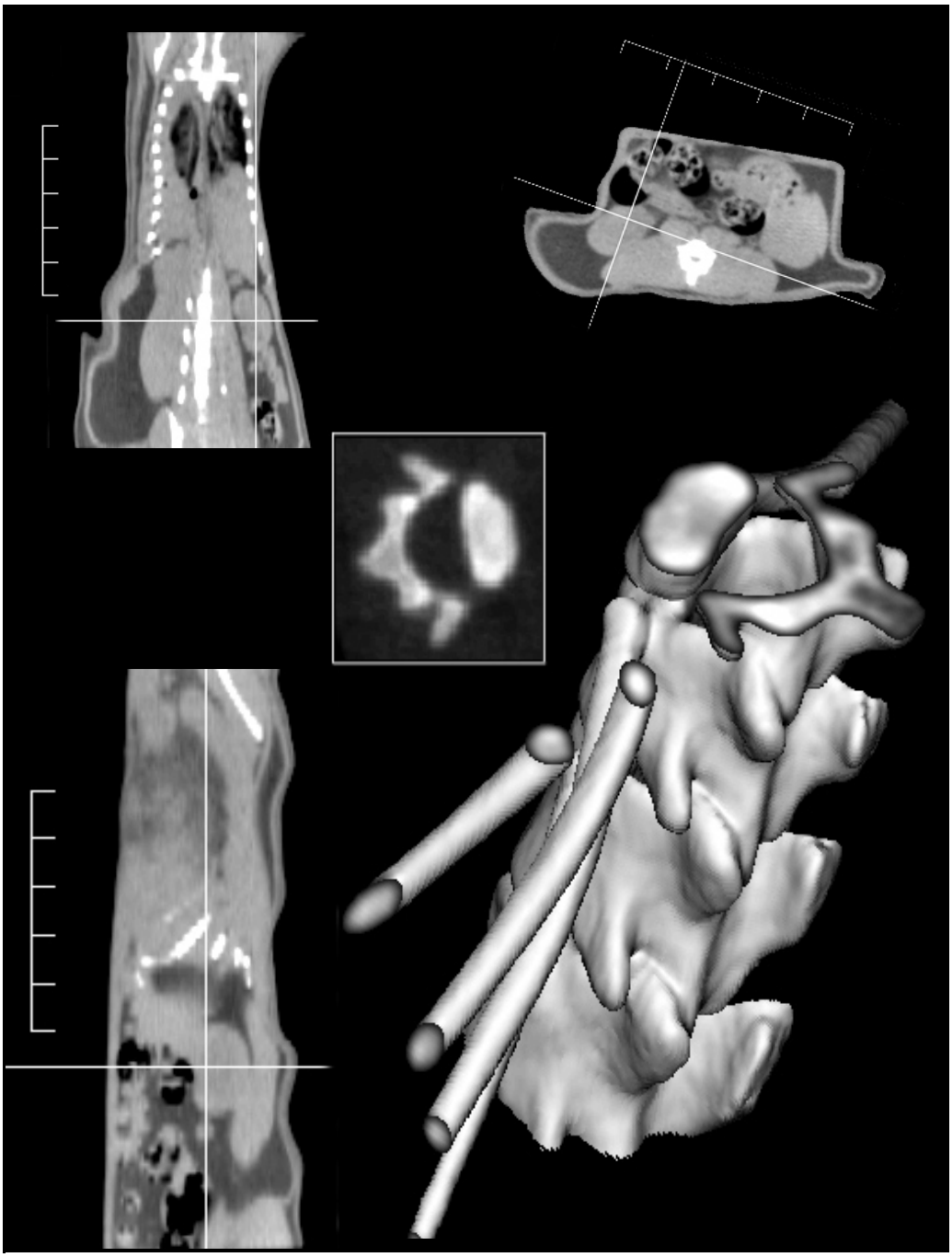
InterACTIONS

CANADIAN MEDICAL PHYSICS NEWSLETTER
Le BULLETIN CANADIEN de PHYSIQUE MÉDICALE



Rattus Norvegicus Radiotherapy

COMP OCPM

A publication of the Canadian Organisation of Medical Physics and the Canadian College of Physicists in Medicine

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

45 (2) avril/April 1999

About our Cover

Rattus Norvegicus Radiotherapy: Images of a common laborator rat acquired using a cone-beam computed tomograph y (cone-beam CT) imaging system. The system uses a conventional x -ray tube/ generator [300,000 HU General Electric Maxi -ray 75 x-ray tube and a General Electric MS -800 100 kW generator] as the x-ray source and a prototype EG&G amorphous silicon flat-panel imager as the image receptor. The array is 512 x 512 with a pixel pitch of 0.4 mm and the x -ray detector is a Lanex Fast (back) gadolinium oxysulfide phosphor screen (133 mg/cm^2). The rat was placed on a rotating stage, rotated over 360 degrees, and imaged (100-130 kVp, ~0.1-10 mAs) every 1.2 degrees. Tomographic images were reconstructed from the radiographic projections using the Feldkamp filtered back -projection algorithm. The transverse, coronal, and sagittal slices through the image data set give some idea of the contrast resolution of the system. The spatial resolution of the CT system (10% modulation transfer factor) has been measured to be 1.5 mm^{-1}. The excellent spatial resolution is illustrated by the volume renderings of the rat's spine. Ribs, spinal processes, and inter-vertebral spaces as well as surface texture of the bone are clearly seen. One of the key benefits of t his system is dose efficiency. The x-ray beam is used much more efficiently to form a CT dataset than conventional single slice CT scanners. Because of its high spatial resolution in both the transverse and axial directions, and because of its dose efficiency, cone-beam CT might become a practical approach for acquiring CT datasets using a radiation therapy simulator.

Images courtesy of David Jaffray, William Beaumont Hospital

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

P. Munro, London Regional Cancer Centre
790 Commissioners Road East
London, ON N6A 4L6
(519) 685-8600 x53317;
FAX (519) 685-8658
pmunro@lrcc.on.ca

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

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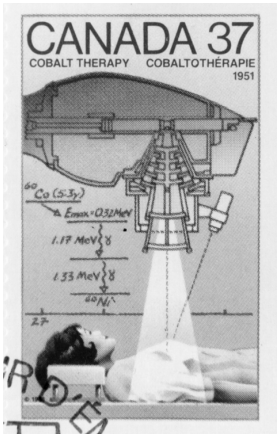

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CCPM BOARD

Message from the COMP Chair:

Our advertisement for a part time executive director garnered a few applications from qualified individuals. The search committee is reviewing these and hopes to interview a short list in the very near future.

My message for this newsletter will be mercifully brief as the Chair is being squeezed by many simultaneous demands! It certainly has been an interesting period for medical physics, especially in Ontario. An impending "crisis" in waiting times for radiation therapy has vaulted medical physicists to the front page of national newspapers. This is perhaps without precedent, although those with better memories may correct me. The upshot of it all is that Ontario's Minister of Health has earmarked new funds for the training, recruitment, and retention of medical physicists in the province. What it will all mean to those in the trenches remains to be seen.

One of the demands on the Chair is finalizing the program for our meeting in Sherbrooke. At the moment this is being written, submissions are trickling in and the usual last minute torrent is expected at the deadline. The CCPM/APIBQ symposium has been finalized (thanks to Chris Thompson) and it looks very interesting indeed. The local arrangements committee (spearheaded by Roger Lecomte and Renald Lemieux) has organized a very special event for Saturday night to conclude a busy social and scientific program. Details of all these were mailed recently to our members and can be viewed at our website (www.medphys.ca).

And speaking of websites, I must remark on the great job done by Peter Munro and all of the members of the Communications Committee in getting this off the ground. I have already received favorable comments from many members, and if you have not yet had a chance to visit, please do. The executive would be most interested in hearing your impressions and ideas for further developments in this area.

Our advertisement for a part time executive director garnered a few applications from qualified individuals. The search committee is reviewing these and hopes to interview a short list in the very near future.

Finally, our committee which is to review the AAPM's new dosimetry protocol (TG 51) has been struck. Ervin Podgorsak has agreed to chair the group and he will be ably assisted by Dave Rogers and Carl Ross from NRC, fellow Montrealer Marina Olivares, Randall Miller from Halifax, Princess Margaret's Alan Rawlinson, and lotus land representative Darcy Mason. The executive looks forward to a report from this group in time for our November meeting.

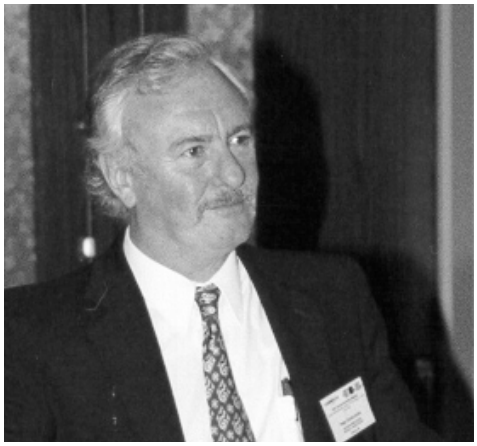
Well, it's time to log off and check CNN for the latest medical physics news…see you all in Sherbrooke!

Mike Patterson

Message from the CCPM President:

This is my last "Message from the CCPM President". In June, at our meeting in Sherbrooke, I will be handing over to John Schreiner. My verbal report to the membership of the College at the AGM will be a summary of activities over the past four years so hope many of you will be able to attend.

For this brief report I will confine myself to the few events of the last few months. I did get around to writing a brief informative article for circulation to the newsletters of other national medical physics organizations. It seemed like a good idea for many reasons to prepare the article jointly with COMP so Mike Patterson and I will work together on producing a final version.



A partly completed draft of a Policies and Procedures Manual for the College has been on my computer now for over a year. I managed to convince myself, and others, that I would finish it during the long dark winter evenings. However, the days lengthen and the manual doesn't. My latest deadline is the Board meeting in June. I suppose if I miss that I still have two more years on the Board in which to complete the project. I'll let you know the status at the AGM.

Accreditation of medical physics residency programs is an issue discussed briefly in the last *Interactions*. There are indications that this will become necessary in Ontario, at least, before too long so either the College or the Ontario physicists or, preferably, both will be forced into action on this issue. This is just one of several possible initiatives that we could be undertaking with a variety of organizations both within Canada and beyond. As these opportunities present themselves, our limited resources are continually highlighted. From my own experience on the Board and observation of my Board colleagues, collectively we have rather little time to devote to College activities. The residency program accreditation issue is currently being driven externally and so will happen but many other good opportunities will not be pursued for lack of resources. A properly utilized Executive Director, which COMP and the College are now seeking, could be a very valuable resource. Another possibility would be to expand the Board and assign specific projects or duties the additional members.

