PARTICLES

sponsored by

PARTICLE THERAPY CO-OPERATIVE GROUP

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

Number 30 July 2002 Janet Sisterson Ph.D., NPTC

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 is covered in this way, so more financial help is needed from the community. PTCOG 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 "Massachusetts General Hospital" and sent to Janet Sisterson at the address given below. We thank Krsto Prelec for their kind donation to Particles.

Facility and Patient Statistics: I continue to collect information about all operating or proposed facilities. Please send me your information. My latest published summary of the worldwide detailed patient statistics through 1999 is:
"Ion beam therapy: overview of the world experience." Author: J. M. Sisterson. CP576, Application of Accelerators in Research and Industry – Sixteenth Int'l Conf., eds. J. L. Duggan and I. L. Morgan, American Institute of Physics, (2001) p865-868. Copies available on request.

Particles Newsletter and Abstracts from PTCOG meetings. This is the first time that we are mailing Particles and the Abstracts from the last PTCOG meeting as a CD. Computerized Medical Systems in St Louis has kindly offered to cut the CDs. I thank them for their support of Particles.

Particles on the Internet *** **new web page** ***:
The URL for the PTCOG and Particles Newsletter is currently http://ptcog.web.psi.ch. The PTCOG web maintained by MGH is on a brief hiatus while the MGH Cancer Center new web pages are under construction.

Other proton therapy links:

- NPTC, MGH, Boston: http://cancer.mgh.harvard.edu/cancer_radonc_nptc_home.htm
- LLUMC, California: http://www.llu.edu/proton
- U of California, Davis: http://crocker.ucdavis.edu/cnl/research/eyet.htm
- Midwest Proton Radiation Institute: http://www.iucf.indiana.edu/MPRI/index.html
- National Association for Proton Therapy: http://www.proton-therapy.org
- TRIUMF, Canada; protons: http://www.triumf.ca/welcome/proton_thrpy.html
- TRIUMF, Canada; pions: http://www.triumf.ca/welcome/pion_trtmt.html

- CPO, Orsay, France: http://www-sop.inria.fr/epidaure/personnel/bondiau/CPO_base/cpo_base.htm
- PSI, Switzerland: http://radmed.web.psi.ch
- TERA foundation, Italy: http://www.tera.it
- Catania, Italy: http://web2.lns.infn.it/catanaweb/default.htm
- GSI homepage: http://www.gsi.de
- HMI Berlin: http://www.hmi.de/isl/att-i_en.html
- The Svedborg Laboratory, Sweden: http://www.tsl.uu.se
- Clatterbridge Centre for Oncology: http://synaptic.mvc.mcc.ac.uk/simulators.html
- ClatterBridge collaboration with the CASIM project: http://www.casim.ac.uk
- Rinecker Proton Therapy Center, Munich, Germany: http://www.rptc.de
- ITEP, Moscow, Russia: http://www.protontherapy.itep.ru
- Tsukuba, Japan - PMRC: http://www.pmrc.tsukuba.ac.jp/index.html
- PATRO, Hyogo, Japan: http://www.hibmc.shingu.hyogo.jp/ENGLISH/HIBMC_home.html
- HIMAC, Chiba, Japan: http://www.nirs.go.jp/ENG/particl.htm (ENG case sensitive)
- NAC, South Africa: http://medrad.nac.ac.za/index.htm

ARTICLES FOR PARTICLES 30

The deadline for articles for the Particles 31 is November 30 2002. Please Send all articles to:

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Massachusetts General Hospital
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Articles for the newsletter should **NOT** exceed two pages in length.

PTCOG BUSINESS and FUTURE PTCOG MEETINGS

The Chairperson, Secretary and Steering Committee members are listed below. The Chairperson and Steering Committee are appointed for 3 years. Their appointments run through June 2004.

Chair: Gudrun Goitein
Paul Scherrer Institute
Division of Radiation Medicine
Villigen PSI CH-5232
Switzerland

Secretary: Janet Sisterson
Northeast Proton Therapy Center
Massachusetts General Hospital
30 Fruit Street
Boston MA 02114

MEMBERS OF THE STEERING COMMITTEE
Appointed in June 2001

Canada	TRIUMF, BC	E. Blackmore
France	Orsay	G. Noel
Germany	GSI/Heidelberg	J. Debus
	HMI, Berlin	H. Kluge
Italy	Catania, Sicily	L. Raffaele
Japan	HIMAC, Chiba	H. Tsujii
	NCC, Kashiwa	T. Ogino
	PMRC, Tsukuba	Y. Akine
	PATRO, Hyogo	Y. Hishikawa
	Wakasa Bay, Japan	S. Fukuda
Russia	ITEP, Moscow	V. Khoroshkov
	JINR, Dubna	G. Mytsin
South Africa	IThemba LABS	D. Jones
Sweden	Uppsala	E. Blomquist
Switzerland	PSI	G. Goitein
UK	Clatterbridge	A. Kacperek
USA	NPTC-MGH/HCL, MA	S. Rosenthal
	LLUMC, CA	D. Miller
	MPRI, IN	N. Schreuder
	Berkeley, CA	W. Chu

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

PTCOG XXXVII	Cape Town, South Africa	October 28-30 2002
PTCOG XXXVIII	Hosted by Clatterbridge, UK	May 2003
PTCOG XXXIX	Hosted by LLUMC, CA	Fall 2003
PTCOG XXXX	CPO, Orsay, France	Spring 2004
PTCOG XXXXI	MPRI, Indiana, USA	Fall 2004

Minutes of Steering Committee Meeting
held during
PTCOG XXXV
Tsukuba on 15 November 2001

I thank Dan Jones for his summary of this Steering Committee meeting.

