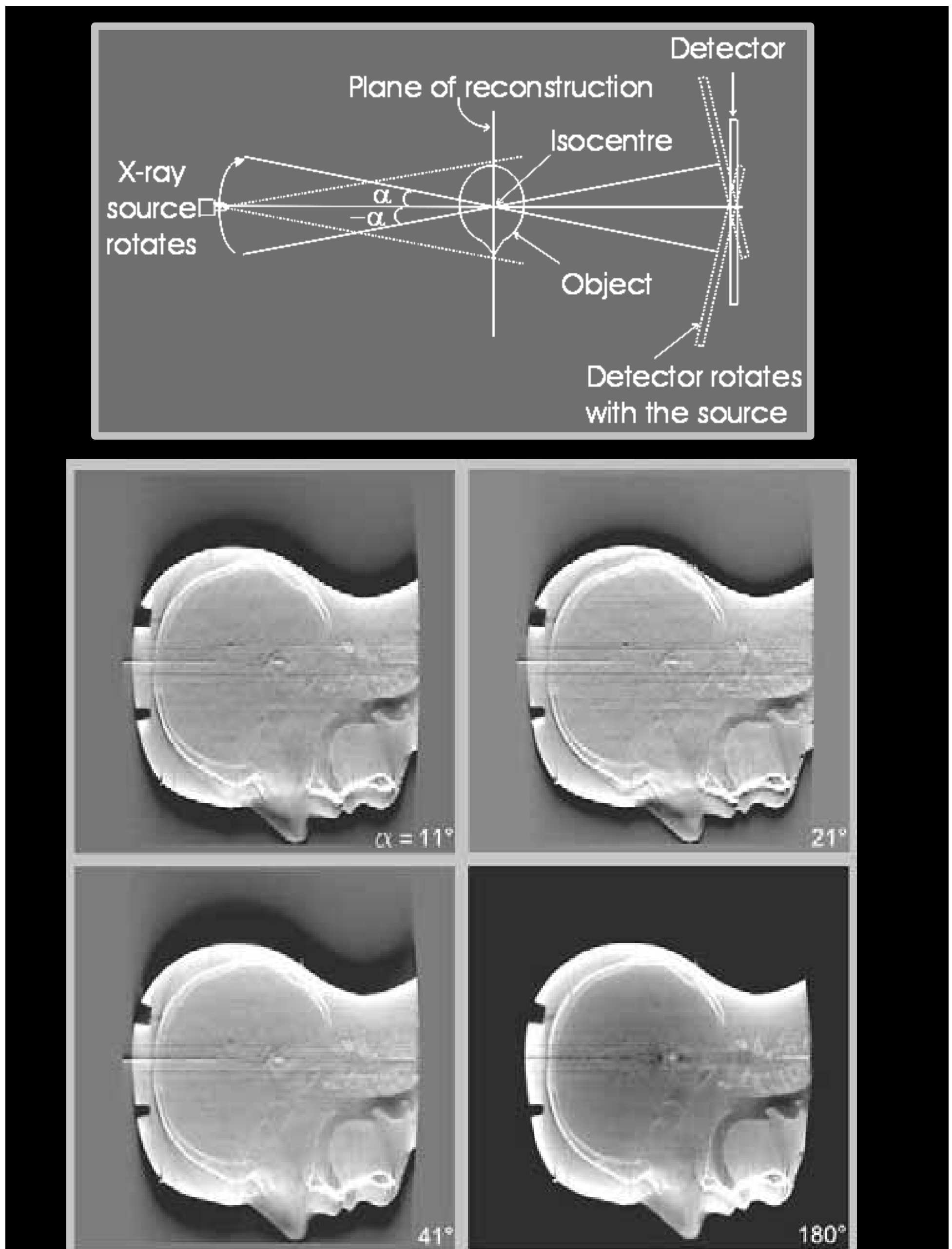
InterACTIONS

CANADIAN MEDICAL
PHYSICS NEWSLETTER
Le BULLETIN CANADIEN
de PHYSIQUE MÉDICALE



Cone Beam Digital Tomosynthesis for Image-guided Radiotherapy

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COMP OCPM

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

52 (1) janvier/January 2006

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About our Cover

At Toronto-Sunnybrook Regional Cancer Center, research is being carried out in collaboration with Siemens to investigate the feasibility of a new imaging technique— Cone Beam Digital Tomosynthesis (CBDT). This is a more rapid alternative to Cone Beam Computed Tomography (CBCT) for creating 3D cross sectional images of a patient in the radiotherapy treatment room. Similar to the CBCT approach, the CBDT uses an x-ray source (either a kV source or a MV source on a Linac) and an x-ray detector to acquire projection data by rotating around a patient. Unlike CBCT, CBDT utilizes partial scans, typically in the range of 20-60 degrees of gantry arc. Thus, CBDT can be also considered as a limited angle CBCT.

The upper figure illustrates CBDT data acquisition on an isocentric system. The x-ray source and the detector rotates around the object from $-\alpha$ to $+\alpha$ and acquire radiographic projections at equal angular intervals. The lower figures show CBDT reconstructed images of a Rando head phantom for the sagittal plane through the isocenter obtained with different values of α shown at the bottom-right corner on each image. It can be seen that for values of α as low as 11 degrees detailed cross-sectional structures in the phantom can still be seen. The planes of CBDT reconstruction are orthogonal to the x-ray beam at the midpoint of the arc. These reconstructed planes are of particular relevance to image-guided radiation therapy, because they depict anatomy along planes that are most relevant to the treatment beam, i.e. orthogonal to the beam axis.

Image provided by Geordi Pang, Philip Au, Peter O'Brien and John Rowlands of the Department of Medical Physics, Toronto-Sunnybrook Regional Cancer Centre, University of Toronto, Toronto.

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, images, and article submissions can be made to:

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675 McDermot Avenue
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Phone: (204) 787-1966
Fax: (204) 775-1684

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. Images in Tiff format at 300 dpi resolution are preferred.

ADVERTISING (both corporate and job) enquiries can be made to:

Nancy Barrett
Executive Director COMP/CCPM
P.O. Box 72024, Kanata North RPO
Kanata, ON K2K 2P4
Email: execdir@medphys.ca
Phone: (613) 599-1948
Fax: (613) 559-1949

Job Advertising Options

OPTION 1 ($200): Job posting on COMP/CCPM website only (updated monthly)
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OPTION 3 ($300): Job posting is immediately e-mailed to COMP/CCPM members (no website or InterACTIONS! posting)

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	1/2 page	1 page	Addn. pages
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Corporate Non-Member	$300	$400	$200
Color	Add $400 (when available)		

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Inside this issue:

Developments in water calorimetry for electron beam radiation dosimetry…16
Kristin J. Stewart, Carl K. Ross, Norman V. Klassen and Jan P. Seuntjens

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Message from the COMP Chair:

We will continue with our plan for a joint meeting (with one of several societies, including CARO) every second year, and a stand-alone meeting in the intervening years.

The annual mid-year meetings of the COMP executive and the CCPM board were held on Friday and Saturday November 25 and 26 at the Comfort Suites hotel in Toronto. The sessions were productive and in this column I will highlight a few of the important issues that were discussed at these meetings.

Over the last year I have had several discussions with COMP members, with manufacturer's representatives and with members of CARO (The Canadian Association of Radiation Oncology) concerning the relationship of COMP and CARO and the possibility of combined COMP-CARO annual scientific meetings on a regular schedule. This issue speaks to the nature of COMP itself. The science at our annual scientific meetings is highly regarded by the membership; the meeting is enjoyable socially and has helped to build a strong sense of community. At joint meetings it is clear that a small group such as ours can easily be overshadowed by a larger partner, and the ambience that we all enjoy may be lost. Also, not all of our membership works in radiation oncology physics and an exclusive arrangement with CARO could limit the scope of our scientific meetings. After some discussion the consensus of the COMP executive is that we should formalize our relationship with CARO and work with CARO to increase the medical physics presence at their meeting, perhaps by having a separate medical physics stream of parallel sessions. We are having a joint meeting with CARO in Toronto in 2007, but the executive would not want to commit to a regular schedule of joint meetings. We will continue with our plan for a joint meeting (with one of several societies, including CARO) every second year, and a stand-alone meeting in the intervening years. I will be taking this message to the CARO executive.

Plans for the COMP 2006 scientific meeting in Saskatoon continue to move forward on schedule. This promises to be an excellent meeting that will highlight the history of medical physics in Canada, and the roots of that history in Saskatoon. The important dates and deadlines for that meeting are announced in this issue. This will be a meeting not to be missed. The 2008 annual meeting is scheduled for Quebec City and the Conference Committee has also negotiated the terms of a contract with the AAPM to hold a joint AAPM-COMP meeting in Vancouver in 2011. There have been inquiries from several groups regarding the 2009 and 2010 annual scientific meetings. This will become a competitive process with bids invited from the COMP membership for both of these years.

COMP has agreed to encourage those working as physics associates (physics technicians, physics technologists) to take associate membership in COMP.

Mr. Peter O'Brien, COMP Chair

Dr. Rick Hooper, of the Cross Cancer Institute, has been organizing and conducting the COMP professional survey for the past 8 years as a volunteer service to the membership. Rick has been performing this task almost single –handedly and he certainly deserves a big vote of thanks from all COMP members. Rick has now decided, quite justifiably, that it is time to pass on this responsibility. There will not be a professional survey for the current year due to this transition. The COMP executive views this as a valuable service to the membership and one that should be continued. *If you are willing to take up this task for COMP please contact one of the COMP executive as soon as possible*. If there is not a suitable volunteer for this task we will contract with the Executive Director to take over this important function.

Several Canadian medical physicists have

(Continued on page 28)

Message from the CCPM President:

I write this having just returned from the mid-year meetings in Toronto and will start by thanking the CCPM board members, **John Andrew, Wayne Beckham, Dick Drost, Michael Evans, John Rowlands, Narinder Sidhu and Katharina Sixel**, for once again giving up a weekend with their families at a very busy time of year to further the business of the College. As you know, all of this work is done on a volunteer basis, much of it in our own time and we are very fortunate to have so many unselfish volunteers.

News from this meeting is that there were 58 successful recertifications this year, including my own. The recertification process has now been in place for 5 years so all our members have now gone through the process. Apart from a couple of retired members who declined to apply, the process has been well received with little difficulty reported, either by our registrar **Wayne Beckham** who handled the workload involved (thanks Wayne!), or our members. While we are reasonably happy that our process satisfies our needs, we will be monitoring the system and seeking improvements over the course of time so please contact us if you have any suggestions.

Dr. Brenda Clark, CCPM President

By the time you read this, the CCPM web site will have been substantially revised thanks to the efforts of **Darcy Mason** and other members of the Communications Committee. The aim was to improve clarity and enable easier navigation through the posted information. If you haven't done so already, go to **ccpm.ca** to check out our new look. This revision will be ongoing for the next few months so please contact us with your suggestions, we always appreciate input. For our Francophone colleagues, we will also be adding some bilingual text. Better late than never, you might say! There has been a suggestion that we revise the format for our certificates; specifically to exchange the current glass frame for a lamination on a wooden base. The advantages of lamination are that it will eliminate the risk of breakage of the glass in the mail and also enable easier photocopying of the certificate if required. The costs should be comparable and we all agree that cost should not be a factor, our priority is to provide a high quality record of the certification that our members will be proud to hang on their wall. You will be asked for input on this issue at our next annual general meeting in Saskatoon so there is plenty of time to consider the pros and cons. The format will remain the same for this year, we have a stock of blank certificates already printed.

Another issue that will be discussed over the next few years is that of educational and experience requirements for applicants for membership in the College. As you may be aware, there is a very strong impetus from our American colleagues to require graduation from an accredited residency clinical training program for application to the American Board of Radiology. Clearly if this initiative is successful, and early indications are that it may well be, we need to consider adopting a similar strategy in Canada. The rationale is to strengthen the similarity between the education and training of medical physicists with that of our medical colleagues who are all required to successfully pass an accredited residency training before becoming licensed practitioners. Of course the main difficulties are current lack of availability of residency positions combined with the "f" word, funding. One suggestion to be considered is that we add an extra year of clinical experience to our requirements for applicants who have not graduated from an accredited residency. This strategy would serve to recognise the advantages of the structured training without excluding applicants who are not able or fortunate enough to secure such training.

On a personal note, last month I moved across the country (once again!) to take up a position

(Continued on page 28)

...there is a very strong impetus from our American colleagues to require graduation from an accredited residency clinical training program for application to the American Board of Radiology. ... we need to consider adopting a similar strategy in Canada.

Message from the Executive Director of COMP/CCPM:

While the idea of establishing a Canadian medical physics archives is not new, we are now in a position to put this important idea into action and we need your help to ensure that the records of today are preserved for future generations ...

Much has been happening with COMP and the CCPM since the last issue of InterACTIONS and I am pleased to be playing a role in a variety of initiatives.

I recently visited Saskatoon to meet with the LAC for the 2006 Annual Scientific Meeting and to conduct a site visit of the Delta Bessborough hotel, the host property. Saskatoon is an important venue for COMP as many prominent members and pioneers of the medical physics community have close ties to this vibrant city. The LAC is working hard on your behalf to plan and deliver another top-notch conference which will include a tour of the Canadian Light Source facility, a national synchrotron research and development centre of excellence. The Delta Bessborough is a landmark in the city of Saskatoon and host of many national conferences. Don't forget to book your accommodations early so that you can enjoy all that this facility has to offer!

