PARTICLES

sponsored by

PROTON THERAPY CO-OPERATIVE GROUP

A Newsletter for those interested in proton, light ion and heavy charged particle radiotherapy.

Number 18 July 1996 Editor: Janet Sisterson Ph.D., HCL

Mailing Lists: PLEASE help to keep the Particles mailing list up-to-date by sending me **address, telephone** number, **fax** number and **e-mail** additions/corrections.

Costs: At PTCOG XIX, the Steering Committee decided that part of the registration fee for PTCOG meetings would be used to help produce both Particles and the abstracts of the PTCOG meetings. Only part of the costs are covered in this way, so more financial help is needed from the community. HCL is always happy to receive financial gifts; all such gifts are deductible as charitable contributions for federal income tax purposes. The appropriate method is to send a check made out to the "Harvard Cyclotron Laboratory". We thank Steven Goetsch Ph.D. of the San Diego Gamma Knife Center for his generous contribution which we have used to cover some of the costs of producing this issue of Particles.

Facility and Patient Statistics: I am still collecting information about all operating and proposed facilities, regarding patient statistics, machine scheduling, and treatment characteristics. Please send me up-to-date information.

Particles on the Internet: We have set up a home page for the Harvard Cyclotron Laboratory on the Internet from which you can access Particles. So far, only the current issue, Particles 18, and the last issue, Particles 17 are on the World Wide Web; I hope that all back issues of Particles will be available soon. We are also planning to provide a link to any home pages of other charged particle therapy facilities; my home page includes a very nice map with all facilities indicated and the links should be there soon.

To find Particles use the URL for the Harvard Cyclotron Laboratory:-
http://neurosurgery.mgh.harvard.edu/hcl/

E-mail address Directory: I do have many e-mail addresses, but not enough to make a formal directory. Please remember that you can use the World Wide Web to find e-mail addresses, telephone numbers etc.

ARTICLES FOR PARTICLES 19

The **deadline for news for Particles 19,** the January 1997 issue, **is November 30 1996**. I will send reminders by fax or e-mail.

Address all correspondence for the newsletter to:

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Articles for the newsletter can be short but should **NOT** exceed two pages in length. I **DO** need a good clean copy of your article and figures as I am using a scanner to get everything into the computer. If you FAX me an article, please send a good copy by mail. **PLEASE**, if you can send me your articles by computer; much simpler for me.

RESULTS OF THE ELECTION OF THE PTCOG STEERING COMMITTEE

The results of the election of the Steering Committee of PTCOG were announced at the Detroit PTCOG meeting. The following members were elected to the Steering Committee :

USA	**Europe**	**Russia**	**Japan**	**South Africa**
J. Castro	U. Amaldi	V.Khoroshkov	K. Kawachi	D. Jones
W. Chu	H. Blattmann		H. Tsujii	
M. Goitein	J.-L. Habrand			
D. Miller	G. Munkel			
J. Sisterson	E. Pedroni			
James Slater	A. Wambersie			
A. Smith				
L. Verhey				

RESULTS OF THE ELECTION FOR PTCOG CHAIRMAN AND SECRETARY

The new Chairman and Secretary of PTCOG elected by the Steering Committee are:

Chairman: M. Goitein
Secretary: J. Sisterson

If you have questions about PTCOG, please contact the secretary of PTCOG by one the means listed previously in this newsletter.

FUTURE PTCOG MEETINGS

The times and locations of the next PTCOG meetings are as follows:-

PTCOG XXV	PSI, Switzerland CERN, Switzerland	September 9-10 1996 September 12-13 1996
PTCOG XXVI	Boston, Massachusetts USA	Spring 1997, possibly April 30 - May 2
PTCOG XXVII	Chiba, Japan	Fall 1997
PTCOG XXVIII	Loma Linda, CA USA	Spring 1998
PTCOG XXIX	Europe	Fall 1998

Abstracts for PTCOG XXV at PSI

Authors are encouraged to submit an abstract of their talk, which will be published with the January 1997 issue of Particles. See details in the next section.

The ideal space allocated for each abstract is **ONE HALF** page; **PLEASE** try and keep to this length. **DO NOT EXCEED** one page. Please do not use a small typeface. Each abstract must have a title and a list of authors with addresses; graphs and line drawings are welcome.

Second International Symposium on Hadron Therapy
September 9 - 13, 1996.
at PSI and CERN.

Registration form, presentation form and the first announcement are included separately in this mailing.
Submitted oral presentations have 10 minutes; poster sessions have 5 mins.