Present:G Goitein (chair), E Takada, K Kawachi, H Tsujii, Y Akine, T Sakae, T Okamura, T Ogino, R Sirio, A Shiu, T Hasegawa, H Paganretti, J Palta, W Chu, Y Luchin, V Khoroshkov, G Klenov, D Jones, S Fukuda

FUTURE MEETINGS

Schedule

The schedule of future meetings was confirmed:

XXVI	Catania (LNS)	29-31 May 2002
XXVII	Cape Town (iTL)	28-30 October 2002
XXXVIII	Clatterbridge (DCC)	Spring 2003
XXIX	Loma Linda (LLUMC)	Fall 2003
XXXX	Orsay (CPO)	Spring 2004
XXXXI	Bloomington (IUCF)	Fall 2004
XXXXII	Villigen (PSI)	Spring 2005

PTCOG XXVI

R Sirio outlined some of the plans for the Catania meeting, to be hosted by Laboratori del Sud, INFN.

The focus sessions would include:

Clinical results of eye treatments
Dosimetry
Prostate treatments
Treatment planning
Beam scanning techniques

Accommodation and scientific sessions will be at the Excelsior Hotel, downtown Catania
It was stated that the first eye treatments at LNS-INFN would be given in Spring 2002.

PTCOG XXXVII

D Jones gave some preliminary information about the Cape Town meeting to be hosted by iThemba LABS.
Suggested focus sessions:

Patient positioning
Radiosurgery
Monte Carlo based treatment planning
Accelerators for particle therapy

The focus session items will be finalised at the next Steering Committee meeting.

Accommodation will be in the Cape Town Waterfront, while the scientific sessions will be held at iThemba LABS.

TRAINING AND EDUCATION

G Goitein proposed that PTCOG should actively participate in training and education in order to make the field of particle therapy interesting and attractive to young people.

D Jones suggested that a Summer School or Workshop could be held in conjunction with PTCOG meetings to give an overview of the field. This was supported by K Kawachi. This proposal will be discussed further at the next Steering Committee Meeting.

V Khoroshkov mentioned that one of the CERN Schools, held at Archamps, could provide courses on particle therapy as has been done previously.

W Chu noted that the National Institutes of Health could provide training grants (presumably only for US citizens).

K Kawachi stated that it took 3-5 years of practical training for a Medical Physicist to become experienced in particle therapy.

FOCUS SESSIONS

E Takada observed that the focus sessions at PTCOG meetings were not properly organized. He suggested that the questions to be answered in these sessions be formulated beforehand and that some some conclusions be drawn at the end of each session.

H Tsujii requested that the treatment planning session at PTCOG XXXVI, Catania, should include an overview of treatment planning at each facility together with a description of any unique developments at that facility.

HONORARY MEMBERSHIP

The Committee decided unanimously to bestow Honorary Membership on K Kawachi.
(note added by J. Sisterson: previously at the Boston Meeting H. Suit, M. Goitein, L. Goldin and J. Slater were bestowed Honorary Memberships.)

OTHER MATTERS

J Palta announced that the University of Florida had developed an information sharing network that could be used for sharing clinical data. He added that construction of a proton therapy centre in Gainesville will probably commence during 2002.

NEXT MEETING

The next meeting of the Steering Committee will be held in Catania, during PTCOG XXXVI.

Minutes of the Steering Committee meeting
held at
PTCOG XXXVI
Thursday May 30 2002, Catania, Italy

Present: G. Goitein, J. Sisterson, A. Kacperek, E. Blomquist, G. Cuttone, L. Raffaele, H. Kooy, M. Moyers, H. Kluge, J. Symons, N. Schreuder, C. Desblancs, P. Joseph, J. Palta, K. Kawachi, L. Yonemoto.

Future Meetings:

October 28-30 2002, Cape Town, South Africa. Julyan Symons – representing Dan Jones – stated that the organization of this meeting is well in hand. Accommodation will be at hotels in or adjacent to the Waterfront and discounted rates have been negotiated. The meeting itself will be held at iThemba LABS and busses will transport all participants between the two venues. The social event will take place in one of the Townships. Continuing credit will be able for South African participants.
There will be three focus sessions with the following topics:

- Patient Positioning:
- Radiosurgery, with emphasis on AVMs..
- Treatment planning was preferred for the third session rather than Accelerators for Particle Therapy.

Workshop: There will be a workshop on the Sunday preceding the meeting. The object of this workshop is to "encourage younger scientists starting out". This workshop would be a good opportunity for PTCOG, which has a role in providing education to its members. It was noted that with so many new centers starting up that there is a need at the beginning of a PTCOG meeting to provide a talk(s) that would set a framework for new participants to appreciate the proffered presentations.

2) 2nd week in May 2003, Clatterbridge, UK. The meeting is expected to be held in Chester where there are several good hotels and attractions.
Focus sessions that they would like are:

- Radiosurgery with an emphasis on contrasting and comparing various modalities. In particular a presentation(s) from the BNCT group at Birmingham University would be included. Apparently this group has 'solved ' the boron compound problem. This would fit well into a session that would show the role of particle therapy in the broader context of all available modalities.
- Eye treatments

3) Fall 2003, Loma Linda CA. Loma Linda is happy to host the PTCOG meeting at this time. The exact date and arrangements still have to be decided.

Meetings further in the future.

Spring 2004; Orsay, France would like to host this meeting. It would be appropriate because at that time the fast switch between the two treatment rooms should be implemented.
Fall 2004: Indiana, USA. would like to host this meeting. At this time commissioning for the first gantry should be underway.
Spring 2005; now open because PSI prefers to host the meeting later in the year.
Fall 2005: PSI would like to host this meeting.

It was commented that we should only plan a couple of years ahead and allow the future meeting schedule to be flexible.

[Not mentioned at the meeting, but the following has always been the requirement: any institution wishing to host a PTCOG meeting should send that request in writing to J. Sisterson indicating the dates desired and the reason why this time would be appropriate. A representative of that institution is encouraged to attend the Steering Committee meetings to present their case in person]

New Business

1) Education Fund.