The Canadian Medical Physics Archives Project is another initiative I am pleased to be a part of. Doug Cormack has agreed to volunteer as Chief Archivist and has some excellent ideas to ensure that this project is a success. While the idea of establishing a Canadian medical physics archives is not new, we are now in a position to put this important idea into action and we need your help to ensure that the records of today are preserved for future generations (please see the article in this newsletter to find out how to get involved). One of the tasks that has been completed for this project is an inventory of all of the materials we currently have at the COMP office. A list of these materials is posted on the website and will be updated regularly as new materials are received. This exercise has enabled me to see how the Canadian medical physics community has progressed over the years. I particularly enjoyed looking at early issues of the newsletter and can only imagine how much volunteer time and effort went into its publication. I have had the opportunity to become involved in the production of today's version of InterACTIONS by securing advertising for each issue and am aware of the many hours spent by the editor, Boyd McCurdy (even with available modern technology). Boyd's efforts, combined with the generous support of our corporate advertisers, enable COMP to produce a first-class publication.

We continue to work at promoting the visibility of the medical physics profession in Canada. The Professional Affairs Committee is developing a mechanism for regular communication with provincial ministries and we are making sure we have a presence at events and on key committees to ensure that the perspective of the medical physics profession is taken into account as policies are developed.

At the mid-year meetings of the COMP Executive and the CCPM Board, I had the opportunity to meet with another group of volunteers that is working diligently on your behalf. Opportunities to streamline and centralize administrative processes have been identified to free up Executive and Board members to focus on issues that are more strategic in nature. Maggie Hay, a member of the AMCES team will be providing administrative support to COMP and CCPM and is pleased to serve members in both official languages. Maggie can be reached via email at: admin@medphys.ca.

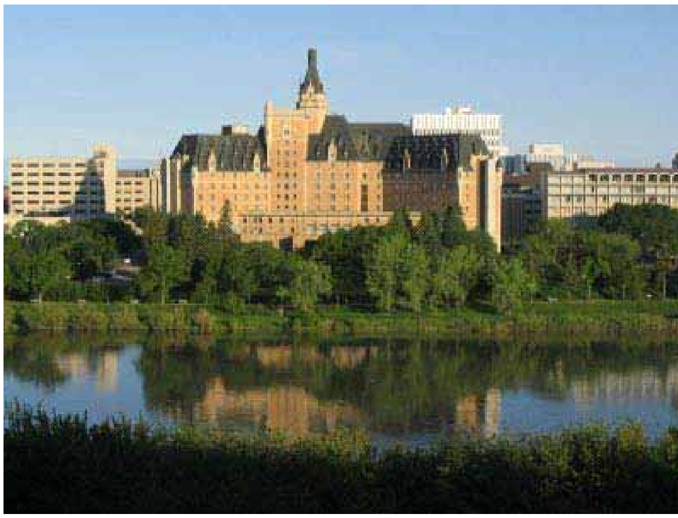
Ms. Nancy Barrett,
COMP/CCPM Executive Director

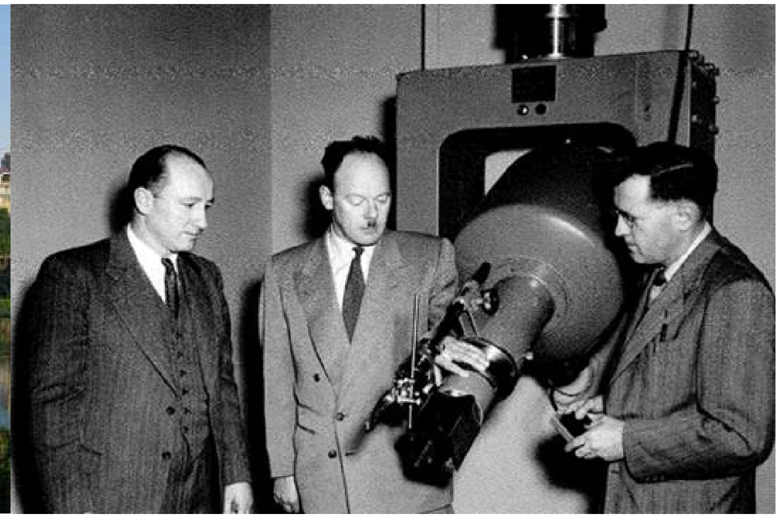
As always, your suggestions and feedback are welcome. Please feel free to contact me at nancy@medphys.ca or 613-599-1948.

CALL FOR PAPERS

52nd Annual Scientific Meeting of COMP and CCPM Symposium

May 31 – June 3, 2006
Saskatoon, Saskatchewan





The Canadian Organization of Medical Physicists and the Canadian College of Physicists in Medicine are pleased to invite you to Saskatoon to attend our 52nd Annual Scientific Meeting. This year's meeting will be held at the elegant Delta Bessborough Hotel, nestled on the banks of the South Saskatchewan River.

MEETING HIGHLIGHTS:

Wednesday:	Public Lecture:	Rock Mackie and Lisa Rendall
Thursday:	CCPM Symposium:	***Biomedical Imaging and Therapy at the Canadian Light Source***
Friday:	Special Lecture /Gold Medal Presentations	
	Banquet: Wanuskewin Heritage Park, http://www.wanuskewin.com/	
Saturday:	Tour of Canadian Light Source ~ 1:30 – 3:30	

IMPORTANT DATES – see COMP website (www.medphys.ca for details)

January 9, 2006	- Early registration and online abstract submission begins
February 24, 2006	- End of abstract submission
March 20, 2006	- End of early registration
May 31 – June 3, 2006	- COMP meeting

CARO 2005 Conference

Sept. 8-10, 2005

Submitted by Marco Carlone
Cross Cancer Institute,
Edmonton, AB

The annual meeting of CARO, the Canadian Association of Radiation Oncologists, was held in Victoria, B.C, September 8 – 10, 2005. This meeting is similar to COMP in size (this year there were about 350 attendees), and runs two parallel sessions. The highlights of the conference were the lectures from the two invited speakers. Dr. Michael Goitein of the Harvard Medical School gave this year's CARO Lecture titled, "Optimisation: Let the Buyer Beware!" Dr. Goitein, a medical physicist known by reputation to many COMP members, has spent much of his career, first at the Massachusetts General Hospital and now in Switzerland, studying and improving radiation treatment planning. His lecture was full of interesting observations regarding dose-volume optimisation. The Gordon-Richards Lecturer was Dr. Timothy Whelan, a professor in the Department of Medicine at McMaster University. Dr. Whelan's talk, "Optimizing Radiation Therapy for Breast Cancer: The Canadian Clinical Trial Experience" was an excellent review of his personal experience in doing clinical trials in breast cancer in Canada. In radiation therapy, the only true method we have to determine the clinical benefit of a new technique or technology is the clinical trial, and it was very informative to hear first hand perspectives from one of the leaders in developing and performing clinical trials in Canada.

The CARO meeting features a resident session (which is similar to the YIS at COMP) that showcases the research done by leading residents in Radiation Oncology across Canada. I was surprised and impressed that many of these talks had a considerable amount of medical physics content as some of the research projects involved fairly sophisticated treatment planning and dosimetry subjects. Also included at the CARO meeting, for the benefit of the Francophone members, is a session, conducted in French, entitled "French Connection". This year's French Connection was devoted to controversial issues regarding prostate cancer. The CARO meeting also features several awards, including one for the best abstract in radiation/medical physics. This year's winner was Jean-Pierre Bissonnette, of PMH, for an excellent talk on a stereotactic technique for lung lesions.

A motion that I believe would be of interest to medical physicists was passed by the CARO general assembly at their annual business meeting. As an associate member of CARO, I could attend this meeting, but could not vote. A proposition was put forth to the membership to change the name of the organisation from the "Canadian Association of Radiation Oncologists" to the "Canadian Association of Radiation Oncology". During the very short debate on this motion, the CARO president, Dr. Jean-Paul Bahary, was asked if this indicated that CARO was moving in the direction where medical physicists and radiation therapists would become eligible for full membership in the association. The president's reply was that he could not comment on the future direction of the association, but that this statement was consistent with the reasons used for the name change. The motion was easily passed.

The CARO meeting, like COMP, is an excellent small meeting with a high quality of scientific content. It is a very good opportunity for medical physicists to get caught up with advances in clinical topics, to look for ideas in clinical research, and to interact with our Radiation Oncologist colleagues. An associate membership in the society costs $50, and this allows registration for the meeting at the member discounted price. It is usually held in the week after labour day, starting on the Thursday, and ending on the Saturday. For those interested, next year's meeting will be held in Calgary.

2nd Annual AQPMC workshop

Submitted by Luc Beaulieu
CHUQ—Hôtel-Dieu de Québec,
Québec, QC

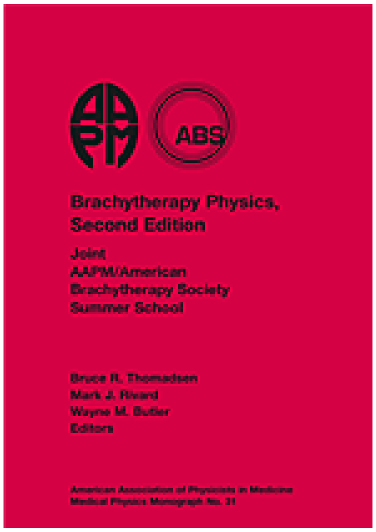
The AQPMC (Association Québécoise des Physiciens Médicaux Cliniques) held its second annual workshop on Saturday, November 19th, 2005. The day was organized by Martin Hinse and the other physicists of the Hôpital Notre-Dame campus of the CHUM (Centre Hospitalier de l'Université de Montréal) where the event was held. This year, the topic was treatment planning systems (TPS) with emphasis on commissioning and challenges to their use. Financial support for the event was provided by Varian Medical Systems, Nucletron Corporation, North American Scientific (NOMOS) and Phillips Medical Systems.

The AQPMC (www.AQPMC.ca) is a non-profitable association whose role is to represent clinical medical physicists in Québec. There are over 50 members who work in applied physics in radio-oncology, radiology, nuclear medicine and radiation protection. The aim of the workshops, held yearly, is to help physicists from Quebec institutions discuss their problems and to offer them a forum for discussions of contemporary topics in clinical medical physics.

The morning started with 10 minute presentations from physicists of each centre describing the various TPSs they have and some issues concerning their clinical use. Jake Van Dyke from the London Regional Cancer Center, this year's invited speaker, followed up with two presentations: a short talk on the

(Continued on page 29)

Book Review: Brachytherapy Physics, 2^{nd} Edition, Proceedings of the joint AAPM/ABS Summer School, Seattle Washington, 2005.



Editors: Bruce R. Thomadsen, Marl J. Rivard, and Wayne M. Butler. 982 pages. Medical Physics Publishing. Price: 175.00 USD (Hardcover, $140 for AAPM members).
ISBN 1-930524-24-2

Submitted by Marco Carlone
Cross Cancer Institute,
Edmonton, AB

This book is the proceedings of the joint American Association of Physicists in Medicine/American Brachytherapy Society summer school that was held in Seattle, Washington July 18-22, 2005. It is a comprehensive review of the current standard of practice of the physics aspects of Brachytherapy. It is divided into six major sections which consist of 54 chapters in total, which were written by 46 contributors. The chapters range in length from short (8 pages) to extensive (62 pages). The book also comes with a CD that contains *.pdf* files of each chapter.

This is the second edition of the original Brachytherapy Summer School, which was held in 1994. It contains numerous updates to the practice of Brachytherapy since the last edition, most notably it contains an excellent description of the update to the TG43 dose calculation formalism. As well, it contains several sections that describe recent advances in the clinical practice in brachytherapy, such as the shift from "system" based implants where the dosimetry is performed and evaluated based on rigid system rules, to "anatomical" based implants where imaging is used for the simulation and planning of the implant. Much emphasis is placed on prostate brachytherapy, however the book is remarkably well balanced with detailed coverage of all major areas of clinical importance (Breast, Head & Neck and Gynecological cancer), and includes a chapter dedicated to the MammoSite® Radiation Therapy System. The book also includes numerous discussions of plan optimisation, evaluation and reporting which include modern inverse planning and a review of the recent (1997) ICRU recommendations for reporting interstitial therapy. Finally, several chapters of the book cover upcoming new technologies for brachytherapy such as new isotopes (^{131}Cs) and small electronic x-ray sources that can be used as seed surrogates. The latter are particularly interesting as they offer considerable reductions in shielding requirements and regulatory oversight.

This book is impressive in its level of detail and coverage of virtually all aspects of brachytherapy. My only criticism of the book is that the contributors, who are all very well qualified and experienced practitioners of brachytherapy, are mostly physicists with few radiation oncologists contributing. Nevertheless this book is well worth its price and would be a good addition to anyone's bookshelf.

Call for Proposals – COMP Annual Scientific Meeting

COMP invites proposals from medical physics groups interested in hosting either the 2009 or the 2010 COMP annual scientific meeting. The COMP meeting is typically held in early June at either a University campus or at a conference facility. Attendance may be up to 250 persons and provision must be made for exhibitor displays and for business meetings of both the COMP executive and the CCPM board. It is expected that the 2009 meeting will be a joint meeting followed by a stand-alone (COMP only) meeting in 2010.