OUTLINE OF THE PRELIMINARY PROGRAM AT PSI

Monday, September 9th

Isocentric Beam Delivery Systems (excluding details of scanning);
Safety, Control and Dose Monitoring Systems for Scanned Beams;
Proffered Papers Physics;
(Session with invited speakers and audience discussion) Patenting of New Technologies; Tour of the Facility in parallel with: Workshop for centers actively involved in the comparative treatment planning of the nasopharynx case;

Tuesday, September 10th

Proton Irradiation of Ocular Lesions - Clinic, Physics and Biology;
Clinical Trials with Protons - Trial Design, PROG Summary;
PTCOG Business Meeting;
Clinical Trials contd. - Lessons from EORTC, Programs of the Proton Users Group - PUG; Proffered Papers: Experimental Tumor Therapy and Radiobiology;
Tour of the Facility and the Social Event;

Wednesday, September 11th

Comparative Treatment Planning (Report on the Monday-workshop and with discussion); Poster Presentation;
Proffered Papers - Clinical;
A session programmed by EORTC;

OUTLINE OF THE PRELIMINARY PROGRAM AT CERN

Thursday, September 12

Welcome addresses
Invited talks:
Status and future directions of tumor therapy;
Clinical programs: a review of past and existing hadrontherapy protocols, their results and future perspectives;
Impact of modern radiobiology on clinical radiotherapy; What radiobiology should be done in a hadron therapy center?;
The role of animals in cancer research;
Boron neutron capture therapy: a review of the Zurich meeting;
Technology of hadron therapy: a review of existing technologies, their plusses and minuses
Round table: Discussion of the latter topic
Inauguration of the exhibition Hadrons for Health
Conference dinner

Friday, September 13

Invited talks:
Advances in computing in the short and long term;
The invention and developments of WWW;
Medical applications of networks;
Clinical trials and ethical issues in cancer research;
Advances in large and precise mechanical structures (CERN);
Robotics;
Recent developments in radiation detectors and beam position monitors;
Proffered papers: patient alignment;
Poster session on hadron therapy;
Invited talks:
Concluding remarks

Abstracts:

Deadline for the announcement of presentations is August 10, 1996. The abstracts of the presentations at the PSI part of the conference and of the posters will be published - as usual one half page - in PARTICLES, the PTCOG newsletter, which appears twice yearly and is edited by Janet Sisterson from the Harvard Cyclotron Laboratory. The most convenient way to submit these abstracts is e-mail to Janet Sisterson and PSI. Status reports will be presented on posters only. Should the amount of announced oral contributions exceed the time frame of the session, the scientific committee will decide upon oral presentation or poster presentation and inform the author(s) by August 23, 1996. All invited papers for the CERN part of the symposium will be published in a volume, as announced in the first bulletin. Authors of short presentations and posters (PSI part) may also submit an extended text for the volume.

Hotels:

For the PSI part of the meeting, blocks of rooms have been reserved in several hotels in Brugg (closest to PSI), Baden (resort town) and Regensdorf, with special rates for participants. September is high season in this lovely area with thermal spas, you should bring swimsuits.

For the CERN part of the meeting, blocks of rooms have been reserved in two Movenpick hotels and in the CERN foyer.

Please make your reservation with the hotels directly, mentioning the **block name HADRON 96**. Hotel rooms will be held until **August 14** at the special rates. Book early! There are only a limited number of rooms and it is high season.

Hotels: PSI part of the Symposium

A block of rooms has been reserved for the SECOND INTERNATIONAL SYMPOSIUM ON HADRONTHERAPY at the Movenpick Hotel in Regensdorf and several hotels in Baden and Brugg (see general information). Transportation between the hotels and PSI, Villigen, is provided.

The rooms are being held at a special rate. Your reservation must be received by the hotels no later than **August 14th, 1996** to qualify for the special rate. The reduced rates are limited by room availability, and therefore it is advisable to make your reservations as soon as possible. Conference participants should contact the hotels directly to make their reservations by mentioning the blockname **Hadron 96** !

Movenpick Hotel available during your stay at PSI, Villigen:

Movenpick Hotel Zurich-Regensdorf
Zentrum
8105 Regensdorf
Tel. ++41/(0)1 871 51 11 Fax ++41(0)1 871 50 11
Room rates: single and double 165 CHF, breakfast 16 CHF

Other hotels provided during your stay at PSI, Villigen: Breakfast is included in all these hotels

Hotel Du Parc
Romerstrasse 24, 5400 Baden
Tel. ++41 (0)56 221 03 11
Fax ++41 (0)56 222 07 93
Single: 195 CHF Double: 280 CHF

Hotel Linde
Mellingerstrasse 22, 5400 Baden
Tel. ++41 (0)56 222 53 85
Fax ++41 (0)56 222 07 70
Single: 148 CHF Double: 195 CHF

Hotel Schweizerhof
Kurplatz 3, 5400 Baden
Tel. ++41 (0)56 221 03 25
Fax ++41 (0)56 221 58 04

Hotel Kappelerhof
Bruggerstrasse 142, 5400 Baden
Tel. ++41 (0)56 222 38 34
Fax ++41 (0)56 222 55 32

Single: 115 CHF Double: 190 CHF

Single: 125 CHF
rate held until July 31st only

Hotel Verenahof
Kurplatz 1, 5400 Baden
Tel. ++41 (0)56 203 93 93
Fax ++41 (0)56 203 93 94
Single: 140 CHF Double: 115 CHF each

Hotel Hirschen
Badstrasse 22, 5400 Baden
Tel. ++41 (0)56 222 69 66
Fax: -
Room with basen: 46 CHF

Hotel Terminus
Bahnhofplatz 1, 5200 Brugg
Tel. ++41 (0)56 441 18 21 Fax ++41 (0)56 441 82 20
Single: 95 CHF Double: 155 CHF

Movenpick Hotels: CERN part of the Symposium

A block of rooms has been reserved for the SECOND INTERNATIONAL SYMPOSIUM ON HADRON THERAPY at the Movenpick Hotels in Geneva. Transportation between the hotels and CERN is provided.

