PARTICLES

sponsored by

P ROTON
T HERAPY
C O-
O PERATIVE
G ROUP

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

Number 4 June 1989 Editor: Janet Sisterson Ph. D., HCL

This is the fourth issue of a newsletter devoted to matters of interest to all those involved, or planning to become involved in proton, light or heavy ion and heavy charged particle radiation therapy. This issue includes a report from Loma Linda on a new proton accelerator as well as a report on the celebration of the first 40 years of proton beams at the Harvard Cyclotron Laboratory.

I have email addresses for only 10 people of the 200 or so who are on my mailing list. I would like more before I include them in an issue of 'Particles'. So, if you think such a compilation would be helpful, send me your email address.

Information sent to me for inclusion in the newsletter does not need to be extensive but it should be "camera ready" if possible. I am using the following format; flush left; left and right margins of one half inch; single spacing using the 12 point New Century Schoolbook, if you have it, and the Times font, or whatever, if you don't. Graphs and line drawings are welcome.

The deadline for the next newsletter is November 30 1989, so that the fourth issue can come out in January 1990. Address all correspondence to Dr. Janet Sisterson, Harvard Cyclotron Laboratory, 44 Oxford Street, Cambridge MA 02138. Telephone (617)495–2885 or send mail to me via the VAX computer at BITNET%"SISTERSON@HUHEPL". Please note that this is a different email address; the other one still works but will ultimately be phased out. HCL now has a FAX machine; the number is (617)495—8054.

FUTURE PTCOG MEETINGS

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

PTCOG XI	PSI, Villigen Switzerland	Sept 18-20 1989	meeting overlaps with the Heavy Particle Therapy Group of EORTC (this is the first PTCOG meeting in Europe)
PTCOG XII	Loma Linda California	Spring of 1990	should allow us to see the Loma Linda facility in action

The proposed topics for the September PTCOG meeting in Switzerland include: beam delivery systems and related topics; accelerator parameters; positioning techniques; verification of patient position; verification of dose distribution etc.; comparison of dose distributions for different radiations and application techniques; calculated rates for complications and local control volume factor; proposal for clinical protocols. Posters in the form of contributions concerning aspects of heavy particle therapy, from radiation source to shielding of treatment rooms or the management of patients and economy, are very welcome, and will be on display during the workshop. Room reservations should have been made by the end of June. If you did not receive the mailing and would like more information contact Michael Goitein at MGH or the workshop secretariat Mrs R. Füllemann, Dept. of Radiation Medicine, PSI, 5232 Villigen-PSI, Switzerland; telephone (056) 99 21 11 or (056) 99 35 24 (direct); fax (056) 99 32 94 PSI CH.

Anyone who has suggestions, or who wishes to join PTCOG, should contact the secretary of PTCOG, Michael Goitein, Department of Radiation Medicine, Massachusetts General Hospital, Boston, MA 02114.

PTCOG News

The following information was received by June 1989.

The status of the **Loma Linda University Medical Center** project:-
Accelerator: The accelerator commissioning continues at Fermilab with encouraging results. The accelerated protons are now being routinely delivered to the experimental cave and experiments with the prototype detector devices for the nozzles are underway as are the neutron attenuation measurements. Extraction efficiency of 85-90% has been achieved which is probably as high as can be reasonably expected under the limitations imposed by the complement of temporary power supplies.

The long-awaited power amplifier for the RFQ injector accelerator was delivered to Fermilab on May 30, and will be installed shortly replacing the borrowed unit. Following installation and commissioning of this component, and successful implementation of phase and amplitude controls for the associated debuncher system, the present limitation on injected beam current should be eliminated so that experiments to increase beam current can again be emphasized. It is presently expected to start moving the accelerator on or about September 1 1989.

Building: The construction of the Proton Therapy facility building is on, or ahead, of schedule in all areas. All of the concrete structure is complete and interior finishing work has started on B level (i.e. the proton accelerator and treatment level). Installation of AC power, cable trays, water piping and building facilities for the accelerator and beam transport systems are nearly complete. Installation of survey monuments has started and contracts are being finalized for installation of the technical components.

