COMP OCPM

CANADIAN COLLEGE OF PHYSICISTS IN MEDICINE

LE COLLÈGE CANADIEN DES PHYSICIENS EN MÉDECINE

CANADIAN MEDICAL PHYSICS

NEWSLETTER

Le BULLETIN

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A surfaced rendered view of a skull phantom in air. The image is formed from a 3-D CT dataset obtained using an x-ray image intensifier that is rotated about the phantom, acquiring ~130 images over 200 degrees (voxel size in the reconstruction is 0.55 mm on a side). This image shows the high resolution achievable with the system, which has been designed to image vascular lesions such as aneurysms. Image reproduced with permission of **David Holdsworth** and **Rebecca Fahrig**, Robarts Research Institute and University of Western Ontario.

Feature Articles:

Inside this issue:

Message from the Outgoing Chair of COMP:
Paul Johns

Our recent annual conference in London Ontario was a huge success, due to the efforts of people both in London and across the country, all of whom I would like to thank here. Local arrangements were handled by Aaron Fenster, Joan Galbraith, Brad Kemp, Peter Munro, Jake Van Dyk, Kevin Jordan, Maria Drangova, Jerry Battista, and Ian Cunningham; the scientific program was arranged, along with myself, by Mike Patterson and Sherry Connors; the College Symposium was put together by Ting Lee; and Lee Gerig was responsible for the commercial exhibits and sponsorship. Brighid McGarry, our Secretariat, was invaluable in receiving the scientific submissions, advance registration, and dealing with innumerable enquiries. The Awards Committee consisted of John Schreiner, Mike Patterson, Ken Shortt, and Dick Drost, and was assisted by numerous anonymous judges. The Sylvia Fedoruk Prize selection was made by a separate completely anonymous committee. I thank also the corporate sponsors for their support of our conference, and the exhibitors for coming to London to participate. The number of attendees and the number of proferred papers were both the largest to date for COMP. And with somewhat over 2/3 of the COMP membership showing up to our annual conference, COMP is a thriving success !

My two year term as Chair - the first such two-year term in COMP history - is now done, and thankfully I will have more time now to devote to my own lab and students. (Mixed thanks to Lee Gerig for engineering the change to two-year terms just before I took office in 1996). It is a good time to look back and assess the changes of the period. Our organization has grown to over 400 members, including, due to Lee Gerig's efforts, a significant number of corporate members. Professional affairs has now been tightly integrated into the organization by way of having a dedicated Councillor for Professional Affairs. We have made good progress in relations with other organizations - in the last few months being both a founding organization of the Canadian Society of Nuclear Medicine (CSNM) and a founding member of the Canadian Radiation and Imaging Societies in Medicine (CRISM). Down the road, CRISM should be a vehicle for making a case to government and the public for funding of advanced technology in health care.

We have also agreed with the CCPM upon a more pragmatic basis for working together, in which funds are allocated collectively via a joint Finance Committee, and other key committees, such as Radiation Regulations and Professional Affairs, are shared. We have made a good workable

arrangement for the present; however, I continue to be concerned that the College Board and COMP Executive have not yet formulated a long-range vision as to what relationship the two organizations should work towards for the 10 to 20 year horizon. It is essential that those steering both organizations discuss this objectively.

We have significant external challenges, ranging from keeping the AECB interest in radiotherapy QA on a useful track to turf protection with engineers on the one hand, and other health care professionals on the other. The recent misguided decision by the CAP to restart, at least for one year, the old Division of Medical and Biological Physics (DMBP), is a challenge to us to ensure that all medical physicists - whether they work in a cancer clinic, hospital, university, government agency, or industry - have a home in COMP.

It was gratifying that at the recent Annual General Meeting in London the membership approved a budget for 1999 that includes the new part-time support position of Executive Director or Administrative Assistant. Such a person should enhance the efforts of the Executive considerably. We have gone about as far as we can go relying on medical physicists volunteering their time. The addition of Brighid McGarry as Secretariat a few years ago was a tremendous boost to our effectiveness and I predict a similar boost by adding a higher-level support person.

