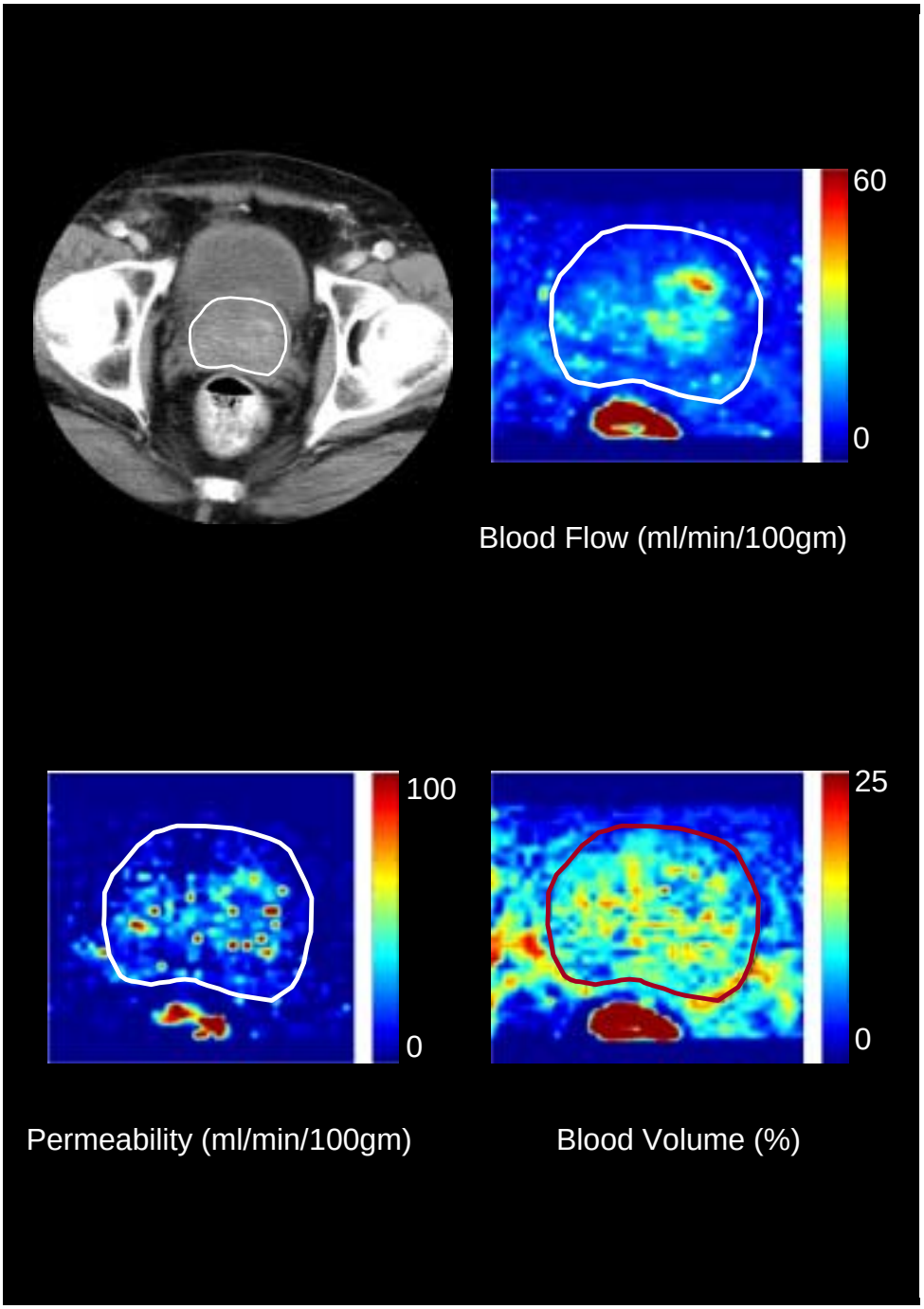
# InterACTIONS

CANADIAN MEDICAL PHYSICS NEWSLETTER
Le BULLETIN CANADIEN de PHYSIQUE MÉDICALE




## CT Functional Imaging for Radiotherapy

COMP OCPM

A publication of the Canadian Organization of Medical Physicists and the Canadian College of Physicists in Medicine

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CANADIAN COLLEGE OF PHYSICISTS IN MEDICINE
LE COLLÈGE CANADIEN DES PHYSICIENS EN MEDECINE

47 (1) janvier/january 2001

# About our Cover

Radiotherapy treatment planning based on functional imaging is here in planning systems near you – almost. Radiotherapy is traditionally planned on anatomic information provided by CT, MRI and other imaging methods. Functional imaging, such as PET-FDG and MRS, has recently worked its way into the treatment planning arena. Functional information can also be derived from X-ray CT imaging. The cover picture shows a contrast-enhanced image of a T2b prostate patient and the corresponding functional maps of blood flow, permeability and blood volume. The maps show increased blood flow in a tumour region, increased capillary permeability and blood volume in the tumour periphery, and decreased permeability and blood volume in the tumour core. These functional maps are derived from a single injection of contrast agent and 6 minutes of serial CT scanning. In addition, with the advent of multi-slice CT, it is possible to simultaneously generate functional maps for multiple CT slices. The advantages of functional CT are its high spatial resolution, relatively low cost and wide availability. There is also perfect registration between the functional and anatomic images as the former are derived from the latter. It remains to be seen how these functional CT maps can be used in the process of treatment planning.

*Provided by Ivan Yeung and Elizabeth Henderson of PMH*


The Canadian Medical Physics Newsletter, which is a publication of the Canadian Organization of Medical Physicists (COMP) and the Canadian College of Physicists in Medicine (CCPM) is published four times per year on 1 Jan., 1 April, 1 July, and 1 Oct. The deadline for submissions is one month before the publication date. Enquiries, story ideas, article submissions can be made to:

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20 Campus Drive
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Please submit stories in Publisher 98, Word 6.0, Word 97, or ASCII text format. Hardcopy submissions will be scanned to generate an electronic document for inclusion in the Newsletter.

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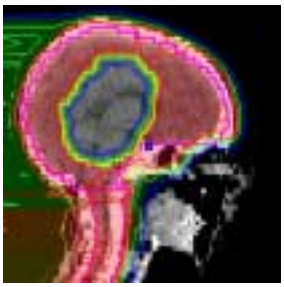
## Inside this issue:





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# Message from the COMP Chair:

Our new executive director, Mr. Michael Henry, comes to us with outstanding recommendations that attest to his integrity, managerial skills, and ability to get things done.

I am glad to report on a few important items that may shape the future of COMP. First of all, it a pleasure to report the successful completion of our search for an Executive Director. The search was a difficult one as we had an excellent list of candidates, the final list being one medical physicist and three administrative/public relations individuals. After long deliberations, we chose Mr. Michael Henry, BA, BSc, MBA. He has a vast range of managerial experience as the former Executive Director of the Canadian Mental Health Association (1985-89), the former General Manager of the Municipal Safety Code Inspection Agency (1997-99), and former Director of the Family and Community Support Services (1980-85) both of Alberta. He also has vast political lobbying expertise from his days as Chief of Staff of the Alberta Liberal Caucus (1989-93), and as member of the Alberta Legislature (1993-97). In addition to many professional posts that he holds/held in various social organizations, he is the recipient of many awards, including the Certificate of Appreciation and Leadership Award from the United Way of Edmonton, and an award as Advocate for Young Children from the Alberta Teachers Association. He was also chosen as one of the three Canadian delegates to the Congress of Political and Economic Future of the Soviet Union, Moscow. In addition to these achievements, he comes to us with outstanding recommendations that attest to his integrity, managerial skills, and ability to get things done. We are delighted that Mr. Henry has accepted our offer, and certainly wish him the best as he leads the COMP and the CCPM into the new millenium. Mr. Henry will start his term as Executive Director on January 1, 2001.

Another item involves the Canadian Association of Provincial Cancer Agencies (CAPCA). This agency has formed a Committee to set clinical, personnel and equipment standards for cancer care in Canada. Our representatives to CAPCA are Drs. John Andrew and Peter Raaphorst. On the problem of equivalence in certification for medical physicists, the PACS chaired by Dr. David Wilkins presented a comprehensive evaluation of the three certifying bodies of North America, and articulated a definition of a qualified medical physicists that has been submitted for approval to the membership. To encourage membership in COMP, special mailouts will be arranged to remind the individuals who are not renewing their membership. This will include in sequence letters, e-mails, letters informing of the advantages of being a COMP member and requesting the reasons the individual refuses to renew membership. CCPM members and fellows would , of course, also be reminded that renewal payments are required to keep

their certification active. Various changes will occur for our next annual meeting in Kelowna, BC. One of them shows that COMP is entering the internet age. The communication committee is designing web submission of abstracts and proceedings to this annual meeting. This would also coincide with the requirement of electronic submission of COMP abstracts for the Medical Physics journal. It is also hoped that this meeting will be the first COMP annual meeting that would offer continuing education credits through CAMPEP. On a final note, Dr. Cheryl Duzenli has agreed to be the COMP exchange speaker at this year's CAP meeting in Victoria, BC. The title of her lecture will be 3D Radiation Dosimetry using Polymer Gels. Thank you Cheryl.

The year 2001 brings us new challenges, but the recruitment of a new Executive Director, the introduction of web submission of papers and the offering of CAMPEP credits for the COMP scientific meetings will certainly prepare us for these challenges.

B. Gino Fallone

# Message from the CCPM President:

Let me begin my message by wishing you all the best and most prosperous of the New Years. I trust you have been able to take some well earned rest in the past two weeks, and that you have rejuvenated yourselves somewhat from the busy, hectic lives that medical physicists all seem to lead these days.

There were a number of issues considered by the Board at the midyear meeting in November. The first was the revisions of the radiation oncology exam questions for the membership examination and the new format of the exam questions for distribution. The exam book is now available for downloading at the Canadian Medical Physics website (http://www.medphys.ca/ ) in Adobe format. Each section for the different subspecialties is a separate file. The electronic document has been issued an ISBN number under publication by the College and COMP. We are very enthusiastic about this change, as we believe it will make our exam book more available to the community and will also make the distribution work of the registrar easier.

About twenty to twenty-five of the College members and fellows will be required to recertify this year (if your year of election to the college ended with the digit one or six, you are due). Applications for recertification will be due around the end of June 2001. The bylaws are clear on what is required of physicists who are submitting their documents for recertification. However, the Board is preparing a form (to be available in February) that should aid applicants put their dossiers together. The recertification process is essentially a document review, and it will be up to the members and fellows to decide what documents they include in their dossiers. The documents will be reviewed by a anonymous committee of Board members and College fellows. There may likely be a random audit of a number of the submissions each year which may generate requests for additional support documentation from some candidates. We expect that it will take a while for the recertification process to become well established. I will keep you informed of the process in the next newsletter.

In our work in the last year, we have noticed that there are a number of bylaws that need revision to clarify definitions and to account for some new ways of doing things. So there are five bylaw changes proposed for consideration at the next Annual General Meeting (please see notice in this issue of Interactions). I would ask that you would review these.

As always, the Board continues to review College's standards for membership and fellowship. This review was encouraged this year by the draft document from the Medical Physics Professional Affairs Committee reviewing the different certification avenues in North America. This work is in development and I will keep you informed of our thinking as it we draft some documents.

Again, I wish you the best in the New Year. As always I ask that you communicate to me (or another more approachable Board member) any concerns you have about the operation or the role of the College.

With best regards,

L. John Schreiner

Kingston
January 1, 2001

The recertification process is essentially a document review, and it will be up to the members and fellows to decide what documents they include in their dossiers.

# Jim Till Elected a Fellow of the Royal Society of London

**By Douglas Cormack**

James E Till, FRS

In the summer of the year 2000, Jim Till was elected a Fellow of the Royal Society of London. The citation reads: "Till founded with McCulloch the field of modern haematology by demonstrating the existence of stem cells that give rise to all blood cell types. They devised the first spleen colony assay for blood cellprecursors and used it to demonstrate that these stem cells have the properties of self-renewal, proliferation and multilineage differentiation. Using irradiation-induced chromosome breaks to follow individual precursor cells and their progeny, they demonstrateded that each spleen colony was a clone. Their contributions laid the foundation for the isolation of stem cells for bone marrow transplantation and much else besides".

Jim Till received a B.A. in Arts & Science (specializing in Physics) from the University of Saskatchewan in 1952 and an M.A. in 1954 under Harold Johns. He obtained a Ph.D. from Yale (Biophyics) in 1957 under Ernest Pollard and then rejoined Johns as one of the first members of the Physics Division of the Ontario Cancer Institute and of the Department of Medical Biophysics of the University of Toronto. Since that time he has held several responsible positions in both the OCI and the U of T and in disciplines ranging from radiobiology to bioethics. He has held a number of offices, and as a volunteer, in the National Cancer Institute of Canada and a few months ago completed a two-year term as its President. He "retired" in 1996 and is now University Professor Emeritus of U of T and Senior Scientist Emeritus of OCI.

In recalling his induction into the Royal Society in London last July, Jim remarks "The ceremonies were quite impressive (as one would expect, after all, they've been doing it for centuries!). The high point was probably the 'Signing of the Book'. 'The Book' is a fat volume made of vellum; it dates back to the origins of the Royal Society and contains many signatures of famous people, beginning with King Charles II (on the founding Charter), Isaac Newton, Charles Darwin, etc, etc. (Newton's signature is quite small, while Darwin's is less repressed-looking!). I was pleased to be able to produce a legible signature (using a fake goose-quill pen, and black ink from an ink-pot). I remembered from early grade-school days that it's easy to produce big blots with such pens, but I managed to avoid such an unhappy outcome (others didn't!)."

References:

Till JE, McCulloch EA. A direct measurement of the radiation sensitivity of normal mouse bone marrow cells. Radiation Research. 14: 213-22, 1961

Becker AJ, McCulloch EA, Till JE. Cytological demonstration of the clonal nature of spleen colonies derived from transplanted mouse marrow cells. Nature. 197: 452-4, 1963

Till JE, McCulloch EA, Siminovitch L. A stochastic model of stem cell proliferation, based on the growth of spleen colony-forming cells. Proceedings of the National Academy of Sciences of the United States
Of America. 51: 29-36, 1964

# Harold Johns Inducted into Canadian Science and Engineering Hall of Fame

**By Peter Shragge**
**Kingston General Hospital**

On 30 November 2000, Harold Johns' three daughters, their spouses and two of his nieces converged on the Canada Science and Technology Museum in Ottawa. The occasion was the posthumous induction of Harold Johns (and Dr. Douglas Harold Copp) into the Canadian Science and Engineering Hall of Fame. Plaques honoring these two scientists were unveiled at a ceremony which was attended by many notables including Dr. Wilbert Keon, O.C. who made the keynote address. The citation honouring Dr. Johns is as follows:

> *Dr. Harold Elford Johns was one of the founders of medical physics. Trained in mathematics and physics, rather than medicine, early in his career he taught the practical aspects of radar and radio navigation to air force pilots, and tested aircraft castings with X-rays.*
>
> *This practical orientation in physics led him to his life's work, the application of radiation in cancer therapy. He embarked on this path at the Physics Department of the University of Saskatchewan, where he established a program in medical physics that focused on X-ray radiation and radioactive isotopes for cancer treatment. The radiation research group worked on the problem of determining the appropriate doses of radiation and controlling the radiation during treatment.*
>
> *Dr. Johns' most obvious achievement was the development of the cobalt-60 cancer therapy unit in 1951. The cobalt bomb, as it is known, revolutionized the treatment of cancers located deep in the body, where previous radiation therapies had proven ineffective. It has been estimated that seven million people have benefited from cobalt-60 therapy worldwide.*

A copy of the plaque honouring Dr. Johns was presented Mrs.Gwen Greenstock, Dr. Johns' eldest daughter, by Dr. Peter Hackett, Vice President of Research, NRC. Dr. Hackett reviewed the many contributions of Dr. Johns as well as emphasizing the importance of science and technology in the modern world. Unfortunately Mrs. Johns was under the weather and could not attend the ceremony. It is most encouraging that the Museum is doing something to increase the profile of science and technology in Canada, and especially gratifying that a Medical Physicist is joining the ranks of many other very famous Canadian scientists. Dr. Johns continues to help his profession even after his death!