G. Goitein expanding on the ideas that were presented in her speech the previous day, would like to see PTCOG set up an educational fund supported by donations, particularly from the industrial partners. This money would be used to assist one or two younger scientists a year to travel to a host institution that would provide training in aspect(s) of particle therapy. Many institutions already offer some form of training program.

Les Yonemoto commented that LLUMC has a fellowship listed through ASTRO.

G. Cuttone commented that the European countries together can request money from the European Community (this includes Switzerland) for education. In the next cycle this would be in the form of an European Education Grant.

J. Palta stated that at the U. of Florida they have a grant from the NCI to support the transfer of electronic information between groups. The NCI is supportive of PTCOG and would look favorably at a particle therapy initiative requesting funds for education. The U of Florida would be happy to provide that education.

2) Cooperation and exchange of information between facilities

L. Yonemoto reminded the committee that there are already several clinical trials in progress in which LLUMC and MGH are participating in under RTOG. These are ongoing although PROG lost its funding some years back.

J. Palta and the U of Florida have the grant, alluded to above, to support the transfer of information between facilities.

3) Continuing credits

Many participants would like to receive continuing education credits for attending a PTCOG meeting. It was the feeling of the committee that we should establish some uniform way of obtaining such credit to make life easier for the meeting organizers. It was suggested that PTCOG meeting should get an approved listing by ESTRO and ASTRO. G. Gudrun and J. Palta volunteered to arrange this with ESTRO and ASTRO respectively.

4) Dosimetry Working Group.

It was suggested that the Dosimetry Working Group be resurrected to try and establish a uniform dosimetry protocol.

Note added in July 2002: I learnt while putting Particles together that a joint IAEA/ICRU committee is being established with the goal of recommending a uniform dosimetry protocol. The work of this

committee would essentially overlaps that of the Dosimetry Working Group and many members may be the same, so PTCOG Steering Committee meeting.

5) Other Business

N. Schreuder commented that he found the book of abstracts available at the time of the meeting very helpful. He would like to encourage all meeting organizers to arrange for this. The abstracts will still be included in the next mailing of Particles for the convenience of those who were unable to attend the meeting.

N. Schreuder also asked that the email address of the presenter be included with the abstract.

The meeting adjourned without discussing all of the issues suggested by G. Goitein and J. Sisterson due to lack of time.

Janet Sisterson.

A letter from the PTCOG President

Dear friends and colleagues:

The last two PTCOG meetings were characterized by a) many things which make up the charm of PTCOG and its conferences: excellent organization, wonderful hospitality, an interesting number of contributions and fruitful discussions and b) news about several new facilities. Japan is now leading in the number of particle therapy projects in one country, which are all run with great enthusiasm and care. Tsukuba, which has hosted the recent meeting, now has the new facility with which to continue it's longstanding tradition, and the other facilities in the country will contribute to implementing particle radiation therapy, based on today's cancer treatment concepts, in Japan and beyond. I was always, and still am, impressed by the dedication of our colleagues in Japan who put a lot of financial and professional effort in the medical use of particles, and I wish them continuous dedication and success with all the programs they have activated or will activate in the future.

The group in Catania was also a wonderful host, and could present a new project, the eye treatment facility at the INFN-LNS. Everybody, who was and is involved in this activity, is fully engaged, and I am very confident that this new facility, too, will operate with high standards and hopefully excellent success, following what has been established in proton therapy of ocular melanomas. Apart from the high quality of the contributions, I was personally very pleased to see so many young participants at PTCOG. This is exactly what we need: both the established team with all their knowledge and vast experience, and new young people in medicine and physics who take over the existing precious knowledge and combine it with new ideas and a fresh view.

I am looking forward to the future of PTCOG and to the next meeting in Cape Town at iThemba LABS.

Yours,
Gudrun Goitein

Everybody is good – how good can we be together?
The presentation made by Gudrun Goitein at PTCOG XXXVI

Everybody is good – our advantage

We have a common philosophy: to use particles in medicine to the best advantage of our patients

We are ambitious teams, who work hard, and over long times, to realize our goals

We have creativity - which leads to new technologies and scientific programs

We have knowledge, to a very large extent on the physics side, but also on the medical side, though here in a still more limited number of centers

We have success in particle therapy of selected tumors

We have established as well as new technologies realized in various centers around the world

We are a worldwide active community

How good can we be together? – our problems:

Different local conditions, e.g. facilities in at physics research institutes or hospital based projects, which lead to different economical and political as well as professional conditions

Different technologies - and consequently

Different physical characteristics which require serious care in comparing procedures and results

Different performance, based on technology but also on

Different medical environments and

Different medical needs.

Different cultures and political environments also have substantial influence on the individual projects; this is the characteristic of

a worldwide active community

How good can we be together? – our challenge:

Extending medical activities beyond the use of particles as a pleasant but exotic speciality for otherwise hopeless situations

Competition from "conventional" radiotherapy, medical oncology, surgery - a stimulus for continuous effort to bring particle therapy up to the level of first-class, established radiotherapy

Maintaining success, as we shall always be "measured" by the excellent results we produced for selected indications like choroidal melanomas or sarcomas of the base of skull. With increasing quality of photon radiotherapy, the niche for particles will become somewhat narrower. We have to determine and then convincingly prove the importance of our method!

Defining quality – something which is needed now and will be needed increasingly in the future, in comparison with modern photon techniques as well as amongst the particle centers

Being self-critical is the "condition sine qua non" in judging our work and means that we must create

Standards of performance and analysis of our work, in all aspects: technical, physical and medical!

Research and production need to be focussed on with equal weight and careful design of the different procedures

Our independence at the different facilities, which may lead to working in an isolated manner, can become dangerous, as tumor therapy in general is looked at internationally and is performed to a large extend based on international cooperation (e.g. multi-center studies and protocols)

Co-operation as a worldwide active community is challenging, fascinating, absolutely important and very promising!