I am very pleased that Michael Patterson is the new Chair of COMP. I have confidence in his ability to follow a common sense practical approach in dealing with our challenges, and look forward to working on his team for the next two years.

Paul Johns
Carleton University

Restart of the Division of Medical and Biological Physics (DMBP) of the CAP

by Paul Johns

Just prior to the 1998 COMP/CCPM conference in London, the Canadian Association of Physicists (CAP) decided to restart, at least for a year, their defunct Division of Medical and Biological Physics (DMBP). To review history, the COMP was born in 1989 when Canadian medical physicists chose to move their activities outside of the CAP. In the fall of that year the DMBP Executive resigned, COMP was incorporated, and the vast majority of medical physicists moved across to the new organization. A fee reduction was negotiated with the CAP for those who wished to continue their CAP membership as a way of keeping contact with the "pure" physics community. The DMBP became inactive but the CAP carried it on their books and it appeared annually on the membership renewal form. Within the 1998 membership year, astonishingly, 36 CAP members have paid dues to the DMBP.

Over the past couple of years COMP and the CAP have pretty much normalized our relations and expanded the list of things we collaborate on. These now include:

- joint membership fee reduction
- members of one organization may register at the other organization's conference at the member rate
- discounted rate for COMP members to subscribe to "Physics in Canada"
- invited speaker exchange at our annual conferences
- Peter Kirkby Award
- sharing of information regarding professional affairs, including the threat to natural sciences from the engineering profession, and the approaches to professional certification

The first action to restart DMBP that we were aware of was an e-mail request broadcast April 15 by Eric Svensson, the CAP President, to heads of Canadian university Physics Departments soliciting names of physicists and graduate students working in "medical and biological physics" and possibly interested in joining a new DMBP. This was followed up by e-mail messages from Dr. Rachad Shoucri, the prime organizer of the new DMBP, sent presumably to those whose names had been submitted to Svensson by Department chairs. All were invited to an organizational meeting at the CAP Congress on June 16, 1998.

I had a long and cordial telephone discussion with Eric Svensson, and made the following points: * If successful, the new DMBP would have the effect of splitting a scientific community across two societies - a very counterproductive situation which is not in the long-term interest of either COMP or CAP. * Since we have a joint fee reduction, and reciprocal member rates at conferences, people in CAP who want to do medical physics should take advantage to join COMP and/or come to the COMP conferences. If the people within CAP are marginal players in the medical physics

field, as they well might be, it would not be to their scientific benefit to organize a "medical physics" meeting off on their own. * At present, COMP and CAP are complementary societies, and joint membership is encouraged. But if CAP starts to grow a new DMBP then we are forced into a competitive situation that is bad for both of us, when we should be collaborating on common external threats (engineers etc).

Our discussion concluded by Eric Svensson inviting me to the June 16 meeting in Waterloo.

At the June 16 meeting, I was pleased to be accompanied and supported by Brian Rutt (who had been the COMP plenary speaker to CAP that morning) and Ira Blevis. On the order of 20 people were in attendance, including ourselves, Eric Svensson, and Francine Ford (CAP Executive Director). The meeting opened with remarks from Eric Svensson followed by Rachad Shoucri. I then made a presentation explaining what COMP was about and our concerns. I detailed our relationship to the CCPM (outsiders often consider them to be synonymous), reviewed the CCPM statement on who needs to be certified, and made the point that the COMP is very broad. This forestalled any argument that COMP consists only of certified physicists working in clinical environments, and has no representation from academic researchers in medical physics. There was then a wide-ranging discussion. There is a desire by some CAP members to have one or more sessions at the CAP Congress on medical physics and biophysics. There was general concern, however, about critical mass and the overlap of a new DMBP with COMP, with the Canadian Biophysical Society, and with the biophysics done in the Division of Condensed Matter Physics of CAP. One opinion was that in the area of medical physics, the DMBP should essentially be a conduit for CAP members to participate in COMP. With a couple of exceptions, the discussion was thoughtful and rational. In the end, the members voted (10 to 1) to restart the DMBP with a one year mandate to examine its relationship with the COMP and the Canadian Biophysical Society. The Executive for 1998-99 of the DMBP will be:

- Chair: David Chettle (Physics, McMaster University)
- Vice-Chair: John Katsaras (NRC scientist at Chalk River)
- Secretary-Treasurer: Joanne O'Meara (PhD student, McMaster Univ.)
- Member at Large: Rachad Shoucri (Math & Computer Science, Royal Military College)

Although Rachad Schoucri was the prime mover for the developments, his rather extreme outlook led to David Chettle being nominated for chair and winning that post.