After the ceremony there was a reception in a large hall housing an early cobalt treatment unit (as well as several awesome steam engines). This gave us a chance to visit with each other and the other attendees. Certain of us also took the opportunity to wolf down as much free food and drink as possible. After all it was noon time, and, as we all know, medical physicists never miss a chance at free eats.

It is worth visiting the Museum website to learn more about the Hall of Fame and even see some pictures taken during and after the ceremony. The url is: www.science-tech.nmstc.ca

# CRISM Annual Report, 1999-2000

**By Paul C. Johns, PhD FCCPM**
Chair, CRISM

Two years have now passed since the incorporation of the Canadian Radiation & Imaging Societies in Medicine (CRISM). The purposes of CRISM are:

1. To serve as a forum for exchange of information between tion between the member societies.
2. To recommend imaging and therapy priorities likely to likely to enhance the health of the public to business, industry, and government.
3. To coordinate existing and future standards and guidelines guidelines among the member societies.
4. To foster the development of scientific and technical technical knowledge in medical imaging, image-guided treatment, and cancer therapy.
5. To promote excellence in the education of professionals fessionals working in medical imaging, image-guided treatment, and cancer therapy.
6. To educate the public about the efficacious use of imaging of imaging and radiation therapy technology in medicine.
7. To coordinate conjoint conferences of the constituent sostituent societies on a periodic basis.

There are six member societies:

CAMRT - Canadian Association of Medical Radiation Technologists

CANM - Canadian Association of Nuclear Medicine

CAR - Canadian Association of Radiologists

CARO - Canadian Association of Radiation Oncologists

COMP - Canadian Organization of Medical Physicists

CSDMS - Canadian Society of Diagnostic Medical Sonographers

In 1999-2000, these organizations were represented by: Mary Jon Lachance (CAMRT), Dr. Karen Gulenchyn (CANM), Dr. Louise Samson (CAR), Dr. Paul Johns (COMP), and Heather Elsey (CSDMS). Dr. André Girard represented CARO for part of the year, but currently the CARO rep position is vacant. These society representatives constituted the CRISM Management Board. In addition, our meetings and teleconferences this year have included the following non-voting representatives from the staff of the member societies: Dr. Richard Lauzon (CAMRT), Normand Laberge and Cristina Sandu (CAR), and Sandra Mayer (CSDMS). Furthermore, Patrice Plourde (E-Z-EM Canada) has participated as an observer from industry.

The 1999-2000 Executive consisted of Paul Johns as Chair, Heather Elsey as Past-Chair, and Mary Jon Lachance as Secretary/Treasurer. Two meetings (Ottawa 1 April 2000, and Montreal 30 September 2000), and four teleconferences have been held over the past year.

CRISM is an umbrella organization. Our member societies represent a diverse spectrum of professionals, but there is a commonality of area of health care and science. The basic idea is that through communication and cooperation, we can obtain recognition and have influence that we would not attain as individual societies. CRISM membership is open to other societies who share our goals and whose professionals work in medical imaging, image-guided treatment, and cancer therapy.

While CRISM is still a very new entity, some success was attained this year.

CRISM sponsored the breast sessions at the June 2000 CAR/CAMRT/CSDMS conjoint conference held at the Metro Toronto Convention Centre. In recognition of this support, the organizers of the conference enabled CRISM to give a press conference June 14 at the Convention Centre. The event was introduced by Steven Brasier (CAMRT communications director). Paul Johns then gave an overview of CRISM, and introduced the key speaker, Dr. Linda Warren, the Chief Provincial Radiologist of the Screening Mammography Program of British Columbia. She spoke on trends in breast cancer management in Canada. The three key messages were: (i) that there is a shortage of personnel in all the professions, (ii), that there is a lack of equipment, and (iii) that research funding in Canada for breast cancer imaging and treatment lags other countries. The presentation was put together by Steven Brasier with input from Linda Warren, Paul Johns, and the Executive Directors of the CAMRT, CAR, and CSDMS. The media kit included background on the member societies and their roles in breast cancer. This event was picked up by the Canadian Press, Torstar, the Globe & Mail, CBC French radio & TV. It was very successful. Great thanks on behalf of CRISM go to Dr. Warren for her participation and to Steven Brasier for pulling the event together.

In June 2000, CRISM offered to submit an oral presentation to a study underway by the Senate of Canada standing committee on Social Affairs, Science, and Technology, on the state of health care in Canada. This study is being chaired by Senator Michael Kirby. While the Committee has declined our request for an oral hearing, we are preparing a written submission. The message will be similar to press conference. At this time, the member societies are requested to make any factual information that they think relevant available to CRISM for incorporation into the submission.

CRISM encourages all member societies to foster communication with the others. The web pages for COMP now include content on CRISM and links to the other societies. Other societies will follow soon.

Many of the society representatives to CRISM have been involved since the early days of discussions about joint efforts between our societies. These commenced in late 1995. Many of these representatives will complete their terms in the near future. Therefore there will be opportunity for new people to get involved in this effort to have our societies work together, via appointment by their society as representative to CRISM.

I thank all participants at the CRISM meetings over their last year for their efforts and their commitment. Finally, I offer my congratulations and continued support to Mary Jon Lachance as she takes on the duties of Chair for the next year

# 2001 Sylvia Fedoruk Prize in Medical Physics

The Saskatchewan Cancer Agency is pleased to sponsor a competition for the 2001 Sylvia Fedoruk Prize in Medical Physics. This award is offered annually to honour the distinguished career of Sylvia Fedoruk, former Lieutenant-Governor of Saskatchewan and previously physicist at the Saskatoon Cancer Centre.

The prize will comprise a cash award of five hundred dollars ($500), an engraved plaque and travel expenses to enable the winner to attend the annual meeting of the Canadian Organization of Medical Physicists (COMP) and the Canadian College of Physicists in Medicine (CCPM) which will be held in Kelowna from July 12 to 14, 2001

The 2001 Prize will be awarded for the best paper on a subject falling within the field of medical physics, relating to work carried out wholly or mainly within a Canadian institution and published during the 2000 calendar year. The selection will be made by a panel of judges appointed by COMP.

Papers published in *Physics in Medicine and Biology* and *Medical Physics* which conform to the conditions of the preceding paragraph will automatically be entered in the competition and no further action by the author(s) is required. All other papers must be submitted individually to the contact below. Four (4) copies of each paper being entered must be sent to:

**COMP Scientific Program:**
**Dr. Gino Fallone**
**Medical Physics**
**Cross Cancer Institute**
**11560 University Avenue**
**Edmonton, AB T6G 1Z2**
**Tel: (780) 432-8750**
**Fax: (780) 432-8615**
**E-mail: gfallone@phys.ualberta.ca**

Each paper must be clearly marked: "Entry for 2001 Sylvia Fedoruk Prize" and must reach the Cross Cancer Institute no later than **Monday, February 19, 2001**.

The award winners from the last five years were:

P. Busono and E.M.A. Hussein, "Algorithms for density and composition-discrimation imaging for fourth-generation CT systems", *Physics in Medicine and Biology* **44**, 1455-1477 (2000).

R.G. Kelly, K.J. Jordan, and J.J. Battista, "Optical CT reconstruction of 3D dose distributions using the ferrous-benzoic-xylenol (FBX) gel dosimeter", *Medical Physics* **25**, 1741-1750 (1999).

C.E. Zankowski and E.B. Podgorsak, "Calibration of photon and electron beams with an extrapolation chamber", *Medical Physics* **24**, 497-503 (1997).

C.J. Henri and T. M. Peters, "Three-Dimensional Reconstruction of Vascular Trees. Theory and Methodology", *Medical Physics* **23**, 197-204 (1996).

W. Zhao and J. A. Rowlands, "X-ray Imaging using Amorphous Selenium: Feasibility of a Flat Panel Self-Scanned Detector for Digital Radiology", *Medical Physics* **22**, 1595-1604 (1995).

COMP OCPM

CANADIAN ORGANIZATION OF MEDICAL PHYSICISTS

ORGANISATION CANADIENNE DES PHYSICIENS MÉDICAUX

# CALL FOR NOMINATIONS

**FOR**

## SECRETARY OF THE CANADIAN ORGANIZATION OF MEDICAL PHYSICISTS

**Term:** Annual General Meeting, July, 2001 to AGM, 2004.

***Duties and Responsibilities:***

- Records minutes of the Annual General Meeting and meetings of the Executive.
- Responsible for the COMP Directory.
- Responsible for the COMP Executive Handbook.
- Responsible for maintenance of COMP membership records.
- Reviews applications for membership in COMP.
- Much of the "hands-on" work for these tasks is performed by Barb Callaghan in the COMP office.

Nominations must be signed by two sponsoring members and by the nominee who by his/her signature agrees to accept the nomination.

Please send nominations to:

**Dr. Michael S. Patterson**
**COMP Past-Chair**
**Hamilton Regional Cancer Centre**
**699 Concession Street**
**HAMILTON, Ontario**
**L8V 5C2**

**Nominations must be received by April 1, 2001.** An election by mail ballot will be conducted in the spring. The results will be reported at the Annual General Meeting in Kelowna in July, 2001.

## HAROLD JOHNS TRAVEL AWARD

The Board of the Canadian College of Physicists in Medicine is pleased to honour the Founding President of the College by means of the Harold Johns Travel Award for Young Investigators. This award, which is in the amount of $1500, is made to a College member under the age of 35 who became a member within the previous three years. The award is intended to assist the individual to extend his or her knowledge by traveling to another centre or institution with the intent of gaining further experience in his or her chosen field, or, alternately, to embark on a new field of endeavour in medical physics.

Further information can be obtained from:

## BOURSE de VOYAGE HAROLD JOHNS

Le Conseil du Collège Canadien des Physiciens en Médecine est heureux d'honorer son président fondateur en offrant aux jeunes chercheurs la bourse Harold Johns. Cette bourse, d'une valeur de $1500, est éligible aux membres du Collège agés de moins de 35 ans at qui sont membres depuis moins de trois an. La bourse a pour but d'aider le récipiendaire à parfaire ses connaissances dans son domaine ou à démarrer dans un nouveau champ d'activités reliées à la physique médicale, en lui permettant de voyager vers un autre centre spécialisé.

Les demandes seront addressées à:

**Dr. Christopher Thompson**
**The Registrar / Le Resistraire**
**CCPM**
**c/o Montreal Neurological Institute**
**McGill University**
**3801 University, WB3**
**Montreal, Quebec, H3A 2B4**

The deadline for applications for the next award is **May 1, 2001**. The award will be announced at the 2001 CCPM Annual General Meeting in Kelowna.

La date limite pour les demandes du prochain concours est le **1er mai 2001**. Le récipiendaire de la bourse sera annoncé à la rencontre annuelle de 2001 du CCPM à Kelowna

Past recipients:

Récipiendaire anterieur:

1990 Dr. L. John Schreiner, Montreal
1991 Ms. Moira Lumley, Kingston
1992 Dr. Donald Robinson, Edmonton
1993 Dr. Yunping Zhu, Toronto
1994 Dr. Brendan McClean, Edmonton
1995 Dr. George Mawko, Halifax
1996 M. Alain Gauvin, Montreal
1997 Dr. Katherina Sixel, Toronto
1998 Mr. Horacio Patrocinio, Montreal
1999 Mr. Craig Beckett, Regina
2000 No recipient

Members of the COMP and/or CCPM can make a donation to the fund by volunteering to increase their 2001 membership dues.

Les membres du COMP et\ou OCPM peuvent faire un don à la cotisation de 2001 un montant additionel de leur choix.

# Canadian College of Physicists in Medicine

## Proposed By-law Amendments

At the November 2000 meeting of the College Board, it was resolved that a number of by-law amendments would be presented to the membership of the College at the Annual General Meeting to be held in Kelowna in July 2001. The proposals address several issues that have been discussed by the Board over the last year. They are;

1) Presently there is no by-law specifying the location of the College's head office as "The City of Edmonton". Petitioning Industry Canada to amend the "Place of Head Office" every time the mailing address of the College changes is a complicated procedure because the “Place of Head Office” is not stated in our by-laws. Declaring the College’s “Place of Head Office” in the by-laws will greatly simplify the procedure.

The following is therefore proposed to be added to ARTICLE 1 after Name:

**Head office**

**The head office of the College shall be in the City of Edmonton, in the Province of Alberta. The address shall be considered permanent until such time as it is changed by the Board and approved at an AGM of the College.**

2) Recently the Professional Affairs Committee (PAC) of COMP published a report comparing North American medical physics certifications. In the analysis, the PAC noted that the CCPM’s statement on ethical practice is unclear and neglects to refer to the COMP/CCPM Code of Ethics. The Board agrees and decided that reference to the " COMP/CCPM Code of Ethics" needs to be included in the by-laws regarding revocation of membership and fellowship.

The following is therefore proposed:

ARTICLE VII (b) replace….
When sufficient evidence has come to light that the individual is judged to be professionally incompetent or ethically unacceptable.
With….
**When sufficient evidence has come to light that the individual is judged to be professionally incompetent or ethically unacceptable as deemed by the statement “COMP/CCPM Code of Ethics” published by the Canadian Organization of Medical Physicists and the Canadian College of Physicists in Medicine.**

3) Since the date of the membership exam changes from year to year, the definition of “2 years FTE” also changes and this has caused some confusion in the past. The Board decided that it should specify how these 2 years FTE would be measured in the by-laws.

*(Continued on page 13)*

**CCPM By-laws***(Continued from page 12)*

The following is therefore proposed:

APPENDIX II: 1. Membership replace…
Only those with patient-related experience in physics as applied to medicine for two years full time equivalent after a post graduate degree are eligible to become members of the College.
With…
**Only those with patient-related experience in physics as applied to medicine for two years full time equivalent after a postgraduate degree, to be completed by March 31st of the year the examination will be taken, are eligible to become members of the College.**

4) The recertification process commences in 2001. The certification process run by the College is intended to be cost neutral. Therefore it may be necessary in the future to recover costs associated with recertification, the Board decided a fee might be warranted.