On reflecting on our accomplishments over the past few years and looking forward to the opportunities of the future, resourcing existing activities and new initiatives could become a limitation. An important challenge for the College over the next few years will be to devise ways of accessing and effectively utilizing more resources to assist in maintaining and enhancing the high standards of our certification process and to increase the scope and depth of our interactions with other organizations.

See you in Sherbrooke

Peter Dunscombe

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Robarts Research Institute Opens Center for Vascular Imaging Research

By Peter Munro

A 16 million dollar partnership between public and private funding sources, known as the Centre for Vascular Imaging Research was officially opened at the Robarts Research Institute on the 4th Feb. 1999. The official announcement was given by Jim Wilson, the Ontario Minister of Energy Science and Technology. The Centre is a collaboration between the Robarts Research Institute, the London Health Sciences Centre, the University of Western Ontario, the Ontario Research and Development Challenge Fund (ORDCF), and five commercial partners.

The Centre has a number of objectives. The main one is to develop advanced imaging tools to help understand and, eventually, help prevent stroke and heart disease. The hope is that the tools developed by the Centre will reduce the incidence of these diseases, which have a huge economic impact; stroke is the most common cause of long-term hospital stays and the leading cause of admittance to nursing homes. In addition, the Centre also has an objective of creating up to 75 high tech jobs. These would be created either directly, due to employment at the Centre, or indirectly, due to the spin-off of high technolog start-up companies. The Robarts Research Institute already has a track record for commercialising their research developments (e.g., Life Imaging Systems – a manufacturer of 3D ultrasound systems) and other start-up ventures are being established under the auspices of the new Centre (e.g., Enhanced Vision Systems – a developer of high spatial resolution CT scanners for small animal imaging).

David Holdsworth demonstrates the computed rotational angiography system (see cover of the Newsletter 44(3) July, 1998) to the Honourable Jim Wilson.

The official funding announcement. From left to right: Brian Rutt, the new director of the Center for Vascular Imaging Research; Paul Davenport, the President of the University of Western Ontario; Tony Dagnone, CEO of the London Health Sciences Centre; the Honourable Jim Wilson, Minister of Energy, Science and Technology; and Dr. Mark Poznansky, CEO of the Robarts Research Institute.

Five million dollars of the funding for the Centre comes from the ORDCF, with the other 11 million coming from the commercial partners. These include GE Canada, Life Imaging Systems, Siemens Canada, Berlex Canada, and Eli Lilly Canada.

The Ontario Research and Development Challenge Fund was established in the spring provincial budget of 1997. Five hundred million dollars have been set aside over a 10 year period to encourage research excellence and partnerships between business and research institutions. Funding from the ORDCF requires financial contributions by industry (minimum 1/3 of the project total) and by the institution (minimum 1/3) hosting the project. Details of the first competition were made public in December of 1997 and the successful application from the Robarts Research Centre was submitted on the 30 Jan. 1998. Thus, the Centre for Vascular Im-

(Continued on page 46)

A Night to Remember – H.E. Johns Inducted into the Canadian Medical Hall of Fame

By Jerry Battista

On October 28, 1998, Dr. Harold Elford Johns was inducted into the Canadian Medical Hall of Fame and becomes the first medical physicist to receive this great honour. The induction ceremony was held at the Canadian Museum of Civilization in Hull, Quebec.Dr. Johns' spouse, Sybil Johns, was invited to accepted the honour on behalf of her late husband . She was accompanied by immediate family members, including her daughters and their husbands. Also in attendance were his nephew Paul Johns, the Past Chair of COMP, and a former graduate student Doug Cormack and their spouses.

The home of the Canadian Medical Hall of Fame is in London, Ontario and portraits of the inducted members are on permanent display at the London Regional Art Gallery. We are very proud in London to support this Hall of Fame and we are particularl pleased that Dr. Johns' accomplishments will be on permanent display in the cit where the world's first Cobalt-60 treatment was delivered on October 27, 1951 – almost exactly 47 years before the induction ceremony.

The purpose of this article is to try to convey the excitement of this event that will be frozen in my memory. I had returned earl from the ASTRO meeting in Phoenix, Arizona and upon opening the official invitation, I noticed that it stated that the dress was to be "formal", without the bailout clause for a dark business suit. I now faced the harsh reality of finding a tuxedo, onl hours before my departure time for Ottawa. After a few panic phone calls, I located some 'tuxedoware' (or is it 'tuxedowear'?) and I was ready to go with about an hour to flight time. I arrived at the London airport dressed in a tuxedo, attracting strange looks, but accompanied by a steady procession of others in 'penguin' attire. At the check-in counter, the Air Canada attendant exclaimed that we had undoubtedly set a record for being the best dressed travelers to board a commercial flight, at least in little London.

As I sat in the waiting lounge, it became apparent that I would be in the company of important people. The first was the Mayor of London, Ontario, Dianne Haskett and w chatted about a number of things including how quickly London should develop co mmercially at its North end. Finally, the a ttendant called for boarding of the flight and we all marched onto the tarmac, with man stunned onlookers waving from the obse rvation tower seeing a cohotof penguins and

The Johns Family attending the Induction ceremony. From left to right, Gwen and Clive Greenstock, Claire and Peter Shragge, Sybi l Johns, Marylin and Harold Duplacey.

However, I came upon **Kiefer Sutherland** again and he had seen me on a video tape vignette (along with Aaron Fenster). I asked if I had a crack at becoming an actor. He replied "No, not really, but maybe you could try broadcasting!"

Men (and Women) In Black: Jerry Battista with various celebrities from the induction ceremonies. From top to bottom: Roberta Bondar, astronaut; Dianne Haskett, mayor of London; Keifer Sutherland, movie actor and grandson of Tommy Douglas (T.D. was also an inductee into the Canadian Medical Hall of Fame); and Clive Greenstock (left) and Doug Cormack.

their female equivalent marching toward the awaiting puzzled pilot. The flight was uneventful, but I remember looking up the aisle and spotting the Ivey family and Cal Stiller well known for his pioneering work in organ transplants at our University Hospital. He is now prominent in the Canadian Medical Discoveries Fund which some of you might be using to minimize your tax burden during RRSP season. Remember, however, that some of your tax dollars paid for the magnificent Museu of Civilization.

On arrival in Ottawa, a chartered bus moved us to the Museum - an outstanding venue for hosting such an event and the television cameras were rolling. For some of you on the Rogers' Cable network, it is likely that you have already seen a broadcast of this event. Copies may be available one day at Blockbuster video, but I doubt it.

The Inductees closest to my heart included H.E. Johns, Norman Bethune, Roberta Bondar, and Tommy Douglas. I sensed quite a bit of excitement in the air and television cameras were hovering around the Tommy Douglas family. In particular, Shirley Douglas, a well known Canadian stage actress was present and drew lots of media attention. However, as I a p-proached, I also noticed another individual – Kiefer Sutherland. My analytical skills went to work and I deduced that Kiefer was there as son of Donald Sutherland the actor who had portrayed Norman Bethune in a documentary movie. That deduction was feasible but indeed incorrect. He was present as the grandson of Tommy Douglas, son of the actor Donald Sutherland formerly married to Shirley Douglas!

I introduced myself to Kiefer so that I could recount the early days of Cobalt 60 developments in Saskatchewan. More specifically, Harold Johns had approached then-premier of Saskatchewan Tomm Douglas for *ad hoc* government funding of the Cobalt ma chine and a betatron. Douglas did the financial finessing and quickly the government of Saskatchewan approved the funds to allow the developments for which Dr. Johns was being honoured this evening. That's efficient and quicker than MRC grants reviews! Kiefer was certainly aware of the work of his grandfather on initiating Canada's Medicare, but not thoroughly versed in the Cobalt 60 story. Cameras were shooting and

I had a chance to have my picture taken with this young actor. I also had a chance to chat briefly with Dr. Roberta Bondar, Canada's space lady, a member of the University of Western Ontario, and got another important snapshot.

The evening proceeded smoothly after a few glasses of champagne and Doug Cormack was quick to point out that my history of the Cobalt story wasn't precise, but close enough. This reminded me of ho important it is to chat with our Medical Physics retirees who have a wealth of i nformation on the history of radiation in the world and in this country. Doug Cormack's photographic and historical detective work (he is the "Colombo" of medical physics) are excellent and I respect him for maintaining this interest in our field.

We finally sat down for the actual dinner and the induction ceremony. As awards were presented, video vignettes of each inductee and their contribution to the medical field in Canada and the world were shown. This was quite a humbling experience and I was thrilled when Sybil Johns received the award on behalf of her late husband and made the point that Harold would be very proud that "a physicist had been recognized by the medical co u-nity".

At the end of the dinner, we all marched more humbly towards the awaiting bus that would take us to the Ottawa airport. However, I came upon Kiefer Sutherland again and he had seen me on a video tape vignette (along with Aaron Fenster) I asked if I had a crack at becoming an actor. He replied "No, not really, but maybe you could try broadcasting!". We parted, I bid farewell to the Johns family, and returned home to the London airport again in a tuxedo in the wee hours. The cab drivers awaited the return of this important flight of "rich doctors". Unfortunately, all of my money had been spent on the tuxedo so that a colleague drove me home at far less expense.

All in all, this was a tremendously exciting evening, it was historically important and I was extremely pleased that H.E.J would be always with us in spirit in London. Our next project is have his achievements commemorated on a Heritage Canada plaque in both London and Saskatoon. One must always be fair about historical events and discoveries, as Doug Cormack will have you know.

What Was Said

The following is the text of the speech given by Sybil Johns at the induction ceremony of the Canadian Medical Hall of Fame.

I am delighted to be here tonight, with our daughters and their hu s-bands, to accept, for Harold, his induction into the Canadian Medical Hall of Fame.

Last spring, when the first announcement was made, Harold was alive, and alert enough to understand and appreciate the honour which you were bestowing on him - and he rejoiced in it - as we do tonight.

It is very special that his last honour, in a long line of awards and accolades, should be that a physicist is named to the highest honour in the medical profession.

Thank you.

Cobalt-60: A Canadian Perspective
Part 2: The Saskatoon Stor

By Doug Cormack with Peter Munro

Note: This is the second of a four part series describing the development of, and initial clinical experiences with, ^{60}Co sources for radiation therapy.