The rooms are being held at a special rate. Your reservation must be received by the hotel no later than **August 14th, 1996** to qualify for the special rate. The reduced rate is limited by room availability and, therefore, it is advisable to make your reservations as soon as possible. Conference participants should contact the hotels directly to make their reservations by mentioning the blockname **Hadron 96** ! In both Movenpick Hotels cancellation of the reservation without penalty must be made at the latest 48 hours before the expected arrival.

Hotel Movenpick Cadett
Mategnin, 21,
1217 Meyrin (Geneve)
Tel. ++41/(0)22 989 90 00
Fax ++41/(0)22 989 99 99
Room rates: single & double 115 CHF,
breakfast 19 CHF

Hotel Movenpick Radisson
Route Pre-Bois 20
1215 Geneve 15
Tel. ++41/(0)22 798 75 75
Fax ++41/(0)22 791 02 84
single and double 170 CHF,
breakfast 24 CHF

Another possibility to stay at CERN in Geneva
CERN Foyer
1221 Geneve 23
Tel. ++41(0)22 767 41 55 Fax ++41(0)22 767 38 00
Please mention here the blockname **AMALDI**!
Reservations should be made at the earliest, as it is holiday period.
Room rate: 51 CHF

Transportation:

To hotels (PSI): The Hotel Terminus in Brugg is situated right opposite the Brugg train station. The enclosed brochure “How to get to the Paul Scherrer Institute” describes the way to the institute by airplane, train and car - and includes information on getting to Brugg. If you stay in one of the hotels in Baden, you take the same trains from the airport (or from other places via Zurich) as for getting to Brugg; just get off the train one stop earlier. There is a shuttle service between the airport Zurich - Kloten and the Movenpick Hotel in Regensdorf.

From hotels to PSI: There will be bus transportation from all hotels to PSI. Detailed information will be available on your arrival at the hotel desk. In addition, for the Hotel Terminus, the postal bus leaves from right opposite the hotel and takes you right in front of the conference building at PSI. Time schedules are available at the hotel desk.

To hotels (CERN): Hotel shuttle minibuses (marked Movenpick) are available between the Geneva - Cointrin airport and both Movenpick Hotels. If you arrive by train, you should go to the train station in the airport, and then use the minibuses to the hotels. Coming by car, head for the Geneva - Cointrin airport via the highway N1 / E4 or one of the well maintained country roads. All Swiss maps will guide you there safely.

From hotels to CERN: There will be bus transportation from the hotels to CERN. By bus between PSI and CERN: Will be provided (with an additional charge) for participants who are attending both parts of the meeting, and companions.

Registration:

The registration fees include coffee, lunches, transportation between hotels and the conference places, the social event and dinner on Tuesday evening (incl. bus) and the dinner and bus for participants on Thursday evening. Not included in the registration fee(s) are: the conference dinner(s) for guests, and the bus transportation from PSI to CERN on Wednesday. If you have already registered, and wish to bring a guest to any of the social events /conference dinners, please let the secretariat know by August 20, 1996. Please read the registration form and payment information carefully! The registration fees are different for the entire Hadron Symposium and for only one part of the meeting. If you decide to pay at the registration desk, please bring cash or traveler cheques. No credit cards or personal cheques can be accepted, Sorry!

Social events and conference dinners:

On Tuesday, a visit to the Landvogteischloss in Baden will begin the social part of the conference at PSI. The Landvogteischloss is a local museum for the history of the region from Roman to modern times. After the aperitif and a short presentation (in English) about the exposition you will have an opportunity to visit the museum. A dinner will follow at the Movenpick Hotel in Regensdorf, with bus transportation provided. The conference dinner during the CERN part of the symposium will take place at the Movenpick Hotel Cadett in Geneva - Meyrin. On Saturday morning a tour of CERN, and of the DELPHI experiment in particular, is planned. Participation forms will be handed out on site.

WORLD CONGRESS ON MEDICAL PHYSICS AND BIOMEDICAL ENGINEERING

Nice, France, September 14 - 19 1997

From 14 - 19 September 1997, the **WORLD CONGRESS ON MEDICAL PHYSICS AND BIOMEDICAL ENGINEERING** will take place in Nice on the French Riveria.