The following is therefore proposed:

ARTICLE VI Fees replace…
Examination fees shall be determined by the Board and approved at an AGM of the College.
With…
**Examination and recertification fees shall be determined by the Board and approved at an AGM of the College.**

5) The Board decided to formalize and therefore preserve the Emeritus membership category in light of recertification.

ARTICLE III Membership Categories and Conditions for Admission replace…
There are two categories of admission to the College: Members and Fellows. Members are certified by written examination to be competent in physics as applied to medicine. Fellows are Members with advanced certification demonstrating excellence in physics as applied to medicine.
With…
**There are three categories of admission to the College: Members, Fellows and Emeritus. Members are certified by written examination to be competent in physics as applied to medicine. Fellows are Members with advanced certification demonstrating excellence in physics as applied to medicine. Emeriti are retired Members or Fellows no longer practicing clinical medical physics, nominated by the Board for Honorary membership. Any retired Member or Fellow of the College distinguished in the field of Medical Physics may be nominated.**

George Mawko
Secretary-Treasurer, CCPM

# Proton Therapy at Loma Linda

**By Arthur Curtin-Savard**
*acurtin-savard@optima.org*

I recently spent a little over two years working in proton therapy at Loma Linda University Medical Center, located in southern California. Since I have spent most of my life in Canada and have graduated from a Canadian university, I thought I would share my experience with readers of Interactions. In this article, I will describe the proton accelerator, give three examples of treatments plans produced with proton beams, and discuss where I think proton therapy may be headed.

**The Loma Linda accelerator**

Loma Linda University currently houses the world's first and only proton beam accelerator dedicated to patient treatment. The accelerator is a synchrotron, capable of producing proton beams of variable energy, from 70 MeV to 250 MeV. A 250 MeV proton beam has a range of approximately 34 cm in water, which is a sufficient for the treatment of any site in the human body. To accelerate the protons, hydrogen gas is ionized in a duaplasmatron, accelerated to 2 MeV in an RFQ linac, and injected into the ring of the synchrotron. The ring is about 10 meters in diameter and consists of eight dipole (bending) magnets, four quadrupole (focusing) magnets, four beam profile monitors, one beam intensity toroid (which may be used to view the time structure of the beam), an RF accelerating cavity, and an extraction device.

In the ring, the accelerating cycle proceeds as follows. It begins with the capture period in which an RF voltage is applied to the RF cavity at the revolution frequency (~1MHz) of the 2 MeV protons in the ring. The amplitude of the RF voltage is gradually increased from 0 V to 330 V in 1.6 ms. At the end of the capture period, the majority of protons are bunched in the "RF bucket" (the region of phase-space containing the stable particles) and can be accelerated together to higher energies. From t = 0.7 ms to t = 0.5 s the protons are accelerated to their final energy. The energy of the protons increases by 90 eV at every pass through the RF cavity, and the bending magnet fields increase linearly during this time to maintain the correct particle curvature. From t = .5 s to t = 1.5 s, the protons undergo controlled extraction at the Lambertson extractor. From t = 1.5 s to t = 2 s, the ring is empty and the bending magnet fields return to their initial value. It follows that patients are treated with a low-frequency pulsed beam, supplying beam for 1 s during each 2 s period. The dose rate generated is approximately 100 cGy / min.

The beam can be sent to one of five rooms: three treatments rooms equipped with gantries, one fixed horizontal beam treatment room, and one fixed horizontal beam room used by NASA and other researchers.

The gantries are 10 metres in diameter and each weigh 95 tons. The gantries are so large because they must contain the three powerful bending magnets required for turning the high energy proton beam, as well as six quadrupoles magnets to maintain focusing of the beam.

All beam lines also house scatterers to spread the narrow proton beam uniformly over a wide area (~20 cm diameter maximum field size). The scattering is achieved by a series of occluding disks and rings whose optimal dimensions were discovered by trial and error. For dose monitoring, the beam lines contain a primary multi-pad transmission ion chamber, a secondary multi-pad transmission ion chamber, and a secondary emission monitor. As emergency backup, there is a fourth ion chamber completely independent of computer control, and also a mechanical timer.

The beam entering a treatment room is approximately monoenergetic, resulting in a very narrow (1-2 mm) Bragg peak at the end of the proton beam range. An example of the percent depth dose for a high energy monoenergetic proton beam is shown in red in Figure 1. To make the monoenergetic beam more useful for treatment, the beam is given an energy spread by placing a lucite propellor wheel in the beam path. The propellor wheel has sectors of increasing lucite thickness; each sector pulls back a portion of the beam by a pre-determined water equivalent distance. The result is the "spread-out Bragg peak" (SOBP) depicted in blue in Fig. 1. These propellor wheels are usually referred to as "modulator" wheels, and at Loma Linda modulator wheels capable of producing SOBPs from 1.5 cm to 15 cm are used clinically.

Fields are shaped laterally by a cerrobend cut-out which needs to be about 8 cm thick to stop 250 MeV protons.

Though the synchrotron can produce any beam energy from 70 MeV to 250 MeV, only certain beam energies have been commissioned for clinical use. The commissoned beam energies are: 126 MeV (10.00 cm range in water), 155 MeV (13.35 cm range in water), 186 MeV (20.00 cm range in water), 200 MeV (21.15 cm range in water), 225 MeV (29.00 cm range in water), and 250 MeV (33.90 cm range in water). To get intermediate energies (i.e., intermediate depths) a milled wax bolus is placed in the beam. The thickness of the bolus at each point represents the difference between the beam range (of one the commissioned energies) and the effective depth to the distal (downstream) surface of the tumour at that point. This is similar to what one does with custom electron boluses. However, since protons are massive compared to electrons, they scatter sideways only very slightly (i.e., about 3% of their depth penetration). It is therefore possible to conserve a very good distal conformity of the dose distribution to the target, even through inhomogeneous tissue.

**Examples of treatment plans**

Inaugurated in 1990, the patient load at Loma Linda has steadily increased and has now reached approximately 1000 patients per

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year in 2000. Although proton therapy is the main focus of radiation oncology at Loma Linda, the medical center also houses three conventional linear accelerators for x-ray and electron treatments. These conventional treatments are primarily a complement to, but occasionally a substitute for, proton radiation therapy. Proton beams do possess a dosimetric advantage for many treatment sites, however there are exceptions, for instance, breast.

Approximately 50% of the proton treatments at Loma Linda are for early-stage prostate cancer. The other 50% are composed of pediatric brain tumours, adult brain tumours, lung and liver tumours, head and neck treatments and retreatments, eye treatments (ocular melanoma, macular degeneration), as well as stereotactic proton radiosurgery. I will describe three proton treatment cases of increasing complexity: a prostate case, a liver case, and a pediatric retreatment of the cranio-spinal axis.

*Prostate case*

For many abdominal cases, including the prostate case I will now discuss, the patient is placed in a body-length half-pipe made of PVC, called a "pod". Between the patient and the pod is a layer of foaming agent which will expand and harden to secure the patient firmly in position. The patient is CT scanned in this immobilization device with a 2 mm slice spacing. The CT study is then exported to the "Optirad" treatment planning system, a very powerful image-based proton (as well as x-ray and electron) planning system designed and developed by Dr. Daniel Miller, Head of Physics at Loma Linda. The gross target volume is contoured by the physician and then expanded by 1.0 cm to allow for microscopic disease. An additional "physics" margin is also allowed around the CTV, to account for beam penumbra (lateral and distal), beam set-up uncertainty, and patient density uncertainty. The beam arrangement typically used is two lateral beams, treated on alternate days. Each beam has a custom cut-out, a custom bolus, and a modulator wheel selected by rounding up the required modulation to the nearest 1 cm. A typical dose is 76 Gy in 38 fractions.

Figure 2 shows the dose distribution for a single prostate beam, normalized to 100% dose at the center of the tumour. The entrance region of approximately 80% dose extends from the skin surface to the proximal side of the CTV. This 80% entrance region then rises rapidly to a plateau (the spread-out Bragg peak) of 100% dose covering the entire CTV. When both lateral beams are looked at together, the entrance dose drops to around 40%. Since no anterior or posterior fields are used, the dose to the bladder and rectum is considerable reduced compared to a four-field box x-ray treatment.

*Liver case*

For liver cases, the patient is also immobilized and CT scanned in a pod, again with 2 mm slice spacing. A motion margin of 0.5-1.0 cm in all directions is generally used in addition to the microscopic disease margin and the physics margin. The beam arrangement for liver treatments generally consists of two equally-weighted beams incident from approximately orthogonal directions, as depicted in Figure 3. A total dose of 63 Gy is delivered in 15 fractions. Dose conformity is excellent, with the dose falling off from 90% to 10% within 1 cm all around the target. This exceptional conformity results in a remarkably low liver toxicity and permits the accelerated treatment schedule.

*Pediatric brain retreatment*

The pediatric retreatment case I will describe is perhaps unique. It involves a young Caucasian boy who at age three was treated with protons for a trilateral retinoblastoma. If the child had presented at an older age, full cranio-spinal irradiation with a subsequent boost to the gross disease would have been performed. But in such a young child, the morbidiy associated with full cranio-spinal treatment was difficult to accept. Therefore the patient was given only localized treatment to his central brain with a dose of 55.8 Gy. Unfortunately, several months after the completion of this initial treatment, a follow-up MRI study revealed disseminated disease and a decision to retreat the patient was made. For this second treatment, the plan was to elevate the entire CNS to 28.8 Gy yet spare the previously irradiated central brain region.

Approximately half of the 28.8 Gy required for the brain portion of the retreatment was delivered with the two lateral fields shown in Figure 4. The right lateral field is shown in (a); the left lateral field is shown in (b). These two fields are distally abutting, and each treat one hemisphere only. The green contour is the 20 Gy isosurface of the initial treatment. The custom bolus of each beam was designed to "stop" the proton beam before it reached this 20 Gy isosurface.

In order to minimize dose inhomogeneity problems in the abuttment region, the other half of the brain portion of the retreatment was delivered with the fields shown in Figure 5. In (a), a right-left lateral parallel-opposed pair is shown treating the frontal region of the brain. In (b), a posterior beam treating the remainder of the brain is shown. This beam "stops" on the lateral edges of the parallel-opposed pair, and also spares the previously treated central brain region.

The spinal portion of the retreatment was accomplished with laterally abutting posterior proton beams. A junction shift was performed halfway through the treatment course to reduce dose inhomogeneities. Figure 6 shows a sagittal cut of the full cranio-spinal axis dose distribution. What a remarkable treatment! There is full coverage of the CNS that was not previously treated, while the heart, the lungs, the gonads, and the entire abdomen are completely spared!

**Future of proton therapy**

During my graduate studies at McGill University, I read a large number of articles on proton therapy and even completed a research project on the Loma Linda synchrotron. My level of enthusiam for this treatment modality was very high. At the time, I thought proton therapy might power the next wave of innovation and development in radiation oncology, and perhaps even replace x-ray therapy. After my two years working in the field, I hope I now have a more realistic view of the future of proton

*(Continued on page 16)*

**Proton Therapy** *(Continued from page 15)*

therapy. I regret to say that, in my opinion, proton therapy will not become mainstream any time soon. My justifications for this last statement are the following:

1) Due to the substantial expense of building and maintaining a proton therapy facility, proton treatments end up costing roughly twice as much to deliver as conventional x-ray or electron treatments. However, reimbursement rates of Medicare and other private health insurances in the U.S. are no greater for proton therapy than they are for conventional therapy. Thus there is no financial incentive for the development of proton therapy.

2) The physical dose distributions produced with proton beams are indeed superior to those achievable with x-ray or electron beams, and allow higher tumour doses to be delivered for the same level of normal tissue complication. Yet it has not been shown convincingly that these superior dose distributions, and their accompanying higher tumour doses, actually lead to better long-term cure rates. Thus, in the current state of knowledge, there does not appear to be an urgent medical need for the development of proton therapy, although one could presume that further long-term comparisons to other modalites might show a therapeutic advantage for proton radiation therapy.

For this modality to be adopted at large, costs must come down and published cure rates must go up. Until at least one of these two events happens, proton therapy will remain on the sidelines.

**Additional information**

I recommend the following web site to readers desirous of additional information about proton therapy:

http://neurosurgery.mgh.harvard.edu/hcl/

# Canadian College of Physicists in Medicine Examination Schedule 2001

**Membership Examination:**

Applications due: 12 January 2001
Examination date: 31 March 2001
Fee: $150.00

**Fellowship Examination:**

Applications due: 20 April 2001
Examination date: 9, 10 or 11 July
Fee: $200.00 2001 (in Kelowna)

Note: Fellowship applicants writing the membership examination should confirm their fellowship application and pay the fee within one week of receiving the membership examination results.