While in the short term the effect on COMP of the new DMBP will be insignificant, if it persists beyond the one year study period we have some long-term concerns in terms of future growth and directions. By virtue of the CAP's presence in university Physics departments, many graduate students could hear about the medical physics activities of CAP but not COMP. Furthermore, the confusion amongst outsiders trying to communicate with the Canadian medical physics community - such as other medical physics organizations (AAPM, IOMP, etc.), or government agencies, or industry - is potentially enormous. It might be best to concentrate on communicating with the CAP with an eye to alerting scientists and graduate students there to the excitement of the science at the COMP meetings, and to encourage them to participate in the mainstream of Canadian medical physics - whether this is through a new DMBP as a route to COMP, or much more preferably with COMP directly. Optimally, physicists in CAP interested in medical applications will be drawn across to COMP, and DMBP will never become a significant entity in itself.

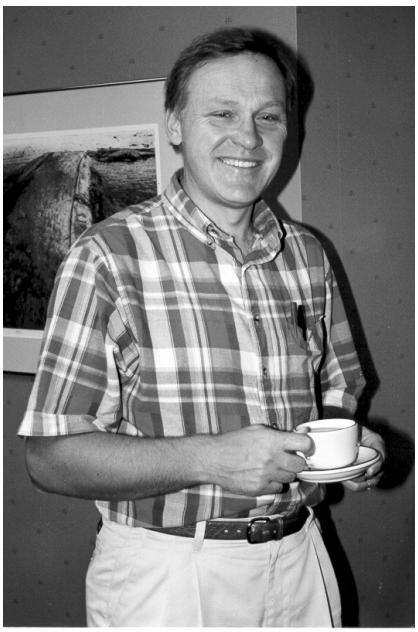
A final note to those who are joint COMP-CAP members: Have you been paying dues to the inactive DMBP over the past few years ? It was not and is still not necessary to belong to a Division in order to belong to the CAP and to support its general aims. It is very unfortunate and misleading that the CAP kept the DMBP on its fees form, with no indication that it was inactive.

Message from the Incoming Chair of COMP:
Mike Patterson

Five days into my two year mandate as Chair and just returned from our 44th Annual Scientific Meeting, it is hard not be bullish on COMP. We have just broken records for total membership, attendance at the meeting, number of papers submitted, and (yes, Dave) money in the bank. As many small organizations and companies have found, however, success produces its owns strains and problems. In London I heard how the meeting has become ever more difficult to organize, how some members would like parallel scientific sessions, how COMP could provide better communication and services to its members, and how COMP could participate in new initiatives with outside organizations. The principal challenge to me and the rest of the executive will be find ways to sustain our growth and to support our pursuit of new opportunities.

But before discussing our plans, I would like to express my thanks to some people who have had a lot to do with our recent success. Paul Johns, my immediate predecessor as Chair, has set a new standard for hard work and dedication to COMP. In a parking lot at Western, Paul and I performed the traditional exchange of COMP files from the trunk of his car to mine, and I was amazed at their volume and organization. Paul will be a tough act to follow, but I hope to benefit from his continuing presence on the executive. Lee Gerig has completed his term as Past Chair and will be leaving the executive. Lee has done an outstanding job, particularly in establishing and fostering links with our corporate members. Their enhanced participation in our Annual Meeting has added a new dimension and has contributed to the financial health of COMP. Finally, David Spencer has completed his term as Secretary and I would like to thank him for keeping track of our members and for preparing meticulous minutes of our executive meetings. Our new executive members, Gino Fallone, Chair Elect, and Curtis Caldwell, Secretary, bring with them a wealth of experience and new perspectives and I look forward to working with them.