How good can we be together? – our potential:

Creativity – I have never met a bored or boring team!

Substance from the founder's generation is a treasure, available to all of us, and should be used in a more organized and efficient way

Experience in planning, building and running particle beam facilities and

Medical experience in a selected but demanding field of cancer treatment are sources for continuously dedicated effort

Positive treatment outcome is the most important reason for the interest in particle therapy and the justification for future activities

New technologies and

New ideas are always coming out of

Excellent teams!

PT**CO**G – a worldwide active community with a common philosophy

How good can we be together? – our needs:

Standards of performance and analysis (documentation) for the whole community are of utmost importance, if we don't want to vegetate in a green house for exotic plants

Dealing with and communicating problems has to be learned and taken care of. Problems are unpopular subjects, and the communication needs respect, seriosity and trust on both sides.

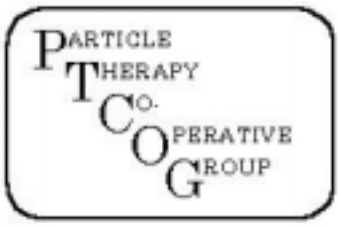
Polemic is the opposite of what we need and we should all try to not be tempted by the easiness of bad style.

Balancing the interest of producers (industry) and users (physicists, medical doctors) is often difficult. We need each other, but we also need to respect each other! Our goal – first class patient care – is too serious to be abused as emotional trigger.

Designing and funding education is the basis for our future. If we believe in particle therapy as a therapeutic tool which must be part of modern oncology, we have to train young people.

Everybody is good – how good can we be together?

As good as our togetherness ……



PTCOG XXXVII MEETING
WORKSHOP ON ION THERAPY
Sunday 27 October - Wednesday 30 October 2002
Cape Town, South Africa

GENERAL
The XXXVII bi-annual meeting of the Particle Therapy Co-Operative Group (PTCOG XXXVII) [Monday 28 -Wednesday 30 October 2002] and a Workshop on Ion Therapy [Sunday 27 October 2002] will be held in Cape Town and will be hosted by the Medical Radiation Group of **iThemba L**aboratory for **A**ccelerator **B**ased **S**ciences (iThemba LABS) [formerly National Accelerator Centre].

The pre-meeting Workshop on Ion Therapy is a PTCOG innovation, which is aimed at introducing medical professionals, residents/registrars and others who may not be familiar with the field to its principles and techniques. This will hopefully provide the spark to motivate young people to pursue a career in the exciting and challenging field of particle therapy.

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DETAILED INFORMATION
Full information on the Meeting and Workshop; registration/hotel reservation and presentation forms are available on the PTCOG XXXVII website:

http://www.medrad.tlabs.ac.za/ptcog.htm

The deadline for registration, hotel reservation and paper submission is 31 August 2002.

PLEASE FORWARD THIS INFORMATION TO COLLEAGUES WHO MAY BE INTERESTED AND ARE NOT ON THE MAILING LIST.

International Symposium on
Standards and Codes of Practice in Medical Radiation Dosimetry
25 –28 November 2002
Vienna, Austria

Objective: The symposium will provide a forum where advances in radiation dosimetry during the last decade, not only in external beam radiotherapy but in all other areas of radiation medicine, can be disseminated and scientific knowledge exchanged. It will include areas which have been developed recently (intravascular therapy, heavy-ion dosimetry) together with classic areas where the standardization of dosimetry may not have reached a mature stage (diagnostic X-rays and nuclear medicine).
Audience: The symposium is addressed to a broad spectrum of experts in medical radiation dosimetry with responsibilities in the following fields:

- external radiotherapy
- brachytherapy
- heavy-ion therapy
- diagnostic X-rays and mammography
- nuclear medicine

List of Topics

- Development and intercomparisons of primary and secondary standards for dosimetry in external beam radiotherapy.
- Dosimetry protocols and codes of practice for external beam radiotherapy: new developments and comparisons with previous codes.
- Standards of measurement and dosimetry protocols for brachytherapy sources; developments in intravascular dosimetry.
- Standardization of diagnostic X-rays including mammography: primary standards and codes of practice.
- Transfer dosimetry: measurements in on-reference conditions, relative dosimetry, interface dosimetry
- Dose quality audits: certification of reference and non-reference dosimetry, national and international quality audit networks, postal and on-site based audits.
- Radiation dosimetry for advanced radiotherapy applications: dynamic wedges, MLC, IMRT, dosimetry using EPID, dosimetry of narrow beams, IORT, monitor unit calculations.
- Dosimetry in nuclear medicine: laboratory standards and internal dosimetry.
- Monte Carlo calculations for dosimetry (all fields).

Papers and Posters: Papers are invited form participants on any of the topics being covered by the symposium. In order to provide ample time for discussion, the number of papers that can be accepted for oral presentation is limited. If the number of papers submitted exceeds the limit, some will be selected for poster presentation.

Key deadlines
15 March 2002 – submission of abstracts, participation forms and applications for grants
13 Sept. 2002 – submission of full papers

There is no registration fee. The symposium will be held in English.

Information on: participation, submission of papers, registration and grant can be obtained from www.iawa.org/worldatom/Meetings/2002/index.html

Contact persons:

Scientific matters and paper submission
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Participation, grants and administrative matters
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Please include reference number CN-96 in your written contacts.

8th Workshop on Heavy Charged Particles in Biology and Medicine
September 26 – 28 2002
Baden near Vienna, Austria

Med-Austron, Initiative for proton-ion-cancer Research Centre for Austria, in co-operation with the Austrian Association for Radiooncology Radiobiology and medial Radiophysics (OGRO), the Austrian Hadron Therapy Group (AHTG) and the Austrian Universities are the organisers of the workshop.