For further information, application kits, and membership examination study guides, contact the Registrar, Dr. Christopher Thompson, at:

**Dr. Christopher Thompson**
**The Registrar / Le Resistraire, CCPM**
**c/o Montreal Neurological Institute**
**McGill University**
**3801 University, WB3**
**Montreal, Quebec, H3A 2B4**

Figures for "Proton Therapy at Loma Linda"

Figure 1

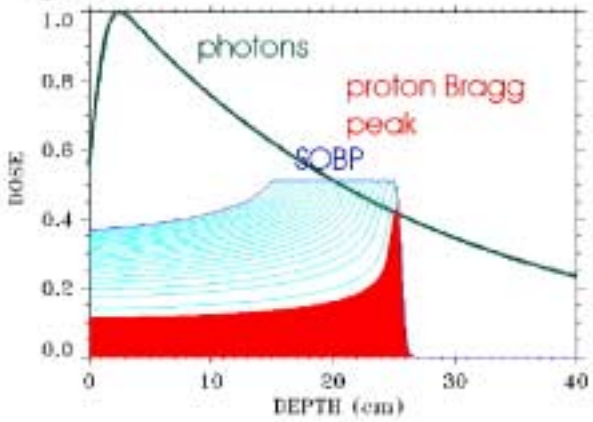



Figure 2

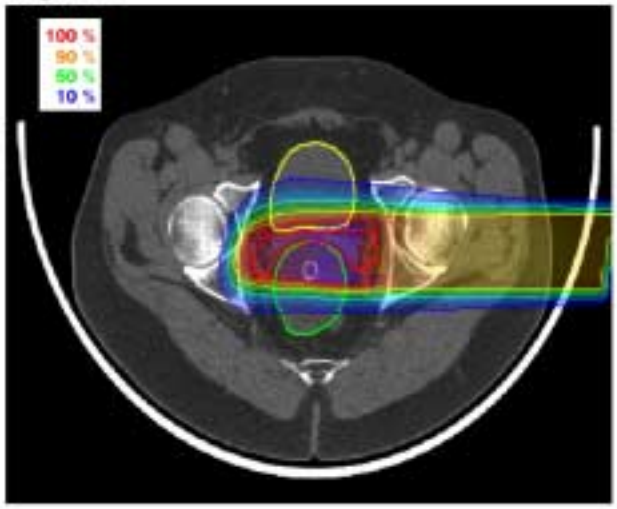



Figure 3

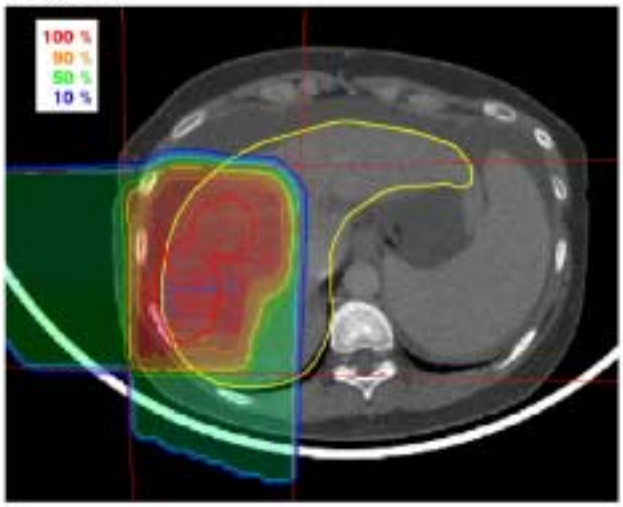



Figure 4

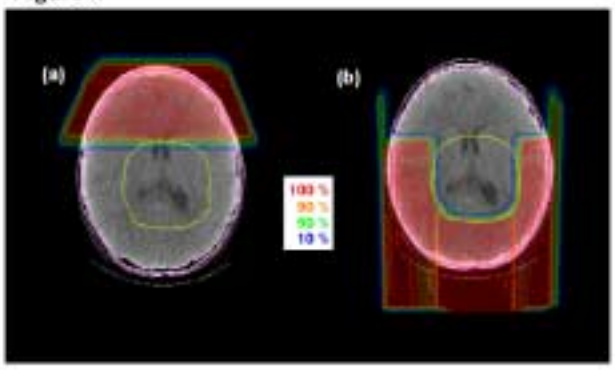



Figure 5

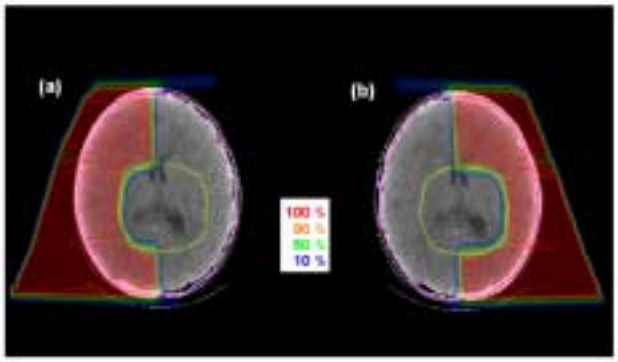
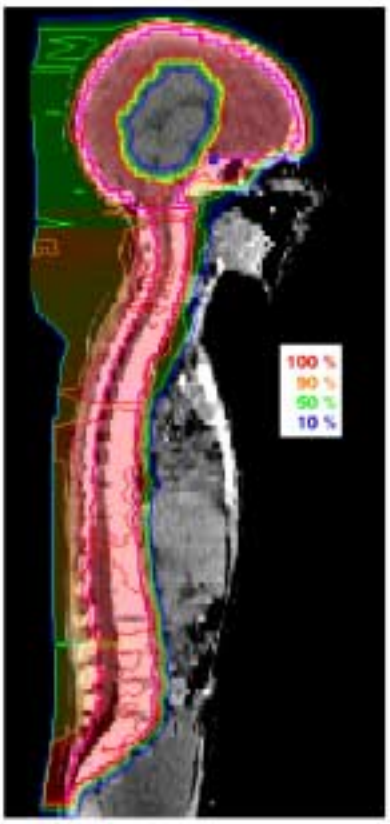



Figure 6



# Report on the Fourth Annual General Meeting of the Canadian Brachytherapy Group

## Edmonton, Alberta, September 20 – 21, 2000

**By Matt Schmid**
**Allan Blair Cancer Centre**
**Regina**

The Canadian Brachytherapy Group (CBG) met Sep. 20-21, 2000 in Edmonton prior to the annual CARO meeting. The CBG is primarily a group of oncologists with a special interest in brachytherapy. Our former clinic director, Dr. L. Arthur Firth, who has had a strong interest in brachytherapy, "strongly encouraged" me to attend this meeting. Dr. Milton Po, the meeting organizer, was very pleased that a physicist was interested in coming.

The meeting focussed on two main topics, namely brachytherapy of the breast and prostate.

The first session on breast brachytherapy dealt with both boost therapy as well as using brachytherapy as the sole treatment for breast cancer. I was surprised to learn of a number of centres already routinely performing brachytherapy boosts in Canada.

There are also a number of centres in North America using brachytherapy as the sole treatment for early stage breast cancer, although London Ont. appears to be the only centre in Canada. We have a keen interest in doing this in Regina and the workshop session was very informative.

The remainder of the meeting dealt primarily with prostate brachytherapy, with the exception of one talk on nasopharyngeal treatment given by Dr. Patricia Tai from Regina. Dr. Tai gained a great deal of experience in treating this site using brachytherapy in China.

The debate about the choice of HDR or LDR for prostate brachytherapy is still alive and well! A number of talks on each were given, and the reported results are excellent. HDR is being used for the treatment of "intermediate" and "high" risk patients although the definitions of the terms "intermediate" and "high" in this context was a subject of much debate. In any case, it is clear that there are a number of centres in Canada providing excellent prostate implant programs. In this regard, there was also some discussion about providing proctorship programs for prostate implants in Canada.

The highlight of the meeting was the second annual Jean Roy memorial lecture. The lecture was delivered by the noted brachytherapist Dr. Rodney Rodriguez.

This talk, which dealt with HDR brachytherapy for high risk prostate disease, was very interesting. Dr. Rodriguez began by reviewing the current thinking about the radiobiology of prostate cancer. He pointed out, that unlike many other cancers, the a/b ratio for prostate cancer, according to the most recent studies, is only about 1.5. This is not significantly different than for the late-responding tissues at risk in the treatment of prostate cancer. This implies, of course, that the cancer itself responds to radiation in a similar manner to the late responding tissues. If there is no difference between the response of the tissues at risk and the cancer itself, there can be no gain in therapeutic ratio by changing the fractionation (this has implications in the HDR/LDR debate). It is well accepted today that advances in local control for prostate cancer rely on delivering higher doses to the prostate. This dose escalation, however, will only be achievable if methods are found to increase the dose to the prostate without an accompanying increase in the dose to the tissues at risk. This, of course, is the motivation for prostate brachytherapy, just as it is for 3D conformal external beam treatments of the prostate.

In summary, the CBG meeting focused primarily on clinical issues and although there was very little physics involved, it was very worthwhile attending. Aside from the relevant discussions of clinical issues, it was both interesting and informative to find out about other brachytherapy programs in Canada. Next year, the CBG will be meeting with the American Brachytherapy Society in Vancouver. I strongly urge all medical physicists with a special interest in brachytherapy to attend.

# NetWorthy by Darcy Mason

Welcome to the first "NetWorthy", a new column to highlight web sites, programs, etc on the internet of potential interest to medical physicists. We hope that with your contributions, we will be able to highlight a few items each newsletter. If you have items of interest, please send them to me at the email address below. You can leave the description part to me if you wish.

Please note that we are collecting a list of web sites that promote graduate programs and/or research centres in Canada. Please send yours in!

## eFilm™

http://efilm.ca

I suspect by now that many in the community have heard of eFilm, a free DICOM image viewer developed by the University Health Network in Toronto. DICOM is the standard for transferring medical images between equipment from different vendors. Now a company has been formed, eFilm Medical Inc, to continue development of the product; however, the basic viewer will continue to be free. I have downloaded and tried the program (retrieved images from our CT scanner very quickly) and it seemed quite useful. I get the impression that eFilm is becoming somewhat of a standard for transferring images between different institutions, as one can store both the images and a viewer on a CD so that they can be viewed on any PC at the receiving institution.

## DICOMObjects

http://www.medicalconnections.co.uk/

On the subject of DICOM, I have been wishing for some time for a DICOM toolkit of some kind to use with my favourite development environment: Visual Basic. I have been particularly impressed with the ease of using ActiveX objects, which integrate wonderfully into the VB environment, and can be used with other languages and databases as well. Until recently, I couldn't find an ActiveX DICOM combination, but I have recently discovered one called DicomObjects. This is a collection of objects written in the style of the built-in Visual Basic objects, complete with fairly detailed help files and sample applications. This is a commercial offering (200 UK pounds for a single workstation, for other licenses see the web site), but could be worth the money to save you a lot of coding time if you need to write some custom DICOM software.

Just to close out the DICOM information, a good source of web site links is at http://www.psychology.nottingham.ac.uk/staff/cr1/dicom.html#links). I suspect many of you know of other good DICOM resources. Send them in!

## Physics Reference Data

http://physics.nist.gov/PhysRefData/contents.html
(link submitted by by Richard Taschereau, Centre Hospitalier Universitaire de Québec)

This site contains a variety of basic physics data of use to the medical physics community. Examples include x-ray attenuation data, stopping powers for electrons, half-lives and isotopic compositions. There is a program (XCOM) to access and display the attenuation data, and data can be generated for your own specified compositions.

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# Federal Provincial Territorial Radiation Protection Committee: 2000

**By P. J. Wall**
**Nova Scotia Department of the Environment & Labor**

Autumn is a time of new beginnings: school, box lunches, fall colors and the annual meetings of the Federal Provincial Territorial Radiation Protection Committee (FPTRPC). The 2000 version was held , October 18-21, at the offices of the Canadian Nuclear Safety Commission (CNSC), formerly the (AECB), and the Radiation Protection Bureau (RPB) at Health Canada. This year, prior to the 3.5 day official meetings, the Department of National Defense (DND) provided a two part training day for interested parties at the offices of the CNSC. The morning session comprised an informative paper presented by, Drs. Brent Lewis and Anna Rae Green of the Royal Military College and, Dr. Slavi Vlahovich of Health Canada on, "Cosmic Radiation Exposure of Aircrew". Dr. Tom Cousins, of the DND, closed out the morning with a very interesting and thought provoking presentation on, "The Radiation Threat to Avionics, Current and Future". Sighs from audience members who suffer from aviophobia were evident in the background during this presentation, perhaps indicative of contentment in finding new reasons for that pre-boarding drink.

Mark Kuisma, Lead Engineer, Electromagnetic Environmental Effects for the DND, provided attendees with an excellent afternoon of education that comprised a seven part presentation on "Radio Frequency Safety", including a "How To" session on measuring various frequencies and currents. The entire day was interesting, informative and well presented. Our hats are off to the presenters and the DND.

Day one of official proceedings began with Wayne Tiefenbach, Provincial and Territorial Chairman, welcoming new delegates from: the DND, their first year as full members, Ontario, Quebec, Prince Edward Island, The Northwest Territories and Nunavut. Newfoundland's representative was unable to attend this year and for the past two years New Brunswick has not had a representative at the table. Following tradition, this first day was devoted to provincial and territorial issues requiring discussion prior to being brought forward in the joint meetings with CNSC and Health Canada. Mammography accreditation; the possible need for guidelines on who should wear dosimeters in diagnostic imaging institutions; working group and subcommittee reports and; the formation of a Radiation Standards Working Group were priority items on the agenda. Many resolutions were tabled until Saturday morning to take advantage of input from the joint meetings with Federal partners. The day concluded with a presentation by Mr. Richard Osborne, who solicited comments and support for his proposal to establish a non-profit Canadian Advisory Council on Radiological Protection. Discussion on this proposal was also deferred to Saturday for a decision.

In her final welcoming address to the 9th meeting of the group - on day two - Dr. Agnes Bishop, MD., President of the CNSC, who is retiring soon, reviewed the accomplishments of the committee and reiterated the need for continued Federal/ Provincial/Territorial cooperation in attaining the goal of jurisdictional harmonization in radiation protection. She made reference to the establishment, by the committee, of a methodology to jointly deal with transport incidents as a priority. In her closing remarks Dr. Bishop wished the Committee success and envisioned that the traditional spirit of cooperation would remain the cornerstone of its future endeavors. Provincial chairman Wayne Tiefenbach thanked Dr. Bishop and appraised the committee's accomplishments during her tenure, citing the production of the S-106 document and, with Health Canada, the NORM guideline as examples of successful cooperative endeavors. On behalf of all delegates he congratulated Dr. Bishop on the accomplishment of her personal goal of overseeing the change from the AECB to the CNSC. He then wished her well in her retirement and turned the meeting over to Dr. Mary Measures to complete the day's agenda.

Of the 21 agenda items, the first, concerning emergency preparedness in Canada, involved a presentation by CNSC staff on the production of off-site guidelines for emergency planning. Consideration is being given to having these guidelines jointly produced with the provinces and territories as two separate documents. One will address the concerns of jurisdictions with nuclear plants and the other those without. The anticipated date for draft documents to be presented to the standing committee on emergency preparedness for comment is December 30, 2000. Two related topics, covered by Health Canada during the morning, were "Guidelines for the restriction of radioactively contaminated food and water following nuclear emergencies" and the "Prophylactic use of potassium iodide during such events". Following the sessions on emergencies, CNSC staff gave an overview of phase 1 of its radium licensing program which involved public information sessions carried out during 1999. Phase 2 of this program, planned to be completed within two years, will involve CNSC staff visiting companies, throughout the country, who are dedicated to the servicing of aircraft instruments. Other items requiring considerable discussion during the day were: harmonization of pregnancy dose limits across jurisdictions and the possibility of having provincial/territorial inspectors respond to transport accidents. The latter would involve possible Memoranda of Understanding with the various jurisdictions but since other considerations, such as qualifications and training, need to be addressed no time line was set.

Chairman Dr. Jack Cornett, director of the RPB, welcomed delegates to Health Canada on day 3. Following his opening remarks, and the usual administrative proceedings, a representative of the Canadian Electrical Association gave a presentation on, "The Potential Effects of the new ICNIRP Guidelines on Canadian Electrical Utilities." The presenter also expressed concern about the committee's position paper titled, " The Health Effects and Exposure Guidelines Related to Extremely Low Frequency(ELF) 50/60 Hz, Electric and Magnetic Fields." Following extensive discussion, that included a presentation by staff from Health Canada's non ionizing radiation division on whether Canada should have exposure guidelines for ELF/EMF, consensus was reached to have a Working Group of the Committee reevaluate the current position paper. Non ionizing

*(Continued on page 21)*

**Radiation Protection Committee** *(Continued from page 20)*

radiation issues, including laser standards and ultraviolet radiation, absorbed a good deal of agenda time. The American National Standard's Institute's (ANSI) standard ANSI Z136.1 - 2000, now being used by Health Canada, was discussed at length as were new proposed National tanning salon guidelines. An interesting presentation initiated by Dr. Harry Johnson of Manitoba, and presented by staff of the Canadian Standards Board on UV protective clothing standards provided an insight into the complexity of establishing such standards. Radiation Emitting Devices Regulation changes; National Mammography Quality Standards and; Health Canada Safety Code updates were other areas of discourse. Bob Bradley, of Health Canada, reminded those present of the inherent pitfalls that can be encountered when jurisdictions utilize these documents as de facto regulations.