In London, the executive presented its plans for the coming year and received approval from the membership for a budget to support them. (The presentation of a budget has, in itself, long been a goal of the executive and our Treasurer, Michael Evans, deserves credit for pulling this together.) A major initiative will be to hire a part-time "executive director" to support the activities of COMP. The executive will establish a job description over the summer and it is likely to include



organization of the conference, corporate relations, and interaction with other organizations. We see this as a necessary step in our growth and one which will help to establish continuity and consistency. The executive has also established a Communications Committee under the leadership of Peter Munro. As well as continuing the improvement and use of our newsletter, this committee will be responsible for enhancing electronic communication with our members. Plans include finding a new home for the COMP/CCPM websites as well as the email service. In the future the website will provide information about our conference, the profession of medical physics, graduate programs, and job opportunities. Money has been allocated in the budget to support the provision of these services.

Looking beyond the borders of COMP itself, there are significant issues to deal with in the coming year. It appears increasingly likely that the AECB will become involved in quality assurance of radiation treatment. In cooperation with CCPM, COMP has encouraged the development of national standards in this area, but has consistently pushed for standards to be developed and administered by health care professionals including medical physicists. Should AECB adopt this approach, COMP will play a major role in this area. Our colleagues in the Canadian Association of Physicists have decided to re-activate the Division of Medical and Biological Physics, at least on an interim basis. One of the reasons put forward for this action is that some physicists in CAP believe that COMP represents only clinical physicists. In response we have reiterated that the goal of COMP is to bring together a broad range of scientists working on biomedical applications of physics. It remains to be seen whether the new CAP division will be viable and how it will affect the relationship between our organizations. The Canadian Radiation and Imaging Societies in Medicine (CRISM) has been incorporated with COMP as a founding member. This new organization will foster cooperation among member societies and represent the interests of the imaging and therapy communities to industry and government. Last, but not least, planning for the 45th Annual Meeting to be held in Sherbrooke with the APIBQ is well under way. Local Arrangements Committee Chair, Roger Lecomte, encourages you to mark the dates June 17-19, 1999 in your calendars.....now!

To complete my message I would like to emphasize that our organization is not so large and bureaucratic that individual members cannot make a significant contribution. If you would like to express an opinion on a specific issue or if you would like to get more involved in the activities of COMP, please give me a call. I wish all our members and their families an enjoyable summer,

Mike Patterson
Hamilton Regional Cancer Centre

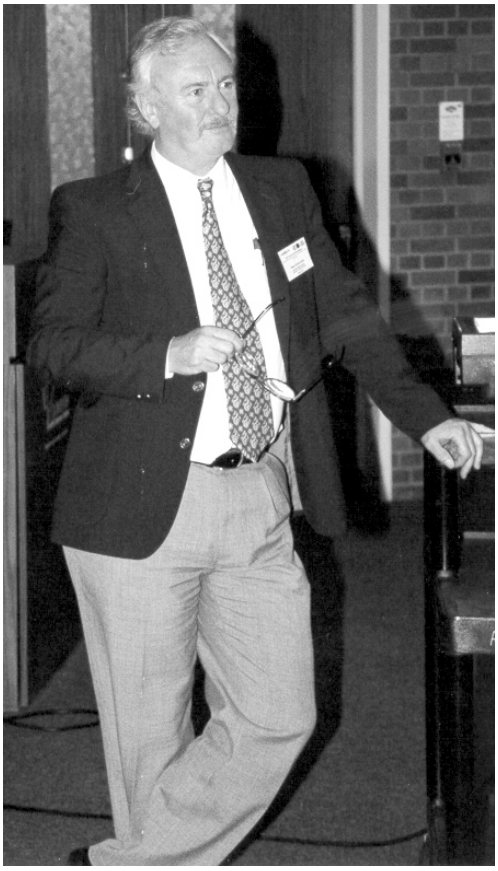
Message from the CCPM President:
Peter Dunscombe

Our annual meeting once again lived up to the very high standards we have grown used to over the years. Thanks go to Aaron Fenster and his colleagues on the Local Arrangements Committee for all the hard work they put in to ensuring that the meeting went without a hitch. The quality of the presentations was, without exception, very high and this reaffirmed that our Canadian meeting ranks with any in the world. We should also acknowledge Lee Gerig, Ting Lee, Paul Johns, John Schreiner and their committee colleagues for the effort they put into ensuring the financial and scientific success of the meeting.