Initiation

The Saskatoon ^{60}Co story had its origins in a series of lectures given in Toronto in 1946 b **Prof. W V Mayneord** of the Royal Cancer Hospital, London. Mayneord had spent the previous year as Adviser to the British-Canadian Atomic Energy project and had been asked b **Dr Gordon Richards** to describe the possible applications of radioactive materials in medicine. One of the attendees at the lectures was **Dr. Harold Johns**, who had been recentl appointed to the joint position of Physicist to the Saskatchewan Cancer Commission and Professor of Physics at the University of Saskatchewan. The Director of Cancer Services for Saskatchewan, **Dr Allan Blair**, had sent Johns on an extensive fact-finding tour of radiation treatment centres in North America, on which the final stop was for Mayneord's lectures in Toronto.

Action in Saskatchewan

In recalling his 1946 experiences, Johns reported (Johns1976): "On my return to Saskatoon, Dr Blair asked me what I had learned and what we should do in Saskatchewan. I said we should get a betatron and design a cobalt unit. By 10 o'clock that morning we had an appointment with the premier of the province, **Tommy Douglas** , whose enthusiasm matched ours and whose permission gave us the full backing of the Saskatchewan Government" (*DVC note: Not for one or the other but for both!*)

Both projects were vigorously pursued in the following five years with strong support from the University of Saskatchewan and from **Dr T A Watson**, who had been named Director of Cancer Services for Saskatchewan after Dr Blair's untimely death in 1948. A 23 -MeV betatron was purchased from the Allis Chalmers company and after substantial modifications it was put into service in 1949 for b oth patient treatments and nuclear physics research. Despite its ver high x -ray energy, which was considered ideal for treating deep-seated tumours, the betatron never was never intended to be a dedicated clinical device. It was mostl used for nuclear physics experiments and facilities for patient care (e.g., flexible beam orientations, patient change rooms, ...) were either limited or non - existent. Therefore, the hope for a practical clinical device lay with the development of the ^{60}Co therapy unit. Encouragement, support, and assistance in the development of a ^{60}Co beam therapy unit was given b **Dr A J Cipriani**, head of the Biology Division of the Chalk River Nuclear Laboratories. A formal request to NRC for the activation of a kilocurie ^{60}Co source was made in August 1949 by Johns and Watson.

Design and Installation

The Saskatoon source (and apparently also the London source) consisted of a number of thin discs of ^{60}Co. For activation in the thermal neutron flux of the NRX reactor, ^{59}Co discs were placed in an aluminum holder so that overlapping was kept to a minimum. **Sylvia Fedoruk** recalls seeing **Bert Co** , the University of Saskatchewan instrument maker at work on the holder, probably in late 1949. An estimate of the neutron shielding in the ^{59}Co was made with the help of **W R Dixon** of NRC's Radiology Laboratory, which was actively involved in preliminary studies of ^{60}Co units in the period 1949 to 1951.

The source arrived in Saskatoon, via Ottawa, on July 30, 1951. Figure 4 shows Dr Johns, with graduate student, **Lloyd Bates**, from New Brunswick examining the shipping container and the treatment head not yet mounted in its yoke. Bates' thesis was on the detailed design of the ^{60}Co teletherapy unit. Figure 2 shows a page from Johns' notebook in which he calculates the activity of the ^{60}Co source on the basis of measurements made with a calibrated Victoreen condenser "r meter". After corrections for self-absorption and scattering in the source th ese indicated an activity of 1118 Ci, somewhat lower than the value predicted by the Chalk River Nuclear Laboratories.

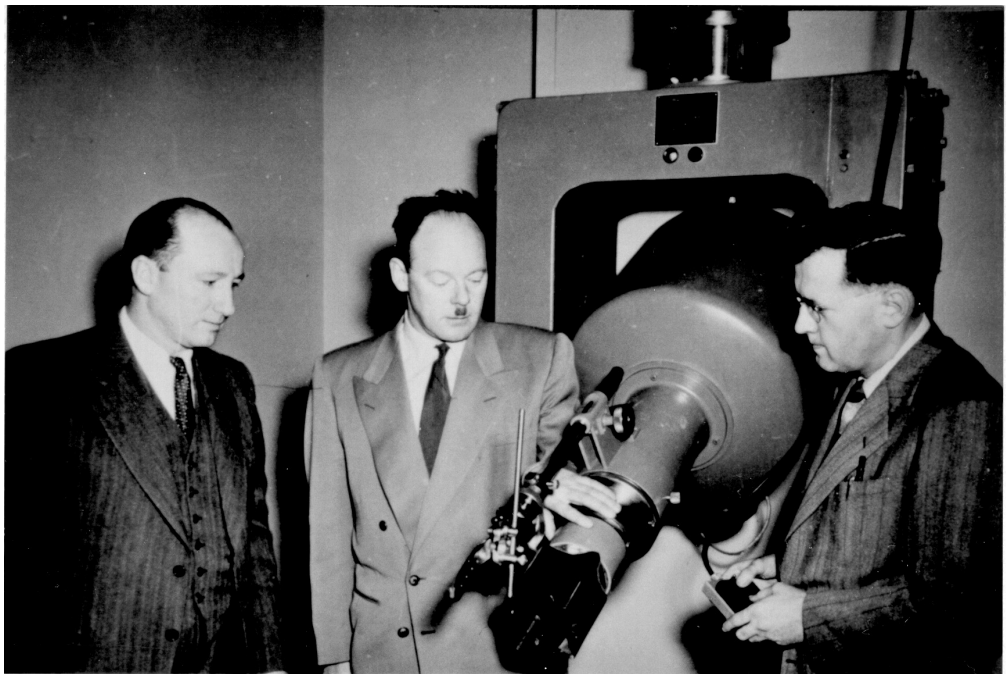

Fig. 1 Dr. T.A. (Sandy) Watson, Johnny MacKay, and Harold Johns, examining the ^{60}Co unit in 1951.

One of the clinical advantages of the ^{60}Co unit, compared to the betatron, was that a

special roo - in a treatment centre – was designed to house the unit. An elevation of this room is shown in Fig. 4. In the summer of 1951 the room was in the throes of construction in the first phase of a new Saskatoon Cancer Clinic which was itself in the first wing of the ne University Hospital. One of the features of this room was an 8-ft turntable flush with the floor, which facilitated treatments where the patent was rotated about a vertical axis through the tumour volume. The ^{60}Co unit was suspended from the ceiling, which allowed considerable flexibility in setting up patients for treatment.

Collimators

The first patient treatments with the unit made use of replaceable fixed-field cones in which collimation was achieved with lead plugs several c thick (see Fig. 4). During the next two years these were superseded by an adjustable collimating device capable of defining fields from 4x4 to 20x20 cm (Johns, MacKay 1954). This design was adopted by the Picker X-ray Company for their ^{60}Co therapy units and the collimators were manufactured under contract by the Acme Machine Shop in Saskatoon. Figure 4 shows a Picker unit, with Johns-MacKay collimator, in service in the Calgary Cancer Clinic, 1962.

Rotation Therapy and TAR

In the early 1950's there was co nsiderable interest, particularly in Europe, in rotation therapy in which the patient was rotated in the radiation beam about an axis through the centre of the target volume. (Isocentric units, first for linacs and then for ^{60}Co units, appeared on the scene a few years later.) The incorporation of a turntable in the floor of the treatment room (Fig. 4) was to facilitate this type of treatment. In considering how to calculate dose distributions, or even the dose on the central axis, for rotation therapy, it became apparent to Johns and his colleagues that the concept of percentage depth dose and the extensive tables and graphs that had been compiled were extremely cumbersome to use in rotation therapy calculations. Rather than a system in which the distance from the radiation source to the skin surface was considered fixed it was found to be much more convenient to fix the distance between the source and the axis of rotation. The ratio of the dose to the tumour on the axis to the dose with no overlying tissue was given the name "tumor-air ratio – which was later generalised to "tissue-air ratio", or TAR (Johns et al. 1953). Starting fro published depth dose tables, Johns et al. compiled extensive tables of TAR, first for 200 kVp x rays and then for ^{60}Co (Johns, Morrison, Whitmore 1956). The importance of the TAR concept was given a major boost by the empirical finding that TAR was essentially independent of source-axis distance form 40 cm to 100 cm.

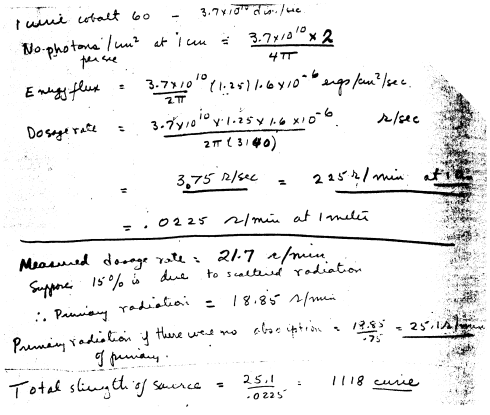

Fig. 2 Early estimates of activity by H.E. Johns circa August, 1951.

Why Cobalt-60?

There were many reasons why a ^{60}Co unit was expected to be a superior treatment device than the clinical orthovoltage units of the time – improved depth doses, higher dose rates, and skin sparing. Studies using the 23 MV beam from the betatron had demonstrated the superior penetration of higher energy x-ray beams and the skin sparing effects of such beams. Estimates suggested that a ^{60}Co beam would be e quivalent to a 2 MV x-ray beam, a beam that would have far greater penetration than the 400 kVp clinical orthovoltage devices of the time. Calculations also suggested that the dose rates of the ^{60}Co beam would be higher than the 8 R/minute that were typical of 1940's orthovoltage units. However, it was not known whether the ^{60}Co beam would be sufficiently penetrating to exhibit skin sparing, since skin sparing (which is now known to occur for photon beams about 1 MeV) had only been observed for very high energy devices such as betatrons. This was an important issue. In conventional radiation therapy of the 1940's the skin received the maximum dose and the treatment protocols (i.e., dose, fractionation) had evolved using skin erythema as a guide to patient response (Thames, 1988). Any photon beam that minimised this skin erythema would allow more radiation to reach deeper structures. Early on in the development of the Saskatoon ^{60}Co unit, attention was paid to collimator designs that would minimise the dose delivered to superficial layers of tissue in the path of the beam, i.e. to maximise skin -sparing. And one of the earliest clinical studies examined the skin-sparing on patients being treated with a split-field on the Saskatoon ^{60}Co unit following intracavitary radium (Burkell, et.al., 1954). On one side an open-ended cone was used and on the other the cone was covered with a 3 mm sheet of ucite. A definite skin reaction was observed with the closed-end applicators and little or none on the open fields. These studies demonstrated that skin sparing was an important benefit of ^{60}Co irradiation and revealed that the radiation sensitive structures were located within the first few mm of the patient's surface.