Late in the day an overview of the changes to medical accelerator licensing was provided by Bob Irwin of the CNSC. Dr. Pat Ashmore, director of the National Dose Registry (NDR), informed delegates of the difficulties encountered at the registry as a result of the different dose limits being utilized throughout the country. He rounded out the sessions with a review of the technical changes made to the on-line access system. During his presentation, Dr. Ashmore questioned why few people were using this method and encouraged suggestions and comments from delegates to enable him to continuously improve the system.

Final day proceedings, chaired by Wayne Tiefenbach, involved a review and prioritization of items discussed during the previous 3 days in order to direct the work required of the various working groups and sub-committees during the coming year. A listing of these bodies and a summary of their work follows:

**Provincial Radiation Dosimetry Review Sub-committee:**

Consideration is being given to adding an expert on radon progeny to this group. In the past year the group, in co operation with the CNSC, has reviewed and approved two licence applications and is currently awaiting documentation from a third applicant. In the coming year, changes to the text of S106, Appendix H, will be undertaken.

**Survey Instrument Calibration Working Group:**

Members of this body, in cooperation with the National Research Council, have established a standard for the calibration of instruments used to measure x-ray energies. Work is still in progress and includes the development a list of other establishments performing similar services.

**Medical Utilization Working Group:**

In the past year the various Colleges of Physicians and Surgeons have received letters from this group outlining concerns with respect to the use of x-ray equipment by untrained personnel. A satisfactory resolution has not yet been achieved and progress is continuing. Safety, technical issues, quality assurance and radiation doses delivered, are all issues with respect to digital imaging currently being explored under the groups mandate. The appendices to their 1999 report cover common questions and answers about digital imaging including a list of quality assurance tests for digital x-ray systems. The possibility of developing digital imaging guidelines is currently being considered by this body along with, depending on the availability of research time, a report on pediatric exposures. All anticipated for next years meeting.

**Naturally Occurring Radioactive Materials (NORM) Working Group:**

The Canadian Guidelines for the Management of Naturally Occurring Materials have been completed, translated and printing is now underway. The document will soon be distributed to websites, various jurisdictions and stakeholders. No further meetings are planned for the group but it will remain intact to address future issues.

**Radiation Standards Working Group:**

This year, to ensure broader representation from the various jurisdictions, several new members were added to this body. New terms of reference under development will expand on the group's mandate of harmonizing radiation standards in Canada. The issues of personnel monitoring and limits for pregnant workers are two areas now under review.

**Business Plan Working Group:**

This is a newly established group with a mandate to develop a committee business plan.

**ELF Working Group:**

A review of the Committee's current position paper on ELF will be undertaken by this group and the need for National ELF guidelines in the range 30Hz - 30kHz is being considered.

**Communications Working Group:**

This summary of meeting proceedings along with the completion of a dedicated committee webpage to the websites of Health Canada and the CNSC are examples of this group's work. Efforts are continuing to add more links and make the site more user friendly. Some position papers and the committee's terms of reference can now be found on the site and plans are underway to post all future position papers and standards developed by the committee. The current URL for the site at Health Canada is: **www.hc-sc.gc.ca/ehp/ehd/rpb/fptrpc/index.htm** and at the CNSC the link is available through the main site at: **www.nuclearsafety.gc.ca** . Input to the CNSC newsletter is also in the works.

**C260 Working Group**

For those unfamiliar with C260; it is a consultative document that enables changes to the National Dose Registry. The working group is now drafting a proposal to include wording in the document that will allow jurisdictions other than the CNSC to initiate changes to Registry dose records.

**Mammography Working Group:**

Two representatives from the committee sit on Health Canada's "Working Group on Mammography Quality Standards"(WGMQS). This group, comprised of representatives from the public, industry and both levels of government, has developed two drafts of a standards document that have undergone widespread distribution soliciting comments. A meeting to review and incorporate the appropriate comments into a final draft took place October 23-24, 2000. That draft is now

*(Continued on page 25)*

**Book Review:**

# General Practice of Radiation Oncology Physics in the 21st Century: 2000 AAPM Summer School Proceedings

**Editors: Almon S. Shiu and David E. Mellenberg**

**Review by:** Ellen El-Khatib
Vancouver Cancer Centre
BC Cancer Agency, Vancouver

This summer school proceedings contains ten chapters dealing with various developments in the current practice and future directions in radiotherapy physics.

Dose specification, prescription, and quantitative tools for plan evaluation according to the latest ICRU (Report 50 and 62) recommendations are discussed in Chapter 1. In Chapter 2 is described the 3D treatment planning process and the use of a 3D planning system using a convolution/superposition photon dose algorithm. Chapter 3 deals with advanced forward planning techniques including MLC and compensator techniques. Inverse planning, dose optimization, and Intensity-Modulated Radiation Therapy, and dynamic collimation is covered in Chapter 4. In Chapter 5 the new absorbed dose calibration protocol AAPM TG-51 is presented and explained. Chapter 6 deals extensively with quality assurance both for state of the art treatment delivery and treatment planning systems.

The next three chapters are then devoted to brachytherapy, starting with a description of dose prescription and the TG-43 protocol in Chapter 7. Chapter 8 is devoted to new implant applications such as endovascular systems and ultrasound guided prostate implants and Chapter 9 deals with current and new applications of HDR techniques. Finally, in Chapter 10 our dosimetry measurement tools are presented. Various 2D and 3D detectors, including the new gels, and their usefulness in measuring dose for some of the new techniques such as IMRT are discussed.

I found this book a pleasure to read. All chapters were very well written including many figures and illustrations. The salient parts of the topics were introduced and important points summarized. A comprehensive list of references was then given for the reader who wishes to pursue the topics in greater detail. It is a very useful text for the practicing medical physicist as well as for new trainees in this field and covers most of the topics a practicing medical physicist in radiation oncology will deal with, from dose prescription, dose measurement, to treatment planning, new techniques, and quality assurance. Portal imaging was briefly discussed in Chapters 6 &10. Although electronic portal imaging devices (EPID) are still not in wide clinical use because of the inherent poor image quality, much work has been done using them for verification of radiation field placements as well as investigating their potential as exit dosimeters. Hence I would have liked to see an entire chapter devoted to portal imaging and new directions in that field.

# COMP 2001 - Kelowna

Preparations are now fairly advanced for COMP 2001, the 22nd Annual Meeting of COMP. The meeting will be held July 13th and 14th at the Okanagan University College campus in Kelowna. On July 12th, CCPM will be presenting a Symposium with the title "The Convergence of Biology and Medical Physics". This will include a number of invited presentations by speakers who will highlight areas where biology and medical physics are impacting each other.

The dates for the conference have been chosen to accommodate those who wish to make the meeting a part of a family holiday in the Okanagan. This means that you will be visiting during the busiest part of the year in Kelowna, so you should think about travel and accommodation plans soon. We have provided links to local travel information on the COMP web site (www.medphys.ca) and will be adding more whenever possible.

Look out for the conference-booking package and Call for Papers which should be mailed to you in mid-January. We will be trying an all-electronic registration and paper submission process this year, so look for the details in the mailing.

Alistair Baillie
Cancer Centre for the Southern Interior
Kelowna

**Book Review:**

# Magnetic Resonance Imaging: Principles, Methods and Techniques

**Author:** Perry Sprauls
**Publisher:** Medical Physics Publishers, Madison
ISBN 0-944838-97-9

**Review by:** Terence Peters
The John P. Robarts Research Institute

Dr. Perry Sprauls is probably one of the most qualified in North America to write a straightforward, non-mathematical textbook on MRI. Perry has been teaching MRI to physicians, technologists and physicists since the earliest days of MRI and the book reflects the care and thought that he has put into educating his audience.

This new textbook is aimed first and foremost at the physician and technologist, who neither possesses nor has the wish to grasp the mathematical foundation of MRI imaging. This is not to say however that the book is inappropriate for the bookshelf of a Medical Physicist. Not only does it manage to convey the essential physical principles of MRI without the use of a single equation (let alone integral!), he does so with astonishing clarity.

One of the novel aspects of the book is the use of a "Mind Map" – a one-page text and graphics summary of the preceding chapter. The mind-map links the topics of the foregoing chapter together succinctly, and provides the reader with the "take-home" message for the chapter.

The book is organized into 15 chapters, beginning with a description of MRI image characteristics, and the hardware involved in acquiring MR data, followed by 2 chapters covering the basic physics of NMR and relaxation mechanism. This is followed by several chapters conveying the imaging process itself. Here, as in the rest of the book, the reader is introduced to major sections through an overview of the subject, which is then further developed in subsequent sections or chapters. This approach, which presumably reflects Dr. Sprawls' teaching style, is extremely helpful in getting the reader excited about what is to come, and establishing a clear context for the material that is to follow.

The text progress logically through a treatment of spin-echo and gradient echo imaging methods, and leads into a discussion of selective signal suppression, covering such topics as fat and fluid suppression, magnetization transfer and regional saturation.

These first eight chapters manage to convey the essence of many complex principles, without introducing the basics of Fourier imaging (apart from acknowledging that the acquired data are stored in an array called "k-space"). Chapter 9 however introduces the explicit relationship between gradients and the imaging process through the introduction of the concepts of "frequency encoding" and "phase encoding" imposed by gradients. Again, the liberal use of clear diagrams conveys the essentials to the reader in an effective fashion. My only minor quibble about this book is that there is no footnote explaining that, at the level of "k-space", there is no fundamental difference between "frequency" and "phase" encoding. While I suspect this was deliberately omitted for simplicity, a statement to this effect could be helpful to a reader when subsequently moves on to understand more complex acquisition protocols (e. g. spiral, echo-planar).

Chapters 10 and 11 deal with image detail/noise, and acquisition optimization respectively, while the following two chapters treat vascular and functional imaging techniques respectively. Chapter 14 (Image Artifacts) discusses many of the more commonly observed MR artifact phenomena and outlines the means of minimizing their effect. The text concludes with a discussion of safety aspects relevant to MR imaging.

This book is a "must have" text for the medical physicist, who is certain to make extensive use of its clear approach when teaching, but will also find it extremely valuable as a means of brushing up on many of the concepts behind MR imaging.

Dr. Sprawls is to be congratulated on a fine piece of work. Both thumbs up!

# Wescan 2001

## 23rd Annual Western Canadian Medical Physics Conference

***Dates***: March 15-17th ***Hosts***: The B.C. Cancer Agency, Fraser Valley Clinic
***Location***: The Inn on the Quay, New Westminster B.C.

Centrally located in the B.C. lower mainland overlooking the scenic Fraser River, a short skytrain ride from Vancouver. Registration and conference details will be available later in December on the Wescan website (www.cancercentre.com/wescan). Now is the time to get your abstracts ready! For further information please contact Lesley Reynolds at the Fraser Valley Cancer Centre 604-930-4011.

**Book Review:**

# Monitor Unit Calculations for External Photons & Electrons

**Editor:** John P. Gibbons, Ph.D.
**Publisher:** Advanced Medical Publishing, Inc.
**Price:** $95.00 US-hardcover

**Review by:** Dimitris N. Mihailidis, Ph.D.
Richland Memorial Hospital
Columbia, South Carolina

Advanced Medical Publishing, Inc. made available to me a copy of this text for review. This work is dedicated entirely to Monitor Unit (MU) calculations for external photon and electron beams and is the product of a successful Symposium organized recently by SEAAPM chapter (annual meeting 1999). The book consists of twelve chapters contributed by experts in photon and electron dosimetry and dose calculations. Under the careful editing of John Gibbons, always in collaboration with the authors, every chapter ended up describing clearly practical methods and examples of performing MU calculations in the clinical setting. This work does not cover MU calculations for Intensity Modulated Radiation Therapy techniques.

The book can basically be separated in two categories. The first category (Chapters 1-8) deals with all aspects of monitor unit calculations for photon beams for all clinical cases encountered daily. In specific, the topics covered in the first category are:

a) methodology for MU calculations for photon beams,
b) head scatter factors,
c) physical attenuators such as physical wedges, trays, compensators and their dosimetric properties,
d) dynamic and virtual wedges and their properties,
e) dosimetry of asymmetric,
f) techniques with multileaf collimators,
g) methods for heterogeneity corrections,
h) issues in total body photon irradiation technique.

The second category (Chapters 9-12) includes the most important issues in performing MU calculations for electron beams. More specifically, the topics of this category are:

a) methodology for MU calculations for electron beams,
b) treatment of irregularly-shaped electron fields,
c) calculations at extended distances (SSDs),
d) total skin electron treatments.

I found that this books covers in a very concise and compete manner all aspects of MU calculations for photons and electrons and, because every chapter presents examples from every day clinical practice, it is without a doubt an excellent reference for radiotherapy physicists, dosimetrists and treatment planners alike. In addition, the bibliography that is included with every chapter can be used as a rich resource of information for many professionals and interested individuals in the field of clinical radiotherapy.

Closing this review, I would like to comment on the practical layout of the chapters, the presentation of the formulae, the quality of the figures and the unique layout and design of book and its cover.

# Rapid Strand™ Takes Root in Ontario

William Que
Ryerson Polytechnic University and Toronto Sunnybrook Regional Cancer Centre

In September 2000, the two cancer treatment institutions in Toronto (PMH and TSRCC) started using Rapid Strands for I-125 prostate implants. A Rapid Strand is a train of 10 seeds placed 1cm apart in absorbable suture material. It was invented to address the seed migration problem associated with loose seeds. Loose seeds are especially prone to migration if the implanted location is outside the prostate gland and near a blood vessel. The literature suggests that when only loose seeds are used, about 10% of the patients end up having one or more seeds in the lung due to seed migration. Although there are no reported short term effects for seeds in the lung, the long term effect is unknown and some worry about the induction of cancer in the lung.

The seed supplier provided excellent training for staff at PMH and TSRCC to ensure the smooth transition. TSRCC started by using two Rapid Strands per patient, but soon we find ourselves using Rapid Strands for more than 75% of the total seeds. Loose seeds have to be used when nonstandard seed spacing is required.

Another positive aspect of Rapid Strand seeds is that they are easier or quicker to load into needles. A drawback is that they are less straightforward to calibrate. Rapid Strands are shipped in sterile packages and they cannot be resterilized. It is possible to calibrate Rapid Strands under sterile conditions and a couple of papers in the literature describe techniques to do this. However, calibration under sterile conditions means that calibration has to be done right before loading needles. If a problem occurs from calibration, such as a more than acceptable deviation from the stated seed strength, there is little time to sort out and resolve the problem. To avoid such a scenario, at TSRCC we order extra Rapid Strands for calibration purpose so that the calibration can be performed several days before the implant. Seeds are taken out one at a time from the strands, and calibrated as loose seeds. After calibration these seeds are used as loose seeds.

