

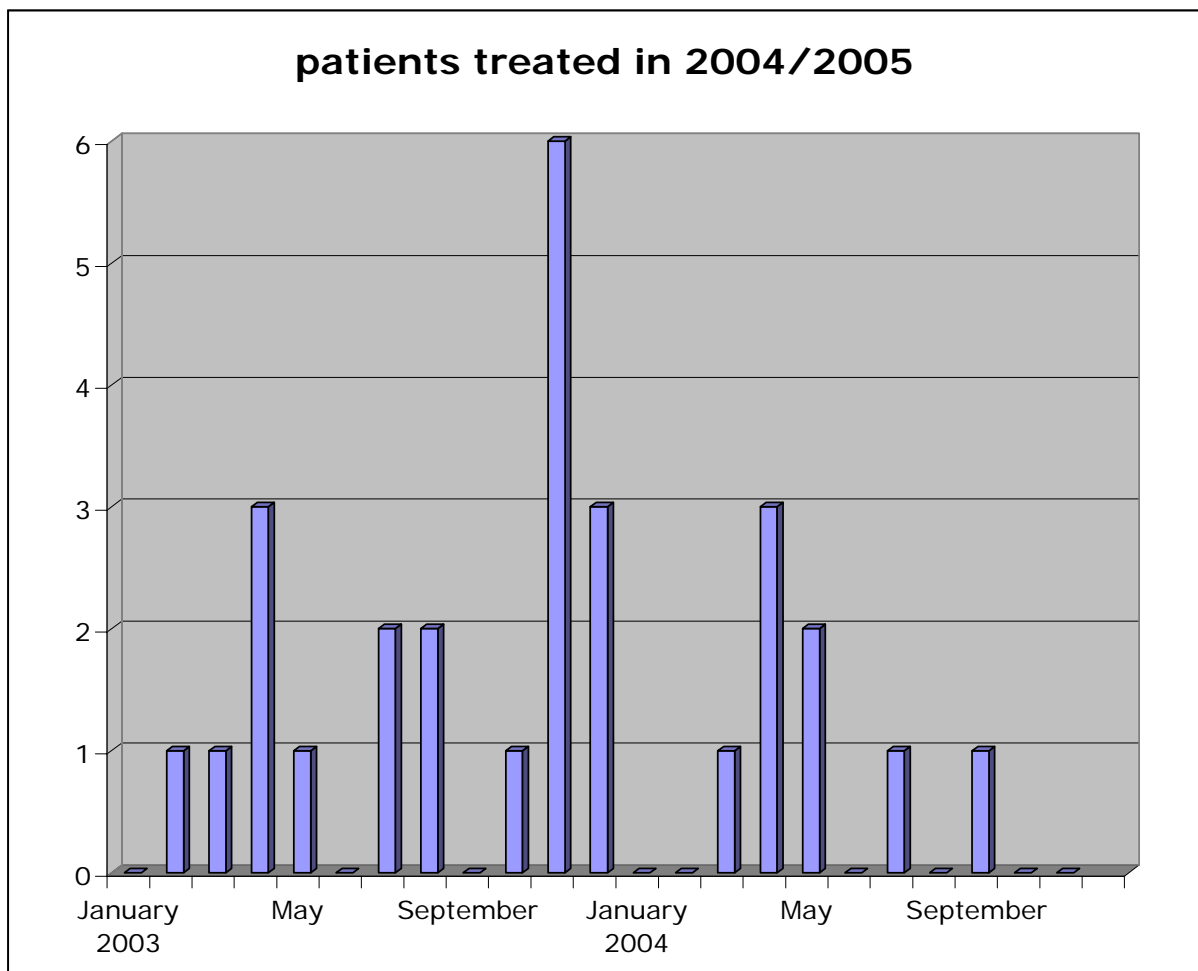
Report to the Cyclotron Trust

Introduction

In preparation of the site visit of representatives of the Cyclotron Trust, I am submitting my report for the last period. It summarizes my own activities but also those of other staff members related to neutron therapy.

Patients treated

Instead of a good start in 2004, many fewer patients were treated than in 2003 (8 vs. 20).



All of these patients were suffering from adenoicystic carcinoma and their neutron treatment was covered by the health care system. The collaboration with the experts from the German health care has been improved and there is a support to maintain the neutron facility in Essen.