therapy should be measured and even expressed. In 1951 most treatments were expressed in terms of the roentgen unit (now "R", then "r") defined for x rays in 1928 and for gamma rays a few years later but for which there was no corresponding quantity. (The ICRU adopted the name "exposure" a few years later after defining "absorbed dose", generally recognised as the physical quantity most closely related to exposure). Exposure is a description of the energy transferred from photons to electrons at some point and, if charged-particle equilibrium exists, differs fro absorbed dose only by a multiplicative constant. When treatments began in 1951 there were no national or international ^{60}Co standards and for the first few years the individual clinics "did their own thing". The first calibrations of the Saskatoon unit were based on measurements with a Victoreen r -meter (the standard dose meter at the time in North America) which had been calibrated by NRC in roentgen units probably up to about a HVL of 3 mm Cu from which a value for ^{60}Co was derived by extrapolation. This procedure was obviously not very reliable and in the next few years two alternatives were investigated for determining the exposure rate in a ^{60}Co beam (Garrett, Johns et al, 1955). The method o f Radiology Lab at NRC was based on comparison with ^{226}Ra for which the value for the gamma-ray constant was accepted to be 8.4 R/h at 1 cm from 1 g. In Saskatoon measurements were made of the ionisation charge produced in a graphite-walled chamber (Fig E7) irradiated in the ^{60}Co beam fro which the exposure could be derived using data such as the stopping-power ratios of carbon to air . The NRC and Saskatoon values agreed within about 2%. In 1954 the National Cancer Institute of Canada convened a meeting of to standardise measurements among the nine Canadian centres then using ^{60}Co. It was agreed that measurements should be made with a 500-r chamber constructed by NRC and circulated among the various centres. Within a few years, NRC, in collaboration with other national and international standards laboratories, established an exposure standard which was used for calibrating ion -chamber dosemeters not only for ^{60}Co but, indirectly, for high-energy x-ray and electron beams as well.

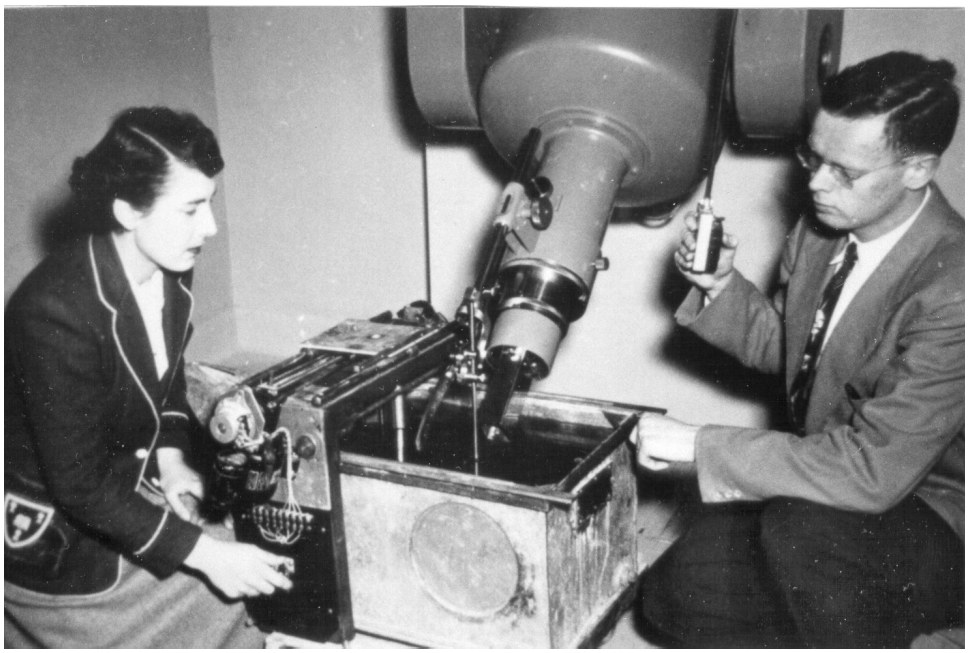

Fig. 3 Sylvia Fedoruk and Ed Epp with the ^{60}Co unit in Nov., 1951.

Epilogue

In their 1949 application to NRC -CRNL to activate a ^{60}Co source, Johns and Watson pointed out the research possibilities of a kilocurie therapy unit. These possibilities were demonstrated in the following years during which the features of ^{60}Co beams directly related to patient treatment were thoroughly investigated and in which the unit played a major role in studies of both ionisation and calorimetric radiation dosimetry, the evolution of the use of TAR in calculating dose distributions and in a number of radiochemical and radiobiological studies. A large number of graduate students were trained because of the existence of the ^{60}Co unit including (in order of graduation): Dick Kornelsen, Sylvia Fedoruk, Ed Epp, Lloyd Bates, Doug Cormack Gordon Freeman (Chemistry), Bob Horsley, John Hunt, Gordon Whitmore, Jim Till, Gordon Mauchel, Margaret Morrison, Jean-Pierre Bernier, Bill Reid, Lloyd Skarsgard, Bob Bruce, Tom Griffith, John Scrimger, Bob Derbowka. Many of these individuals went on to become leaders in the (then new) field of medical physics.

Acknowledgments

The contributions of Sylvia Fedoruk, including the provision of several of the figures, are greatly appreciated.

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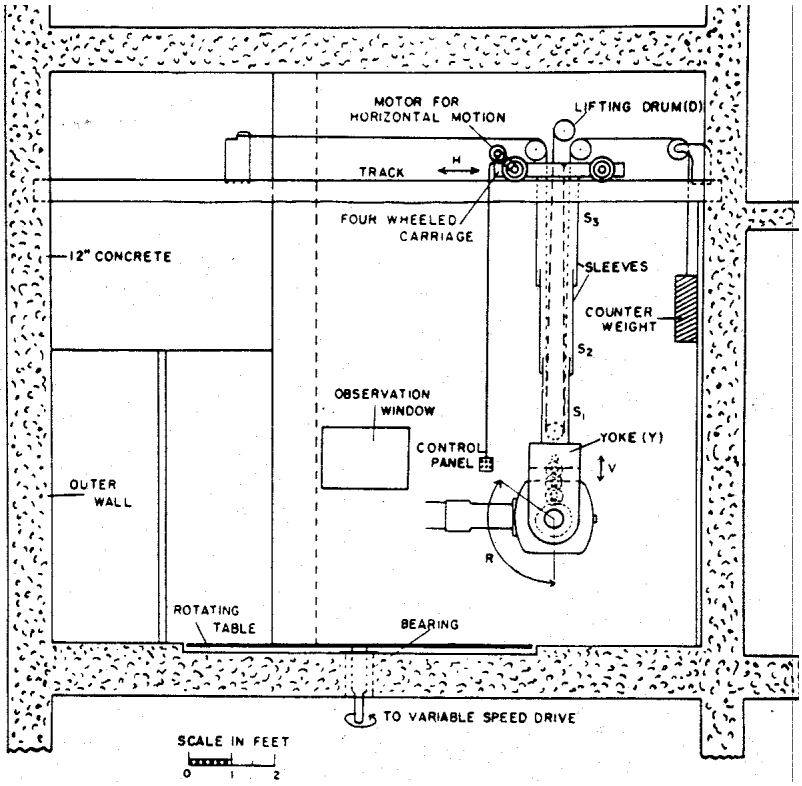

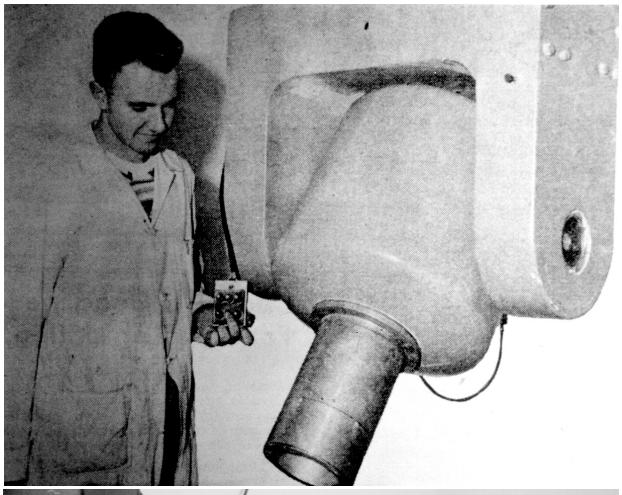

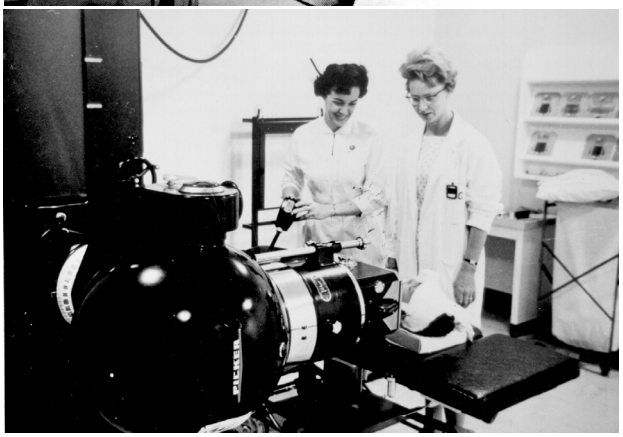

Fig. 4 The lifecycle of a ^{60}Co therapy unit. Clockwise from upper-left: room design; delivery; testing; clinical use; and retirement. The panels show (clockwise from upper-left) an elevation drawing of the Saskatoon ^{60}Co treatment room showing the ceiling mount and the rotating turntable; Lloyd Bates and H.E. Johns with the un-mounted treatment head and shipping container; Gordon Whitmore with one of the early collimator designs that used lead cutouts to adjust the field size; a Picker ^{60}Co unit with Johns-MacKay collimator in Calgary with technical director, Beth Parton, and radiation oncologist, Priscilla Barnes observing a treatment; and, Harold Johns, Charlie Burkell, Sylvia Fedoruk, and Doug Cormack in December 1972, a few months before the Saskatoon ^{60}Co unit was decommissioned.