The team at TSRCC has been performing prostate implants since January 1998. It is the first Canadian team receiving RTOG credentials for this procedure. Currently TSRCC is in the process of producing an educational CD-ROM for this procedure.

**Book Review:**

# Chernobyl Record:
# The definitive history of the Chernobyl catastrophe

**Author:** RF Mould

**Publisher:** Institute of Physics, Bristol UK 2000 pp402

**Review by:** Walter Huda
Syracuse, NY

The author of this book (RF Mould) holds a M.Sc. in Nuclear Physics and Ph. D. in cancer statistics, and worked as a Medical Physicist for 30 years in London, England. After the Chernobyl accident on 26 April 1986, Dr Mould avidly followed the radiological & physics aspects of the nuclear accident, and visited the Chernobyl site in December 1987 and June 1998. The book has been compiled from sources in the former USSR, Europe and America, and includes graphic eyewitness accounts of the accident. A variety of interesting photographs, graphs, cartoons and other types of illustration enhance the written text.

The book follows a logical structure with four chapters devoted to the early events and two dedicated to the Sarcophagus structure that was built to contain the devastated reactor unit No. 4. Three chapters are devoted to doses to various populations, and another three are assigned to the major environmental impact of the accident. There are individual chapters devoted to long-term health effects that address the well known (e.g., cancer incidence), as well as lesser-known topics (e.g., non-malignant diseases and psychosocial illnesses). An interesting attempt has been made to compare the radiological aspects of the Chernobyl disaster with other types of radiation related accidents. These events include the Hiroshima and Nagasaki atomic bomb attacks (August 1945), the Three Mile Island accident in the US (1979), as well as the recent radiation accident in Tokaimura, Japan (1999).

The final two chapters of this book are additions that help to add local color. The penultimate chapter contains a short memoir by Academician V Legasov (*My duty is to tell you about this*) who was the First Deputy Director of the Kurchatov Institute of Atomic Energy. Dr Legasov was a leading proponent of the nuclear power option for generating electricity, who committed suicide on the 2nd Anniversary of the Chernobyl accident in April 1988. The final chapter describes the local history of the Polissia area that contains the most highly contaminated regions (30 km zone) around the devastated nuclear power plant.

Two aspects of this book will likely impress any medical physicist who wants to learn more about the Chernobyl disaster. The choice of covered topics is excellent, including the technical aspects of the accident, the magnitude of the radiological releases and the impact of this release of radioactivity on the adjacent population and environment. The book also makes use of unambiguous terminology to describe radiation effects on the population (e.g., effective doses in mSv), and these radiation effects are generally explaine¤ in a relevant context (e.g. relative to natµral background). For both these reasons, this book will be a valuable resource tool to anyone scientific minded individual who wishes to learn about the radiological aspects of the Chernobyl disaster.

The sub-title of this book claims that this a “definitive history” of the Chernobyl catastrophe. It is arguable whether any one individual, or even a small group of researchers, would be in a position at end of the 20th century to write such a definitive account. Hyperbole apart, any medical physicist looking for valuable, interesting and comprehensible data on Chernobyl would benefit from this addition to the Chernobyl literature.

**Radiation Protection Committee** *(Continued from page 21)*

undergoing a final review by the group and on completion will become the standard which will then be broadly distributed to stakeholders.

A 6 month pilot Performance Evaluation Program, based on the standards, and involving approximately 10 -15 mammography units will begin January 2001. A full program, evaluating some 75 sites is planned to start in the Fall of 2001. Once the full program is in place a mammography site will be evaluated approximately once every three years. Currently there are about 700 mammography units in Canada at some 500 sites. The working group may meet once more, perhaps before the document is published, but will remain intact to keep the standards current.

Following the delegation of work to the various groups the chairman initiated a discussion on Mr. Osborne’s proposal which was tabled from Wednesday’s meeting. In general, delegates supported the principles of harmonization and standards development but felt linkages with organizations performing similar functions needed further study. The committee’s joint chairs will contact Mr. Osborne for further clarification of his proposal and then respond officially on behalf of the committee.

The closing detail of this year’s meetings was the unanimous re-election of the provincial chairman, Saskatchewan’s Wayne Tiefenbach, for another two year term. On behalf of all delegates Wayne: “Congratulations!”

The 2001 meetings will take place at the usual Ottawa locations from October 17-20. Tentative plans are to again hold a training day, October 16, prior to the official proceedings.

# Intensity Modulated Radiation Therapy with Filters

**By Ernst Lederer, David Want, Konrad Leszczynski, Daniel Provost and Peter Dunscombe**

**Northeastern Ontario Regional Cancer Centre**

There are several techniques currently available for the production of complex customized dose distributions in patients. The most widely used methods require a multileaf collimator (MLC) and involve the delivery of several discrete field segments or a dynamically changing field at a series of gantry angles. An alternative approach to modulating the radiation intensity within a portal, and hence customizing the dose distribution, is to employ specially designed filters (strictly speaking attenuators) in the beams. The use of such filters has some advantages over the use of an MLC. For example, beam modulation is continuous and not discrete as in step and shoot methods, head leakage is generally lower thus reducing the unwanted dose to the patient and to staff, and quality control may be easier with a device that requires thoroughly checking once only during a course of treatment. On the other hand, with an MLC, the delivery of the treatment can be fully automated which certainly adds to the convenience although it does not necessarily save time depending on the equipment available and the technique used. Here at NEORCC we had a very simple rationale for choosing to initiate intensity modulated radiation therapy (IMRT) with filters – we have no MLCs.

In a previous issue of Interactions we reported on our initial experience with the optimization software available with the Helax-TMS treatment planning system. In this brief article we describe the commissioning activities which preceded the recent clinical implementation of IMRT in Sudbury.

In the light of our experience thus far with the Helax optimization software we elected to optimize the beam modulation on the basis of dose homogeneity in the Planning Target Volume only. The organs at risk are, in the clinical cases we have looked at, adequately protected by using customized cerrobend shielding and thus do not need to be explicitly considered in the optimization process.

Over many years we have been interested in the commissioning and quality control of compensating (modulating) filters. This work has been described in presentations at the World Congress this year and in Sherbrooke in 1999. Prior to the clinical introduction of IMRT we undertook a further study of the agreement between the dose distribution generated in a homogenous phantom by a modulated beam and that predicted by Helax. The modulators for this implementation were fabricated from a gypsum-stainless steel mixture hardened in a styrofoam mould produced by the Huestis Compuformer$^{TM}$ system. For a variety of modulator forms we find that the agreement between calculation and measurement (using film) in a calibration geometry can be characterized by standard deviations of 4% or less. This degree of agreement meets published criteria of acceptability for high dose-low dose gradient regions.

Having separately evaluated the two key components required for IMRT, viz optimization and modulation, our third and final step in commissioning was to simulate two treatments with an anthropomorphic phantom using TLD dosimeters. A two field brain and a three field maxillary antrum were "treated" using both conventional and IMRT techniques for a total of four irradiations. Approximately 40 TLD chips were used for each irradiation and the agreement between Helax calculations and measurement was 3.5% (standard deviation) or better, once again satisfying commonly accepted criteria. Figures 1 and 2 illustrate the results of validation experiments such as these. Figure 1 displays the Helax calculated dose versus the TLD measured dose for a conventional two wedged field brain irradiation. Note that doses are absolute and not relative. Figure 2 shows the result of adding an optimized filter to each of the two fields. Agreement between calculation and measurement is clearly good and thre is a slightly tighter clustering of calculated values around the prescription dose of 200cGy, as is expected.

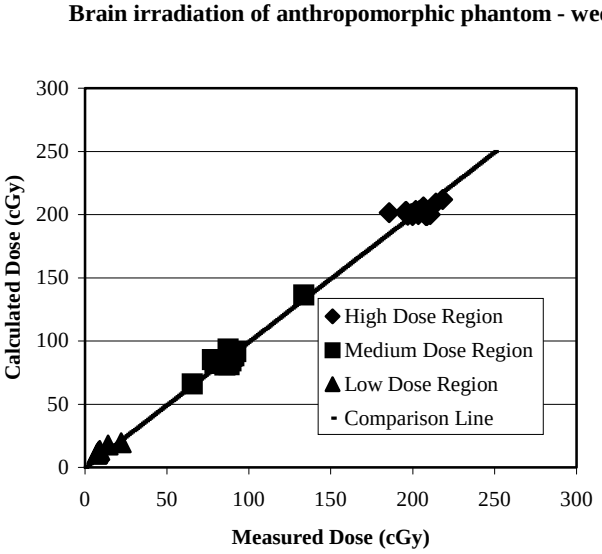


**Figure 1**

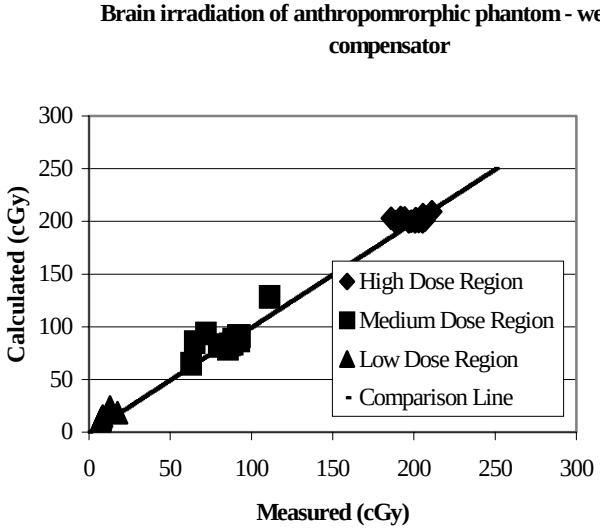


**Figure 2**

**IMRT with Filters***(Continued from page 26)*

The first clinical site to be treated with IMRT in Sudbury was a metastasis from a melanoma. The metastasis, of volume approximately 1200 $cm^3$, developed in the vicinity of the spinal column in the lumbar region and was treated with three modulated fields with the filters based on dose optimization performed by Helax. Some manual editing of the attenuation matrix as designed by Helax is required to accommodate the thickness limitations of our filter fabrication system. Editing ensures that no design thicknesses exceed our limit of 4cm of the stainless steel- gypsum mixture. This limitation also required the use of wedges in two of the three beams. Beam blocking is provided by Cerrobend independently of the filter system. The edited attenuation matrices are re-imported into Helax where they are used to generate both the final clinical dose distribution for approval by the Oncologist and planar dose distributions in a calibration geometry for verification of filter fabrication using film dosimetry. Once the filters have been made, their transmission is measured for use in monitor calculations and verification films taken and analyzed and then the patient is ready to be treated.

Our experience with planning IMRT treatments for both the anthropomorphic phantom irradiations and clinical cases has shown that IMRT can lead to demonstrably improved dose distributions. The improvements observed so far have, however, been small in terms of changes in dose volume histograms (DVH). It will be of interest to identify those sites where the improvement in the DVH is most likely to translate into an improvement in clinical outcome. Such information will be essential in the priorizing of limited resources for the planning, delivery and verification of IMRT and will presumably become available as global experience with this new technique accumulates.

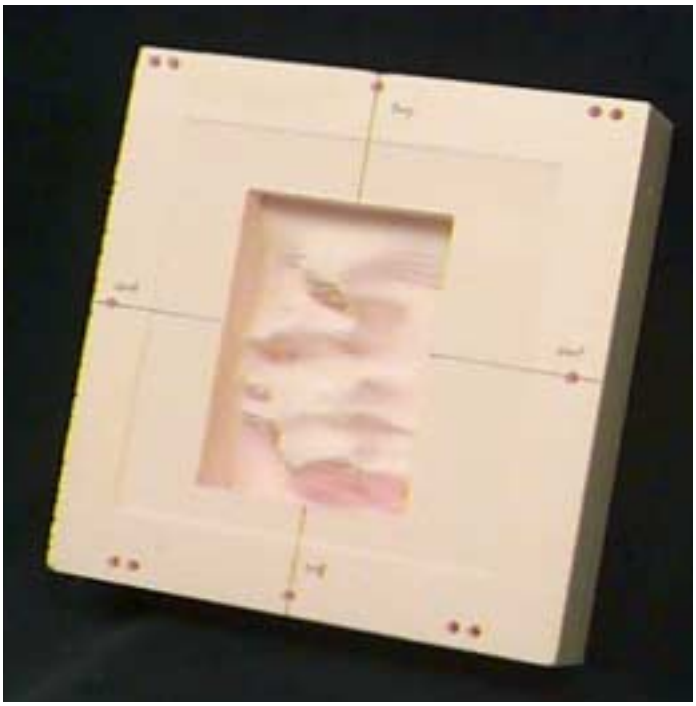

**Figure 3**

# RSNA 2000

**By Alain Gauvin**
**Hôpital Hôtel Dieu du CHUM, Montreal, PQ**

The meeting of the Radiological Society of North America (RSNA) was held again at McCormick place, in Chicago, from November 25th to December 1st. Attendance was slightly above 60,000. For a short while, Orlando had been presented as a possible future site for upcoming RSNAs, but the project seems to be off at least until 2003. It is a little scary to imagine the organisational nightmare of moving such an event, with the transportation and lodging needs that can be met only with difficulty by a city the size of Chicago.

Like in 1998, computed tomography was very much at the forefront. Two years ago, the first 4 slice CT had been presented, but this year, vendors were presenting near release products increasing the amount of slices acquired at every rotation to 16. This is giving this technology the means to tackle what can be seen as CT's Holy Grail: coronary artery imaging, for which CT is now proving to be a viable option against its economically challenged competitor: MRI. As the simultaneously acquired slices are not parallel to one another, some modifications to current reconstruction methods need to be employed. At one extreme, "cone beam methods" will take a general but extremely computationally intensive solution to the problem by allowing a wholly three-dimensional approach.

PACS systems are steadily making their way into imaging departments. Since last year, the attention has shifted from the integration of PACS with modalities, to the more global integration of PACS with enterprise-wide health information systems. An initiative was started last year at RSNA, the "Integrated Health Enterprise", or IHE, a 5 year project with demonstrations at every RSNA until 2003 with live health information systems communicating with each other and demonstrating increasing integration from one year to another.

The demonstration consists of taking attendees from one system's console to another as the workflow for simulated patients is demonstrated, and as those patients go from admission to release. This year, IHE demonstrated features such as a correction of identification of a patient with originally erroneous data, cascaded through the various systems, which had received the initial (and incorrect) information.

Of course, much more was on display. It is truly amazing to see how well the event is organized, and it is an extremely valuable meeting for keeping track with products and technology, along with scientific and clinical developments in medical imaging. It certainly makes the membership to AAPM worthwhile, as the latter brings the registration fees from nearly $500 (US!) to zero. It is also an excellent opportunity to acquire continuing education, for which quality competes with choice.