Your initial proposal should not exceed 3 pages and should include a description of the meeting facilities at the proposed venue; the accommodation that will be offered to attendees and any other information that will help the Executive evaluate your bid.

Submissions will be accepted up May 18, 2006 and the proposals will be discussed at the COMP and CCPM business meetings in Saskatoon.

COMP OCPM

CANADIAN ORGANIZATION OF MEDICAL PHYSICISTS	ORGANISATION CANADIENNE DES PHYSICIENS MÉDICAUX

CALL FOR NOMINATIONS

APPEL POUR MISES EN CANDIDATURE

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(2-year Term as Chair-Elect from 2006 to 2008;
2-year Term as Chair from 2008 to 2010;
2-year Term as Past-Chair from 2010 to 2012)

Président(e)

(Terme de 2 ans comme président(e) élu(e) 2006 à 2008;
terme de 2 ans comme président(e) 2008 à 2010;
terme de 2 ans comme président(e) sortant(e) 2010 à 2012)

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

La mise en candidature doit être signée par deux membres actifs et par le(la) candidat(e) qui indique par sa signature qu'il(elle) accepte la mise en candidature.

Please send nominations to:

Envoyez vos mises en candidature à:

Clément Arsenault, Ph.D., FCCPM
COMP Past-Chair
Centre d'oncologie Dr Léon-Richard
Moncton, NB E1C 8X3
Tel: (506) 862-4151
Fax: (506) 862-4222
E-mail: carsenault@health.nb.ca

DEADLINE : FEBRUARY 28, 2006

The results will be reported at the Annual General Meeting in Saskatoon in June 2006.
(See Articles IV.B(6&7) of COMP Bylaws)

DATE LIMITE : 28 FÉVRIER 2006

Les résultats seront rapportés à la réunion générale annuelle à Saskatoon en juin 2006.
(Voir articles IV.B(6 et 7) des règlements de l'OCPM)

Nominee :

Accepted by nominee :

Sponsors: 1)

2)

Candidat(e) :

Acceptée par le(la) candidat(e):

Parrains: 1)

2)

COMP OCPM

CANADIAN ORGANIZATION OF MEDICAL PHYSICISTS

ORGANISATION CANADIENNE DES PHYSICIENS MÉDICAUX

CALL FOR NOMINATIONS

APPEL POUR MISES EN CANDIDATURE

Councillor for Communications

(3-year Term from AGM in 2006 to AGM in 2009)

Conseiller des communications

(Terme de 3 ans de la RGA en 2006 à la RGA de 2009)

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

La mise en candidature doit être signée par deux membres actifs et par le(la) candidat(e) qui indique par sa signature qu'il(elle) accepte la mise en candidature.

Please send nominations to:

Envoyez vos mises en candidature à:

Clément Arsenault, Ph.D., FCCPM
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Accepted by nominee :

Sponsors: 1)

2)

Candidat(e) :

Acceptée par le(la) candidat(e):

Parrains: 1)

2)

2006 Sylvia Fedoruk Prize in Medical Physics

The Saskatchewan Cancer Agency is pleased to sponsor a competition for the 2006 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 on June 1-3, 2006 in Saskatoon.

The 2006 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 2005 calendar year. The selection of the award-winning paper 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. Four (4) copies of each paper being entered must be sent to:

Peter O'Brien, MSc., FCCPM,
COMP Chair,
Toronto Sunnybrook Regional Cancer Centre,
2075 Bayview Avenue,
Toronto, Ontario,
M4N 3M5
Tel: (416) 480-4622
Fax: (416) 480-6801
E-mail: peter.o'brien@sw.ca

Each paper must be clearly marked: "Entry for 2006 Sylvia Fedoruk Prize" and must reach the above address no later than **Friday, February 24, 2006**.

The award winners from the last four years were:

P. Johns, M. Wismayer, " Measurement of coherent x-ray scatter form factors for amorphous materials using diffractometers", *Physics in Medicine and Biology",* **49**, 5233-5250 (2004)

A. Samani, J.Bishop, C. Luginbuhl, D. Plewes, " Measuring the elastic modulus of ex-vivo small tissue samples", *Physics in Medicine and Biology*, **48**, 2183-2198 (2003)

J.H. Siewerdsen, I.A. Cunningham and D.A. Jaffray, "A framework for noise-power spectrum analysis of multidimensional images", *Medical Physics,* **29,** 2655-2671 (2002)

B. McCurdy, K. Luchka and S. Pistorius, "Dosimetric investigation and portal dose image prediction using an amorphous silicon electronic portal imaging device", *Medical Physics,* **28**, 911-24 (2001).

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We are pleased to invite you to be part of an exciting project undertaken by the COMP Executive. While the idea of establishing an archives of Canadian medical physics is not new, we are now in a position to put this important idea into action and we need your help!

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- Photos (including names and dates) of individuals or groups
- Biographical sketches of leaders in the medical physics community who have made significant contributions in medical physics
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- Meeting Minutes
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- Conference proceedings
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A listing of the material that has been collected to date is posted on the COMP website. Please refer to this list and if you have additional materials to contribute, they can be emailed to nancy@medphys.ca or forwarded to the COMP office:

Canadian Organization of Medical Physicists
Archives Project
P.O. Box 72024
329 March Road
Kanata, ON K2K 2P4

If you have any thoughts or questions about this project, please feel free to contact either of us via email. Thank you for your support and interest in this project!

Douglas Cormack, PhD, FCCPM
Chief Archivist
cormackd@shaw.ca

Nancy Barrett, CAE
Executive Director
nancy@medphys.ca

ARCHIVE CONTEST:

This photo includes two of the candidates who survived the very first round of CCPM exams (written + oral) in 1980. Can you name them?

Please send your response to nancy@medphys.ca

Update on Response to Current CNSC Initiatives

Submitted by Peter Dunscombe
Tom Baker Cancer Centre, Calgary, AB

Below are two letters that have been sent to the CNSC and are related to their current initiatives. The first one, S-213, was emailed to heads of physics across the country with encouragement to have all the physicists in the centre sign it and then mail the signed copy to the CNSC. The second one, G-313, was sent by the RSTSAC on behalf of the Canadian medical physics community. The documents to which they refer can be found on the CNSC website.

Letter One: S-213

Administrative Assistant
Directorate of Operational Strategies
Regulatory Documents and Research Division
Canadian Nuclear Safety Commission
P.O. Box 1046, Station B
280 Slater Street , Ottawa, Ontario K1P 5S9
CANADA
Re: File 1-8-8-213

Dear Sir or Madam

Through the Canadian Organisation of Medical Physicists (COMP) we have recently been made aware of a proposed new regulatory standard on Quality Assurance Programs for Nuclear Facilities (CNSC Document ***S-213***).

Our institution has been, and continues to be, committed to respecting the legislated regulations that pertain to the safe operating practices for our CNSC licenses, and we believe that the current level of CNSC regulation is adequate and reasonable without the imposition of regulatory standard ***S-213***

CNSC draft regulatory standard ***S-213*** (Quality Assurance Program Requirements for Nuclear Facilities) is a document that applies to all Class I and II nuclear facilities and in our opinion is an unreasonable and unmanageable burden on a health care facility. In addition it appears to have been designed with industry in mind. Cost recovery strategies are entirely different between industry and health care facilities, and the financial burden of additional regulations may not be easily passed on to health care users as is the case in industry. In short, our institution would have considerable difficulty in satisfying the criteria as listed in section 5 of ***S-213***.

We would like to request that the CNSC refrain from imposing ***S-213*** as a license condition for our Class II medical facility.

Letter Two: G-313

Administrative Assistant
Regulatory Standards and Research Division
Directorate of Operational Strategies
Canadian Nuclear Safety Commission
P.O.Box 1046, Station B
280 Slater Street
Ottawa
ON K1P 5S9

Dear Sir or Madam

I am writing to you on behalf of the Canadian Organization of Medical Physicists (COMP) and the Canadian College of Physicists in Medicine (CCPM) regarding draft regulatory guide G-313. The CCPM and COMP represent medical physicists working in the 38 provincial CNSC regulated Class II radiotherapy facilities across Canada. The Radiation Safety and Technical Standards Advisory Committee (RSTSAC) of COMP met during the annual meeting in Hamilton, Ontario this summer (July 5, 2005) and discussed the possible outcomes of implementing guide G-313 in our clinics.

While we recognize that this document is well presented and represents a significant amount of work by the CNSC, the application of this guide in hospital based Class II facilities would require the re-allocation of limited resources now directed towards patient care. Personnel currently working in Class II radiation therapy centers (such as physicians, physicists and therapists) are only employed following the completion of either accredited or sanctioned training. The training program and associated administration suggested by G-313 represents an enormous amount of duplication and unnecessary effort.

We believe that the safety record and level of risk associated with Class II radiation therapy facilities does not support the scope of training suggested by G-313, and we would ask that document G-313 be modified, especially for hospital based Class II facilities so that it is more reflective of our needs and resources.

Yours faithfully,

Peter Dunscombe, Ph.D
Chair, Radiation Safety and Technical Standards Advisory Committee.

Canadian College of Physicists in Medicine

Examination Schedule 2006

Membership Examination:
Applications due: 6 January 2006
Examination date: Written 11 March 2006
Oral 13 May 2006
Fee: $450.00
Decisions announced on or before February 24
(Note: Non-Radiation Oncology specialty orals to be held at the same time as Fellowship orals)

Fellowship Examination:
Applications due: 6 January 2006
Examination date: 1-2 days prior to COMP Meeting in Saskatoon
Fee: $300.00 (Exam in Saskatoon)
Decisions announced on or before February 24
(later for those who do the membership exam in the same year)

Note:

- The application forms, exam study guide, and sample exams are available on the COMP website under the heading "CCPM Certification". Application forms must be the ones currently posted on the COMP website.
- Membership & Fellowship examination application deadlines are set to the same date. This allows the Credentials Committee to review all applications in one time period.
- **It is critical for the success of your application that you respect the deadlines**.

For further information contact the Registrar:

Dr. Wayne Beckham. Registrar, CCPM
BC Cancer Agency, Vancouver Island Centre
2410 Lee Ave.
Victoria, British Columbia, V8R 6V5
Phone: (250) 519-5620 Fax: (250) 519-2024
wbeckham@bccancer.bc.ca

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Developments in water calorimetry for electron beam radiation dosimetry

By Kristin J. Stewart[1], Carl K. Ross[2], Norman V. Klassen[2] and Jan P. Seuntjens[1]
[1]Medical Physics Unit, McGill University, Montreal, QC
[2]Institute for National Measurement Standards, National Research Council of Canada, Ottawa, ON

1. INTRODUCTION

Absorbed dose-based protocols (e.g. TG-51 [1], TRS 398 [2]) are widely used in clinical reference dosimetry for megavoltage photon and electron beams. These protocols are based on calibration of an ionization chamber in a ^{60}Co beam in terms of absorbed dose to water and use the beam quality conversion factor k_Q to determine the absorbed dose to water calibration coefficient for other photon and electron beams. For photon and electron beams the absorbed dose calibration coefficient $N_{D,w}$ is given by:

$$N_{D,w} = k_Q N_{D,w}^{^{60}Co} \quad (1).$$

In AAPM TG-51, k_Q for electron beams is rewritten as the product of k_{ecal} and k_{R50}, the photon-electron conversion factor and the electron beam quality conversion factor respectively. k_Q values provided in the protocols are primarily based on approximate calculations and simplified models. For photon beams, measurements have been performed to confirm the validity of these factors using water calorimetry [3]. New Monte Carlo simulations indicate that there may be errors in some of the factors used in calculating k_Q. One example is recent work by Buckley and Rogers [4], which indicates that P_{wall}, a factor used to calculate the electron beam quality conversion factor and which was assumed to be unity for cylindrical chambers in electron beams, may have values of up to 1.007.

Measurements of $N_{D,w}$ in electron beams are currently being performed at two national standards labs. At the NPL (National Physical Laboratory) in the UK, graphite calorimetry is used [5]. However, there remain issues with the wall correction factors for the ionization chambers needed to convert dose to graphite into dose to water [6]. At METAS (Metrology and Accreditation Switzerland) in Switzerland, absorbed dose calibration coefficients have been measured in electron beams with reference to total absorption Fricke dosimetry [7]. The advantage of using water calorimetry rather than graphite calorimetry or Fricke dosimetry for measurements in electron beams is that it provides a direct measurement of absorbed dose to water in water without the need for energy-dependent conversion or correction procedures.

Some early efforts were made to use a first-generation water calorimeter for a wider range of electron beam measurements [8]. In these measurements, however, water purity was not carefully controlled, so that the chemical heat defect was uncertain. As well, the effect of temperature gradients produced by electron beams was not corrected for. Water calorimetry in low energy electron beams was generally considered unfeasible since high dose gradients were thought to provoke unmanageable temperature gradients. Hence, there remains the need to develop a water calorimetry system that is sufficiently accurate and precise for electron beam absorbed dose determination over a wide range of energies. This means that not only water quality and chemical heat defect are issues for consideration, but also the effects of thermal gradients need to be properly taken into account. If such a system can be developed it would be possible to calibrate ionization chambers directly in electron beams of clinically relevant energies and use these calibrations to calculate beam quality conversion factors.

In this work, we present the Electron Sealed Water (ESW) calorimeter, a new calorimeter designed specifically for measurements in clinical electron beams. We also discuss the determination of various correction factors necessary for these calorimetry measurements and finally show preliminary evaluations of relative beam quality conversion factors for two different ionization chambers for electron beam energies between 6 and 20 MeV.