Task Force Completes Recommendations to Ministry of Health

By Peter Munro

On December 8, 1998 Ontario's Minster of Health, Elizabeth Witmer, commi s-sioned a "Task Force on Human Resources for Radiation Services" to examine the challenges of delivering radiation services to the province's population. This action by the minister was in part the r e-sult of negative publicity about the long waiting lists for radiation services and the need to refer patients out of province that became widely publicised in July, 1998. The task force, chaired by Dr. Charles Hollenberg, completed its recommendations [see following page] on Feb. 10th, 1999 and by the Feb. 27th, 1999 its re c-ommendations had been accepted by the Minister and funding had been put in place to act on the recommendations. The speed by which the government acted on the recommendations, and their comprehensive nature, suggest that the emplo y-ment environment for physicists working in radiation therapy in the province will change considerably over the coming years. And it is clear that the effects of the recommendations will be felt across the country.

Over $15 million (per annum) has been set aside for training, recruitment and retention, of professionals in radiation services. Of this amount, $1.0 million has been set aside for education and training of medical physicists, and $5.0 million has been set aside to increase the numbers (and the salaries - we hope) of medical physicists working in the province. In addition, $0.5 million has been set aside for recruitment of medical physicists, radiation therapists, and radiation oncologists. [Editors note: I look forward to the advertising revenue of Interactions increasing dramaticall in the coming months and years.] One of the main goals of the plan is to train more medical physicists. When the training program is operating fully, 10 physics trai n-ees will enter the program annually, resulting in ~20 physicists in training at any one time. In the short term, however, recruitment will be used to increase the numbers of physicists in the province. One of the more important recommendations a d-dresses workload (i.e., the number of physicists required per patient being treated) as well as the need for technical support (e.g., dosimetrists, computer e x-perts). These recommendations may help counter the poor record for retention in the province during the 1994-1998 period. Over this period 32 physics trainees and physicists stopped working in the pro v-ince, including 20 who found jobs in e i-ther the USA (14) or other provinces (6). Retirements, dismissals, illness, and i-gration to other fields accounted for the other departures.

The following is a message from Dr. Ken Shumak, the new CEO of Cancer Care Ontario, on his expectations for the future.

Our ultimate goal for the radiation program is to treat all patients withi n four weeks from the time they are referred for radiation. Currently, the average wait for treatment is between seven and 14 w eeks. To reach this goal, we will extend operating hours and offer monetary incentives to staff who agree to work longer hours. We also will launch an extensive recruitment drive to attract more radiation therapists, medical physicists and radiation onco logists, and will increase Ontario salary scales to be competitive with other jurisdictions. At the same time, until the expa n-sion initiatives are in place, we will begin to re -refer a limited number of patients requiring radiation treatment to cancer ce ntres elsewhere in the province and in the United States. Only those patients who are willing and able to travel, and who meet specific medical criteria, will be re -referred. [In addition, the Minister of Health has] ... also announced $10.5-million in s tart up funding for our three new cancer centres under development in Waterloo, Durham, and Peel [regions].

An overview of how the number of phy s-ics personnel will change in the coming years is summarised by the accompanying table (provided courtesy of Jerry Battista). The Ministry of Health appears to have agreed that there should be a physicist for every 300 patients treated. Given that workload figure and the expected 4% a n-nual increase in patient workload, the number of physicists and trainees in the province is expected to increase from 64 to 107 in the next six years. During the first 2-3 years of the program much of the increase will be by recruitment. However, once the training programs are established most of the net gain will be due to newl trained graduates. Built into the predictions are losses due recruitment to other

(Continued on page 43)

	1998	1999	2000	2001	2002	2003	2004	2005
RT Cases/Year	21484	23000	26411	27500	29000	30000	31500	32266
Goal (According to Staffing Formula - Ministry of Health)	72	80	88	92	96	100	104	108
External recruited	0	10	10	5	2	2	2	2
Residents recruited	2	3	3	7	7	7	7	7
Atttrition	-3	-3	-4	-4	-5	-5	-5	-5
Net GAIN	-1	10	9	8	4	4	4	4
Total Physicists	64	73	83	90	95	99	103	107
Cases/Year per staff	338	314	320	304	306	303	306	302

Task Force Recommendations

The following is an executive summary from the task force report.

1. Currently Ontarians are experiencing significant delays in gaining access to radiation treatment services. These delays, which can compromise quality of care, result from an insufficiency in the availability of those professionals involved in the delivery of radiation treatment (radiation therapists, medical physicists and related staff, medical oncologists).

2. A definitive solution to these staffing problems will require the education and retention, in Ontario, of sufficient numbers of professionals to meet current and projected needs. The achievement of t his objective will require enlargement of education and training programs in Ontario and adjustment of Ontario salaries and working conditions to meet market conditions in Canada.

3. The Michener Institute program in radiation therapy must begin in September, 1999 with 75 students per class. The Ministry should immediately ensure that the Institute will have the capital and opera ting funds required for this program. These costs are $1.82M and $1.OM per year (net of fees) respectively.

4. A training program in Medical Physics of 10 post-PhD students per class (total of 20 students) should be instituted as early in 1999 as possible. The Ministry should ensure that CCO and PMH that have sufficient funding ($1.IM per year) to begin this program in 1999.

5. The residency program in radiation oncology should be increased to 10 residents per year (totalling 50 positions) as of July, 1999. The Ministry should immediately inform the Ontario Faculties of Medicine that the funds required to begin a program of this size will be available in July, 1999 and will gro commensurate with the number of residents in this program. Costs for a full program of 50 residents will approximate $2.7M per year (98/99 dollars).

6. Since the output of the education and training programs will not increase for several years, staffing deficiencies must be met in part b encouraging out-of-province recruitment. To this end it is recommended that a recruitment office be established immediately in CCO and that this office be allocated sufficient funds to relocate up to 50 professional staff into Ontario in 99/00.

7. The recruitment and retention o f staff related to radiation services will require urgent adjustment in both salary scales and workload standards. For radiation the salaries equivalent to the ONA rate for nurses should be introduced. Staff/ high energy machine ratios should be set at 6.5 per eight hour day and 11 for twelve hours. The salaries for medical physicists employed in Ontario should be set at the top of the Canadian scale. A staffing ratio for medical physicists of 1/300 treated cases should be accpted. For all disciplines related to physics this ratio should be 1/125. The fee schedule for radiation oncology should be adjusted to accommodate both a technical component and increased complexity of planning and treatment. An optimum staffing ratio of one oncologist/215 ne cases should be reached in this discipline as soon as possible.

8. It is recommended that the funding of radiation services in Ontario be placed on a direct cost per case basis and that the recommended salary and staffing adjustments be built into the cost beginning in 99/00. 98/99 direct costs per case approximate $2,600; with the recommended salary and staffing adjustments this figure will increase to about $2,900. The application of this figure in 99/00 will allow salary adjustments to be made in that year, a move that will improve recruitment and retention.

9. To meet a year-over-year increase in patient numbers and to eliminate a waiting list of approximatel 2,000 patients, it is estimated that there will be a requirement to treat about 29,000 new patients with radiation in 99/00. A t a cost per case of $2,900 this will engender radiation expenditures in 99/00 of about $84M, a $17M increase over 98/99 expenditures. It is recommended that the Ministry make provision for this increase while adjusting the base budgets of the operating a gencies according to the actual number of treated cases in 99/00.

10. Since direct cost per case calculations do not include the costs of indirect services which are sensitive to volume and/or hours of operation (e.g. operation of facilities, patient records), it is recommended that increments in indirect costs be dealt with through the operating plan process. Further, since the cost per case calculations do not include depreciation of major equipment, the MOH and the operating agencies must develop a separate protocol regarding the acquisition and replacement of this equipment.

11. It is recommended that responsibilit for the implementation of the recommendations of this Task Force be placed in the office of the Deput Minister's Advisor on Cancer. This office should be advised by a small committee derived from the Ministry, appropriate educational institutions and the operating agencies.

(Continued from page 42)
provinces and the USA. For several years Ontario will be a net importer of physics talent, however, after 2001 the province should become a net exporter.

New Medical Physics Association Forms in Quebec

By Micheal Evans

On Saturday Jan. 10, the Association Québécoise des Physicien(ne)s Médicaux Cliniques (AQPMC) met for its first official reunion at the new radiation oncology center of Hôpital Maisonneuve-Rosemont in Montreal. The meeting was the result of an ad-hoc reunion at the COMP annual meeting in London Ontario the previous year. At that time a group of about 15 medical physicists primarily involved with radiation oncology met to discuss the possibility of forming some sort of association to address the working conditions of clinical physicists (primarily salary and professional recognition) in Quebec. The London meeting produced a provisional executive comprising J. -P. Bisonnette (U of Montreral), J. Pouliot (U of Laval) and M. Evans (McGill), and a mandate to proceed with the logistics of registering the group as a professional association. The main aim was to bring about recognition of the clinical component of our profession to the bureaucrats in the government, and to form a recognisable entity with which the Ministry of Health would be able to conduct discussions with.

Following the London meeting, the AQPMC proceeded with two projects. The process of registering the association with the proper levels of government was dealt with, and letters of support were received by physician groups provincially, and from the leadership of COMP and CCPM. It was made quite clear that the AQPMC was in no way a competing bod to the two national medical physics groups, but rather a group that was aiming to deal with the salar and professional working conditions which are in the main controlled by provincial jurisdiction. The second project during fall 1998 was a membership drive initially aimed at identifying medical physicists primarily in radiation oncology, and recruiting them to join the association. Approximately 46 medical physicists were initially identified, and to date the AQPMC has a membership of 41 from the Montreal, Gatineau, Sherbrooke, Quebec, and Chicoutimi regions.

During the fall there were several meetings as well with ministry officials at various levels to try and explain the relationship between the clinical physicist and the oncology department. Quebec is the only province without some kind of a cancer control agency to co-ordinate treatment and research, and as a result radiation oncology departments are run as any other hospital department, and the relationships with management vary from hospital to hospital.

The first general assembly in January of this year, attended by about 35 members, served several purposes. First of all it was an opportunity for physicists from around the province to meet and put faces to names. Secondly, an executive meeting was held with the provisional president, secretary and treasurer to review the progress made on defining salary levels for physicists. This was based on a survey sent to identified members during the fall of '98. Finally a general assembl was held, whereby the executive was able to inform the membership that the AQPMC was a recognised association, and as such probably constituted the most obvious group with which the province would conduct any salary discussions. A presentation was also made by a Human Resources director from one of the Montreal hospitals. This individual was from an institution that had experienced problems in recruiting medical physicists in the past, and was quite sympathetic to the physicists salary concerns. Of course, he pointed out that while the government did not seem entirely unsympathetic to our problems, the truth was that such a small group of health professionals hardly even registers on the public policy radar screen. Nonetheless several of the larger hospitals in the province have combined resources to lobby the government on behalf of medical physicists, and the fact that a recognised professional association was no in place seemed to be a positive step forward. The general assembly conducted some routine business, and ended with the election of official officers for a fixed term. J.P. Bissonnette remains as president, J. Pouliot remains as Secretary, and H. Patrocinio from McGill was elected as treasurer.