# Stanford International Workshop on Monte Carlo Treatment Planning

**By David Rogers**
**National Research Council, Ottawa K1A 0R6**

On Nov 9 to 11, 2000, a group of about 50 medical physicists met in Palo Alto for an International Workshop on Monte Carlo Treatment Planning. The workshop was organised by Charlie Ma of the Stanford University School of Medicine's Radiation Oncology Department. It was fully booked within 7 days of being announced 10 months ago and was attended by most of the major players in this field, including representatives from the various manufacturers who are currently working on implementing Monte Carlo dose calculations into their clinical treatment planning systems. This list is becoming quite extensive. NOMOS has 510K approval for LLNL's PEREGRINE system which it is already selling as an add-on system for photon beams with 16 800 MHz CPUs (list price of the add-on is $US150K but the first 10 are being sold for $US75K). Nordion has announced that it will be implementing the VMC++ code developed by Iwan Kawrakow at NRC, first for electrons and then for photons. CMS has announced that it is working with Numerix and Charlie Ma at Stanford to initially implement MC dose calculations for electron beams. Varian has announced that is implementing Hans Neuenschwander's Macro Monte Carlo for electron beams and ADAC is actively working on a Monte Carlo dose engine as well.

The workshop itself consisted of 40 talks, 3 panel discussions and lots of time for discussions. The talks ranged from details of algorithms from code developers, to descriptions of current clinical implementations in research clinics (Stanford, Virginia, Royal Marsden Hospital, Lund, UCLA). The workshop included debates about whether to report dose to the medium or dose to water (as all current treatment planning systems do) and about whether there was any proven need or value of doing Monte Carlo based treatment planning (it was shown that Monte Carlo is clearly more accurate, but there was still some debate about the need, at least for photons beams). There were some discussions and examples of the value of using Monte Carlo techniques in optimisation algorithms as well as about how to handle statistical uncertainties. There was a description of the 510K process followed by NOMOS/PEREGRINE. In their application they have included, for the first time for any clinical treatment planning system we were told, accuracy claims in their documentation. This means they had to demonstrate this accuracy for the first time! Discussions extended beyond external beam dose calculations and included several talks about Monte Carlo calculations for endo-vascular brachytherapy and portal imaging.

All in all the workshop was very successful and Charlie Ma is to be congratulated for organising a timely event.

On a more personal note it was satisfying to see that of the 40 speakers, fully 25 were using NRC's BEAM system for Monte Carlo simulation of radiotherapy accelerators and dose calculations in patient (although Kawrakow and others have developed methods for the patient calculations which are up to 50 times faster than EGS4). At one point, Bruce Curran of NOMOS even played from his computer the world famous ``BEAM song'' written and played by Blake Walters and Leo Heistek of NRC. It was also good to see so many old friends from NRC who are still working in this field (see the picture). It is unfortunate that Canada has lost so many good people to the US but we continue to gain good people from elsewhere!

Stayed tuned for a Monte Carlo dose calculating engine in the treatment planning system near to you!

Past and present NRC people attending the Stanford workshop. From left to right (with their NRC dates and current location): Charlie Ma (93-96), Stanford U; Iwan Kawrakow, NRC; Bruce Faddegon (86-92), UCSF; David Rogers, NRC; Blake Walters, NRC; Daryoush Sheikh-Bagheri (93-98), Nordion; Alex Bielajew (82-97), U of Michigan; Jan Seuntjens (96-99), McGill; Alan Li (92-93), U of Maryland. Photo by Joerg Lehmann.

# CCPM Certification Survey

**By Pat Cadman**
**Saskatoon Cancer Centre**

Recently, a survey was conducted of a number of Canadian institutions employing medical physicists to see how CCPM certification is being tied to hiring and advancements within those institutions. The results of the survey are provided below. I apologize for the incompleteness of the survey and to those I was unable to contact.

| Institution | MCCPM Prerequisite For: | MCCPM Recommended For: | FCCPM Prerequisite For: | FCCPM Recommended For: | Submitted By: |
|---|---|---|---|---|---|
| B.C. Cancer Agency | - Advance to senior<br>- 1 extra pay level | | - 1 extra pay level | | Ellen El-Khatib |
| Alberta Cancer Board | | Medical Physicist | | Senior Medical Physicist | Gino Fallone |
| Saskatchewan Cancer Agency | | Asset for Medical Physicist | | Asset for Senior Medical Physicist | Narinder Sidhu |
| Cancer Care Manitoba | Stipend ($3000/an.) | | Stipend ($3000/an.) | | Stephen Pistorius |
| Cancer Care Ontario | Salary advancement after 2 yrs at Medical Physicist level | Entry into Medical Physicist position | Promotion to, or hire at Senior Physicist level | | Peter O'Brien / Peter Raaphorst |
| Robarts Research Inst. London, ON | N/A | N/A | N/A | N/A | Terence Peters |
| NRC Ottawa, ON | N/A | N/A | N/A | N/A | Dave Rogers |
| McGill University Montreal, PQ | 5% above government pay scale | | 10% above government pay scale | | Ervin Podgorsak |
| Hôpital Notre-Dame, Montreal, PQ | 3% bonus | | Additional 3% bonus | | Jean-Pierre Bissonnette |
| Radio Oncologie Centre Hospitaliér Régional de Trois-Rivières, PQ | | All Physicist positions | | All Physicist positions | Daniel Michaud |
| Hôpital DR. Georges-L Dumont, Moncton, NB | Promotion to Medical Physicist 2 (highest pay level) | | | | Clement Arsenault |
| Nova Scotia Cancer Centre | All Medical Physicist positions (not junior) | | Additional 10% salary - Chief Physicist (also + 10% for Ph.D.) | | John W Andrew |
| Radiation Onc. Q. E. Hospital Charlottetown, PEI | Advancement to next salary scale | Medical Physicist | | | Judy Hale |

# In Brief

### Saskatoon linacs produce negligible amounts of radiation

Recently, linear accelerators at the Saskatton Cancer were surveyed for radiofrequency emissions to determine if they present an occupational hazard. Connie Schwindt of the Occupational Health and Safety Unit, Saskatchewan Labour, conducted the measurements and reported that the radiofrequency emissions were well below the recommended exposure limits of 50 $W/m^2$ for occupational workers and 5 $W/m^2$ for the general public to the unprotected eyes and skin for 3 GHz emissions. The only points of measurement that were not negligibly low were on the treatment bed and under the waveguide for a Varian Clinac 21EX linac; measurements around a Philips SL25 linac were undetectable both inside and outside the treatment room.

Pat Cadman

### News from Nova Scotia

A revised compensation package has been established for radiation oncology physicists in Nova Scotia. The new package is competitive with other parts of Canada, recognizes those with higher levels of education, e.g., Ph.D. versus M.Sc., and places an emphasis on Membership and Fellowship in the CCPM. A new nine-step salary scale has been implemented. All physicists must have their MCCPM, DABR or DABMP certification to be placed on the scale. Those without certification are placed on a lower Junior Physicist scale. Progression up the Physicist scale is assessed yearly and based on performance. Physicists with their Ph.D. have a 10% adjustment added to their base salary. The nine-step Physicist scale covers what we used to call Physicists and Senior Physicists. Under the new system, when a physicist obtains their FCCPM they are given a 10% salary adjustment over their base salary (or over their base plus Ph.D. salary). The Chief Physicist is on the same scale but receives an additional administrative stipend. More information

*(Continued on page 31)*

# Consequences of Nuclear Medicine Procedures on Ontario Power Generation Nuclear Employees

**By Spencer M. Fisher**

Ontario Power Generation is very concerned about internal contamination of employees working in its nuclear facilities who may receive this contamination in the course of their work. In order to detect this internal contamination whole body counting systems and bioassays are used. These are very sensitive and can detect extremely small amounts of radioactivity with extremely low minimum detectable activities. Any activity above background can be detected. For instance, the whole body counters have a minimum detectable limit of 3 nCi of Cobalt 60.

Any residual activity from a nuclear medicine study could mask this low level of any possible internal contamination from the workplace. For this reason, these employees must be re-assigned to other work duties. The employee must wait, typically, for ten half lives of the radiochemical before resuming their regular duties. For instance, following a Thallium Scan the employee must wait about one month. With Thallium-201, we are able to detect the decay product, Thallium 202 as well as the 201.

Carbon-14 from breath studies can be detected in the employee's urine for a week following the study. Co-60 from Vitamin B-12 studies has been detected one year after the study.

Ontario Power Generation is attempting to make sure that all employees are educated regarding nuclear medicine studies. The Nuclear Medicine Community can also help their patients, and us. I know that the public is afraid of the **R** word, and that radioactivity is often downplayed. When asked how long the radioactivity will remain in a person's body, the nuclear medicine technologist should tell the patient that although most of the activity will be excreted or decay rapidly, small residual amounts can still be detected for some time after by sensitive instruments.

It would also be helpful that the referring physicians tell the patient that the tests involve radioactivity. Using terms like a persantine study, or breath test do not convey to the patient that radioactivity is involved. Similarly, words like dye or tracer are also vague.

I know that all nuclear medicine professionals will help us in this matter.

Thank You.

By Spencer M. Fisher, M.R.T.(N)
Responsible Health Physicist-Radioisotope/Radiography Licensing and Permits
Ontario Power Generation
1549 Victoria St. E.
Whitby, Ont.
L1N 9E3
Phone (905) 430-2215 ext. 3290

# Is it physics or is it funnies?
## By Brennan MacDonald




**In Brief** *(Continued from page 30)*
about the construction of nsation package is available from the Human Resources Department at the QEII Health Sciences Centre in Halifax. I would also be happy to provide further details, especially to anyone interested in filling one of our vacant positions here in Nova Scotia!

John Andrew

### Physics of Mammography course to be held during COMP annual meeting

You are probably aware that the next COMP annual meeting will be held in Kelowna in July 2001. The Accreditation Committee on Physics of Mammography is in the process of organizing a two-day course (including a hands-on session) on "Physics of Mammography", just before or after the annual meeting. This will be a good opportunity to acquire CME credits to retain the accreditation for those who are already accredited, as well as an introduction for those who are interested in performing mammography physics testing in the future. If you are interested in attending the course, please forward me an e-mail including your contact information.

Rasika Rajapakshe
Rrajapak@bccancer.bc.ca
Tel: (250) 712-3915

# Open Letter About the COMP/CCPM Archive

Dear Medical Physics Colleague:

I have been asked by the Canadian Organization of Medical Physicists (COMP) to look into the feasibility of establishing an official collection of historical information about our association, past and present, and of our emeritus members. The long-range outcome may be a COMP/CCPM archive with an index to all materials of historical interest with mechanisms for storage, retrieval, and preservation. In the near-term I am conducting a survey of what types of information or artefacts are currently being held in private collections, libraries, Universities, and hospitals throughout Canada.

After assessing the volume (literally) occupied by such materials, we will be in a better position to assess the feasibility and advisability of geographic consolidation in one archival system. Alternatively, items could be assembled on a distributed basis, with only a central COMP database 'pointing' to these locations and important items. This is still an open question for which one must balance ownership, convenience, and long-term security of the collection.

Please take a moment to locate and "dust off" some materials or artefacts which you currently possess or which you may have already donated to your previous employer. If you wish to have these considered for inclusion in the archive fill in the attached form or contact me at:

Dr. J.J. Battista
Director of Physics Research and Education
London Regional Cancer Centre
790 Commissioners Road
London, Ontario
Canada
N6A 4L6

e-mail: jerry.battista@lrcc.on.ca

Thank you!

J.J. Battista

# Survey of Items of Historical Significance in Canadian Medical Physics

1. Please identify yourself and your location:

2. Please describe the items you currently possess:

   Letters
   Minutes of CAP, COMP, CCPM or other meetings
   Photographs
   Physical Devices
   Souvenirs
   Scientific data or lab notes
   Newspaper articles
   Video
   Audio
   Other (Please specify)

3. Please estimate the mass and volume of the aggregate of the above materials.

4. Please indicate if historical materials *that you are familiar with* are currently being held in institutions such as cancer centres, hospitals, libraries, Universities, museums, etc…

| **ITEMS** | **LOCATION** |
|---|---|

5. What are your personal views on the need for a centralized archive or database of such historical materials ?

6. Are you aware of past activities of this nature and who was involved ?

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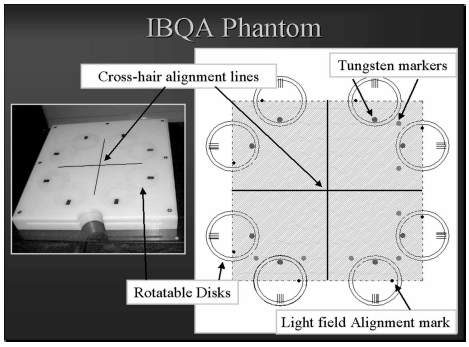


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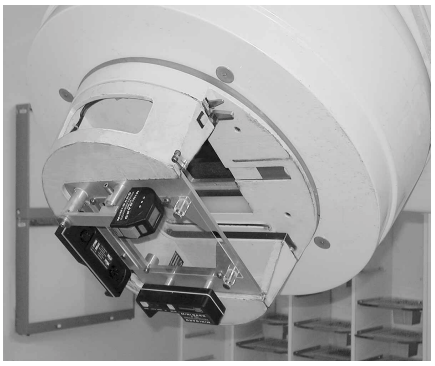

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Website: www.elekta.com
Contact: *Ms Wendy Hornby*
Email: Wendy.Hornby@elekta.com

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2300 Meadowvale Boulevard
Mississauga, ON L5N 5P9
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Website: www.ge.com/medical
Contact: *Ms Deborah Keep*
Email: deborah.keep@med.ge.com

**Harpell Associates Inc.**
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Oakville, ON L6L 2X4
Phone: (905) 825-2588
Fax: (905) 825-0234
Website: www.harpellassociates.com
Contact: *Mr David Harpell*
Email: info@harpellassociates.com

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Contact: *Dr. Joseph Baskinski*
Email: hilferdine@sympatico.ca

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Contact: *Mr Bob Gollaher*
Email: gollaher@kodak.com

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Email: sales@landauerinc.com

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Website:www.multidata.systems.com
Contact: *Ms Patricia Roestel*
Email: info@multidata-systems.com

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Email: yerge@nucusa.com

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Website: www.ptwny.com
Contact: *Mr Steve Szeglin*
Email: ptw@ptwny.com

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Fax: (901) 382-9453
Website: www.wellhofer.com
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Email: wellusa@aol.com

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Contact: *Ms. Jan Roth*
Email: JRoth@os.varian.com

# McMaster University

## Medical Physics & Applied Radiation Sciences - Tenure-Track Appointment

McMaster University invites applications for a tenure-track appointment in the Medical Physics and Applied Radiation Sciences Unit of the Department of Physics & Astronomy. The position is targeted to begin on 1st July, 2001, although some flexibility can be accommodated. Candidates should possess a PhD and have demonstrated both an excellent research record and an aptitude to teach. The ideal candidate will be able to teach in the area of the fundamentals of radiation physics, with particular emphasis on radiation transport and radiation dosimetry. She/he would be expected to contribute particularly to graduate and undergraduate programmes in Medical Physics and Health Physics through teaching, attracting research funding and mentoring research students.