2. MATERIALS AND METHODS

2.1 Calorimeter Design

The ESW calorimeter (see Figures 1 and 2) has been designed to be relatively compact and transportable. The calorimeter box contains a 30 x 30 x 20 cm^3 water phantom with 10 mm thick PMMA walls. The calorimeter is operated at 4°C to avoid convection. This operating temperature is achieved and maintained by surrounding the water phantom with a cooling and insulating system consisting of a 5 cm layer of Styrofoam, 5 mm copper plate with copper tubing soldered to it and a second 5 cm layer of Styrofoam. This is enclosed in a plywood box which has outer dimensions of 55 x 55 x 40 cm^3. The lid consists of a 5 mm copper plate with copper tubing soldered to it and Styrofoam layers of 2.5 and 1 cm above and below the copper respectively. A window is cut in the copper of the lid to allow for irradiation from above by a 10 x 10 cm^2 beam. This window is covered with a 0.1 mm brass foil to provide active cooling of this area. A Neslab RTE-7 refrigerated bath/ circulator controls the temperature of the cooling fluid to within 0.1°C and this fluid is circulated through the copper tubing in the calorimeter box and lid. A valve can also be opened to allow the cooling fluid to flow through an anodized aluminum heat exchanger inside the water phantom when large temperature adjustments are required (e.g. when reducing the temperature of the water from room temperature to 4°C). With the valve closed, the water phantom temperature can be maintained within 5 mK over several hours, which is important because the

(Continued on page 17)

Water calorimetry for electron beams... (Continued from page 16)

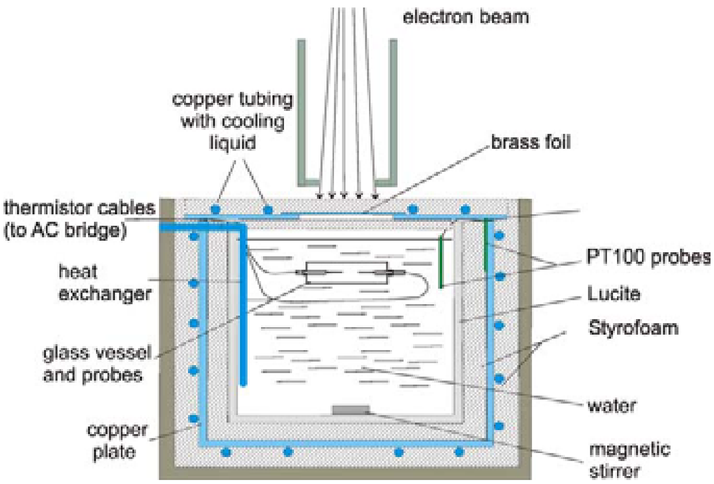


Figure 1: *Schematic diagram of the ESW calorimeter – side view*

Figure 2: *Photograph of the ESW calorimeter taken from above with the lid removed.*

temperature change produced by irradiation is only 0.24 mK/Gy. There is a magnetic stirrer at the bottom of the water phantom which is used during initial cooling as well as following a series of measurements to remove temperature gradients produced by irradiation. On the side of the water phantom is a depth positioning device for the calorimeter vessel and the ionization chambers. The depth of the vessel or chamber is set using digital calipers.

2.1.1. Vessel, thermistor probes and electronics

The calorimeter vessel (see Figure 3) is made of Pyrex glass and is of a "pancake" cylindrical design. The front and back circular windows are 79 mm in diameter and 1.1 mm thick and the cylindrical side wall is 2.1 mm thick. The internal separation between the front and back windows is 24 mm. There are two ports in the side wall with threaded openings for the insertion of the thermistor probes. A third port is used for filling and gas bubbling and has a small glass bulb in which a gas bubble can be trapped to allow for volume changes in the water. This port is closed using a glass stopcock with three CAPFE® Teflon-encapsulated O-rings. A threaded plastic cap holds the stop-cock in place.

The thermistor probes were constructed using Pyrex tubing with a diameter of 8 mm and a wall thickness of 1 mm which was pulled down to an outside diameter of approximately 0.6 mm over a length of 4 cm and an inside diameter of at least 0.3 mm. The thermistor bead itself is 0.25 mm in diameter and has a nominal resistance of 10 kΩ at 4°C. It is positioned inside the glass tube, approximately 0.7 mm from the tip of the sealed end. Waterproofing of the wires connected to the thermistor bead is provided by latex tubing which is stretched over the large end of the glass tube and extends outside the water phantom.

When preparing for measurements, the two probes are positioned inside the glass vessel with a 5 mm separation between the tips. CAPFE® Teflon-encapsulated O-rings and threaded Teflon bushings are used to seal each thermistor probe in a vessel port. Four screws on each bushing allow for small adjustments of the probe angles. The distance from the front of the glass vessel window to each thermistor bead is measured by focusing a traveling microscope first on the front of the glass and then on the thermistor bead. The vessel is rinsed and filled with high-purity water from a MilliQ-UV Plus water purification system (total organic content <5 ppb). The water in the vessel is then bubbled with high-purity nitrogen gas (Alphagaz, <2 ppm O_2). Following this, the vessel is positioned in the water phantom and the water temperature is reduced to 4°C.

The wires from the thermistors are connected to an AC bridge circuit (see Figure 4). One arm of the bridge is composed of two 20 kΩ Zeranin resistors (0.01% precision). The other arm has the two thermistors and is balanced using a Burster 1408 high-

(Continued on page 18)

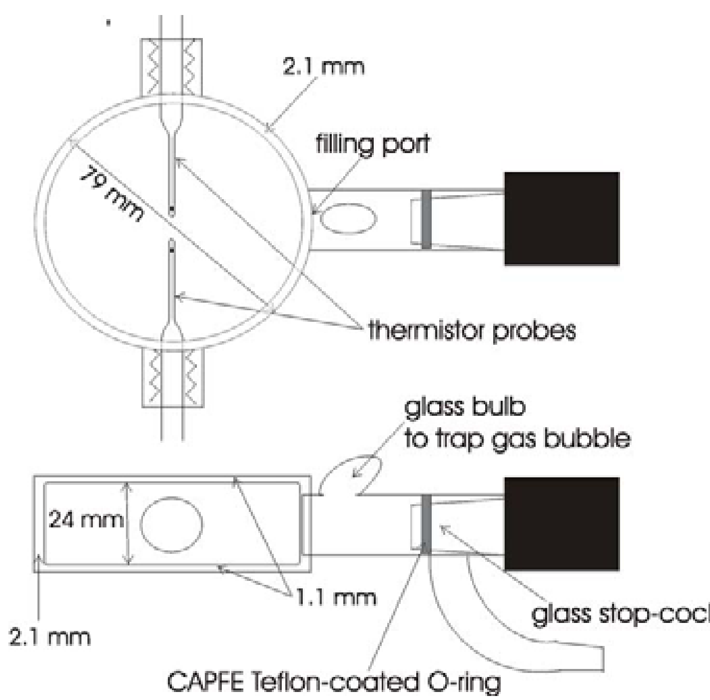


Figure 3: *Schematic diagram of the Pyrex glass vessel and thermistor probes*

Water calorimetry for electron beams... (Continued from page 17)

precision resistance decade box. The sinusoidal excitation voltage (1 V, 10 Hz) is provided by a SR510 lock-in amplifier. The lock-in measures the voltage of each arm of the bridge and provides the difference between the two voltages as output. Three PT-100 RTD temperature probes are used to monitor the water and copper temperature: two in the water phantom and one on the copper plate. The resistance of each probe is read using the 4-wire ohm-mode of a Keithley K2000 digital multimeter. Computer software is used to remotely control and read both the lock-in amplifier and the digital multimeter through a GPIB interface.

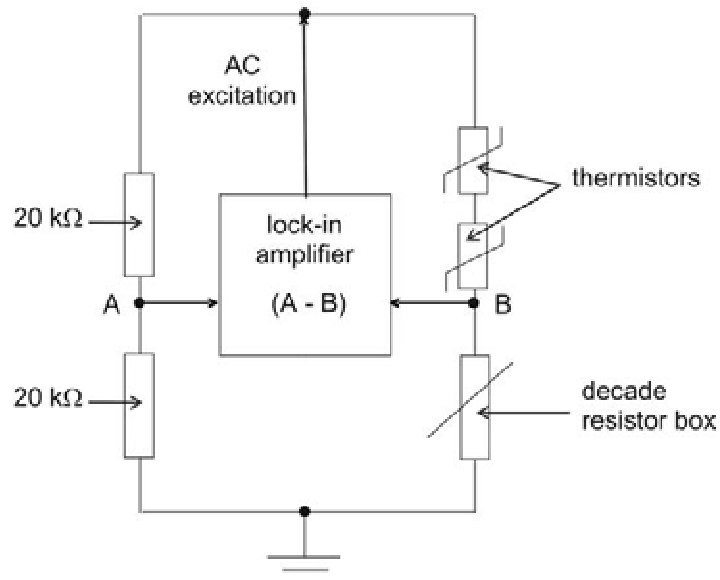


Figure 4: *Diagram of the AC bridge circuit*

2.2 Determining absorbed dose to water

In water calorimetry, absorbed dose, D_w, is determined from the temperature rise, ΔT, according to the following equation:

$$D_w = c_w \Delta T k_{\mathrm{P}} k_{\mathrm{HT}} k_{\mathrm{HD}} \qquad (2),$$

where c_w is the heat capacity of water, k_{P} corrects for perturbation of the radiation field due to non-water materials, k_{HT} corrects for heat transfer due to thermal conduction and k_{HD}, the head defect, is a correction for heat lost or gained due to chemical reactions. Since what is measured is a voltage difference, calibrations are necessary to convert this voltage change to a temperature change.

2.2.1. Calibration

Each thermistor probe was calibrated in the refrigerated bath at a series of temperatures between -4°C and 12°C against the PT-100 probes. The PT-100 probes had previously been calibrated over this same temperature range using a NIST-traceable calibrated mercury thermometer. Measured resistances of the thermistor probes were fit to an equation of the form:

$$\ln R = a_0 + \frac{a_1}{T} + \frac{a_2}{T^2} \qquad (3),$$

where R is the resistance and T is the temperature.

From the relationship

$$R = R_0 e^{\beta(1/T - 1/T_0)} \qquad (4)$$

it can be found that

$$\beta(T) = a_1 + \frac{2a_2}{T} \qquad (5)$$

and

$$R_0(T) = \exp\left(a_0 + \frac{\beta(T)}{T_0} - \frac{a_2}{T^2}\right). \qquad (6)$$

For our two thermistors we obtained β values at 4.0°C of 3022.1 K and 3145.4 K ± 0.1%.

Calibration of the voltage change of the AC bridge for a given resistance change was performed by increasing the decade box resistance by 1 Ω and measuring the change in voltage. These 1 Ω calibrations were performed along with each set of calorimeter measurements to determine the dependence of the voltage change on the measurement temperature as well as to watch for any gain changes in the system.

2.2.2. Measurement Conditions

Calorimeter measurements were done on a Varian Clinac 21EX for 6, 9, 12, 16 and 20 MeV electron beams with a distance from the source to the water surface of 105.6 cm. The field size was set to 10 x 10 cm^2 at 100 cm SSD using a cut-out in the electron applicator (see Figure 5). To determine R_{50} for each electron beam energy, PDD measurements under the calorimeter lid were obtained using a diode in a scanning water tank. d_{ref} was calculated based on these values of R_{50} according to:

$$d_{\mathrm{ref}} = 0.6 R_{50} - 0.1 \text{ [cm]} \qquad (7).$$

The calorimeter vessel was positioned with the thermistor probes at d_{ref}.

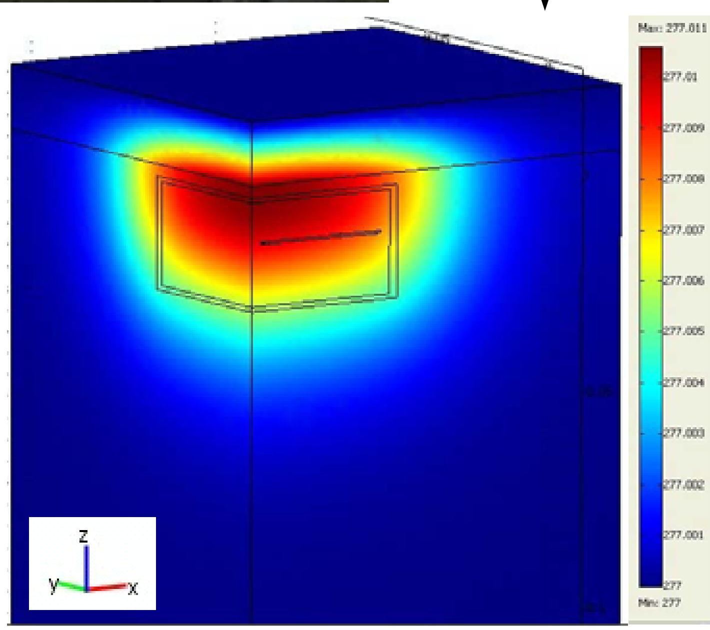
Irradiations of 667 MU at 1000 MU/min resulted in an irradiation time of 40 s and a dose of 5.5 to 6 Gy at the measurement point. The temperature drift was measured for 60 s before each irradiation (pre-drift) and 90 seconds afterwards (post-drift). By applying linear fits from 0 to 50 s of the pre-drift and 20 to 88 s of the post-drift and then extrapolating these linear fits to the mid-point of the irradiation time, the total temperature change during the irradiation was determined. A set of 8 to 12 irradiations were performed with approximately 5 min between the start times of each. At least two 1 Ω bridge calibrations were performed for each set of irradiations. A total of approximately 30 irradiations were done to determine the dose for each energy.