The AQPMC intends to have a business meeting coinciding with the COMP-APIBQ meeting in Sherbrooke this summer, and review any progress made in salary discussions and professional working conditions. There is also some interest in examining the formation of a licensed professional order of medical physicists, and a report on the pros and cons of this route are expected to be reported on at the summer meeting. While any progress on the salary scales for medical physicists will likely be a long and slow process, we feel confident that there is support from the administration level some of the hospitals. The formation of a professional association to represent our group was also a useful development, as the government could no longer claim (however rightly) that it didn't know who to talk to. And if all else fails, then what the heck, we tried, and it makes a good reason to get together after a long winter of taking measurements and have a fe beers/wine/Perrier …whatever… together!

In Brief

From Winnipeg

In an effort to replace needed diagnostic imaging equipment, Manitoba Health d ecided to merge the 1997-98 and 1998 -99 capital equipment budgets. This meant some $6M were available in one chunk. Seventeen pieces of equipment were identified as being top priority for urgent r eplacement in the province of Manitoba. The priority of the equipment on the list had to be preserved. That meant the first piece had to be bought first before, for example, the fifth piece could be bought. Teams were assembled for each modalit represented and vigorous discussions ensued. In the interim, during Spring 1998, Manitoba made the transition to Hospital Authorities, making the purchasing process even more complex and challenging. Through it all, the medical imaging physicists perservered. In conclusion, sixteen pieces of equipment were bought from the combined budgets: 3 general radiographic units, 2 CTs, 2 rf units, 2 dual head gamma cameras, 6 high end ultrasound scanners with colour Doppler, and 1 portable ultrasound scanner. Some equipment has been delivered, while, in other instances, we are waiting for delivery.

Jacqueline Gallet

Prostate Implant Program at PMH

Princess Margaret Hospital in Toronto recently launched an ultrasound-guided prostate implant program. The first patient was treated on March 1, 1999. A B&K ultrasound imaging system is used to acquire images of the prostate. These images are recorded on videotape and later digitised and imported into the MMS treatment planning system (Multimedia Medical S stems, Charlottesville, Virginia). The MMS system is a treatment planning syste dedicated for prostate implant. It uses the AAPM TG-43 dosimetry formalism and can be easily updated to accommodate the change of the NIST 1999 calibration standard for I-125 seeds. A digital image acquisition module with DICOM 3 interface

(Continued on page 47)

Book Review: Radiation Protection Dosimetry - A Radical Reappraisal

Review by Chris Davey, RSO, Cross Cancer Institute

Authors: Jack A. Simmons, David E. Watt

Publisher: Medical Physics Pu blishing, Madison, Wisconsin 1999, 140pp.

Price: $39.95 US-softcover.

Medical Physics Publishing made available a copy of the above text to be r eviewed for the COMP newsletter.

This book presents an alternative a pproach to current radiation protection dosimetry. It points out the many defects and limitations of the present radiation protection paradigm and shows that the current assumptions are the cause of much misunderstanding, erroneous risk estimations and misdirected expense in this field.

The first chapter takes a brief step back in time to review an analogous situation in the history of astronomy, and then the second chapter describes the development of radiation protection philosoph from the beginning, pointing out scie ntific lapses which occurred, and comparing the circumstances with the astr onomical analogy. In the third chapter, ICRP 60 is analysed from this perspective, and further problems with the ne concepts therein are laid out.

In chapter 4, there is a thorough review of the most widely used simulation models of biophysical effectiveness, and the conclusion is reached that the physical mechanisms of radiation action in the are not valid. Chapter 5 investigates radiation as a probe for the physical investigation of radiosensitive structure in biological targets, and concludes that radiation quality is determined by the mean free path for linear primary radiation.

Chapter 6 concludes that the correct approach would use a fluence-based system for radiation protection, and that it is feasible to construct and use detectors which would measure the absolute bio-effectiveness of any radiation type b simulating the response of intracellular DNA. The detector output would be the equivalent of the number of double strand breaks produced per unit fluence.

The final chapter (seven) includes these four conclusions:

1 Weighting coefficients and risk factors derived with their use are meaningless numbers when used for calculating radiation protection dosimetry.

2. To deny the existence of a threshold for the induction of cancer b radiation is to fly in the face of a large body of evidence supporting its existence.

3. The postulate of a linear response as a function of dose is, at best, a crude approximation and, at worst, an extremely expensive way to over-estimate risk.

4. For low-LET radiation, the fact that "dose" implies a homogeneous distribution of energy disposition means that it is a conve nient surrogate for fluence down to values of about 1 cGy. For high-LET (charged particle) radiation, RdoseS is a meaningless concept below values of a few gray.

This important book could and should be the first step towards a totally ne system of measuring radiation, based on the fluence of the radiation, coupled with an estimation of the reciprocal mean free path of the primar ionisation. Risk of detriment would be solely on the basis of these two measurements. R adiation dosimetry should be radically reappraised, say the two authors, and their proposals deserve serious consideration by all interested professionals in radiotherapy.

Theratronics Research Fund Results

Jerry J. Battista, Chair
Theratronics-CCO Grants Panel

An R&D fund was established by Theratronics International (MDS-Nordion) as a result of a purchasing agreement reached with Cancer Care Ontario (CCO). Theratronics was awarded a contract to supply a large number of computer workstations for 3D radiation treatment planning in Ontario. New computer systems have now been installed in London, Toronto, Windsor, Thunder Bay, Kingston, and Ottawa. The first commercial installation took place in the Fall of 1996 at the London Regional Cancer Centre.

In a renewed research partnership with the CCO medical physics community, Theratronics International agreed to provide funding of $250,000 over a 5-year period. The goal is to stimulate Physics projects of excellent scientific merit in the area of clinical radiation therapy. Projects are peer-reviewed by a Panel of physicists and a Theratronics representative, with external referees called upon as needed. Judgement is based on criteria such as innovation, scientific merit, impact on the field, ease of technology transfer across Centres, and the potential to attract additional external funding.

The inaugural first-round competition was held during the summer of 1996, with four applications approved for Toronto and London. The following Table lists the projects approved recently by the Grants Panel in the second-round of competition.

Congratulations to these awardees !

A third competition will been scheduled for the Fall of 2000.

Applicants	CCO Centre	Project Title	Amount Approved
B Faddegon Y. Ung R. Mackenzie J. Balogh	Toronto-Sunnybrook	Conformal Electron Therapy	$30,000
D. Wilkins J. Cygler	Ottawa	Software for Biological Effect of Fractionation	$19,570
J. Schreiner A. Kerr J. Robins G. Salomons R. Sankreacha	Kingston	Development of an Automated First-Generation Cobalt-60 Tomotherapy Unit	$24,000

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help
end

This will give you a list of all the commands you have access to. If you have any other questions or concerns please send e-mail to canada-l-owner@irus.rri.uwo.ca , and someone will get back to you.

Shidong Tong
tong@clinphys.pmh.toronto.on.ca

Centre for Vascular Research *(Continued from page 34)*

aging Research represents one of the first projects to benefit from ORDCF funding. To date 107 applications have been considered and 26 have been funded. The total funding requested has exceeded $224 million and the t o-tal funding distributed exceeds 86 million.

In Brief *(Continued from page 45)*
will be installed, which allows ultrasound images to be transferred from the ultrasound machine to the MMS system via computer network. Seeds implant is guided by the ultrasound system using a needle template. Post-op dosimetry based on CT scans is performed one day and one month after the implant. Currently we are treating one patient per week, and we will be moving on to treat two or more patients per week in the near future.

Shidong Tong

Go West Young Man!

The big news at the Cross Cancer Centre in Edmonton is the recent arrival (March 1, 1999) of Gino Fallone as the new Director of Medical Physics. Rick Hooper stepped down after 5 years at the helm into a senior physicist position. Gino's timing was impeccable, just missing a large winter storm in Montreal in exchange for the balmy (do I hear an -20^0C temperatures in the forecasts?) weather of Edmonton. His new phone number is (780) 432-8750 (if you can catch him!).

Sherry Connors with Peter Munro

More Reading

Jake Van Dyk has just completed editing a book entitled "*Modern Technology of Radiation Oncology: A Compendium for Medical Physicists and Radiation Oncologists*". The book consists of 25 chapters written by internationally renowned authors. Each chapter provides an up-to-date guide on some aspect of the modern technology of radiation oncology including: design, clinical needs assessment, purchase considerations, acceptance testing, commissioning, quality assurance, and practical use. While the book is primarily written for medical physicists and radiation oncologists who are involved with the clinical implementation and use of new technologies for radiation treatment, it is hoped that the book will become a valuable teaching resource, as well.

Peter Munro

PROPOSAL TO AMEND COMP BYLAWS

By Curtis Caldwell

During the November 1998, meeting of the COMP Executive, motions were passed to propose two amendments to the COMP Bylaws relating to the "Eligibility and Rights as Full Members" and the "Eligibility and Rights of Associate Members". The intent of the amendments is to (1) define the eligibilit requirements more clearly and (2) to make clear th e intended use of the "Associate Member" category (we currently have only one such member).

Please note that the COMP membership will be asked to vote on these proposed changes at the Annual General Meeting in Sherbrooke in June 1999. The publication of these proposed amendments in the April 1999 issue of INTERACTIONS constitutes the 60 days notice required in our bylaws.

(1) Proposed amendment relating to "Eligibility and Rights as Full Members"

Currently, ByLaw Number One, Article III, under "ELIGIBILITY AND RIGHTS AS FULL MEMBERS" reads:

Are Eligible:

A) Those who have graduated from an accreditated University, who also subscribe to the specific objectives of the COMP and are practicising medical physicists as determined by a review of their membership application.
B) Those who are Members or Fellows of the Canadian College of Physicists in Medicine (CCPM).

It is proposed that the above text be replaced by:

Are Eligible:

A) (i) Those who have graduated with a Master's degree or Doctorate in medical physics, a physical science or engineering from an accredited University (in exceptional cases, other qualifications will be considered), and
(ii) who also subscribe to the specific objectives of the COMP, and
(iii) are practicing medical physicists as determined by a review of their membership application by the Executive.
B) Those who are Members or Fellows of the Canadian College of Physicists in Medicine.

(2) Proposed amendment relating to "Eligibility and Rights of Associate Members"

Currently, ByLaw Number One, Article III, under "ELIGIBILITY AND RIGHTS OF ASSOCIATE MEMBERS" reads (in part):

Those who are not eligible as Full members but are engaged in a field of endeavor related to Medical Physics.