The Board of the Canadian College of Physicists in Medicine assembled in London at noon on the Tuesday before the main meeting. Three candidates took the Fellowship examination that afternoon and two were successful. As only four hours were available to the Board on the main professional meeting day – Wednesday – we started our Agenda on Tuesday evening after the examinations. After our scheduled meeting on Wednesday we were still not finished and needed another hour later in the day. However we did finally get through the Agenda and I will report on what we discussed at the Board and subsequently at the Annual General Meeting on 18th June.

Karen Breitman has served eight years on the Board with the last few as Secretary/Treasurer and according to the College rules had to retire this year. Her effort on behalf of the CCPM is greatly appreciated. George Mawko has taken over as Secretary/Treasurer and Brenda Clark was nominated to the Board. We thank George for agreeing to fill this important position and we welcome Brenda to the Board. Next year at this time I will step down as President after four years and John Schreiner will take over. At the same time Ting Lee will replace Gino Fallone as Chief Examiner.

The Board received reports from Andrew Rainbow, who has been our representative on the CMA's Conjoint Accreditation Committee for many years, and from Ian Cunningham who is looking after the accreditation of mammography physicists as part of the CAR's accreditation program. Andrew was thanked for his continued contribution on behalf of the physics community to the accreditation of technologists' programs. He will continue to represent us with the aim of maintaining high standards in these programs. Ian's committee continues to identify physicists competent in the area of mammography physics. The contentious issue of whether or not non CCPM members can or should be accredited under the auspices of the CCPM may have finally been put to rest after a straw vote at the AGM. We will



hear more from Ian's committee as issues such as this and mammography re-certification are dealt with. Other items on the Agenda included correspondence with the AAPM and ACR. John Schreiner and I will meet with representatives of these organizations in San Antonio to explain what the College is and to attempt to ensure that our certification continues to be recognized south of the border. Our joint initiative with the CAMRT was also discussed. The results of the survey will be distributed soon as will the decision made by the CAMRT. At that time I will contribute a few thoughts of my own on joint ventures which in general I strongly support.

Well, that concludes my report. I believe we accomplished a lot at the Board and the other meetings held on the Wednesday. COMP and the CCPM have an excellent working relationship within our redesigned committee structure and this should enable us to respond rapidly and efficiently to our changing environment.

Peter Dunscombe
North Eastern Ontario Regional Cancer Centre

Quiz for the Quiz-Masters

Editor's Note: In honour of the CCPM membership and fellowship examinations I. Larchie has submitted the following quiz for the CCPM examiners and other COMP members.

The quiz that has nothing to do with Medical Physics

1. No matter how hard you try you will not find a medical physicist in one of these:
   A. Otology
   B. Balneology
   C. Surgery
   D. Taxonomy

2. Which of these folks had nothing to do with the development of Medical Radiation Physics:
   A. Lord Kelvin
   B. President J.F. Kennedy
   C. George F Feyman
   D. Albert Einstein

3. This computer operating system was never used in Treatment Planning at the Princess Margaret Hospital in Toronto:
   A. PDP II
   B. MSDOS 4.5A
   C. Unix BSDIV
   D. Apple IIe

4. These Units and other chaotic ideas are very common at the McGill Medical Physics Department except one:
   A. Fano-Factor
   B. Minkowski Sausage
   C. Kaplan Ratio
   D. Reklab Index

(Continued on page 74)

Report of the Awards Committee

Dick Drost, Mike Patterson, Ken Shortt and John Schreiner (Chair)