Gantries: The structural components for the gantry systems are being manufactured in Riverside, California. The trial assembly of the first complete gantry structure will be completed by June 2 and installation of the first unit in Gantry Room #3 will start immediately thereafter. Installation of the gantry structures in Room 1 and 2 will start at about one month interval. *Phil Livdahl, Department of Radiation Therapy, Loma Linda University Medical Center,24880 Prospect Street, Loma Linda, CA 92354.*

The following report was received from the **Heidelberg/Darmstadt** collaboration May 17 1989:-
With high-energy heavy ions a further development can be achieved in the treatment of local tumors. This was the substance of a meeting which took place on May 12 1989 in Heidelberg and Darmstadt. Through interdisciplinary cooperation between the University Clinic of Radiology, Heidelberg, the German Cancer Research Center (DKFZ), Heidelberg, and the Laboratory for Heavy Ions (GSI) in Darmstadt this promising method of therapy should become available soon in Germany.

150 attendants of different medical subject areas, physics and accelerator techniques met in the morning in the "Kopfklinik" Heidelberg. Prof. J. Castro from Berkeley, California, where the only available possibility of heavy ion radiotherapy is located, reported about impressive clinical success which had been achieved through irradiation of tumors with high-energy heavy ions.

Physical and biological advantages were explained by Dr. G. Kraft from the GSI. The high accuracy in target localization, the increase in dosage as well as in relative biological effectiveness with depth cannot be reached by any other beam. Dr. G. Gademann from the University Clinic of Radiology introduced the planned clinical trials. If the project is granted the effect of heavy ions on five different tumor sites will be demonstrated in a clinical report after 7 years. The following talks were dealing with questions on clinical dosimetry, patient positioning and treatment planning.

In the afternoon, all interested guests were guided through the acceleration facilities of the GSI in Darmstadt. Afterwards Prof. P. Kienle explained the scientific program of the GSI and the specifications of a therapy accelerator. Then the whole accelerator facility and the extensions necessary for this project were introduced. These are a special medicine-injector, a device to scan tumor volume by the ion beam, a fragment separator and a positron camera. The two latter devices enable to control accurately the target volume of the ion beam directly before the irradiation. This is a prerequisite for using the high precision of heavy ions fully.

The reports showed that all experts necessary for the interdisciplinary cooperation in the concerned institutes are available. Prof. M. Wannenmacher from the University Clinic of Radiology expressed his conviction that radiotherapy with heavy ions is of clinical necessity and can be realized.

According to mutual opinion of all participants of the project symposium a clinical study can be successfully carried out within schedule and clarify the potential application of heavy ion radiotherapy.

Finally, Prof. Wannenmacher expressed his hope that the institutes concerned may receive the necessary grant for the realization as well as the necessary financial and personal support. *Dr. Günther Gademann, Radiologische Universitätsklinik, Abt. Klinische Radiologie, Im Neuenheimer Feld 400, D-6900 Heidelberg 1,Federal Republic of Germany.*

Clatterbridge Hospital, England reports that the first patient will be treated with the 62 Mev proton beam sometime this June. *David Bonnett, MRC Cyclotron Unit, Clatterbridge Hospital, Bebington, Merseyside L63 4JY, England.*

The **Harvard Cyclotron Laboratory** celebrated the 40th anniversary of the first proton beams accelerated in synchrocyclotron on June 14 1989. Over 400 invitations were extended to friends of the Laboratory and to all those who had used the cyclotron in the past 40 years. Talks on the history of the Laboratory by Professors Norman Ramsey and Richard Wilson and a buffet supper were preceded in the afternoon by an open house. To the amazement of the present staff of the Laboratory, more than 200 people attended and wished us well in our future endeavors. The cyclotron magnet motor generator set chose to fail catastrophically 5 days before the party. Seven and a half treatment days were lost while the 42 year old MG set was replaced by solid state supplies. *Andy Koehler, Harvard Cyclotron Laboratory, 44 Oxford Street, Cambridge MA 02138.*

Pion Radiotherapy at **TRIUMF**. The first prospective randomized trial in the world to evaluate pions vs photons was launched in June of 1988. The study, involving patients with glioblastoma multiforme, is proceeding well and patient accrual should be complete in about 2-2.5 years time. The randomization of patients between photon and pion arms of the study mean that fewer patients have been treated with pions in the past year.

Just over 190 patients have now been treated at TRIUMF with pion radiotherapy. Most tumors were located in the brain and pelvis.

In his research project Dr. Y Ogawa, Associate Professor of Radiology, Kochi University and visiting TRUIMF clinical research Fellow has been investigating the potential therapeutic gain for pions using two kinds of animal tumor models. The adjuvant use of biological response modifier Schizophyllon (SPG) has been studied in its capacity to delay time to recurrence of tumors. The studies show that pion treatments are of greater benefit in moderately slow growing tumors (SCC VII) with hypoxia and with fractionated treatments whereas KHT sarcoma, a rapidly growing tumor, showed little effect. The immunomodulator SPG produces an enhanced growth in one tumour model (SCC VII) and with reduction in pulmonary metastases. This suggests new horizons for combination therapy in that pion can control the local tumor resulting in minimal residue allowing the immunomodulator to maximize its effect.