It is proposed that the above text be replaced by:

Physical scientists or engineers not eligible as Full members may apply as Associate Members.

CORPORATE MEMBERS

Argus Software, Inc.
2221 Broadway, Suite #212
Redwood City, CA 94063
Phone: (650) 299-8100
Fax: (650) 299-8104
e-mail: rstark@argusqa.com
Contact: Mr. Richard H. Stark, M.S.
President

Canadian Scientific Products
1055 Sarnia Road, Unit B2
London, ON N6H 5J9
Phone: (800) 265-3460
Fax: (519) 473-2585
e-mail: sgensens@csp2000.com
Contact: Mr. Steve Gensens
Sales Manager

CNMC Company, Inc.
2817-B Lebanon Pike, P O Box 148368
Nashville, TN 37214-8368
Phone: (615) 391-3076
Fax: (615) 885-0285
e-mail: CNMCCo@aol.com
Contact: Mr. Ferd Pusl

Donaldson Marphil Medical Inc.
1550 de Maisonneuve O. #801
Montreal, PQ H3G 1N2
Phone: (514) 842-5530
Fax: (514) 931-6408
e-mail:
Contact: Mr. Mike Donaldson

EEV Canada Ltd.
6305 Northam Drive, Unit 3
Mississauga, ON L4V 1H7
Phone: (905) 678-9811
Fax: (905) 678-7726
e-mail: Anne_An-Yong@eevinc.com
Contact: Ms. Anne An-Yong

Elekta Canada, Inc.
601 Milner Avenue
Scarborough, ON M1B 1M8
Phone: (416) 412-4607
Fax: (416) 412-4623
e-mail:
Contact: Ms. Anne Dreyer
Radiation Therapy Sales Specialist

G. E. Medical System
2300 Meadowvale Boulevard
Mississauga, ON L5N 5P9
Phone: (905) 567-2158
Fax: (905) 567-2115
e-mail: deborah.keep@med.ge.com
Contact: Ms. Deborah Keep

Hilferdine Scientific Inc.
25 Whitburn Crescent
Nepean, ON K2H 5K5
Phone: (613) 591-5220
Fax: (613) 591-0713
e-mail: hilferdine@sympatico.ca
Contact: Dr. Joseph Basinski

Landauer, Inc.
2 Science Road
Glenwood, IL 60425-1586
Phone: (708) 755-7000
Fax: (708) 755-7016
e-mail:
Contact: Mr. William Megale
National Sales Manager

Multidata Systems International Corp.
9801 Manchester Road
St. Louis, MO 63119
Phone: (314) 968-6880
Fax:
e-mail:
Contact: Ms. Patricia Roestel

PTW-New York Corporation
201 Park Avenue
Hicksville, NY 11807
Phone: (516) 827-3181
Fax: (516) 827-3184
e-mail:
Contact: Mr. Steve Szeglin
General Manager

Sandström Trade & Technology Inc.
610 Niagara Street, P. O. Box 850
Welland, ON L3B 5Y5
Phone: (800) 699-0745
Fax: (905) 735-6948
e-mail: stx@sandstrom.on.ca
Contact: Ms. Pia Sandström

Siemens Canada Ltd.
Medical Systems Division
2185 Derry Road West
Mississauga, ON L5N 7A6
Phone: (905) 819-5747
Fax: (905) 819-5884
e-mail: dean.willems@siemens.ca
Contact: Mr. M. Dean Willems
Manager, Oncology Systems

Theratronics International Limited
Box 13140, 413 March Rd.
Kanata, ON K2K 2B7
Phone: (613) 591-2100
Fax: (613) 592-3816
e-mail: marketing@theratronics.com
Contact: Ms. Denise Ashb
Regional Manager for Canada

VARIAN MEDICAL/EQ.
Bldg. 2-256, 4000 Kruseway Place
Lake Oswego, OR 97035
Phone: (503) 636-5433
Fax: (503) 636-7774
e-mail:
Contact: Mr. S. Clifford Robison
Northwest District Manager

Wellhofer North America
3111 Stage Post Drive, Suite 105
Bartlett, TN 38133
Phone: (901) 386-2242
Fax: (901) 382-9453
e-mail: wellusa@aol.com
Contact: Mr. Neil Johnston

X-Ray Imaging Consultants Ltd.
674378 Hurontario Street, RR #1
Orangeville, ON L9W 2Y8
Phone: (519) 942-1923
Fax: (519) 942-0288
e-mail: xicl@headwaters.com
Contact: Ms. Lois Brown, ACR
President

Northwestern Ontario Regional Cancer Centre

Cancer Care Ontario, a provincial agency, is responsible for the development of an integrated cancer control system in Ontario. This organization advises government on the planning of the cancer system in the province, develops standards related to the delivery of cancer programs, and promotes the coordination and effectiveness of services that are provided.

As part of its mandate, Cancer Care Ontario manages the province's eight regional cancer treatment centres, including the Northwestern Ontario Regional Cancer Centre (NWORCC). Located in Thunder Bay, Ontario, the NWORCC serves a population of 250,000 with an annual new radiation treatment case load of 600 and is affiliated with Lakehead University and McMaster University. We are currently seeking a full-time...

Radiation Oncology Medical Physicist

This position offers an opportunity to participate in a progressive and rapidly evolving Centre with a strong academic and research commitment. The Centre is currently equipped with two dual energy linear accelerators (Varian Clinac 2300 C/D; Siemens Mevatron KD), a cobalt unit (AECL Theratron 780), a simulator with CT attachment (Varian Ximatron), a virtual simulator (GE Advantage Sim), a LDR brachytherapy unit (Nucletron Selectron), an orthovoltage unit (Theratronics Therapax) and a Theraplan Plus treatment planning system (Theratronics). The Centre recently completed a $5M expansion during which the Clinac was installed. This machine is state-of-the-art, with MLC, EPID and dynamic wedging capabilities. Both the Clinac and the simulator are networked through a verification system (Varian VARiS). The Centre is also slated to relocate to a new site within the next three years, presenting unique opportunities and challenges. The Mevatron is slated for replacement at the same time. Acquisition of a HDR brachytherapy remote afterloading system is currently anticipated.

The successful applicant will join a department comprised of two other physicists and three technical staff, and will be required to participate in the full range of clinical physics activities. Leadership in the development and improvement of the techniques used in radiation treatment program is expected. Teaching is also an integral component of the position as the department maintains a medical physics residency and supports a radiation therapy student program. Research and academic pursuits are supported, and qualified candidates will be eligible for an Adjunct Professorship at Lakehead University.

The ideal candidate will have a PhD in medical physics or a related discipline from a recognized university, at least two years' clinical experience, membership or eligibility for membership in the Canadian College of Physicists in Medicine (CCPM), and a record of research activity. Outstanding candidates with MSc degrees will also be considered. Experience with high dose rate brachytherapy is an asset. Excellent written and oral communication skills are required. In accordance with Canadian immigration requirements, preference will be given to Canadian citizens and permanent residents of Canada. Overseas candidates may also be considered.

Please send a Curriculum Vitae, with the names of three referees, by April 30, 1999, to: Dr. P.L. McGhee, Chief Physicist, Department of Medical Physics, Northwestern Ontario Regional Cancer Centre, 290 Munro Street, Thunder Bay, Ontario, Canada P7A 7T1. Tel.: (807) 343-1612. Fax: (807) 344-6888. E-mail: peter.mcghee@cancercare.on.ca. *We are an equal opportunity employer.*

Cancer Care Ontario

THE UNIVERSITY OF ALBERTA DEPARTMENT OF ONCOLOGY AND

THE CROSS CANCER INSTITUTE INVITE APPLICATIONS FOR

MEDICAL PHYSICIST

An academic medical physicist position (at the level of Assistant or Associate Professor) is available through the University of Alb erta (Department of Oncology, Division of Medical Physics) at the Department of Medical Physics, Cross Cancer Institute (CCI). The applicant should have a Ph.D. in medical physics or a closely related discipline, and a minimum of two years experience in Radiation Therapy Physics. Preference will be given to applicants with CCPM certification or the equivalent (ABR, ABMP).

The CCI is the comprehensive cancer centre that serves the population of Edmonton and northern Alberta, providing tertiary level diagnostic and treatment services, conducting ca n-cer research and participating in professional education.

The facilities of the CCI include six Varian linear accelerators, a cobalt unit, an orthovoltage x-ray machine, a CT-simulator, three conventional simulators, and CT, MRI and SPECT i m-aging systems. There is also a busy brachytherapy program including a MicroSelectron HDR, Selectron LDR, two MicroSelectron LDRs, and an NPS brachytherapy treatment pla n-ning system. External beam treatment planning is carried out on both an in-house developed system based on Alpha and Sun comput er systems, and on a Helax - TMS planning system. There exists extensive computer, electronic, and mechanical facilities in the department.

Scientific research in Medical Physics includes work on intensity modulation planning, deliv-ery, and verification; and brachytherapy planning. Clinical research includes participation in 3D conformal radiotherapy clinical trials of the RTOG. Teaching responsibilities are within the medical physics graduate program, the radiation oncology reside ncy training program, and the in-house radiation therapist training school. The candidate will be expected to esta b-lish an independent research program. The level of the appointment and the amount of gua r-anteed research time will be commensurate with the qualifications of the candidate.

In accordance with Canadian Immigration re quirements, priority will be given to Canadian citizens and permanent residents of Canada. Please submit a resume with the names of three referees to Gino Fallone, Ph.D., FCCPM, ABMP, Professor and Director, Medical Physics, University of Alberta, Cross C ancer Institute, 11560 University Avenue, Edmonton, AB, T6G 1Z2, Tel. 780 432-8522, FAX 780 432-8615, Email gino.fallone@cancerboard.ab.ca.

The closing date for this competition is April 30, 1999.

EXCITING PHYSICIST OPPORTUNITY
IN ONE OF THE LARGEST HOSPITAL-BASED
CANCER CENTERS IN THE SOUTHWEST

Bring you physicist skills to one of the cleanest, friendliest and most wholesome communities in the Southwest.

GROWING, PROGRESSIVE CANCER CENTER

Regional Cancer Center about to announce affiliation with major Cancer Program. This facility is seeking a medical physicist to assist with the program expansion.

The position includes all aspects of radiation oncology physics, involving 3-D and conformal treatment planning oversight, HDR and brachytherapy.

Major equipment upgrades are in progress and you can have a leading role in the commissioning of a new linear accelerator with online portal vision.

NO STATE INCOME TAX!