After Kyoto (1991) and Rio (1994), it will provide an unique opportunity for scientific exchanges and discussions on various topics of interest for all those involved in “Particle therapy”.

Jean-Claude ROSENWALD
Co-chair for the Scientific Committee

- For information about the meeting:
  NICE’ 97 - SEE
  48, rue de la Procession
  F75724 PARIS CEDEX 15 - FRANCE
  Phone: + 33 1 44 49 60 60
  Fax: + 33 1 44 49 60 44

- For Scientific contacts on “protons, neutrons and heavy ions in radiotherapy”
  Alejandro MAZAL
  Centre de Protontherapie d’Orsay, BP. 65
  91402 ORSAY CEDEX - FRANCE
  Phone: + 33 1 69 29 87 00
  Fax: + 33 1 69 07 55 00

PTCOG News: The following reports were received by July 1996.

Status report: the **Northeast Proton Therapy Center**, at Massachusetts General Hospital, Boston, MA USA:

The Northeast Proton Therapy Center (NPTC) continues to be essentially on schedule and without changes in the overall budget. Some time was lost during the winter due to the discovery, and subsequent extraction, of a large number of old wood piles in locations where concrete piles were to be driven. Several large concrete caissons were also uncovered on the construction site and had to be removed. The building is scheduled for completion in January, 1997 at which time we will begin the installation of equipment. Some personnel will move into the building at that time.

The second isocentric gantry was procured in January of 1996. The shipping, assembly, and installation reviews of the cyclotron, energy selection system, beam transport system, gantries, nozzles, and patient positioner system are scheduled for December, 1996. The cyclotron and energy selection system are scheduled to arrive at MGH in February, 1997 while the beam transport system will arrive March-May. The first gantry will be delivered in April and the second will arrive in May. The NPTC control and safety systems will be installed in the summer of 1997 and the patient positioning systems will be installed in the Fall.

We plan for the NPTC systems acceptance tests to be completed in February, 1998 after which the clinical commissioning of all systems will commence. Patient treatments are scheduled to begin in the early Fall, 1998. *Alfred Smith, The Northeast Proton Therapy Center, Massachusetts General Hospital, Boston, MA 02114, USA.*

Clinical Trials Update: **Proton Radiation Oncology Group (PROG)**

PROG’s goal is to provide a centralized research base, not available elsewhere, for clinical trials employing proton therapy. PROG has been funded by the National Cancer Institute-U.S. to: a) undertake clinical trials and other related studies to assess the extent of the gain and the cost of that gain achieved by use of proton beams in the treatment of the cancer patient, b) improve the control of primary and regional malignant disease by use of proton beam radiation therapy and to the study patterns of failure, c) coordinate the scientific activities of group members and committees and to foster the design and implementation of protocols within a unified research program, and to d) collaborate with clinical investigators on statistical and scientific aspects of planning new studies and to prepare interim statistical reports for each ongoing study.

Loma Linda University Medical Center and Massachusetts General Hospital are actively accruing patients to PROG studies. In addition, there is committed growth in PROG membership by proton beam therapy centers abroad. The medical directors at four foreign proton therapy treatment centers have written to indicate interest in participating in PROG studies; these include: Paul Sherrer Institut, Switzerland; the National Accelerator Centre, South Africa; Centre de Protontherapie, Orsay; and the University of Tsukuba, Japan. This substantial increment in the number of participants is anticipated to

more than double the current accession rate. PROG statisticians review all study designs regardless of phase to ensure they are appropriate to the scientific question posed. All accruing studies are monitored on a semi-annual basis to identify and resolve any problems. Analyses performed by the statisticians produce results that become the basis for presentations at medical meetings and publications in refereed journals. The statisticians have collaborated with the investigators on the publication of 19 manuscripts and 4 abstracts.

Current Studies:

PROG 85-26 Phase I/II Randomized Study of Charged Particle Radiation in the Treatment of Chordomas of Low Grade Chondrosarcomas of the Base of Skull or Cervical Spine (Munzenrider)
opened: 2/9/87, accrual as of 6/1/96: 261

PROG 92-13 Prospective Study of Patients with Recurrent or Incompletely Excised Benign Intracranial Meningiomas for the Evaluation of Treatment Results with Combined Proton & Photon Irradiation to Doses of 55.8 or 63.0 CGE (Munzenrider)
opened: 8/1/94, accrual as of 6/1/96: 10

PROG 92-14 Phase I/II Study Employing Proton Therapy for the Treatment of Squamous Cell Carcinoma of the Oropharynx (Slater)
opened: 10/1/93, accrual as of 6/1/96: 7

PROG 92-15 Phase I/II Study of Hyperfractionated, Accelerated Radiation Therapy for Advanced Paranasal Sinus Carcinoma Employing Combined Proton and Photon Irradiation (Thornton)
opened: 10/1/93, current accrual as of 6/1/96: 1