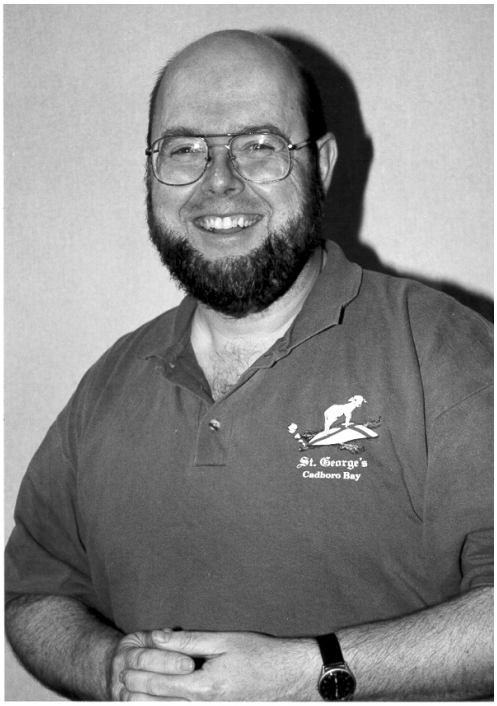
The primary function of the Awards Committee is to coordinate the various competitions held during the annual meeting. The committee selects the final presenters for the J.R. Cunningham Young Investigators' Symposium and the recipients of COMP travel assistance. The chair of the committee also recruits judges for the final Young Investigators' competition and for the COMP Poster competition. Together with the COMP Executive, we also review and revise the regulations for the different competitions.

This year the committee had a full task as the quality and number of YIS applicants was at a new high with 22 submissions. While the work of the committee was made easier by the detailed conference proceedings, it was no easy task to decide on the list of finalists. More work was added to the endeavor when some lost submissions were discovered at the end of the judging; this lead to the competition having 11 finalists. In London the work was then passed on to the actual judges for the competition.

We had no eligible applicants for travel assistance this year and the $2000 of budgeted assistance monies were generously donated to the H.E. Johns Travel Award fund of the CCPM.

A record number of poster judges were recruited for London to handle the large number of submissions. The judging went through three rounds with each judge first reviewing the submitted proceedings and then viewing the actual posters for a particular subset of posters. A list of finalists was prepared from this initial two step process and these were judged along similar criteria as for the YIS competition.

One disappointment over the past year was the large number of incomplete applications that came in for the various submissions. It is difficult to refuse a Young Investigator, for example, because he has not seen fit to make sure his supervisor has written a letter of support. However, given the amount of work now involved in preparing for the meeting and competitions, I have made a strong recommendation to the COMP executive that the application forms be made more formal and that in the future all incomplete applications be removed from the running without exception. I have also recommended that those submitting posters be able to stand down from the contest if they wish. Alternately, we may decide to not give two prizes but rather to recognize five posters or so as being praiseworthy. These approaches may lighten the difficult task of the judges by bringing the number of posters in the competition to a more manageable level. If you have any other suggestions on how the various competitions can be improved, please forward them on to me. Any changes to the awards processes will be clearly outlined in the Call for Papers.



I wish to personally thank my fellow Awards Committee members for their assistance since the beginning of the year. They were a great help in March and April when the many proceedings to judge came in. I especially acknowledge Mike Patterson who has served as a member of the committee for many years, and who now moves on to better things. I have not yet recruited new members for the committee as the last while has been busy with the actual competitions. I hope to be able to nominate a new member when the COMP executive meets in the winter so that the committee is at full strength for the next meeting.

I also thank the many judges who were kept busy during the annual scientific meeting. They gave considerable effort and thought to their task. Their unheralded work and prompt scoring made possible our recognition at the banquet of merit among the various competitors in London. I must apologize publicly now for perhaps not being as honest as I might have been when, at recruitment, I explained to them the amount of work they would have to do in London.

Respectfully submitted,

L. John Schreiner
Kingston Regional Cancer Centre
June 22, 1998

(Continued from page 73)

Answers for: Quiz for the Quiz-Masters

1: (D) 2: (C) 3: (B) 4:(D)

I. Larchie
DalTECH, Dalhousie University

COMP Competition Winners
London, Ontario, 1998

On behalf of the of the COMP Awards Committee and the COMP judges it is my pleasure to announce the winners of the J.R. Cunningham Young Investigators' Symposium and of the COMP Poster Competition held in London, ON, June 18 and 19th of this year.