The topics to be discussed at this conference include:

- Cell and Tissue Radiobiology, DNA damage and repair
- Treatment planning, clinical RBE and dose optimisation
- Epidemiological aspects, clinical results
- Status reports on treatment facilities and projects, future developments
- Technical solutions to application of ion beams

For further information please contact med-austron@med-austron.at. The scientific secretary of the organising committee is T. Auberger.

This workshop is sponsored by the Government of Lower Austria and the City of Baden. http://www.historic-centres.com/baden/.

PTCOG Information/News/Reports:

The following reports and articles were received by July 2002.

News from the **Northeast Proton Therapy Center**, MGH, Boston:

The Northeast Proton Therapy Center, NPTC, commenced clinical operation on November 8, 2001, when the first patient started treatment for a cavernous sinus meningioma. This patient had the honor of exclusive care by our clinical staff for only one week, after which additional patients were added at the rate of, initially, one per week.

In parallel, the Harvard Cyclotron Laboratory, HCL, continued treating its complement of patients. The schedule, as envisioned and achieved, was to gradually reduce the patient load at the HCL and simultaneously increase the patient load at the NPTC. There was a real (and this time for real) deadline:

the HCL was slated to be shut- and torn down to make space for new construction on the Harvard campus. It is, of course, with considerable sadness for us, and we are sure the proton community at large, to see the HCL come to such an abrupt and ignoble end after fifty years of continuous operation and its unique contributions to science and proton therapy. We can only hope that we will continue the HCL tradition with equal dedication and excellence.

The next milestone was reached on April 1, 2002 when the original HCL eye treatment apparatus – moved intact to its new location – started eye treatments. The move caused a one-month cessation of eye treatments. We continued to use 160 MeV as our input energy into the apparatus. This greatly facilitated commissioning and the transfer and use of auxiliary equipment, including the large selection of modulation wheels, from the HCL to the NPTC. We intend, however, to reduce the input energy to a lower energy to improve the distal fall-off properties for our eye treatments.

As of July 2002, we are treating about 20 gantry patients per day and up to 6 eye patients per day. Compared to treatments at HCL, the NPTC has the advantage of gantry-based treatments – which facilitates patient setup and permits new field approaches – and of higher energies, up to 230 MeV. Both new features are being actively used to permit treatments for new sites. Only one gantry treatment room is currently in operation. We had decided long before to only focus on one treatment room to ensure a timely first patient treatment date.

It was, of course, a considerable effort of all parties involved to reach our first milestone of 1st patient treatment on November 8, 2001. The IBA and MGH teams first went through a rigorous and extensive set of acceptance and validation procedures to certify the large number of features and components of the system. Clinical commissioning by the MGH clinical team followed acceptance and validation. The clinical commissioning task had three components: the treatment snout and the performance of its components during treatment, the patient positioning devices, and the treatment delivery software. The snout and its components are of course the primary focus as far as the physical aspects are concerned. The snout, at this moment, is able to deliver fully modulated SOBP, double-scattered, fields with a range between 5-28 cm H_20, and a field diameter of 25 cm. The snout is capable of narrow single-scattered fields, broad wobbled fields (where a "broad" pencil-beam is scanned over an area up to 30x40 cm^2), and pencil-beam scanning as well. The next phase will activate the single-scattering and wobbling modes, while pencil-beam scanning is under active development in all aspects, from treatment planning to treatment delivery. The patient positioning capabilities of the NPTC are particularly flexible. The heart of patient positioning is a treatment couch with 6 degrees of freedom (3 translations and 3 rotations) that permits patient placement, combined with the gantry rotation, at almost arbitrary positions with respect to beam axis. Patient setup is supported by a set of (currently two) orthogonal X-ray devices and digital imagers that permit accurate daily repositioning of the patient. Finally, the treatment delivery software must be considered as well. The NPTC facility is, in essence, a software-driven environment, where the control software manages all components and the sequence of operations. (Of note, all aspects of safety management are duplicated in hardware as well.) The software, more so than the hardware at this point, will drive the new capabilities of the system. We are currently on version 1 of the software. IBA and MGH continue to make very significant and continual progress on the software. System performance at this point is high and we will be ready soon to complete and integrate the second gantry room.

Finally, we ourselves are not immune to progress. The MGH has commenced construction of a new outpatient clinical facility that will integrate our center as well. The new architects apparently lack the appropriate circular thought processes and we have lost our signature rotunda. But, after all, beauty is only skin-deep and it is what is on the inside that counts.

Demolition in progress at NPTC, July 2002.
Hanne Kooy, Northeast Proton Therapy Center, Massachusetts General Hospital, 30 Fruit Street, Boston, MA 02114.

A plea from **Dr M. R. Raju, Mahatma Gandhi Memorial Medical Trust, India**: to Scientists in the field of Particle Radiotherapy

After having worked for more than three decades in the field of nuclear particles for cancer treatment, and as I have stated in my review paper "Particle Radiotherapy: Historical Developments and Current Status" in Rad.Res. 145, 391-407 (1996), I feel that unless individuals who are working to improve the quality of medicine start taking some active role in meeting the needs of people at large, the gulf between the quality of treatment received by the haves and have-nots will widen further.

With this in mind, I have taken voluntary retirement from the Los Alamos National Laboratory and I have been spending most of my time in rural India since 1994. I am now developing a rural cancer center in a village Pedamiram, near Bhimavaram Town, Andhra Pradesh, India with an emphasis on prevention and the importance of early detection of cancer.

In India, most of the cancer centers are located in big cities, while more than 75% of the population live in villages. At present, more than 75% of patients by the time they go for treatment, they are in advanced incurable stages. I am trying to build a rural cancer center as a model to significantly increase the percentage of patients with early curable disease seeking help.