Ionization chamber measurements were done with a PTW Roos chamber and an Exradin A12 chamber. Chamber measurements

(Continued on page 19)

Figure 5: Photograph of the ESW set-up for electron beam measurements

Figure 6: COMSOL MULTIPHYSICS simulation of temperature change including conductive heat transfer for a 6 MeV electron beam following a series of 10 successive irradiation runs (60s pre-drift, 40s irradiation, 90s post-drift). One quarter of the symmetric geometry was simulated including the glass vessel and thermistor probes in water with an air layer above the water surface.



were performed inside the calorimeter phantom under the same conditions as were used for the calorimeter measurements except that the water temperature was increased to 22ºC. The correction for the change in water density from 4ºC to 22ºC was calculated to be less than 0.1% for all electron energies, so no correction was applied. In order to correct for any changes in accelerator output, readings were taken before and after both calorimeter and ionization chamber measurements using a NE2571 chamber in a polystyrene block inserted into the electron applicator.

2.2.3. Correction Factors

2.2.3.1 Chemical Heat Defect

For a nitrogen-saturated pure water system, the correction for the chemical heat defect, k_{HD}, has been determined to reach a steady state of 1.000±0.003 once a sufficient accumulated dose is reached [9]. We have assumed that this correction applies to our system since, following pre-irradiation of 10 Gy, no change in response with accumulated dose was observed.

2.2.3.2 Vessel perturbation effect

The perturbation of the radiation field caused by the glass vessel was determined using the EGSnrc/dosrznrc Monte Carlo code [10]. Simulations were done including the lid materials both with and without the glass vessel for each beam. The dose scoring region at the point of interest had a 1 cm radius and 1 mm thickness. k_P is the ratio of the dose without the vessel to the dose with the vessel at the position of the thermistor probes.

2.2.3.3 Thermal conduction

Since the calorimeter is operated at a temperature of 4°C, where the density of water is maximum, thermal perturbations resulting

(Continued on page 23)

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Water calorimetry for electron beams... (Continued from page 19)

from convection in the water have been ignored. However a correction must still be applied for thermal conduction in the water resulting from temperature gradients. These temperature gradients arise from two main sources: the gradient of the radiation field and, since glass has a lower heat capacity than water, a greater heating of the glass in the vessel and thermistor probes compared to water.

The total heat transfer due to conduction during a measurement must be determined. COMSOL MULTIPHYSICS 3.2 (formerly FEMLAB 3.1) finite element modeling software was used to simulate the geometry, materials and irradiation heating present in our system and solve the conductive heat transport equation at the thermistor bead position (see Figure 6). The temperature evolution was followed for a series of ten successive simulated irradiations including associated pre- and post- drift times. Analysis of the simulations was similar to the measurement analysis: the 60 s temperature drift before irradiation was fit to a straight line and the irradiation and 90 s post-irradiation temperatures were normalized to this linear fit. By dividing by the expected temperature change in the absence of conduction, the amount of conductive heat transfer was determined. The normalized temperature difference in the post-irradiation interval between 20 and 90 s was fit with a straight line and this was extrapolated to the mid-irradiation time. This gave the amount of conductive heat transfer we would expect to be present in our measurements and therefore the inverse of the extrapolated value provided the correction k_{HT}. This process was repeated for each of the ten runs and an average of the corrections was used.

3. RESULTS AND DISCUSSION

3.1 Vessel perturbation correction

Monte-Carlo calculated corrections for the glass vessel ranged from 0.994 to 1.026 (see Table 1). For low energy electron beams, this correction was found to be very sensitive to the position of the thermistor probes within the vessel. The uncertainty in k_P due to position was estimated to be 0.8% for 6 MeV, 0.3% for 9 MeV, 0.2% for 12 MeV and 0.1% for 16 and 20 MeV, corresponding to a position uncertainty estimate of ±0.5 mm. This uncertainty was combined with the statistical uncertainties for the simulations (0.1% for 6 and 9 MeV, 0.2% for 12, 16 and 20 MeV) to determine the overall uncertainty in k_P. For the 6 and 9 MeV beams, the perturbation is equivalent to a shift in the PDD of 1.4 mm (equivalent to the shift caused by the glass of the front face of the vessel due to its density). For the higher energy beams the perturbation cannot be explained by a simple shift of the PDD, indicating that effects from scatter become significant for these energies.

3.2 Conductive heat transfer correction

An example of the simulated post-drifts for 10 successive runs for a 12 MeV beam is shown in Figure 7. The values of k_{HT} vary from 1.008 to 1.013 for the different electron energies with a standard deviation of 0.1% for 10 runs (see Table 1).

e-beam energy	R_{50} (cm)	k_P	k_{HT}
20 MeV	8.26	1.004±0.003	1.009±0.001
16 MeV	6.64	0.998±0.003	1.009±0.001
12 MeV	4.94	0.999±0.003	1.008±0.001
9 MeV	3.54	1.007±0.003	1.008±0.001
6 MeV	2.25	1.024±0.008	1.013±0.001

Table 1: *Corrections with uncertainties for perturbations of the radiation field and conductive heat transfer for each electron beam energy.*

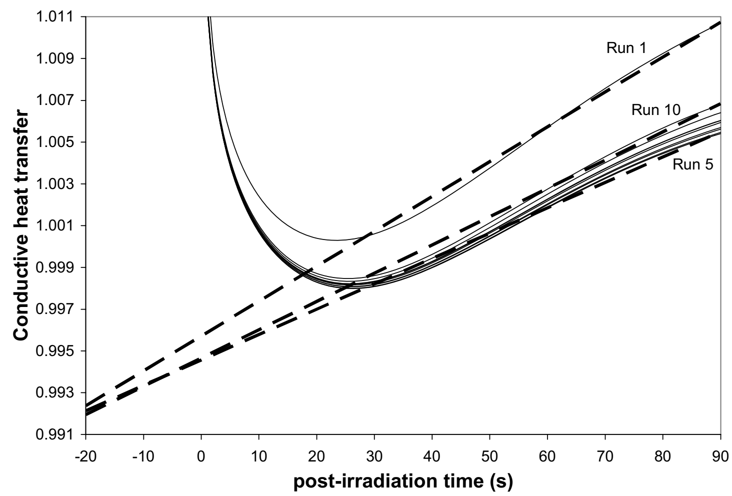

Figure 7: *COMSOL MULTIPHYSICS simulation of conductive heat transfer from 0 to 90 s post-irradiation time for 10 successive simulated 40 s irradiation runs of a 12 MeV electron beam. Results are normalized to a linear fit to the preceding 60 s pre-drift region and compared to the expected temperature change in the absence of conduction. The amount of conductive heat transfer present in measurements is determined by extrapolating the linear fit from 20 to 90 s post-irradiation to the mid-irradiation time (-20 s on this graph). The inverse of this value is k_{HT}.*

3.3 Dose measurements

Figure 8 shows an example of the voltage signal for a typical calorimeter irradiation run as well as the straight line fits to the pre-and post-drift regions. Measurements for the electron beams were taken on six separate occasions over a one year period and measurements for the 12 MeV beam were taken each time to check the variation in response for each vessel fill. The standard deviation of the 12 MeV measurements on separate occasions was 0.4%.The standard uncertainty on the mean temperature change for 30 runs at each energy was less than 0.2%.

Figure 9 shows the beam quality conversion factor k_Q for the Roos and Exradin A12 chambers calculated from the calorimeter and chamber measurements normalized to unity for the 20 MeV beam measurements (R_{50} = 8.26 cm) according to the equation:

$$\frac{k_Q}{k_{Q(R_{50}=8.26\text{cm})}} = \frac{D_{\text{cal}} / M_{\text{chamber}}}{D_{\text{cal}(R_{50}=8.26\text{cm})} / M_{chamber(R_{50}=8.26\text{cm})}}, \quad (8)$$

(Continued on page 24)

Water calorimetry for electron beams... (Continued from page 23)

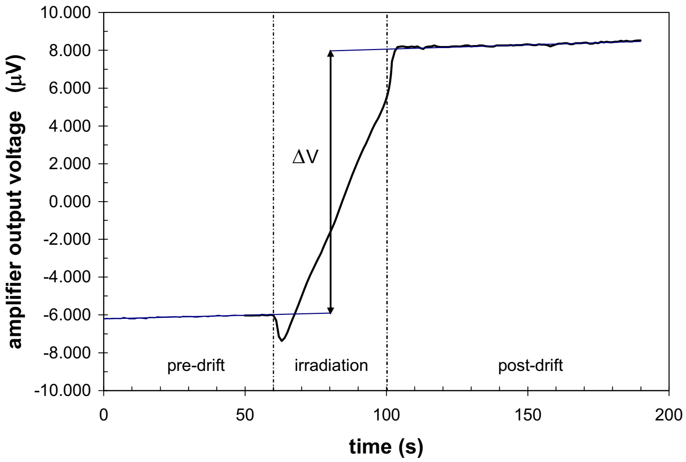

Figure 8: *Voltage signal from a typical calorimeter run indicating pre-drift, irradiation and post-drift. The sharp changes in voltage at the beginning and end of irradiation are caused by radiation-induced electrical effects. These effects should not influence the calculation of the temperature change, however, as this is determined using the pre- and post-irradiation drifts.*

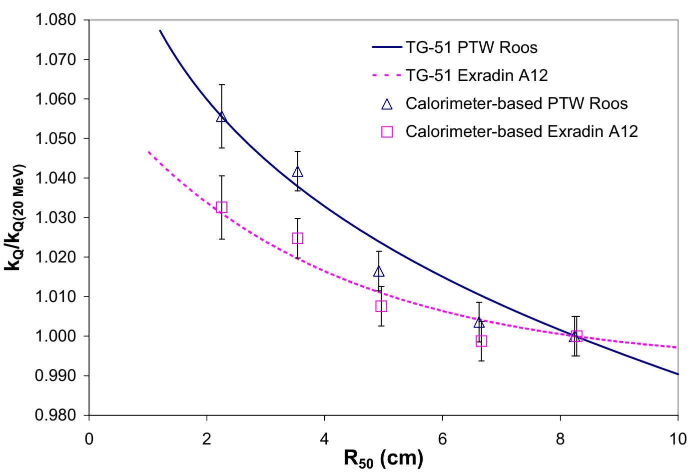

Figure 9: *Points indicate the ratio of the beam quality conversion factor k_Q calculated using equation 8. Error bars indicate combined uncertainties of 0.5% for 9-12 MeV and 0.9% for 6 MeV (note: error bars have been offset for clarity). Points are normalized to unity for 20 MeV (R_{50} = 8.26 cm). Lines indicate the TG-51 values for k_Q also normalized to R_{50} = 8.26 cm.*

where D_{cal} is the calorimeter dose and $M_{chamber}$ is the corrected charge measurement made using the ionization chamber. These results are compared to k_Q factors given in the TG-51 protocol [1], also normalized to R_{50} = 8.26 cm. The normalized calorimeter measurements are in agreement with the normalized TG-51 values within the associated uncertainties of 0.7% for 9 to 20 MeV and 1.4% for 6 MeV.

4. CONCLUSIONS

In this paper we discussed recent developments at our centre in regard to water calorimetry for absorbed dose measurements in clinical electron beams. We have constructed a sealed water calorimeter for use in clinical electron beams. Simulations of the correction factors for vessel perturbation and thermal conduction indicate that for energies between 9 and 20 MeV, these corrections are small (<1%). Sets of consecutive measurements had a standard uncertainty of less than 0.2% for energies between 6 and 20 MeV. Values of k_Q obtained via calorimeter measurements for the PTW Roos and Exradin A12 chambers normalized to 20 MeV were in agreement with values reported in TG-51 within the uncertainties. These are still only relative k_Q values, but currently we are performing measurements with the ESW calorimeter in photon beams in order to experimentally establish absolute values of k_Q and determine whether factors provided in the current protocols are correct. We expect that in the near future a large set of calorimeter-based beam quality conversion factors will be available that should provide the much-needed experimental backup for currently used or revised clinical dosimetry protocol data for electron beams.

Acknowledgements

We would like to acknowledge V. Bobes, J. Larkin, P. Leger, D. Marchington and R. van Gils for their work in the construction of the ESW calorimeter. Thanks to H. Palmans for helpful advice. Also thanks to G. Jarry for assistance with the Monte Carlo simulations. Funding has been provided by the Canadian Institutes of Health Research through a doctoral research studentship and by the Natural Science and Engineering Research Council of Canada through grant RGPIN 298191. JS is a research scientist of the National Cancer Institute of Canada appointed with funds provided by the Canadian Cancer Society.