PROG 95-09 Phase III Trial Employing Conformal Photons with Proton Boost in Early Stage Prostate Cancer: Conventional Dose Compared to High Dose Irradiation (Zietman)
opened: 1/31/96, current accrual as of 6/1/96: 27

Treatment protocols will be developed for tumors in pediatric patients; carcinomas of several head and neck sites; carcinomas of the rectum/recto-sigmoid; sarcomas of the soft tissues of the retroperitoneum; carcinoma of the uterine cervix; non small cell lung cancer, carcinoma of the urinary bladder, stage 3; malignancies of the biliary duct; hepatic malignancy, and for patients with intracranial arteriovenous malformations. Presentations on the prostate protocol and the importance of a centralized statistical data base will be made at the Fall PTCOG meeting. Information regarding PROG is available from: *Elaine Pakuris, PROG Project Administrator, ACR, 1101 Market Street, Philadelphia, PA 19107, 215-574-3195, FAX 215-928-0153, e-mail epakuris@acr.org*

Heavy Ion Therapy at **GSI, Darmstadt, Germany:**

The medical annex has been constructed and furnished this winter. Commissioning of the medical beam line and the new rasterscan is continued using a prototype control system. The final system combining the scanner control and safety inputs as for instance the fast position sensitive counters and other safety controls is not yet ready. This delay is mainly due to the complexity of the safety and control system and the integration of components that have been tested as single prototypes only.

Another important safety equipment, the PET camera developed by the FZR Dresden has been installed and tested with carbon beams scanned to various 3-D volumes into plastic or gel-targets. Figure 1 shows the results of a PET reprojection of 14 spills produced by the irradiation with ^{12}C ions of 10^8 particles in total. From this and further experiments it is evident that the critical spots of the treatment field can be tested with a low intensity beam before main treatment starts.

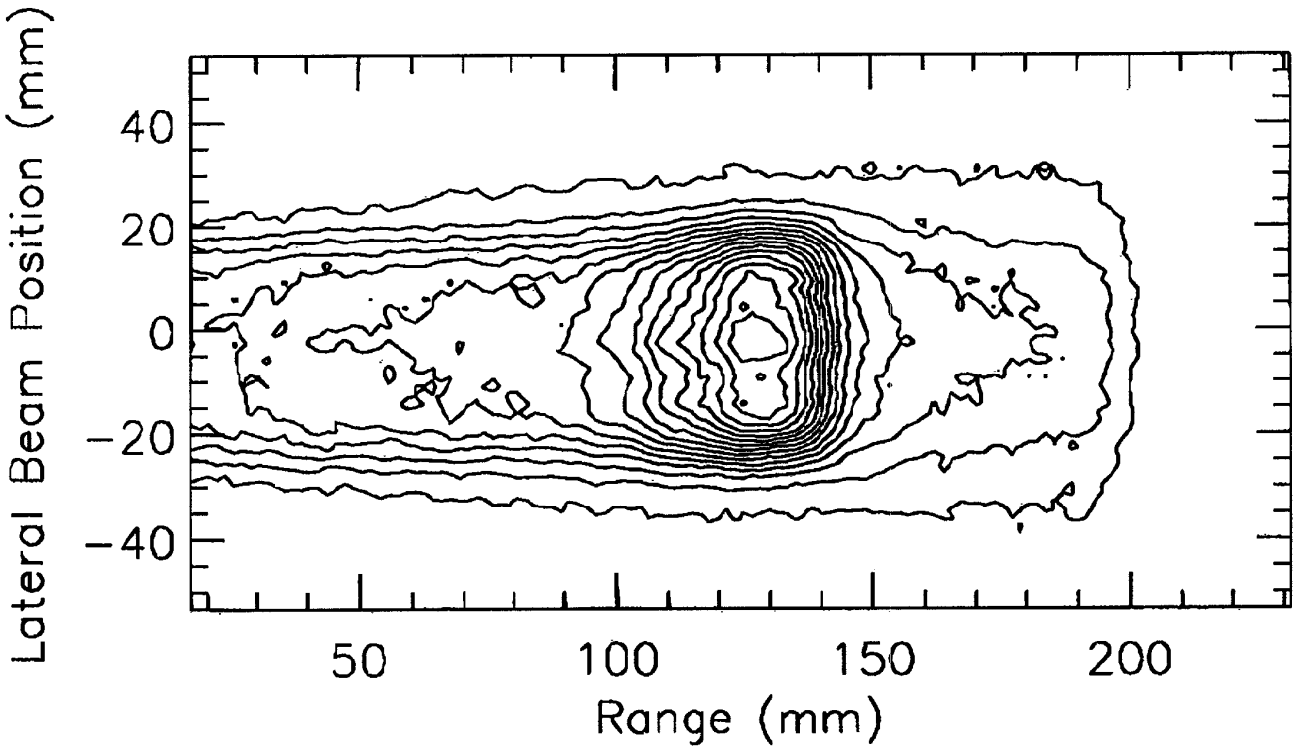


Figure 1. PET image of the scanned irradiation of a plastic block with carbon ions.