We have received approval from the Bhabha Atomic Research Center for building radiotherapy facility with an area of about 10,000 square feet. This building has rooms for external beams of low and

high energy, simulation, high dose and low dose rate brachytherapy, treatment planning, mould room etc. in addition to the patient waiting hall, examination rooms etc. I am getting this building built mostly with my personal resources so far. I am happy to inform you that the foundation work is completed and we expect to finish the construction before the end of this year.

May I request you to visit the webpage: http://www.mgmtrust.org for background information regarding our efforts so far at the Mahatma Gandhi Memorial Medical Trust which is a charitable organization. Please see the section on cancer control.

I am hoping that some of you will help me in offering your services and in procuring some of the radiation equipment required for cancer treatment.

Medical Physicists Without Borders, an organization similar to the organization of Doctors Without Borders in France are seriously considering to join in my efforts and a small group of them under the leadership of Dr. Andree Dutreix are planning to visit me in India.

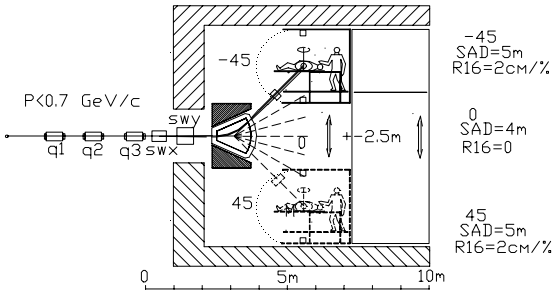
I had the pleasure of knowing many of you especially old timers in different countries and I am hoping with the help of some of you, I will be able to develop good model for a rural cancer center with an emphasis on prevention and the importance of early detection with a hope that this will be a good demonstration project by concerned scientists working in the forefront of cancer treatment joining together as 'scientists for social action'. *Dr. M.R. Raju, Fellow Bioscience Division, Los Alamos National Laboratory, Los Alamos, New Mexico-87545, USA. e-mail address: raju@telomere.Lanl.gov. Tel: (505) 662 – 9175. Address in India: Mahatma Gandhi Memorial Medical Trust, Pedamiram, Bhimavaram-534204 (A.P), India. E-mail address: mgmtrust@vsnl.co. Tel: 91 - 8816- 23167.*

Simple planar system for multidirectional patient irradiation for cancer treatment with heavy charged particle beams. M. M. Kats (ITEP), Moscow, kats_mark@global.net.ru)

In view of significant simplification and cost decreasing of system for lying patient irradiation it is suggested to use both "medical cabin" and few compromises.

The spatial scheme of the suggested "simple planar system" for proton beam consists in the fix magnetic equipment only and medical cabin(d=3m, l=4m, 2t) with simplest vertical displacement 62.5m. There are three quadrupole lenses, two scanning magnets and one bending magnet with a big gap. This magnet bends the beam in the vertical plane at any angle φ from the horizontal plane, but the angle value can be less than some maximal angle φ_{max}. Permissible to irradiation spatial interval Ω depends on maximal angle φ, $\Omega=4\pi\sin(\varphi)$. For 45 degrees limit the useful spatial interval Ω will be about 2.8π instead of 4π.in usual rotated gantry.

Size of magnets gap depends on both the maximal angle φ_{max} of the bend and on the maximal target size. In system for protons beam (see Fig. 1) the length of the magnet gap is 1.15 m, the width of the gap is increased from 0.3m at the magnet input, up to 1.3 m at the magnet output, the height of the gap is about 160 mm. Maximal magnetic field is 1.6T, maximal magnet power is less 150kW, the weight of the magnet is about 30 t. The input angle and the field gradient of the magnet are equal to zero. The output boundary of the poles have arc shape with the center in beam input point in magnet and with the radius equal to the magnet length (1.15m). Such shape of poles made slow focus of the beam in both planes.



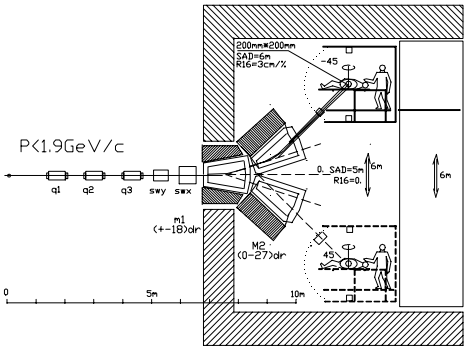


Fig. 1. Simple planar system for protons.

Fig. 2. Simple planar system for carbon ions.

Optics of this system depend on the irradiation direction and it is not the best. This system can be used for transport of particle beams with big phase volume (for example, 12mm×mrad), but dP/P must be about $\pm 10^{-3}$, at increasing of the dP/P spread produced an increasing of the vertical beam size at the target after significant bends of the beam. Such system can work successfully with small phase volume ($<$1mm×mrad and dP/P$<10^{-3}$) beams even if the maximal bend of the beam in the magnet would be wider than 45 degrees. Value of SAD is big enough (SAD>4m).

It is possible to use bigger maximal bend of the beam in the magnet for the increasing of the spatial direction spread, but negative effects would be bigger too. The magnet will significantly be heavier and more expensive. The dependence of the beam focus on the irradiation direction would be stronger.

The suggested “simple planar system” can be used for both proton and ion beam transport (see Fig. 2). There are three usual hot magnets with approximately equal weight and power. Magnets are fix on a small vertical wall. The first magnet has usual symmetric shape. It bends the beam at angles less of 18 degrees to the horizontal plane. The second and the third magnets have “C”-shape of joke. Each one of them bends the beam at angles less 27 degrees. A similar system can be produced immediately as the first low-cost experiment for ion beam multi-directional patient irradiation. It is possible to use one super-conductive magnet for ion beam transport instead of three hot magnets. The magnet is fix and a velocity of its current changes is not very high.