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Water calorimetry for electron beams… (Continued from page 24)
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New Emeritus Member – Greg Kennelly

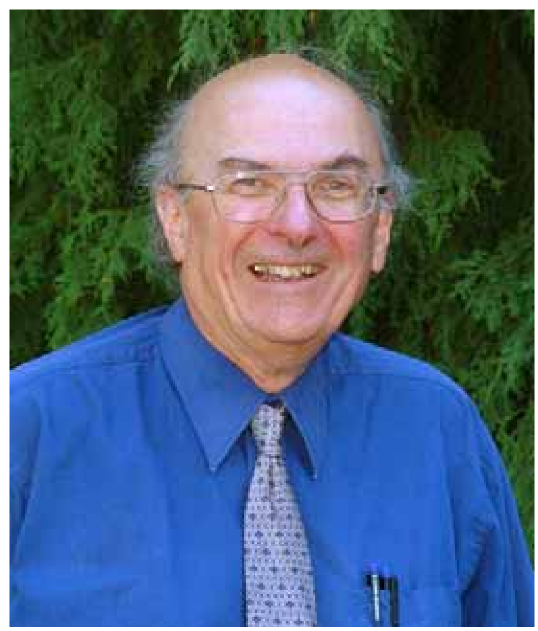
Submitted by Brenda Clark
The Ottawa Hospital Regional Cancer Centre, Ottawa, ON

It is with pleasure that the Canadian Organisation of Physicists in Medicine announces the election of Greg Kennelly to the status of Emeritus Member of COMP.

Greg retired recently after a career in medical physics spanning 40 years! He was initially recruited into a physics technician position at the Vancouver Cancer Centre by Dr. Harold Batho, of "Batho Correction" fame. After taking some time off to complete his degree in physics, Greg returned to the BC Cancer Agency as a medical physicist and stayed. Greg became a Member of the CCPM in 1983 and achieved Fellowship in 1984, the first and one of only three who have ever achieved Fellowship without a graduate degree.

During his career, Greg made many contributions to the profession, but this election recognises his outstanding work in raising the profile and increasing the recognition of the profession of medical physics within the legal and political community of BC.

Greg was the driving force behind the recent incorporation of the BC Association of Medical Physicists under the Society Act of the Province of British Columbia. This is the first step towards professional recognition of medical physics in BC. To achieve this, Greg spent many days researching the legal requirements, drafted a consitution and bylaws for the newly formed BCAMP, applied for and was granted incorporation. In recognition of this effort, Greg was elected as the first President of this organisation in April 2003.



Across Canada

Saskatchewan Cancer Agency
Excellence in Patient Care & Cancer Control

Saskatoon Cancer Centre
Saskatoon, SK
Submitted by Narinder Sidhu

The Saskatoon Cancer Centre, birth place of Cobalt – 60 radiation therapy, is located on the campus of University of Saskatchewan in Saskatoon. The Centre is one of the two cancer centers operated by the Saskatchewan Cancer Agency to meet its legislated mandate of Cancer Control. The Agency strives to meet its mandate through research, education, treatment, prevention and early detection of cancer. The Saskatoon Cancer Centre is a comprehensive treatment and research facility, providing systemic and radiation therapy treatments to patients in the surrounding areas with a population of approximately half a 0.5 million. The department of Medical Physics provides clinical and research support to the Radiation Oncology Program at the Centre. The department consists of 4 Medical Physicists, 5 Dosimetrists, 3 Electronic Technologists, 1 Mould Room Technologist, 1 Physics Assistant and a Secretary.

It is always a challenge to keep up with the latest developments in the field due to scarcity of funds and fast pace of technological developments. However, given the foresightedness of our management and the dedication of our staff, we have been doing quite well. Some strategic decisions resulted in our starting an IMRT program as early as 2001. Currently we are participating in many national and multi-institution studies involving IMRT treatments. Our radiation therapy equipment consists of two fully matched Varian Clinac 21EX treatment machines with Millennium (120 leaves) MLC and a-Si portal imaging systems, a dual slice GE CT simulator, a conventional Philips simulator, an ortho-voltage unit and a Selectron LDR treatment machine. The treatment planning is done on four Pinnacle workstations and we provide full 3D CT treatment planning for all treatment sites. A new Varian Clinac iX with On-Board KV imager and cone beam CT is currently being installed and is expected to go into clinical service in early 2006.

All our Senior Medical Physicists have academic appointments at the University of Saskatchewan. We offer a graduate program in Medical Physics at the level of M.Sc. and Ph.D. through the department of Physics and Engineering Physics at the University of Saskatchewan. Some of our current research projects are in the field of gated therapy, lung modeling and IMRT QA. We also do some teaching in the Radiation Therapy training program. Due to our close proximity we get ample opportunities to collaborate with other researchers at the University of Saskatchewan and the Canadian Light Source (Synchrotron facility).

We are always very eager to help our immediate neighbors as well. A team of our Physicists helped in the design and commissioning of a Veterinary Radiation Oncology facility at the Western College of Veterinary Medicine at the University of Saskatchewan. The facility consists of a Theraton Th780 treatment unit, a Pinnacle treatment planning station, a CT scanner and an MRI unit.

While we are excited to start our Image Guided Radiation Therapy program in early 2006 with the arrival of our new treatment machine with OBI we are also excited to see you in Saskatoon for COMP – 2006 annual meeting. Some of our staff are currently busy making arrangements for the COMP - 2006 annual meeting in Saskatoon. The meeting is scheduled for May 31 – June 3, 2006, at the Delta Bessborough Hotel in downtown Saskatoon. Arrangements are being made for the tour of the Canadian Light Source during this meeting. We look forward to see you in Saskatoon for COMP – 2006.

Physicists at the SCC (left to right) – Pat Cadman, Gavin Cranmer-Sargison, Narinder Sidhu, and Claude Lapointe

(Continued on page 27)

ACROSS CANADA… (Continued from page 26)

Cancer Centre of Southeastern Ontario
Kingston, ON
Submitted by L. John Schreiner

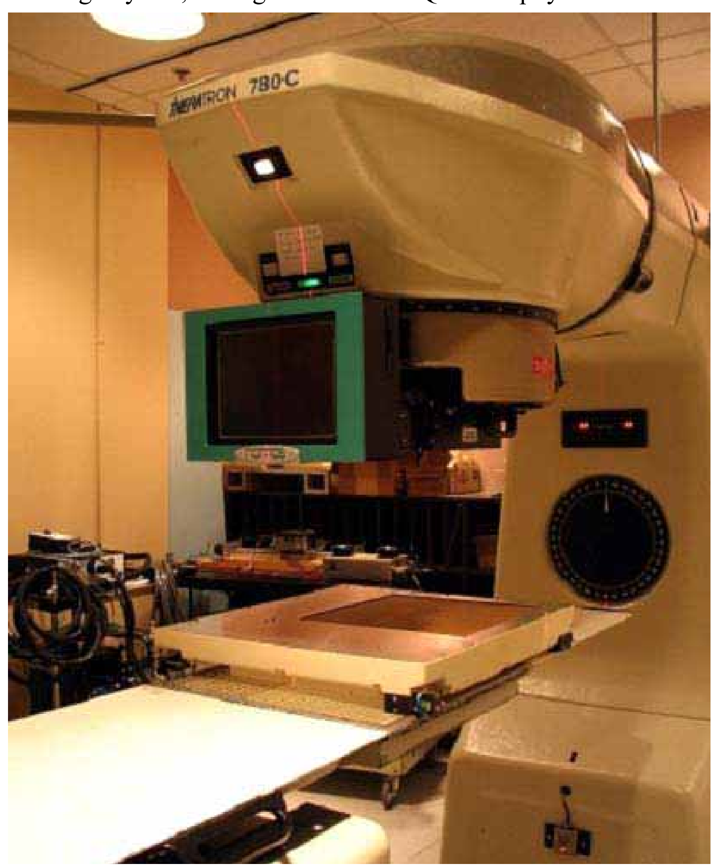
The Cancer Centre of Southeastern Ontario (CCSEO) at the Kingston General Hospital has been providing radiation therapy cancer treatment to the population of Southeastern Ontario for over 72 years since its inception in 1933 as Ontario's first radiotherapy clinic, the Ontario Institute of Radiotherapy (Kingston). In 1945 the site was expanded as a pilot cancer centre, to provide all-inclusive cancer care including the diagnosis and treatment of cancer by whatever means, including radiotherapy. As the clinic was established, it made many notable innovations, one of the most interesting developments being the recruitment of a fulltime medical physicist, Art Holloway, in 1948.

In December 2005, medical physicists (Johnson Darko, Chandra Joshi, Andrew Kerr, Greg Salomons, and John Schreiner) in the Department of Medical Physics continue to serve the present and future population of Southeastern Ontario through their clinical, research and educational activities. Clinically the Department, also including 2 physics residents, 2 physics technicians, 4.5 dosimetrists, 3 accelerator service personnel, 1 machinist, 1 secretary and .5 programmer analyst, provides physics, dosimetry, electronics, machinist and IT services to the CCSEO's Radiation Oncology Program. The group has been very stable and has grown steadily over the last few years (although one of our esteemed colleagues Jeans Robins, a friend to many physicists and oncologists in Ontario and Canada, retired last month).

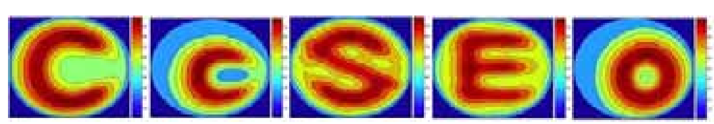
Much of the clinical effort of the department in the last three years has been to commission three newly acquired Varian Clinac linear accelerators (a 2100EX, 600EX and 2100IX), a Philips AQSim CT simulator, a Gulmay superficial unit and a VARiS/Vision record and verify/ imaging systems. This new equipment has supplemented the Varian Clinac 2100C/D, Ximatron conventional simulator and Selectron LDR unit long operated in the centre. All Clinacs have operational enhanced dynamic wedge, and the three new units have 120 leaf multileaf collimation and amorphous silicon portal imaging systems. Physics was vital for the development of the Centre's permanent implant prostate brachytherapy program and is actively directing the replacement of the clinic's treatment planning system and the acquisition of high dose rate brachytherapy. Physicists also serve both the CCSEO and the Kingston General Hospital as Radiation Safety Officers, and have been busily planning of the expansion of the centre, which is slated to start in about 18 months with the addition of two floors and two bunkers to the existing facility.

The medical physicists and colleagues participate in the clinical teaching of radiation therapists through the Michener Institute and of radiation oncology and medical physics residents. Currently, there are two physics residency training positions at the CCSEO; this program has been very successful over the years with some 7 residents trained in Kingston now clinically active in Kingston, Sudbury, and throughout the U.S.A. In the last eight years, a large number of Queen's physics students

CCSEO's Medical Physicists (left to right): Chandra Joshi, Johnson Darko, Andrew Kerr, John Schreiner and Greg Salomons relax in front of the Centre's new Varian Clinac 2100IX.



The world's first MIMIC equipped Co-60 unit with a Varian SLIC portal imager for Co60CT (not mounted in picture).



(Continued on page 28)

ACROSS CANADA… (Continued from page 27)

have been attracted to medical physics graduate programs in Ontario and throughout Canada because of exposure to cancer centre physicists teaching in the undergraduate Engineering Physics program. About half the physicists, who have appointments in Queen's Departments of Oncology and Physics, also currently supervise graduate students (in Physics and Chemical Engineering).

The research efforts of the department are focused primarily on investigating the potential for Cobalt-60 based tomotherapy and on the development of new gel dosimeters and new reading methods for three-dimensional radiation dosimetry. We have developed original polymer gel dosimeters with colleagues in Chemical Engineering, and have recently acquired a novel cone beam optical CT scanner from to probe these dosimeters. Recent Co-60 tomotherapy research has included the Monte Carlo investigation of Co-60 dosimetry (in the lung and in the head and neck) and the design of new source configurations to enhance tomotherapy output, and the development of inverse planning for tomotherapy dose delivery (resulting in two submitted theses, one Ph.D. and one M.Sc., in the last month). Ongoing work is devoted also to Cobalt-60 megavoltage CT imaging (which we have designated Co60CT). Co60CT has been well established for patient set up verification in a tomotherapy radiation treatment, and has been extended with good success to other imaging applications, in particular investigating the potential for artifact reduction in imaging of anatomy containing metal implants such as surgical clips and prostheses. In the last six months the Co-60 tomotherapy dose delivery research has moved towards the clinical implementation with the donation of a new source from MDS Nordion and the loan of a MIMIC multileaf collimator from North American Scientific/NOMOS Radiation Oncology.

This research has been supported by funding from the CCSEO and KGH, from the Cancer Care Ontario/MDS Nordion physics research initiative, the Ontario Research and Development Challenge Fund (with MDS Nordion and Varian Medical supporting industrial partners) and finally from the Canadian Institutes of Health Research. The funding has enabled us to support a strong group of post-doctoral fellows, research associates, graduate students and co-op undergraduate students.
All in all the activities of the Department continue to provide a challenging and fun environment for work. The group wishes to extend an invitation to all readers to come visit. We are sure we can show you some interesting developments in the clinic and in our research, and to show you just how beautiful Kingston really is.

Erratum

In the October 2005 issue of InterACTIONS, there was a misprint in the COMP 2005 Annual General Meeting Minutes (page 146).

In section 9 (Report of the RSTSAC) of the minutes, it is incorrectly stated that "P. McGhee will present CAPCA ...".

This should read "P. Dunscombe will present CAPCA ...".