„International Workshop on Clinical High-Energy Neutron Dosimetry“

In April 2004, Dr. Hentschel and Prof. Sauerwein participated at the „International Workshop on Clinical High-Energy Neutron Dosimetry“ organized by the Fermi National Accelerator Laboratory (Batavia, Illinois). For the first time since more than 15 years, this meeting brought together all fast neutron therapy. Please find here a short summary of their report including consequences for the Essen Cyclotron:

The following institutions were represented at the workshop.

Karmanos Cancer Institute, Wayne State University Detroit
Fermilab
University of Washington and
University of Washington Medical Centre
Themba Labs South Africa
Northern Illinois University
Idaho National Engineering and Environment Laboratory
Massachusetts Institute of Technology

Dosimetry

The goal of the meeting was to discuss the protocols for dosimetry at the different institutions and to agree on standards to be followed. It was no problem to find consent based on ICRU-Report 45 (Clinical Neutron Dosimetry Part I: Determination of Absorbed Dose in a Patient Treated by External Beams of Fast Neutrons). Everybody shared the opinion that this document represents the actual state of the art as an international standard and replaces the old protocols AAPM-Report Nr.7 und ECNEU. It was agreed, that all centres should join the procedures described in ICRU 45. In fact, due to the “stand alone” situation that had occurred in the last 2 decades, none of the centres really applied ICRU 45 in its full extent. In Essen, only measurements to control constancy were performed, based on an absolute dosimetry following ECNEU executed in 1978. On the other hand, Essen was the only centre that had made an absolute dosimetry with a calorimeter in water. In order to join with our quality management the international standards, an absolute dosimetry following ICRU 45 will be performed in December 2005 or end of January 2005. The preparations are underway and will be shown during the site visit.

Finances

The last day of the meeting was dedicated to the situation of reimbursement in the US. Fast neutron therapy is seen in the US as a standard radiotherapy procedure. A specific justification of the indication in an individual case towards the health care system is not necessary. Medicare regards fast neutrons as irradiation with particles such as electrons and pays the same price, which does of course not cover the real costs. Recently a new approach has been found for protons that now are reimbursed at a more realistic level. The US neutron centres intend to join efforts to obtain a “proton like” solution.

Some comments

The workshop clearly demonstrated the need to have regular exchange between the different Neutron Therapy Centres. Such an exchange is necessary to improve quality management but also to allow the intercomparison of medical and physical protocols and procedures. The University Hospital Essen is interested to organize such a workshop in 2005 or 2006. A more pessimistic aspect for the future of fast neutrons in clinics is the fact that except Prof. Sauerwein no radiation oncologist participated at the meeting. Physicists alone will not be able to improve the use of neutrons in routine patient treatments.

Lectures given at the workshop with participation from Essen

SAUERWEIN W., WITTIG A., ABU JAWAD J., BOURHIS-MARTIN E., HENTSCHEL R., BAUMHOER W., HÜDEPOHL G., HIDEGHÉTY K., LEVEGRÜN S., RASSOW J., STUSCHKE M. (2004): Neutron Therapy In Essen.

HENTSCHEL R., BAUMHOER W., LEVEGRÜN S., SAUERWEIN W. (2004): Clinical dosimetry at the Essen neutron therapy facility.

NIGG D.L., HARTWELL J.K., WEMPLE C.A., RISLER R., LARAMORE G.E., SAUERWEIN W., LENNOX A. (2004): Transport benchmarks for physical dosimetry to support development of fast-neutron therapy with neutron capture augmentation.

A registry for patients treated with fast neutrons in Essen

In collaboration with the Institute for Medical Informatics, Biometry and Epidemiology (Director. Prof. Dr. K.-H. Jöckel) a registry for patients, who were treated with neutrons in Essen, has been created. Up to now data of 108 patients were entered. All of them are suffering from adenoid-cystic carcinoma. We tried to have actual information about the status of the patients. In this respect, we made contact with the family doctor and/or the patient himself. In selected cases, we were able to convince patients to come back to Essen for follow-up. In patients that were treated during the last years, a very strict follow-up protocol has been applied. The registry will be demonstrated during the side visit.