Good progress has been made also in the commissioning of the accelerator. For raster scanning the accelerator settings have to be changed from pulse to pulse (i.e. within 2 seconds). For the treatment of one fraction, up to 60 different energies out of a set of 255 virtual energies can be combined with one spot size out of 4 between 4 and 10 in diameter and with one beam intensity of 10 between 5 x 10^6 and 1 x 10^8 particles/sec. The energy and intensity variation from pulse to pulse has been tested successfully including the beam transport to the cave.

In order to ensure a correct dose, a dosimetry comparison with Loma Linda and Chiba has been carried out from the DKFZ group Heidelberg and yielded satisfactory results. Large progress has been made in treatment planning. A code, called TRIP developed at GSI has been completed and integrated into the Voxelplan system of DKFZ. TRIP is a biology oriented planning system that optimizes first the physical dose distribution and uses this distribution as input for a second, more elaborate biological optimization procedure. In this code, the various dose distributions originating from particles of different atomic numbers and energies are known for each volume element. Therefore, the local RBE values have to be calculated according to its composition using a new model developed recently at GSI. In this way inhomogeneous RBE distribution can be combined with the appropriate physical dose in order to achieve the desired biological effect.

The treatment planning system TRIP has been used for a fractionated treatment of minipigs where three skin fields have been exposed with graded doses of carbon ions and three with x-rays. The results showed that the theoretical RBE values for early effects are correct within the error of the experiment.

This minipig experiment has been performed in collaboration with the TU and FZR both at Dresden. Another animal experiment irradiating Ehrlich Ascites tumor cells in mice has been performed in cooperation with the Radiological Institute of the University of Frankfurt and is now being analyzed. This and other biology experiments will be reported later.

On the administrative side, the safety report and the request for approval have been finalized and submitted to the government. There, an expert commission has been formed that will visit GSI in June and start its review process necessary for legal approval.

In general, the project in presently delayed by 4 - 6 months compared to the original plan from 1992 and the treatment of the first patient cannot be scheduled before the end of 1996. *G. Kraft, GSI mbH, Planckstrasse 1, D-64291 Darmstadt, Germany.*

News from **ITEP, Moscow, Russia**:

In recent years, two treatment rooms have been functioning at ITEP PTF (intracranial irradiation in supine position , eye irradiation and other targets in seated position). About 150 patients are irradiated per year. Prostate and gynaecological irradiations have been temporarily suspended. Within the framework of the H-minus TEST experimental programme (acceleration of H-minus ions in ITEP synchrotron), a new fourth channel is under construction for the external proton beam of up to 200 MeV energy. The objective is the parameters study of the proton beam obtained by recharge of H-minus ions, and its suitability for modern proton dose delivery - GANTRY and 3D scanning systems. *V. Khoroshkov, ITEP, B. Cheremushkinskaya 25, Moscow 117259, Russia.*

Proton Treatment Facility at the **National Cancer Center Hospital East, Kashiwa, Japan:**

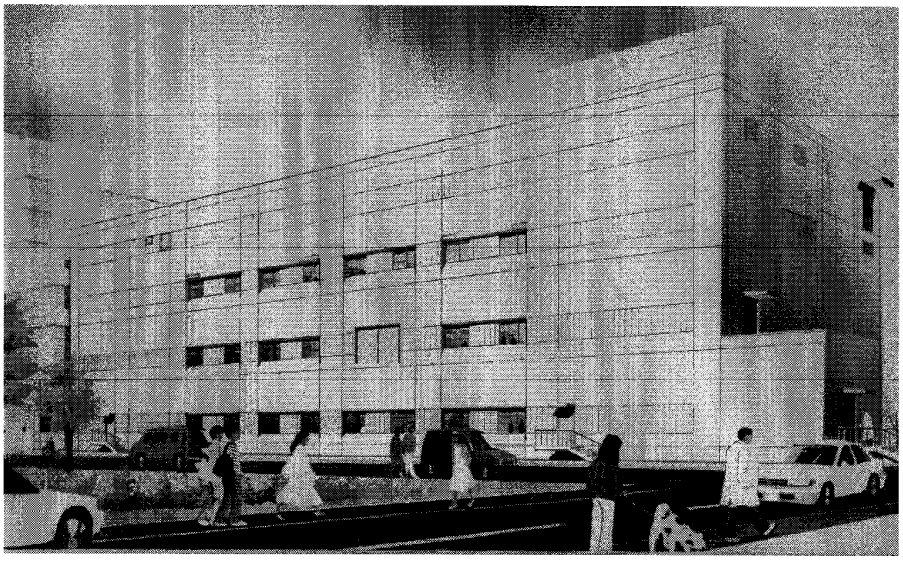
National Cancer Center, Japan had determined to build a dedicated proton treatment facility, and obtained the national funds in 1995. We had made clinical and technical requirements of the equipment. Because it was an international competitive bidding, the selection of the vendor was carried out by the process of total evaluation of the technical scores and the cost.