COMP Chair's Message… (Continued from page 4)

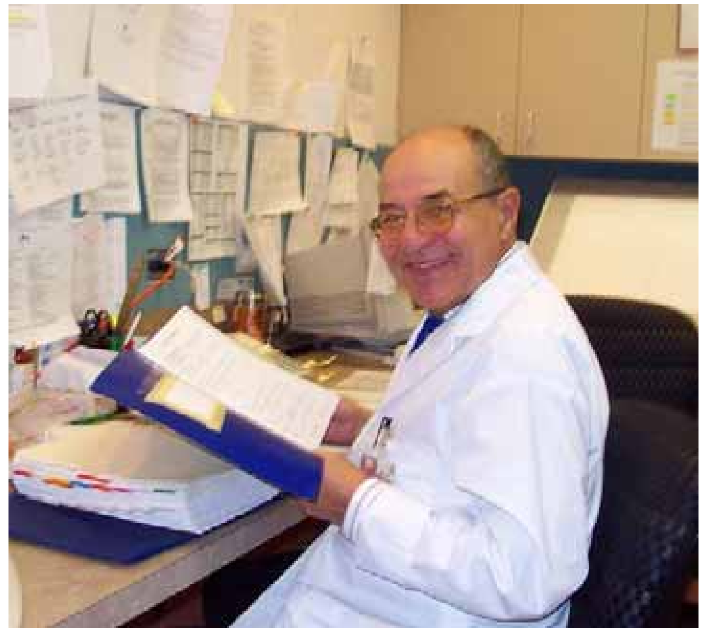
passed away over the last few years and there have been notices in Interactions for a few but not all of these sad events. COMP members are urged to notify the Executive Director, Nancy Barrett, when they become aware of the passing of a COMP member. A suitable notice will then be placed in Interactions and the COMP database will be amended appropriately.

CCPM President's Message… (Continued from page 5)

as Head of Physics at the Ottawa Regional Cancer Centre. In case you have any doubts, moving is a lot of work! While November is not the best time of year, we are gradually getting settled into our new digs near the Rideau Canal and I am looking forward to exciting challenges with my new colleagues.

In Memoriam — Dr. Yuri Mandlezweig

Submitted by David Viggars
CancerCare Manitoba,
Winnipeg, MB



After a long battle with cancer, Dr. Yuri Mandelzweig passed away on October 21, 2005.

Yuri was born in 1929 in Moscow in the USSR and received his education there, achieving an M.Sc. in Nuclear Physics in 1953 at the Moscow Institute of Physics and Engineering. He then worked at the National Research Institute of Medical Engineering in Moscow, becoming in succession Chief of the Division of Dosimetry Instruments and Chief of the Laboratory of Clinical Dosimetry. He was awarded a Ph.D. in Nuclear Engineering from the Institute in 1970 for his studies on semiconductor radiation detectors.

Yuri sought to emigrate to Israel, an objective which was not viewed with favour by the Soviet authorities at the time. Nevertheless, as a result of his perseverance, in 1976 he was finally able to take up a position as a senior medical physicist at the Rambam Medical Center in Haifa, spending two periods as Acting Head of the Physics Division before being appointed as Division Head in 1988. While in this position he spent periods as a visiting scientist in the USA at the Stanford University Medical Center, the Mallinkrodt Institute of Radiology and the Gershenson Radiation Oncology Center.

In 1991 Yuri accepted the offer of a sabbatical position as a visiting senior medical physicist at what was then known as the Manitoba Cancer Treatment and Research Foundation in Winnipeg. The visiting position was made permanent and Yuri was appointed as a senior physicist in the Department of Radiotherapy Physics at CancerCare Manitoba, concentrating, as in the early years of his career, on dosimetry. During this period, following up on work he had performed a few years earlier for the Israel Medical Association, Yuri introduced total skin electron irradiation at CancerCare Manitoba using the Montreal rotational technique. Yuri had particular responsibility for physics at CancerCare Manitoba's satellite facility at St Boniface General Hospital in Winnipeg and was based there until a diagnosis of cancer in August 2004 prevented him from continuing with the profession to which he had dedicated his working life. During his career Yuri published 40 peer-reviewed papers and well over 40 abstracts, he co-authored a monograph on the use of semiconductor detectors in ionizing radiation dosimetry and was awarded seven patents.

Yuri leaves behind him not only his significant contributions to the development of radiation therapy physics and the welfare of many patients, but also a reputation for warmth, kindness, integrity and humour. He made many friends around the world within his profession and in his private life. He was devoted to his wife Bella and took great pride in the achievements of his daughters Marina, Tali, and Karen, and in the recent arrival of his first grandchild. He will be greatly missed by his family, colleagues and friends.

AQPMC Workshop.... (Continued from page 8)

activities of the LRCC and a repeat of the refresher course he had given earlier in the year at the AAPM in Seattle entitled *Quality Assurance of Radiation Treatment Planning Systems: A Significant Challenge?*

After a copious lunch, six presentations were given by members of the association on specific topics related to treatment planning, including heterogeneity corrections, commissioning of IMRT TPSs, and connectivity issues.

The event was a success and attracted over 75 people including physicists, dosimetrists and medical physics students from all over Québec. All 10 radiation oncology facilities in Québec were represented by at least one physicist, and many students from all three graduate programs (McGill, Université de Montréal, and Université Laval) were also present.

AQPMC members get an opportunity to discuss TPS QA with Jake Van Dyk over lunch

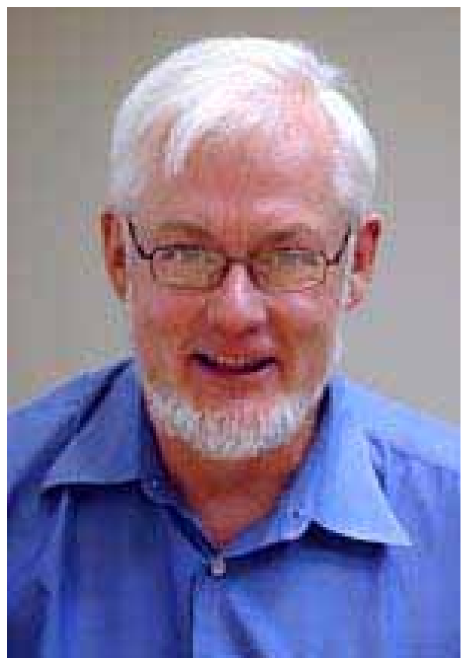
CAMPEP Accreditation for Two Residency Programs
Cross Cancer Institute, University of Alberta, Edmonton, AB

The Department of Medical Physics at the Cross Cancer Institute (CCI), which is also designated as the Division of Medical Physics at the University of Alberta, has achieved CAMPEP accreditation, in 2005, for each of its two medical-physics residency programs: Radiation Oncology Physics Residency Program and Diagnostic Imaging Physics Residency Program. The Department had also achieved CAMPEP accreditation for its Medical Physics Graduate Teaching Program in 2002. The Department is the first to achieve CAMPEP accreditation for three programs. Further information about the three Programs can be obtained from its Director, B.Gino Fallone at gfallone@phys.ualberta.ca, or from the website: med.phys.ualberta.ca. Information about CAMPEP can be obtained from www.campep.org

Gino Fallone

COMP Physicist, Dr. Mark Henkleman, Honoured

Submitted by Peter O'Brien
Toronto Sunnybrook Regional Cancer Centre, Toronto, ON



Dr. Mark Henkleman, a longtime COMP member, has been elected as a fellow of the Royal Society of Canada. Election to the Royal Society of Canada is the highest honour that can be attained by scholars, artists and scientists in Canada. "The Society is now proud to celebrate the intellectual achievements of the new Fellows", said Gilles Paquet, President of the Society. "We wish to recognize the extraordinary accomplishments of persons of talent, expertise and creativity in all fields, from experimental and applied science to health and medical sciences, and from socials sciences and humanities to the various artistic domains."

In addition, in May of this year Dr. Henkleman was elevated to the rank of University Professor at the University of Toronto, the highest honour that can be bestowed by the university on its faculty.

After working at the University of British Columbia on the TRIUMF project, Mark Henkelman joined the faculty of the University of Toronto 1979 and started his research in medical imaging, initially investigating the use of CT for radiation treatment planning but quickly moving to magnetic resonance imaging in 1980, the first Canadian into the field. With more than 250 publications and 9 patents to his credit, Mark Henkelman is the most frequently cited imaging scientist in Canada and was awarded the Gold Medal of the International Society of Magnetic Resonance in Medicine in 1998, the only Canadian to receive the award. Dr. Henkleman had a 10-year term from 1989 to 1999 as vice-president (research) at Sunnybrook and Women's College Health Sciences Centre. He was exceptionally successful in attracting key research personnel to the Sunnybrook and in transforming it into a leader in research in Canada and internationally. After leaving the Sunnybrook Dr. Henkelman became the founding Director of the Mouse Imaging Centre at the Hospital for Sick Children.

Dr. Peter Raaphorst Receives Career Achievement Award

Submitted by David Wilkins
The Ottawa Hospital Regional Cancer Centre, Ottawa, ON

G. Peter Raaphorst, who recently retired as Head of Physics of The Ottawa Hospital Regional Cancer Centre after 20 years in the position, was awarded a prestigious Career Achievement Award by the Ottawa Life Sciences Council. At a televised awards ceremony and banquet at the Ottawa Congress Centre on September 27, Peter was recognized for his outstanding contributions to scientific research.

Peter came to Ottawa in 1985 from AECL's Whiteshell Laboratory in Pinawa, Manitoba, to head the Physics Department of the Cancer Centre. At the time, the centre consisted of 6 radiation oncologists, 3 medical physicists, 2 accelerators, 3 cobalt units, and a simulator. Over the last 20 years, Peter helped the centre grow to what it is today: 8 linacs, Tomotherapy, PET/CT, 2 CT-sims, 12 medical physicists, 18 radiation oncologists, and active graduate and residency programs in medical physics.

Upon his arrival in Ottawa, Peter immediately became a leading influence in the fledgling medical physics community in Ottawa. As a founding director of the Medical Physics Organized Research Unit (now Ottawa Medical Physics Institute, OMPI), he laid the groundwork for what has become one of the leading medical physics graduate programs in Canada. OMPI brings together over 30 academic medical physicists in the Ottawa area, from institutions such as Carleton University, the Cancer Centre, The Ottawa Hospital, the Heart Institute, Health Canada, NRC, and AECL. OMPI currently has 22 graduate students, and has coordinated the programs of 50 medical physics grad students since its beginnings. Peter Raaphorst has personally supervised 16 of those students (as well as 5 from other disciplines), an academic accomplishment of which he is particularly proud.

During his incredibly productive research career, Peter has published an impressive 242 articles in peer-reviewed journals. While most of his publications have been in the radiation biology literature, he has published in journals as diverse as Medical Physics, Journal of the National Cancer Institute, Cancer, Journal of Neurosurgery, Cryobiology, and the International Journal of Hyperthermia. His scientific publication record includes 8 book chapters, 124 published abstracts, and 164 invited lectures in North America, Europe, China and Japan.

In twenty years of research at the Cancer Centre in Ottawa, Peter was Principal Investigator on 43 grants, with a total of \$3.46 million, and co-investigator on another 7 grants totaling \$519,000.

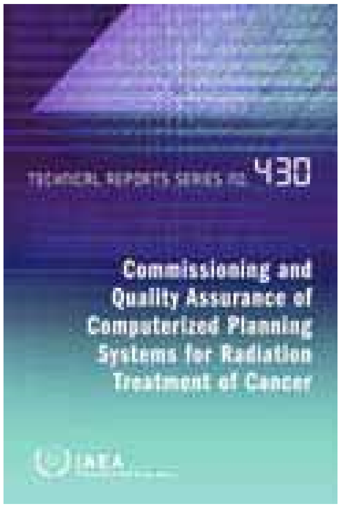
While publications and grants are a quantitative measure of the productivity of research, these have never been Peter's top priority. The simple pursuit of knowledge, and the desire to apply science to ease the burden of cancer, have been the driving forces in his career. His curiosity and enthusiasm for science are infectious, as witnessed by his proclivity for collaboration. Scientists and clinicians in Ottawa and around the world, in fields such as radiation, medical and surgical oncology, neurosurgery, biology, physics, chemistry, engineering and mathematics have collaborated on research projects with Peter, and have benefited from his wealth of knowledge, his analytical skills, and his genuinely helpful nature.

In addition to the research and clinical physics support of cancer treatment, Peter has been a leader in the field of image quality assurance for mammography. He was one of the first medical physicists in Canada to receive certification from the CCPM for mammography QA. Breast screening clinics throughout the Ottawa area have been accredited based on quality assurance programs established with Peter's assistance.

The medical physics community in Ottawa is pleased that, in receiving this Career Achievement Award, Peter has received public recognition for his outstanding career in science. Peter remains on staff one day a week at the Cancer Centre working on special projects, but his primary occupation these days is building, with his wife Ginette, a large addition to his century-old farmhouse in the upper Ottawa Valley.

Book Review: Commissioning and Quality Assurance of Computerized Planning Systems for Radiation Treatment of Cancer

IAEA Technical Reports Series No. 430



Submitted by Peter Dunscombe
Tom Baker Cancer Centre,
Calgary, AB

This report covers a lot of ground in its 280 pages. The introductory chapter establishes a context for the rest of the report and, in particular, includes relevant and topical issues such as the avoidance of errors and total quality management. This is followed by a very brief Chapter 2 dealing with the radiation treatment planning process and the clinical implementation of a treatment planning system (TPS).