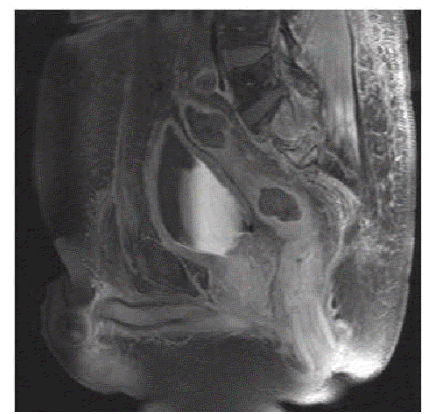
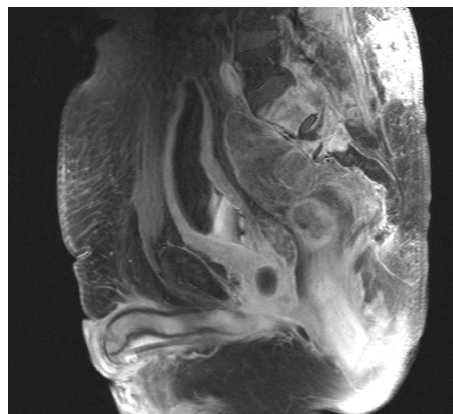
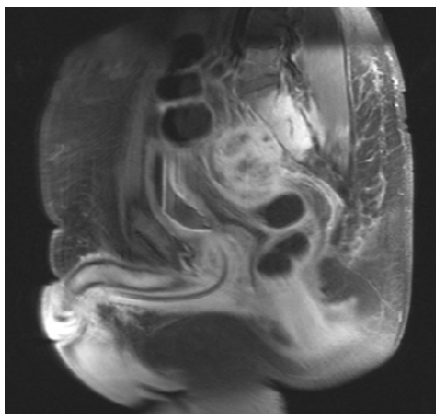
Technical improvements

A new way to build mouldages for fast neutron therapy is under development and will be shown.

Case report

In my last report I presented a case of a patient suffering for a sarcoma, who was treated jointly by Essen and Orleans. . Using 15 MV photons, we irradiated in Essen the tumour from August 14 until September 10 (with large safety margins) up to a dose of 36 Gy. This was followed by fast neutron irradiation in Orleans (proton energy 34 MeV). A large volume that included the sacrum and L5 received 3.34 Gy (weighted dose 10 Gy), to the macroscopic tumour a supplementary boost of 5 Gy was given. Applying an RBE of 3, the gross tumour received a weighted dose of 25 Gy from neutrons and 36 Gy from photons. As already reported, the immediate clinical result was very positive. The further follow up underlines the important role neutrons may play in the treatment of large sarcomas that cannot be surgically removed.

Please find below some MRI images showing the mid term results 5 a 12 months after the treatment.

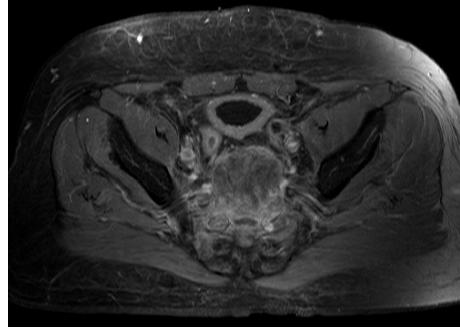


Extended liposarcoma metastases in the pelvis.
MRI T1 with GD



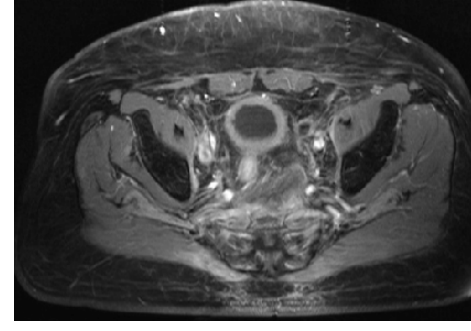
Extended liposarcoma metastases in the pelvis.
MRI T1 with GD

Follow up at 5 months after treatment



Follow up at 5 months after treatment

Follow up at 12 months



Follow up at 12 months

My own situation

In 2004, more of my time could be protected for making progress in my PhD “Outcome after fast neutron therapy in patients suffering for adenoidcystic carcinoma”. The collection of patient data and the follow up for these patients is more or less closed. A first analysis can now be performed.

In July 2004, I passed to German board examination in radiation oncology.

Publications

In 2004, 1 article related to the Essen Cyclotron has been published:

BOURHIS-MARTIN E., BREDE H.J., GREIF K.-D., BAUMHOER W., RASSOW J., SAUERWEIN W. (2004):
Absolute dosimetry in a d (14MeV)+Be fast neutron beam.
Med Phys 31, 832-838

We all wish to record our thanks to the Cyclotron Trust for sponsoring the Fellowship of Jihad Abu Jawad M.D.

Essen,

Jihad Abu Jawad M.D.

Read and approved

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