Enjoy all the everyday amenities in this town filled with community pride, as well as access to major sporting and cultural events associated with one of the nation's top five metropolitan areas, all within an hour's drive.

This quiet, friendly community is located on the shores of one of the area's largest recreational lakes, making available excellent fishing, hunting, camping, and skiing. Enjoy affordable housing with a strong economy based on Fortune 500 companies that call this community home.

I recently returned from evaluating this beautiful center and can assure you, it is a must see with a highly competitive salary and benefits package. For more information, call me, **Chad Rudel**, at **(800) 262-4194** or (972) 506-1500 and reference ROC-7847.

McMaster Universit

McMaster University invites applications for a 3 year contractually limited position at the Assistant Professor rank in the Radiation Sciences Unit of the Department of Physics & Astronomy. The position is to begin on 1st July, 1999, or as soon thereafter as possible. Candidates should possess a PhD and have demonstrated both an excellent research record and an aptitude to teach. The successful applicant will be expected to contribute to the strongly physics based undergraduate Honours Medical & Health Physics programme and the graduate programmes in Health & Radiation Physics and Medical Physics.

She/he will be expected to develop and provide leadership to her/his own independent research. It would be desirable for this to interact with one of the existing research fields within the Radiation Sciences Unit. These include laser and light propagation in tissue for photodynamic therapy and tissue characterization and the cellular and molecular basis of photodynamic therapy; the role of DNA damage and DNA repair processes in carcinogenesis and in the response of tumour cells to radiotherapy and chemotherapy; novel methods of imaging bone architecture and joint structure non-invasively; dosimetry of diagnostic and brachytherapy radioisotopes; imaging in PET and MRI, particularly for neurological and cardiac studies; and nuclear and atomic techniques used for body composition studies. McMaster has major facilities for Radiation Science research, including a nuclear reactor, an accelerator laboratory and a cyclotron used for production of PET isotopes.

In accordance with Canadian immigration requirements, this advertisement is directed to Canadian citizens and permanent residents. McMaster University is committed to employment equity and encourages applications from all qualified candidates including, aboriginal peoples, persons with disabilities, members of visible minorities and women.

Applications, including a statement of research interests and letters from three referees should be sent by April 30th, 1999 to:

Dr. D.R. Chettle
Radiation Sciences Unit
Department of Physics & Astronomy
McMaster University, Hamilton, Ontario, L8S 4K1, Canada.

phone **(1) 905 525 9140 ext 27340**
FAX **(1) 905 528 4339**

e-mail: **chettle@mcmaster.ca**

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Hamilton Health Sciences Corporation is Ontario's largest provider of comprehensive health services, serving a community of more than 1.9 million people.

Through our affiliation with McMaster University's Faculty of Health Sciences and partnerships with several health care providers and community agencies, Hamilton Health Sciences Corporation is at the forefront of innovation and excellence in health care delivery and health sciences.

Our four-site Nuclear Medicine Department is currently seeking a full-time……

MEDICAL PHYSICIST

This position is responsible for participating in all aspects of clinical and academic Nuclear Medicine activities. The department is equipped with 12 Gamma cameras, 2 Positron Emission Tomographic Scanners, 3 Bone Densitometry Scanners and 1 Medical Cyclotron.

Major areas of responsibilities include: Radiation Safety, Equipment Quality Control and Troubleshooting, Software Programming and Network Systems. Able to organize and independently fund a research programme.

Applicants require a post-graduate degree in Medical Physics or allied fields and eligibility for certification in CCPM. Experience with Nuclear Medicine equipment and software is preferred. Academic appointment to McMaster University is available to suitable applicants.

Qualified candidates are invited to submit resumes to:
Human Resources
Hamilton Health Sciences Corporation
McMaster Campus,P.O. Box 2000
Hamilton, ON L8N 3Z5
Fax # (905) 577-7773

The London Regional Cancer Centre

POSITION: MEDICAL PHYSICIST

The London Regional Cancer Centre is committed to providing le adership in cancer treatment, research, and education and is affiliated with the University of Western Ontario. Current treatment resources include 9 high-energy treatment machines, some with MLC and EPID, 2 simulators, a CT-simulator, HDR, LDR, and programs in prostate brachytherapy, stereotactic radiosurgery, and TBI. Leading-edge medical physics research is underway in projects related to 3-D conformal radiation therapy, megavoltage imaging, dose optimization, outcome prediction, and biological modeling. The successful candidate will join a very a c-tive and dynamic Medical Physics team consisting of 11 physicists, 5 dosimetrists, 7 electrical and e-chanical engineering staff, and appropriate computer and technical support. The candidate will participate in all aspects of clinical physics related to radiation treatment. The Medical Physicist will also be involved in research and development projects. He/she will participate in teaching physics to Radiation Oncology residents, Medical Physics residents, and Medical Biophysics graduate and undergraduate students. The Medical Physicist will also participate in the supervision of Medical Physics resident s, graduate students, and undergraduate term students.

Qualifications include a Ph.D. or M.Sc. in Medical Physics or related fi eld (Ph.D. preferred), completion of Peer Review A of Cancer Care Ontario or equivalent, 2 to 5 years of related experience in C linical Physics, and Membership in the Canadian College of Physicists in Medicine or equivalent. Applicants should have a high degree of interest, enthusiasm and commitment to patient care and research; the ability to supervise students and technical staff; the abilit y to teach; excellent verbal and written communication skills; and the ability to perform research and development in Clinical P hysics. The successful candidate should be eligible for a university appointment at the University of Western Ontario.

In accordance with Canadian immigration requirements, this advertisement is directed to Canadian citizens and permanent residents of Canada. Cancer Care Ontario has an employment equity program, which wel-comes diversity in the workplace and encourages applicants from all qualified candidates including women, aboriginal people, people with disabilities and visible minorities.

Application deadline is 15 May 1999. We thank all those who apply; however, only candidates chosen for interview will be contacted.

CONTACT: Jake Van Dyk, Professor, UWO, and Manager,
Radiation Treatment Planning and Delivery Support
790 Commissioners Road East
London Regional Cancer Centre
London, Ontario Canada
N6A 4L6
Phone: 519-685-8607
Fax: 519-685-8658
E-mail: jvandyk@lrcc.on.ca
Website: http://www.lrcc.on.ca

The London Regional Cancer Centre

POSITION: MEDICAL PHYSICIST RESIDENT

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

The London Regional Cancer Centre is committed to providing leadership in cancer treatment, research, and education and is affiliated with the University of Western Ontario. Current treatment resources include 9 high-energy treatment machines, some with MLC and EPID, 2 simulators, a CT-simulator, HDR, LDR, and programs in prostate brachytherapy, stereotactic radiosurgery, and TBI. Leading-edge medical physics research is underway in projects related to 3-D conformal radiation therapy, megavoltage imaging, dose optimization, outcome prediction, and biological modeling. The successful candidate will join a very active and dynamic Medical Physics team with a full range of dosimetrist, computer and engineering support. The candidate will benefit from "on-the-job" experience and will participate in all aspects of clinical physics related to radiation treatment including radiation dosimetry, treatment planning, brachytherapy, and quality assurance of all radiation therapy equipment. Courses in radiation physics and radiation biology at the University of Western Ontario are also offered during the tenure of this position. While the primary intent is to provide the candidate with a practical foundation in clinical physics, participation in a research project will occupy about 20% of the time. The duration of the training is two years and the training period will end with the Cancer Care Ontario Peer Review A process.

Qualifications include a Ph.D. (preferred) or M.Sc. in Medical Physics or related field.

Application deadline is 15 May 1999. We thank all those who apply; however, only candidates chosen for interview will be contacted. In accordance with Canadian immigration requirements, this advertisement is directed to Canadian citizens and permanent residents of Canada. Cancer Care Ontario is an equal opportunity employer.

CONTACT: Ms. Susan Vande Sompel, Human Resources Administrator
London Regional Cancer Centre
790 Commissioners Road East
London, Ontario N6A 4L6

Telephone: (519) 685-8665 Fax: (519) 685-8726
E-mail: svandesompel@lrcc.on.ca
Website: http://www.lrcc.on.ca/

From the Editor:

Newsletter News

As you can see from this issue of Interactions the world of Canadian medical ph s-ics is beginning to change. I had always felt that if we survived 1998 (that was the year when we as Canadians received the leas t amount of services for our tax dollars) then the future would start to look brighter. This prediction appears to be coming true. In the areas of research (e.g., MRC, CFI, ORDCF) and in clinical activities (e.g., Ontario Task Force on Human Resources) the federal and (some) provincial governments are beginning to direct more funding towards areas that will have a direct impact on what we do as medical physicists. It is indeed an exciting time to be in the field – if only we had time to enjoy the changes. Indeed, as editor the Interactions my perception is that many exciting events are happening in Canadian medical physics, but that COMP members do not have the time or energy to communicate those events to me. This is beginning to make it difficult for me to create a quality newsletter. So I urge you to overcome those feelings of exhaustion and to contribute to Interactions.

One of the characteristics of successful executives is that they start planning for su c-cession early. [I have been offered the p o-sition "Editor for Life" but I have declined that generous offer.] Although my mandate will not be finished until June, 2000 it is a good time to start encouraging enthusiastic individuals to volunteer to become the editor of this fine publication. While I cannot deny that there is an effort involved, the amount of work has steadily decreased as I have finalised the design and learned more about the tools available to simplify this task. And the feelings of accomplishment when an issue "goes out the door" have to be experienced to be believed!

Web News

As most of you are probably aware two services were introduced in the past three months, an e-mail service whereby the COMP executive can send e -mail messages to all COMP members and the launch of a refined version of the COMP/ CCPM web site at http://www.medphys.ca. These accomplishments are due to the great efforts of the COMP Communications Committee: Darcy Mason, Jacqueline Gallet, James Mainprize, Shidong Tong, Lara Dyke, and Warren Foltz. They have done a tremendous job! The web site is still in development and i m-provements will continue to occur, a l-though some of these changes will be not be apparent immediately. Behind the scenes we are improving the interactivit of the COMP membership database. Electronic submission of abstracts and short communications are also a long term goal. These are ideal opportunities for some COMP members to help out – and to sharpen their PERL skills at the same time.

Peter Munro

We're on The Web!
www.medphys.ca

Lend Me Your Demographics

Friends, Canadians, Countrymen; we are trying to i m-prove the accuracy of our membership database. If your e-mail address – or any other piece of information – in the membership directory is missing or incorrect please contact the COMP Secretariat (bmcgarry@compusmart.ab.ca). Only you can help prevent the scourge of dat a-base inaccuracy!