio Medico, Via Caminadella 16, 20123 Milan, Italy. Tel +39-02-80298474; fax +39-02-80298475; e-mail piero.fossati@cnao.it
Roberto Orecchia, Istituto Europeo di Oncologia, Divisione di Radioterapia, Via Ripamonti 141, 20145 Milan, Italy. Tel +39-02-57489037; fax +39-02-57489036; e-mail roberto.orecchia@ieo.it

Received May 7, 2008;
accepted July 29, 2008.