The facility will be build at its' Kashiwa campus which is some 30 km from its' Tokyo campus. It will be connected with the National Cancer Center Hospital East (NCCHE) by a passage.

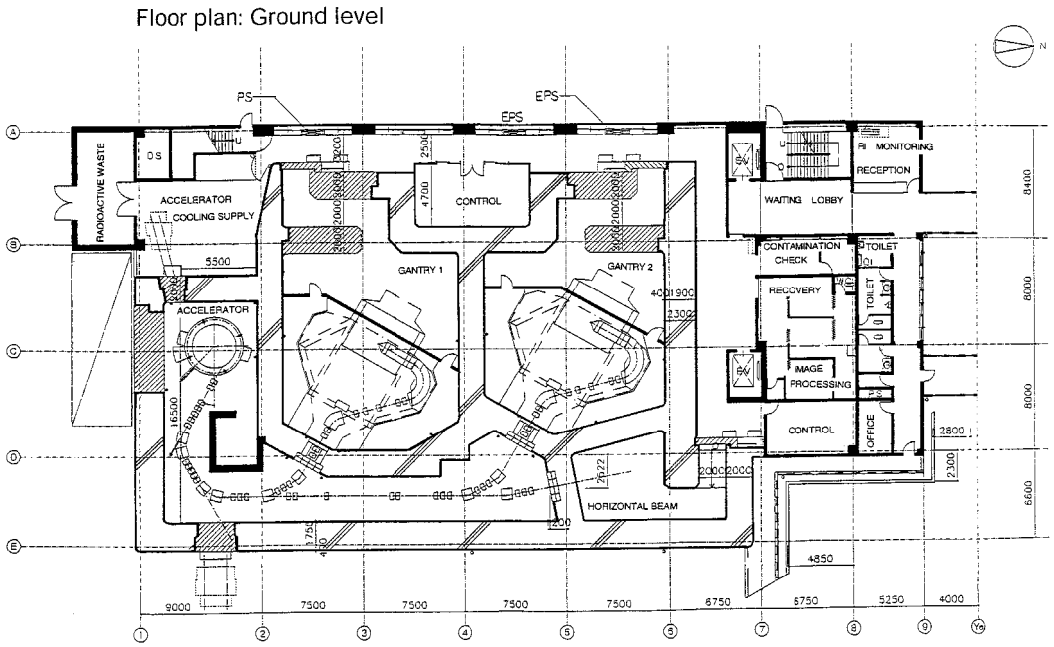
The Equipment: Three vendors submitted their proposals (two for synchrotrons, and one for cyclotron), finally, Sumitomo Heavy Industries Ltd. (SHI) was selected as a main contractor of the equipment in March 1996. Details of each part is now under discussion. What we determined up to now is as follows;

Accelerator will be a 235 MeV cyclotron. There will be three treatment rooms, two with isocentric gantries and one with fixed horizontal beam. Double scatterer or Wobbler scanning will be used initially as a beam spreading system. Active scanning method will be a future plan. Maximum diameter of the fields will be 30 cm at the gantries and 10 cm at the horizontal beam. Patient positioning system (couch) will rotate isocentrically, move horizontal, lateral, vertical and also it will roll (up to 5 degrees) to adjust the patient's position. For the fixed horizontal beam, a chair will be used. We are going to use real time digital fluoroscopic radiography (DR) system for verifying patient's position. Respiration gating system will be introduced to the two gantries. A dedicated helical CT scanner, an X-ray simulator and a MRI unit will be introduced for treatment planning and evaluation.

The Building: Tokyu Construction Co. was selected as a main contractor of the building in March 1996. The building will provide approximately 4700 net square meter, and will have three floors (Figure 1. The building seen from the south-west side. Existing NCCHE can be seen in the left side).



The ground level will be a treatment floor, which include cyclotron, beam transport lines, control rooms and three treatment rooms (Figure 2). Part of the gantries extend below the floor. The 2nd. level will contain accelerator main control room and bolus & collimator shop. The 3rd. level is a diagnosis and planning floor. All the diagnostic and treatment planning equipment will be introduced into the floor. Also on this level will be consultation and education rooms, computer and physics rooms, immobilization fabrication and storage areas, conference rooms and staff offices.



Schedule: A groundbreaking ceremony was held on May 14, 1996. The schedule is very tight due to the Japanese government's policy of budget plan. The building construction and equipment installation will be finished in the first half of 1997. We hope the beginning of treatment will be in the first half of 1998. This project will be carried out in collaboration with the National Institute of Radiological Sciences (NIRS), in Chiba. *Takashi Ogino, M.D., Head of Div. of Radiation Oncology, The National Cancer Center Hospital East, Kashiwa, Chiba 277, Japan.*

News **from Clatterbridge Centre for Oncology, UK**:

In conjunction with the Clatterbridge Cancer Research Trust, we have completed a large series of radiobiological measurements of tumour and endothelial cell lines. This was motivated by the possibility of treating age-related macular degeneration with protons where the target is neovascular tissue. A known tumour cell-line was used as a reference to test the experimental methodology. RBE values were derived by comparison with Co-60 irradiations performed at the radiotherapy department. The results will be presented at the PSI PTCOG in September by Dr C Walker.