The successful candidate's research is expected to draw strength from facilities, personnel and colleagues associated with the McMaster Institute of Applied Radiation Sciences. Applicants should describe how they would expect their research to prosper at McMaster, taking into account existing research strengths and opportunities.

Recent investment by the Canada Foundation for Innovation, the Ontario Innovation Trust and the University itself, coupled with support from industrial partners has revitalised our accelerator laboratory, enabling a renewed focus on biomedical applications. Our nuclear reactor is being refurbished and upgraded. There has also been significant investment in magnetic resonance imaging of bone and joints, neutron radiography, radiation geochronology, nuclear and radiation chemistry, remote sensing and medical applications of isotope geochemistry.

Existing research fields within the Medical Physics and Applied Radiation Sciences Unit include experimental and theoretical dosimetry of photons and electrons, the interface problem in beta dosimetry and applications to the dosimetry of diagnostic and brachytherapy radioisotopes; and nuclear and atomic techniques used for body composition studies; the role of DNA damage and DNA repair processes in carcinogenesis and in the response of tumour cells to radiotherapy and chemotherapy; understanding human health risks of low doses and low dose rates of ionizing radiation using molecular cytogenetics and microbeams in combination; the cellular and molecular basis of photodynamic therapy; laser and light propagation in tissue for photodynamic therapy and tissue characterization; radiation geochronology; novel methods of imaging bone architecture and joint structure non-invasively; and structural and functional imaging, particularly for neurological, cardiac and neuroscience studies.

Canadian citizens and permanent residents will be considered first for this position. McMaster University is committed to employment equity and encourages applications from all qualified candidates including aboriginal peoples, persons with disabilities, members of visible minorities, and women.

Applications, including a statement of research interests and letters from three referees should be sent by March 31st, 2001 to Dr. D.R. Chettle, Medical Physics and Applied Radiation Sciences Unit, Department of Physics & Astronomy, McMaster University, Hamilton, Ontario, L8S 4K1, Canada. Telephone (1) 905 525 9140 ext 27340, FAX (1) 905 528 4339, e-mail: chettle@mcmaster.ca.

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## Division Head, Medical Physics

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**The Department of Oncology and the Alberta Cancer Board (Tom Baker Cancer Centre)** invite applications for a full-time academic position as Division Head of Medical Physics at the Associate Professor level or higher. The successful applicant will provide leadership in research and radiation therapy services in the areas of treatment planning, machine calibrations, and new treatment techniques development with five other physicists. Duties will also include graduate and undergraduate teaching.

The Tom Baker Cancer Centre is a tertiary centre with 8 linacs with MLC, 1 Co-60 unit, 2 CT Simulators, 1 conventional simulator, HDR and LDR brachytherapy and stereotactic radiosurgery. As part of a coordinated Provincial program, the Centre serves a population in excess of 1.5M persons. The Department of Oncology is part of the rapidly growing Faculty of Medicine which is in the process of building a major new research facility. Calgary is a vibrant, multicultural city (population ~850,000) near the Rocky Mountains, Banff National Park and Lake Louise.

Qualifications include a PhD in Medical Physics, Canadian College of Physicists in Medicine, (CCPM) or equivalent certification (ABR/ABMP) and demonstrated interest in research, clinical medical physics and administration.

Please submit a curriculum vitae and a statement of career goals together with the names of three referees by **January 31, 2001** to:

**Dr. Gavin C.E. Stuart,** Professor and Head
Department of Oncology, Tom Baker Cancer Centre
1331 – 29 Street N.W., Calgary, AB T2N 4N2

*In accordance with Canadian immigration requirements priority will be given to Canadian citizens and permanent residents of Canada. The University of Calgary respects, appreciates and encourages diversity.*

**www.ucalgary.ca**

# Medical Physicist Positions

Queen Elizabeth II
Health Sciences Centre

Applications are invited for Medical Physicist positions at the Queen Elizabeth II Health Sciences Centre in Halifax and the Cape Breton Cancer Centre in Sydney, Nova Scotia.

Cape Breton
Cancer
Centre

The Nova Scotia Cancer Centre (NSCC) at the QEII Health Sciences Centre, along with the Cape Breton Cancer Centre (CBCC), provide radiation therapy treatment services to the residents of Nova Scotia. The Medical Physics Department complement at the NSCC is seven medical physicists, a Junior Physicist and a Physics Assistant. Two additional physicists are permanently located at the Cape Breton Cancer Centre.

The NSCC in Halifax has recently been re-equipped with four Varian accelerators with MLC, Portal Vision and Varis. Selectron LDR and HDR units are in use as well as a Theratron 1000 cobalt unit and a superficial x-ray machine. Simulation is carried out on a Picker AcQsim CT system and on a conventional Philips simulator. Theraplan Plus and Nucletron brachytherapy planning systems are in use. A machinist and two electronics technologists provide equipment maintenance support. Stereotactic radiosurgery and prostate implant programs are in the planning stages.

The CBCC is equipped with Varian 2100C/D and 600C accelerators, both with MLC and Portal Vision. Both Varis and Varis Vision are installed. The centre has a Varian Ximatron simulator and a Theraplan Plus 3D treatment planning system. Physicists at the CBCC are permanently based in Sydney and are members of the Medical Physics Department, NSCC, QEII Health Sciences Centre in Halifax.

There is an active Radiation Oncology residency program and a medical physics residency program is under development. Radiation oncologists and medical physicists are members of the Dalhousie University Department of Radiation Oncology. In addition to clinical service requirements, there is a renewed emphasis on individual and cooperative research and development programs.

The salary scale for Radiation Oncology Physicists in Nova Scotia has recently been revamped and is very competitive with any Canadian Province. Medical Physicists with an M.Sc. or Ph.D. are hired as Junior Physicists until they are certified. Certified physicists (MCCPM, DABR, DABMP) are placed on a nine-step physicist scale, which includes salary incentives for those who have their FCCPM, Ph.D. or both.

Applications are invited from all qualified candidates. In accordance with Canadian Immigration requirements, priority will be given to Canadian citizens and permanent residents of Canada. Please submit a covering indicating the position(s) applied for (Halifax and/or Sydney), a curriculum vitae and the names of three professional references to:

**Dr. John W. Andrew, Chief Physicist, Nova Scotia Cancer Centre, QEII Health Sciences Centre,**
**5820 University Ave., Halifax, Nova Scotia, B3H 1V7, Canada. (Phone (902) 473-6017)**

The application deadline is February 15, 2001. Applications may be submitted electronically by e-mail to: ccjwa@qe2-hsc.ns.ca or by fax to (902) 473-6120.

The Cape Breton Regional Municipality (population 118,000), including the former City of Sydney, offers excellent recreation and housing possibilities, small town friendliness, and an excellent educational system. Sydney is adjacent to the beautiful Bras d'Or Lakes and the Cape Breton Highlands and is one hour by air from Halifax. Cape Breton, although better known for deep-rooted, celtic musical traditions, is also the home for a broad mosaic of other ethnic cultures.

Halifax is a vibrant metropolitan area of 350,000 on the edge of the Atlantic Ocean. Professional theatre and orchestra, many universities, ocean sailing, hiking, take your choice! Information on Dalhousie and Halifax is at www.medicine.dal.ca, and www.region.halifax.ns.ca. Cape Breton and Nova Scotia information is at www.capebretonet.com and www.explore.gov.ns.ca. Find your new home at http://www.mls.ca/mls/home.asp.

# Scientist Positions in Imaging Research

## Sunnybrook & Women's College Health Sciences Centre

Imaging Research at Sunnybrook & Women's applies the principles of physics, mathematics, and engineering to innovative approaches to visualize molecules, cells, tissues, organs, and whole organisms. Technologies and techniques are being developed and refined for the imaging of both structure and function for normal and disease conditions. Applications are both medical and biological, including the detection, diagnosis, and assessment of disease and the planning, guiding, delivery, and monitoring of therapies. Imaging modalities studied include ultrasound, x-ray, magnetic resonance, optical and radionuclides while approaches involve the generation of image databases and development of novel methods for extracting information from images. The group currently includes 10 scientists with associated graduate and post-graduate trainees and technical support staff totalling more than 75 individuals working in state-of-the art research facilities.

This group is seeking several individuals for positions as scientists to join these pursuits. Candidates should hold an advanced degree in an appropriate field and must demonstrate a strong commitment to high quality research and post-graduate training in medical imaging. Productive postdoctoral training and preliminary grant success are preferred attributes; applications from senior scientists are also solicited. We seek individuals with expertise in:

- microcirculation characterization
- tracers / molecular imaging agent development
- mathematical tools for image fusion and analysis to facilitate medical decision-making
- instrumentation and imaging system development

You will be expected to integrate your research program into a multi-disciplinary environment including basic and clinical sciences, while developing external peer-reviewed funding for ongoing lab support. To facilitate this, you should be eligible for an academic appointment in the Department of Medical Biophysics at the University of Toronto. Applications must be received by January 15, 2001 and should include a covering letter describing current research interests and future goals, a complete CV, and names of three references, including permission to contact them.

In accordance with Canadian Employment and Immigration guidelines, preference will be given to Canadian citizens and permanent residents of Canada. In accordance with Sunnybrook & Women's Valuing Diversity Initiative, applications from all qualified persons are encouraged.

Applications should be sent to:

M.J. Bronskill, PhD, FCCPM
Director, Imaging/Bioengineering Research
Sunnybrook & Women's College Health Sciences Centre
2075 Bayview Avenue
Toronto, Ontario, M4N 3M5
Tel 416.480.5710 ; Fax 416.480.5714
E-mail: michael.bronskill@swchsc.on.ca

## POSITION: RADIATION ONCOLOGY PHYSICIST
## TOMOTHERAPY PROJECT CO-ORDINATOR

## LOCATION: London Regional Cancer Centre
## London, Ontario, Canada

The London Regional Cancer Centre is committed to providing leadership in cancer treatment, research, and education and is affiliated with the University of Western Ontario. Current resources include 9 megavoltage therapy machines several with MLC and electronic portal imaging, 2 simulators, a CT-simulator, HDR and 2 LDRs units, and specialty programs in prostate brachytherapy, stereotactic radiosurgery, TBI, and PDT. One of the first prototype helical tomotherapy systems will be installed in the year 2001. This leadership position involves co-ordinating the physics research and development associated with clinical implementation of tomotherapy. Additional related research is already underway in 3-D conformal radiation therapy with conventional linacs, 3-D gel dosimetry to verify IMRT, kilo/megavoltage verification imaging, dose optimization, radiobiological modeling, and uncertainty propagation. The successful candidate will join a dynamic Medical Physics team with a full range of dosimetry, computer, and engineering support. The candidate will participate in clinical service, research, and teaching, including graduate student supervision.

Minimum qualifications include a Ph.D. with several years of related clinical experience, and CCPM certification or equivalent. The successful candidate should be eligible for an appointment at the University of Western Ontario. The salary range is CDN$79,403 - CDN$118,000 depending on years of clinical experience.

London, Ontario is a pleasant and affordable university and health care city of 350,000 people nestled in southwestern Ontario equidistant from Toronto, Windsor (Detroit), and Niagara Falls (Buffalo). Proximity to the Great Lakes offers a wide range of recreational activities.

In accordance with Canadian immigration requirements, priority will be given to Canadian citizens and permanent residents of Canada. Cancer Care Ontario is an equal opportunity employer. We thank all those who apply; however, only candidates chosen for interview will be contacted.

**CONTACT:** Jake Van Dyk
London Regional Cancer Centre
790 Commissioners Road East
London, Ontario, Canada, N6A 4L6
Phone: 519-685-8607
Fax: 519-685-8658
E-mail: jake.vandyk@lrcc.on.ca

Website: http://www.lrcc.on.ca/

## THE OTTAWA REGIONAL CANCER CENTRE
**is currently seeking to recruit a**

## MEDICAL PHYSICIST

to participate in all aspects of its high tech clinical radiotherapy physics activities.

The Centre is equipped with 6 linear accelerators, 2 cobalt units, 3 simulators including a CT Sim. Multileaf collimators and portal imaging are also being used. The Centre also has extensive programs in stereotactic radiotherapy, brachytherapy and TBI. In addition, the Centre is well-equipped with a host of other radiotherapy and physics equipment and has extensive electronic and machine shop facilities and support.

The Medical Physics program has a strong academic component operating through the Department of Physics and Radiology at Carleton University and the University of Ottawa and includes a graduate Medical Physics program of 14 students. These programs are coupled with active research in radiotherapy and imaging physics as well as biophysics. The Medical Physics Department of the Ottawa Regional Cancer Centre currently employs 7 physicists and is offering the successful candidate an excellent opportunity for Research and Academic activities. Faculty appointments may be commensurate with experience.

The position requires a postgraduate degree in Physics, or equivalent (PhD. Preferred) and a minimum one year radiotherapy physics experience, certification by the CCPM or equivalent is required.

The Centre offers a competitive salary and benefits package and the opportunity to contribute to a dynamic medical physics team.

Qualified candidates may submit a detailed curriculum vitae and list of references to:

**G.P. Raaphorst, Head, Dept. of Medical Physics**
**Ottawa Regional Cancer Centre**
**503 Smyth Road Ottawa, Ontario Canada K1H 1C4**

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# From the Editor:

That's it; I am leaving! Well not exactly leaving, but I will be moving the *From the Editor* section to a new page on the inside of Interactions to make way for color advertisement on the back cover. What you may perceive as a flippant (and expensive) use of color on this page is truly a flagrant attempt to attract advertising from our corporate members. It actually costs no more for us to use color on both the front and back covers so we hope an advertiser will seize the opportunity to support Interactions and promote their products.

It is most gratifying to see that the diversity of submissions has continued in this, my second production as editor. Hats off to all those who contributed to the issue (and to those who harassed their colleagues for material). I also think the editorial board is proving to be a good idea so beware of the wily board member looking for you.

It is very exciting to receive an update on some of the challenges and innovations that are happening in our institutions, without having to wait for the annual meeting or journal publications. A case in point is the article on Intensity Modulated Radiation Therapy with Filters from the group at the Northeastern Ontario Regional Cancer Centre. They have provided a snapshot of the kind of work that is changing the radiation therapy paradigm in Canada, almost as we speak (or read — I hope Peter Dunscombe doesn't mind me sharing this, but the article was waiting on hold to see if the patient would actually be treated). I know there are many such developments happening across the country and they make excellent stories to share through Interactions. What exciting things are happening in your clinic or institution?

And speaking of innovation, check out the latest from Darcy Mason—NetWorthy. This regular feature is really a timely idea and should provide an excellent guide to items of interest on the internet and software offerings. Darcy has some great ideas and it will be interesting to see how this feature evolves.

Well, I seem to be a man of few words, lots of material, and loads of help; Ho Ho Ho. I wish you and your families all the best in the new year to come and I hope your challenges are all met with great enthusiasm and a reasonable amount of funding.

Pat Cadman

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