The “simple planar system” is a compromise between the advantageous system properties and its cost. It is NOT the universal optimal decision of the gantry design. But it can be used for irradiation of the most of cancer positions.

The cost of such system is so small in comparison with any rotated GANTRY, that it will be useful to build about six of such systems near to one accelerator with aim of increasing a total year productivity of center of irradiation and decreasing of a cost of treatment.

The adoption of the “simple planar systems” in the practice of proton and ion therapy seems very useful.

References.

[1] M.M.Kats. New GANTRY schemes IET, #2, 2002 (in Russian ПТЭ, #2, 04.2002,).
[2] M.M.Kats. New GANTRY schemes (in Russian “Медицинская физика”, #13, 02.2002).
[3] M.M. Kats. New schemes of multidirectional patient irradiation systems for cancer treatment with heavy charged particle beams. TERRA Report 2002 (in publication).

New schemes of rotated GANTRY. M. M. Kats (ITEP), Moscow, kats_mark@global.net.ru

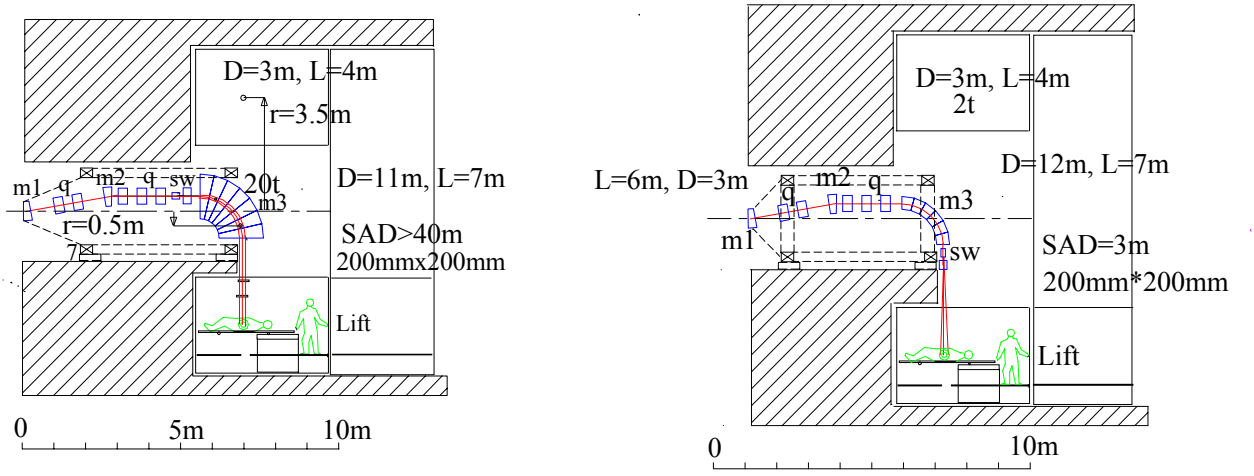
Several new spatial and optics schemes of rotated systems for irradiation of the horizontally lying patient from different directions by both protons and ion beams are proposed.

These schemes are founded on the use of a medical cabin (d=3m, l=4m, 2t) and a conventional symmetrical achromatic beam. Three new ideas for rotating gantry simplification have been put forward here. The first one is to choose the optimal position of the rotation axis. The second idea is to reasonably choose the scanning distance (SAD). The third idea is a correction of the beam direction instead of precision mechanic rotation of frame with heavy magnetic channel.

Those ideas allow us: (1) to get rid of the counter-weights; (2) to reduce the gap size and the weight of the last magnet; (3) to significantly reduce the rotation radii of all magnetic elements; (4) to reduce the bending angles in the first two magnets; (5) to reduce the price of the frame and cabin mechanics. Therefore all new rotating systems have significantly smaller bending momentum K.

The proposed schemes of rotating gantry fulfilled all medical requirements. Gantries designed according to new ideas can be much cheaper than any conventional gantry described before. Two examples of new GANTRY spatial schemes for proton beam are shown on Fig. 1 for two SAD values.

Above discussed ideas may prove to be fruitful when designing any new proton or ion therapy facility.



$K=\Sigma(M_i \times Ri)+M_{cab} \times R_{cab.}$ [t×m]

K=(2t33.5м+10t30.5м)32=24 t3м	K=(2t34.5м+2t30.5м)32=20 t3м
SAD>40m (parallel scanning)	SAD=3m, IBA NOZZLE.

Fig.1.

References.

[1] M.M.Kats. New GANTRY schemes IET, #2, 2002 (in Russian ПТЭ, #2, 04.2002,).
[2] M.M.Kats. New GANTRY schemes (in Russian “Медицинская физика”, #13, 02.2002).
[3] M.M. Kats. New schemes of multidirectional patient irradiation systems for cancer treatment with heavy charged particle beams. TERRA Report 2002 (in publication).

TREATMENT PLANNING SYSTEMS FOR PROTON THERAPY
July 2002

The following Table was originally presented in October 1999 by Skip Rosenthal, MGH at the Workshop on Treatment Planning Systems, PTCOG XXXI Please send corrections/additions to Janet Sisterson.

Year	Created By	System Name	Status
1979-93	LBL	LBL system	Not Available
1980	MGH	Rx	**Distributor MGH**
1980	MGH	EYEPLAN	**Distributor MGH – EYES only**
1990-96	MGH/Seimens	V-Treat(AXIOM)	Not Available
198?,1991	PSI	PSI system/Pion	**Distributor PSI**
1995	DKFZ/Royal Marsden	Voxelplan/Proxelplan	**Adapted by GSI, NAC, DKFZ**
1996	Radionics/MGH/HCL	P-Knife	Not Available
1997	LLUMC/PerMedics	OptiRad 3D	**FDA approved; commercial**
1998	Tsukuba	Hitachi system	In-house system
1998	DKFZ	OCTOPUS	**Under development – EYES only**
1994	Orsay/Curie	ISIS	Distribution ?
1998	CMS/MGH	FOCUS	**Commercial Release 1999**
1998	DKFZ	KonRad Plus Protons	Research Only
1989 – 2000	CCO, Clatterbridge, UK	EYEPLAN v1.6 (VMS)	Available free;eyes only; research only
2001	ITEP (Moscow)	ProGam	Adapted in PTF ITEP
2002	MDS Nordion	Helax-TMS	**FDA approved: commercial**
	RenderPlan		?
	Adac		?
	Michigan		?
	Varian		?