Out of several proposed methods of boosting the existing cyclotron energy (62 MeV) by a proton linac booster, one is being pursued in collaboration with Daresbury Synchrotron Radiation Laboratory and CERN. Some preliminary measurements are scheduled based on initial calculations. *Andrzej Kacperek, Douglas Cyclotron Unit, Clatterbridge Centre for Oncology Bebington, Wirral, L63 4JY, UK.*

Proposed NEW FACILITIES for PROTON & ION BEAM THERAPY
July 1996

INSTITUTION	PLACE	TYPE	1ST RX?	COMMENTS
P.S.I	Switzerland	p	1996	200 MeV, var. energy, gantry, dedicated line
Berlin	Germany	p	1997	72 MeV cyclotron; eye treatment beam line.
G.S.I Darmstadt	Germany	ion	1997	First Carbon beam in the medical cave 7/6/95
KVI Groningen	The Netherlands	p	1998	plan:- 200 MeV accel.; 2 rms; 1 gantry; 1 fix.
NPTC (Harvard)	MA U.S.A.	p	1998	at MGH; 235 MeV cyclotron; 2 gantries + 3 horiz.
Kashiwa	Japan	p	1998	235 MeV cyclotron; 2 gantries, 1 horiz. beam
NC Star	NC U.S.A.	p	1999?	synchrotron; 70-300 MeV; 2 horiz; 1 gantry
Regensburg	Germany	p	1999?	gantry;1 fixed beam; 1 eye beam.
Hyogo	Japan	ion	2000	protons & ion; 2 gantries; 1 horiz; 1 vert; 1 45 deg.
TERA	Italy	p, ion	2002?	H- accel; 60-250 MeV p; +BNCT; isotope prod.
AUSTRON	Austria	ion	?	protons and light ions.
Beijing	China	p	?	250 MeV synchrotron.
Central Italy	Italy	p	?	cyclotron; 1 gantry; 1 fixed
Clatterbridge	England	p	?	upgrade using booster linear accelerator.
ITEP Moscow	Russia	p	?	3 horiz.-1 fix beam, 2 gantry, 1 exp., H- accel.
Jülich (KFA)	Germany	p	?	exp. beam line; plans for therapy.
Krakow	Poland	p	?	60 MeV proton beam.
Kyoto	Japan	p	?	250 MeV synchrotron; gantry; 1 fixed horiz beam.
Proton Development N.A. Inc.	IL USA	p	?	300 MeV protons; therapy & lithography
PROTOX	England	p	2001?	existing RAL synchrotron; 250 MeV; 3 treat. gantry

WORLD WIDE CHARGED PARTICLE PATIENT TOTALS

July 1996

WHO	WHERE	WHAT	DATE FIRST RX	DATE LAST RX	RECENT PATIENT TOTAL	DATE OF TOTAL
Berkeley 184	CA. U.S.A.	p	1954	— 1957	30	
Berkeley	CA. U.S.A.	He	1957	— 1992	2054	June-91
Uppsala	Sweden	p	1957	— 1976	73	
Harvard	MA. U.S.A.	p	1961		6785	June-96
Dubna	Russia	p	1967	— 1974	84	
Moscow	Russia	p	1969		2838	May-96
Los Alamos	NM. U.S.A.	π-	1974	— 1982	230	
St. Petersburg	Russia	p	1975		969	Dec-95
Berkeley	CA. U.S.A.	heavy ion	1975	— 1992	433	June-91
Chiba	Japan	p	1979		86	June-93
TRIUMF	Canada	π-	1979	— 1994	367	Dec-93
PSI (SIN)	Switzerland	π-	1980	— 1993	503	
PMRC, Tsukuba	Japan	p	1983		462	July-95
PSI (SIN)	Switzerland	p	1984		2054	Dec-95
Dubna	Russia	p	1987		40	June-96
Uppsala	Sweden	p	1989		81	Mar-96
Clatterbridge	England	p	1989		698	June-96
Loma Linda	CA. U.S.A	p	1990		2000	July-96
Louvain-la-Neuve	Belgium	p	1991		21	Nov-93
Nice	France	p	1991		636	Nov-95
Orsay	France	p	1991		673	Nov-95
N.A.C.	South Africa	p	1993		130	Mar-96
IUCF	IN USA	p	1993		1	Dec-94
UCSF - CNL	CA U.S.A	p	1994		71	May-96
HIMAC, Chiba	Japan	heavy ion	1994		104	April-96
TRIUMF	Canada	p	1995		5	Dec-95
					1100	pions
					2591	ions
					17737	protons
				TOTAL	21428	all particles

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for
The Proposed New Facilities Table