Chapter 3 describes TPSs and, at first reading, seems to include several superfluous statements such as (in relation to hardware) “A keyboard and mouse are standard”. However, the document is intended for use worldwide and the fact that this reviewer picked up on such statements might suggest a myopic view of the sophistication of radiation treatment equipment in many centres across the globe.

Chapter 4 constitutes an overview of treatment planning algorithms and display and evaluation techniques for both tele- and brachytherapy. The issue of quality assessment is dealt with in Chapter 5. Terms such as tolerance, error and confidence limit, in this context, are defined together with related recommendations from several sources such as the AAPM’s Task Group 53. Quality assurance management is dealt with in the next chapter which contains much useful advice on the components and structure of a quality management system for TPSs. Chapter 7 includes guidance on purchasing and vendor selection.

Chapters 8 and 9, running to 132 pages, comprise the main body of the document. These chapters, covering acceptance testing and commissioning, include descriptions of 160 tests which the authors recommend should be performed on the most advanced treatment planning systems. In general the test descriptions are fairly clear and benchmark data are included in an appendix. One apparent inconsistency is the inclusion of tolerances for some tests but not for others. For example, for open fields it is stated that agreement between the manual MUs/time and that obtained by the TPS should be better than 2%. However for wedged fields and some other more challenging geometries no tolerance is given. Overall, the extent of testing recommended in this document is quite daunting. Even in a large well staffed centre, the resource implications of following every recommendation made verge on the impractical in this reviewer’s opinion. A possible solution to this workload issue would be collaboration between multiple users and the manufacturer to develop a comprehensive profile of the TPS in question.

The report concludes with two short but useful chapters on periodic quality assurance and patient specific quality assurance.

In summary, the knowledge and effort of the authors has resulted in a thorough and comprehensive document on computerized treatment planning systems for radiation treatment of cancer. The early chapters, up to page 70, contain a wealth of information much of which is applicable well beyond treatment planning systems. For example quality assessment and quality assurance management embody philosophies that apply also to treatment machines. As such, these early chapters, including an overview of treatment planning algorithms, will be valuable to graduate students, radiation oncology physics residents and more seasoned physicists who might benefit from a refresher course on some basics (and that probably includes all of us). The more intense chapters 8 and 9 are likely to be of interest to those with direct responsibility for a treatment planning system. The final chapters 10 and 11 are brief and worth reading by the broader radiation oncology physics community, many of whom will have duties checking plans and may participate in some aspect of routine quality control on treatment planning systems.

Harold Johns Travel Award Announcement
Deadline for Application: 6th March 2006

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 $2000, 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 travelling 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.

The H. E. Johns Travel Award is awarded annually by the Canadian College of Physicists in Medicine to outstanding CCPM Members or Fellows proposing to visit one or more medical physics centres or to attend specialized training courses such as the AAPM summer school. The applicant should not have previously taken a similar course or have spent a significant amount of time at proposed institutions. The award is for $2,000 and will be paid upon receipt of a satisfactory expense claim. The deadline for application is four months prior to each CCPM annual general meeting. All applicants must have written and passed the exam for membership in the CCPM within the previous three years. They should supply a one page proposal indicating the course they wish to attend or the name(s) of the institutions they would visit and the reasons for their choice. They should also supply an estimate of the costs involved and letters from their present employer indicating that they are in agreement with the proposal. For a visit to an institution the candidate must have the institution write to the Registrar in support of the visit. The candidate should also provide their curriculum vitae and the names and phone numbers of two references whom the Awards Committee can contact. No reference letters are required. The Awards Committee reserves the right to contact additional individuals or institutions.

Applicants may travel either inside Canada or elsewhere. If their proposed expenses exceed the value of the award, then they should also indicate the source for the additional funds required.

The award is intended both to assist the individual in their medical physics career and to enhance medical physics practice in Canada. Recipients are therefore expected to remain in Canada for at least one year following their travel. Applicants should be working in Canada but need not be Canadian citizens.

Successful candidates will have two years after their application deadline to complete their travel. They will be required to submit a short report to the Canadian Medical Physics Newsletter.

The award recipient will be chosen by a committee consisting of the Chairman of the Examining Board, The Registrar and the President of the College. Their choice will be based upon 1) the written proposal submitted by the candidate, 2) references obtained by the committee and 3) membership exam results. The award will be announced at the Annual General Meeting of the College.

Unsuccessful candidates in any one year who are still eligible in subsequent years may have their applications considered again by writing to the Registrar and providing any necessary updated information.

Applications should be sent to:
Dr. Wayne Beckham
The Registrar
Canadian College of Physicists in Medicine
c/o BC Cancer Agency, Vancouver Island Centre
2410 Lee Avenue, Victoria, BC, Canada V8R 6V5

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edewerd@standardimaging.com

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staylor@thomson-elec.com

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Contact: Ms. Jodi Pachal
jpachal@tomotherapy.com

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Medical Physics Resident

The Radiation Oncology Program operates three newly acquired Varian Clinac linear accelerators (a 2100EX, 600EX and 2100IX), a Philips AQSim CT simulator, a Gulmay superficial unit, and VARiS/Vision record and verify/imaging systems. This new equipment has supplemented the Varian Clinac 2100C/D, Ximatron conventional simulator, and Selectron LDR unit long operated in the centre. A T780 cobalt unit is available for a focused cobalt tomotherapy research program within the department. The resident will join a strong clinical team consisting of five medical physicists, a physics resident, research personnel (graduate students and post docs), and technical support staff. The medical physicists supervise medical physics graduate students in the Department of Physics at Queen's University.

The Medical Physics Resident will receive hands-on training over two years covering all aspects of clinical physics related to radiation treatment including radiation dosimetry, treatment planning, brachytherapy, and quality assurance of all radiation therapy equipment. The resident is encouraged to participate in medical physics courses and radiation oncology training and clinical rounds. At the completion of the program the candidate will have the foundation necessary for the Ontario Review A clinical certification process. About one-fifth of the resident's time will be devoted to research.

Qualifications for the residency position include a graduate degree in Physics or a related field. The preferred entry requirement is a Ph.D. in Physics or a related subject and the minimum entry requirement is a M.Sc. in Medical Physics. Candidates should also have good verbal and written communication skills, basic knowledge in radiation physics, and a strong interest working with a multidisciplinary medical team.

Applications are invited from all qualified candidates. Please submit a curriculum vitae, transcripts of graduate and undergraduate studies (may be unofficial), and the names of two professional referees, by **January 31, 2006**, to: **L. John Schreiner, Ph.D., FCCPM, Chief, Medical Physics, c/o Human Resources, Kingston General Hospital, 76 Stuart Street, Kingston, ON, Canada, K7L 2V7 Fax: (613) 548-1334 e-mail: kghhr@kgh.kari.net**

www.kgh.on.ca

We thank all applicants; however, only those individuals to be interviewed will be contacted.

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Physicist

In this role, the successful candidate will be responsible for designing and maintaining the department's Quality Assurance Program related to radiation safety, linear accelerator calibrations and performance, radioactive materials calibration and maintenance, and three-dimensional treatment planning accuracy and performance. Key functions will include monitoring the performance of peers and subordinates, in addition to taking responsibility for the commissioning and acceptance testing of new equipment and technical procedures. Other duties will include participating in peer review and staying abreast on current and future technological developments within the field.

The ideal candidate will have an M.S. or Ph.D. in Medical Physics along with board certification in Radiation Therapy. Must comply with regulatory requirements (i.e., JCAHO) appropriate for position. Requires strong analytical and problem solving skills, coupled with excellent communication and interpersonal abilities. US Work Authorization is required.

We offer a competitive salary and excellent benefits. Please send your resume and salary history to: Aptium Oncology, Inc., Attn: Greg Wildman, 8201 Beverly Blvd., Los Angeles, CA 90048. E-mail: resume@aptiumoncology.com. For company info: www.aptiumoncology.com. EOE.

Medical Physicist

UNIVERSITY OF CALGARY

The Department of Oncology and the Alberta Cancer Board (Tom Baker Cancer Centre) invite applications for a full-time academic position as a Medical Physicist at the Assistant Professor level. Duties include education and training of graduate students and residents as well as research.

The Division of Medical Physics is one of 10 Divisions within the Department of Oncology at the University of Calgary. Physicists within the Division are funded by the Alberta Cancer Board and provide clinical physics services at the Tom Baker Cancer Centre (TBCC). Approximately 2,500 patients per year receive radiotherapy on one of the nine megavoltage units at the TBCC. Eight of these units are Varian linear accelerators, all of which are equipped with multileaf collimators and three of which have aSi EPIDs. A ninth accelerator with on-board imaging will be installed in early 2006. Treatment preparation takes place on one of two CT simulators or a conventional simulator, currently being upgraded to Acuity, with plans generated by the Pinnacle treatment planning system. The TBCC supports active clinical programs in IMRT, brachytherapy, including LDR prostate brachytherapy, and stereotactic radiosurgery/therapy. There are currently 10 faculty physicist positions at the TBCC within a total Physics Department staff of 45.

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 ~1,000,000) near the Rocky Mountains, Banff National Park and Lake Louise.

Qualifications include a PhD in Medical Physics or Physics, completion of a clinical physics residency and membership in the Canadian College of Physicists in Medicine, and a record of effective teaching and productive research. A strong commitment to the highest clinical standards and highly developed interpersonal, teamwork, organizational and leadership skills are also required.

Please submit a curriculum vitae and a statement of career goals together with the names of three referees by **February 28, 2006** to:

Dr. Peter Dunscombe, Director
Medical Physics Department
Tom Baker Cancer Centre
1331 – 29 Street N.W., Calgary, Alberta 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.

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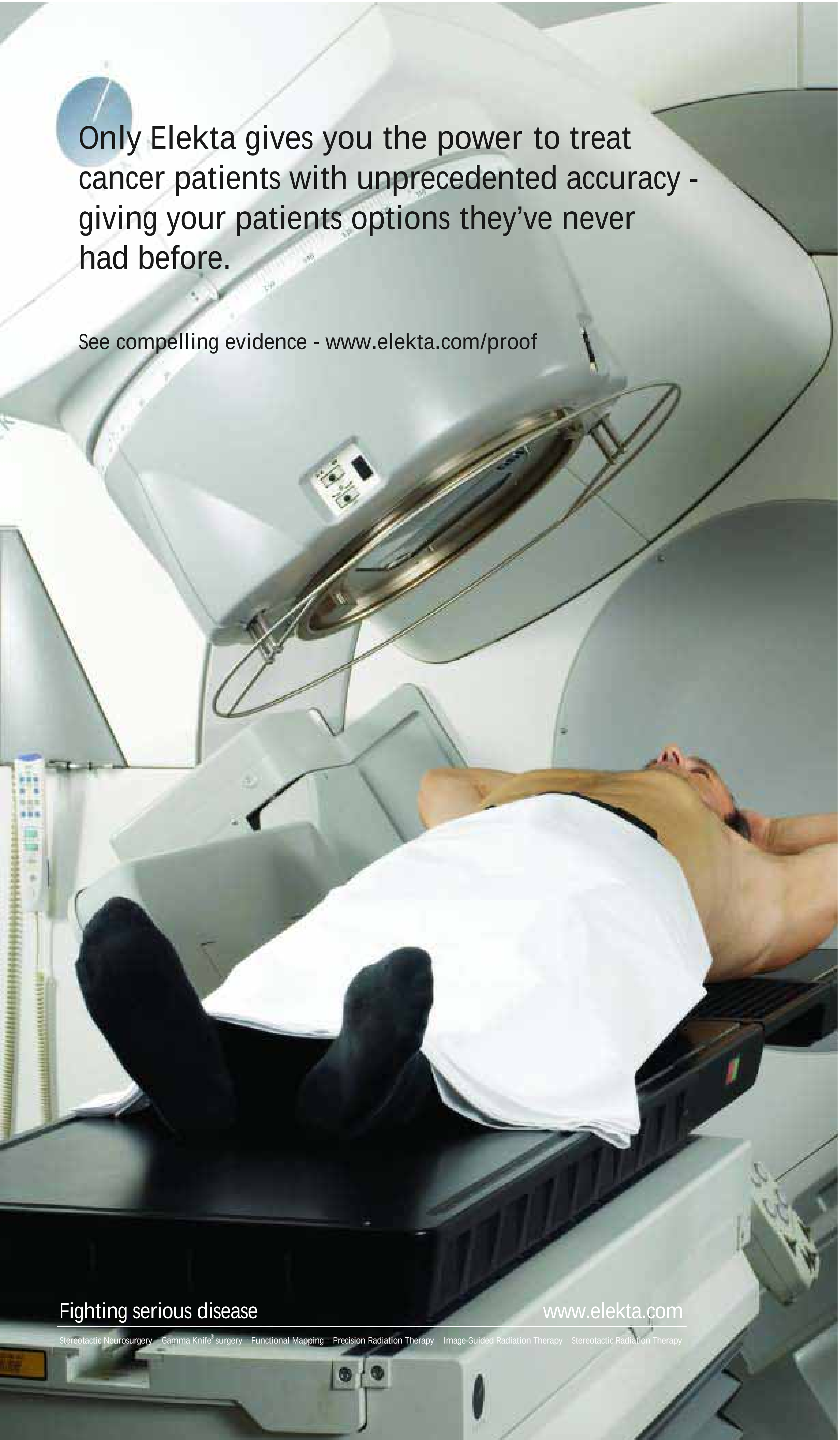

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