Proposed NEW FACILITIES for PROTON & ION BEAM THERAPY - July 2002

INSTITUTION	PLACE	TYPE	1ST RX?	COMMENTS
Bratislava	Slovakia	p, ion	2003	72 MeV cyclotron; p; ions; +BNCT, isot prod.
IMP, Lanzhou	PR China	C-Ar ion	2003	C-ion from 100MeV/u at HIRFL expand to 900 MeV/u at CSR;clin. treat;biol. research;no gantry;shifted patients
Shizuoka Cancer Center	Japan	p	2003	synchrotron 235 MeV; 2 gantries; 1 horiz; funded.
Rinecker, Munich	Germany	p	2003	4 gantries, 1 fixed beam, 230 MeV, scanning beams.
Wanjie, Zibo	China	p	2003	Under construction. 230 MeV synchrotron, 2 treat rooms.
PSI	Switzerland	p	2004	Addition of a 250MeV cyclotron, 2nd gantry, new 1 fixed
NCC, Seoul	Korea	p	2005	235 MeV cyclotron, 2 gantries, 1 horiz.
IThemba LABS, Somerset West	South Africa	p	2006	230MeV,1 gantry,1 horiz.+30° beams,1 horiz.+15°.beams
CGMH, Northern Taiwan	Taiwan	p	2001?	250MeV synchrotron/230MeV cyclotron;3 gantry,1 fixed
Erlangen	Germany	p	?	4 treatment rooms, some with gantries.
CNAO, Milan & Pavia	Italy	p, ion	2004?	synchrotron; 2 gantry;1 fixed beam rooms;1 exp. room
M. D. Anderson Cancer Center	TX, USA	p	2004?	235MeV cyclotron; 3 gantries; 1 fix + 1 exp beam rooms
Heidelberg	Germany	p, ion	2005?	
Med-AUSTRON	Austria	p, ion	2007?	2p gantry;1 ion gantry;1 fixed p;1 fixed ion;1 exp room
Xi'an, Shanxi Province	China	p	?	Contract signed with IBA.
Central Italy	Italy	p	?	cyclotron; 1 gantry; 1 fixed
Clatterbridge	England	p	?	230 MeV cyclotron; part of the CASIM project
TOP project ISS Rome	Italy	p	?	70 MeV linac; expand to 200 MeV?
3 projects in Moscow	Russia	p	?	including 320 MeV; compact, probably no gantry
Krakow	Poland	p	?	60 MeV proton beam.
Proton Development N.A. Inc.	IL USA	p	?	300 MeV protons; therapy & lithography

WORLD WIDE CHARGED PARTICLE PATIENT TOTALS

July 2002

WHO	WHERE	WHAT	DATE FIRST RX	DATE LAST RX	RECENT PATIENT TOTAL	DATE OF TOTAL
Berkeley 184	CA. USA	p	1954	— 1957	30	
Berkeley	CA. USA	He	1957	— 1992	2054	June-91
Uppsala	Sweden	p	1957	— 1976	73	
Harvard	MA. USA	p	1961	— 2002	9115	Apr-02
Dubna	Russia	p	1967	— 1974	84	
Moscow	Russia	p	1969		3445	Oct-01
Los Alamos	NM. USA	π^-	1974	— 1982	230	
St. Petersburg	Russia	p	1975		1029	June-98
Berkeley	CA. USA	ion	1975	— 1992	433	June-91
Chiba	Japan	p	1979		145	Apr-02
TRIUMF	Canada	π^-	1979	— 1994	367	Dec-93
PSI (SIN)	Switzerland	π^-	1980	— 1993	503	
PMRC (1), Tsukuba	Japan	p	1983	— 2000	700	July-00
PSI (72 MeV)	Switzerland	p	1984		3429	Dec-01
Dubna	Russia	p	1987		88	Feb-02
Uppsala	Sweden	p	1989		311	Jan-02
Clatterbridge	England	p	1989		1102	Dec-00
Loma Linda	CA. USA	p	1990		7176	May-02
Louvain-la-Neuve	Belgium	p	1991	– 1993	21	
Nice	France	p	1991		1951	June-02
Orsay	France	p	1991		1894	Jan-01
iThemba LABS	South Africa	p	1993		417	June-02
MPRI	IN USA	p	1993		34	Dec-99
UCSF - CNL	CA USA	p	1994		448	July-02
HIMAC, Chiba	Japan	C ion	1994		1187	Feb-02
TRIUMF	Canada	p	1995		70	June-02
PSI (200 MeV)	Switzerland	p	1996		99	Dec-01
G.S.I Darmstadt	Germany	C ion	1997		106	Jan-02
Berlin	Germany	p	1998		277	June-02
NCC, Kashiwa	Japan	p	1998		113	May-02
PATRO, Hyogo	Japan	p	2001		30	Jan-02
PMRC (2), Tsukuba	Japan	p	2001		51	Apr-02
NPTC, MGH	MA USA	p	2001		101	July-02
PATRO, Hyogo	Japan	C ion	2002		28	July-02
INFN-LNS, Catania	Italy	p	2002		8	July-02
Wakasa Bay	Japan	p	2002		2	June-02
					1100	pions
					3808	ions
					32243	protons
				TOTAL	37151	all particles