Proton beam therapy: Specifications for a proton beam facility at TRIUMF for radiosurgery of intracranial tumours and for malignant tumours of the eye will be finalized soon. A proposal will be drafted for funding of the detailed design study. Proton committee members are preparing specification and budget reports; one is ready and included under 'Recent Publications' as an internal report. *George Goodman, Cancer Control Agency of B.C., 600 W. 10th Avenue, Vancouver B.C. V5Z 4E6 Canada and G. Lam, Batho Biomedical Facility, TRIUMF, University of B.C., Vancouver B.C. V6T 2A3, Canada.*

Obituaries

It is with great sadness that the staff of the **Harvard Cyclotron Laboratory** report the death of of their former director, William Munro Preston. Bill was director of the Laboratory from 1952 until 1975 and was one of the pioneers in the medical program at Harvard remaining an essential supporter until his death. Besides his physics research, Bill had a lifelong concern for environmental matters which lead him among other things to found the Lincoln Land Conservation Trust in 1957, one the first town-based land trusts in the country.

Recent Publications

R.D. Merritt "Proton beam AVM treatment: first order equipment specification and budget" published as a TRUIMF internal report February 1989.

WORLD WIDE CHARGED PARTICLE PATIENT TOTALS

The following institutions are/were active in the treatment of patients with protons, pions, light or heavy ion beams. Data for the patient totals were collected by the middle of June 1989.

WHO	WHERE	WHAT	DATE FIRST RX	DATE LAST RX	RECENT PATIENT TOTAL	DATE OF TOTAL
Berkeley 184	CA. U.S.A.	p	1955	— 1957	30	inc. in Berkeley Bev total
Berkeley 184	CA. U.S.A.	He	1957	— 1987	-	inc. in Berkeley Bev total
Berkeley Bev.	CA. U.S.A.	heavy	1975		2351	total all beams. May 1989
Uppsala	Sweden	p	1957	— 1976	73	1976 original series
Harvard	MA. U.S.A.	p	1961		4664	June 1989
Moscow	U.S.S.R.	p	1965		1993	March 1989
Dubna	U.S.S.R.	p	1967	— 1977	80	1977 expected to reopen
Los Alamos	NM. U.S.A.	π-	1974	— 1982	230	final total 1982
Leningrad	U.S.S.R.	p	1975		508	Dec 1987
Chiba	Japan	p	1979		65	Oct 1989
TRIUMF	Canada	π-	1979		190	May 1989
PSI (SIN)	Switzerland	π-	1980		439	June 1989
Tsukuba	Japan	p	1983		158	August 1989
PSI (SIN)	Switzerland	p	1984		719	October 1989
Uppsala	Sweden	p	1988		1	September 1989
Clatterbridge	England	p	1989		28	December 15 1989
					= 859	pion beams
					= 2257	ion beams
					= 8138	proton beams
				TOTAL	= 11254	all particle beams

PROPOSED NEW FACILITIES
PROTON & ION BEAM THERAPY

INSTITUTION	PLACE	TYPE	DATE 1ST RX?	COMMENTS
Loma Linda	CA U.S.A.	p	1989	250 MeV accelerator; 4 treatment rooms; 3 gantries.
Clatterbridge	England	p	1989	62 MeV proton beam line added to neutron facility.
Orsay	France	p	1989?	adapt an existing cyclotron no longer being used for physics.
N.A.C.	South Africa	p	1990	200 MeV. 2 treatment rooms; 2 horiz. beam; 1 vert. or gantry.
Nice	France	p	1990	MEDICYC; neutron & proton radiotherapy facility
Chiba	Japan	ion	1993?	HIMAC design complete; funds are available to construct.
Harvard	MA U.S.A.	p	1995?	new accelerator & facility to be built at MGH
TRIUMF	Canada	p	?	adapt existing proton beam lines to therapy use.
EULIMA	Europe	ion	?	European cooperative venture; location not yet decided.
Louvain-la-Neuve	Belgium	p	?	variable to 90 MeV proton beam; add to neutron facility
A.P.D.C.	IL U.S.A	p	?	250 MeV accelerator; private facility; intra-operative capability.