J.R. Cunningham Young Investigators' Symposium

First Prize: *1st Author: Rebecca Fahrig*
(Institute: JP Robarts Research Institute and University of Western Ontario, supervisor: David Holdsworth)
Title: Computed Rotational Angiography: 3D CT Images of Cerebral Vessels.

Second Prize: *1st Author: Robert Stodilka*
(Institute: Lawson Research Institute and University of Western Ontario, supervisor: Brad Kemp)
Title: The Effects of Uniform and Non-Uniform Scatter Attenuation Compensation for Quantitative Brain SPECT.

Third Prize: *1st Author: Arthur Curtin-Savard*
(Institute: Medical Physics Unit, McGill University, supervisor: Ervin Podgorsak)
Title: Dosimetric Verification of Intensity-Modulated Photon Beams with a Portal Imager.

COMP Poster Awards

Authors: *Anita Brendt, Jeff Bews, Setapal Rathee and Dan W. Rickey*
Institute: *Manitoba Cancer and Treatment Research Foundation*
Title:. A High-Dose Brachytherapy Computed Tomography Scanner

Authors: *Chien Ting Chin and Peter Burns*
Institute: *Sunnybrook Health Science Centre, University of Toronto*
Title: Predicting Acoustic and Response of a Microbubble Population for Ultrasound Contrast Imaging

The Awards Committee and Judges commend all competitors for their efforts in these two excellent events. The task of reducing the excellent field of competitors to five winners was an enormous challenge.

L. John Schreiner
Kingston Regional Cancer Centre
June 20, 1998

L to r: Rebecca Fahrig, Robert Stodilka, Arthur Curtin-Savard

L to r: Anita Brendt and Chien Ting Chin

Sylvia Fedoruk Award – 1997

The COMP panel of judges reviewed over 40 articles published in the field of medical physics with significant Canadian content. The judgement criteria included originality, clarity of presentation, scientific rigor, and the anticipated impact on the field of medical physics. The panel finally narrowed its choice to three excellent articles, listed below:

Winner:

Calibration of photon and electron beams with an extrapolation chamber.
Medical Physics, volume 24, issue 4, Pages 497-503 (1997).

Corey E. Zankowski and Ervin B. Podgorsak
Department of Medical Physics
Montreal General Hospital
McGill University
Montreal, Quebec

"This concise article is well written and rigorous in its scientific content, with a clear objective, data interpretation and detailed error analysis. The authors present an alternative ionization chamber, which can measure the absolute calibration dose for megavoltage radiotherapy beams, based on a controllable volume of air. The advantage is that this approach avoids some of the troublesome theoretical corrections needed for standard cylindrical chambers with a fixed air volume. There is enough design information presented that would enable other physicists to build the extrapolation chamber and to cross-check the absolute dosimetry for radiotherapy with an accuracy of better that 1%."

Peter Dickof (left) presents the Sylvia Fedoruk Award to Corey E. Zankowski during the banquet at the 1998 COMP annual meeting.

Runners-up:

Accurate characterization of Monte Carlo calculated electron beams for radiotherapy
Medical Physics, volume 24, issue 3, Pages 401-416 (1997).
C.M. Ma, B.A. Faddegon, D.W.O. Rogers, and T.R. Mackie.

Tomographic imaging of the angular-dependent coherent-scatter cross section
Medical Physics, volume 24, issue 1, Pages 3-10 (1997).
M.S. Westmore, A. Fenster, I.A. Cunningham.

Allan M. Cormack, Nobel Laureate – Obituary

Peter Munro

Allan M. Cormack, one of the two people credited with the "invention" of the CT scanner, died on 7th May 1998 at his home in Winchester, a Boston suburb, after a brief illness. He was 74.

He shared the 1979 Nobel Prize in physiology and medicine with Godfrey N. Hounsfield (now Sir Godfrey Hounsfield) for his contributions to the development of the CT scanner. In 1963 he published his work on the development of mathematical techniques for reconstructing images from x-ray projections and demonstrations of these mathematical techniques using measurements of simple phantoms (centre figure).

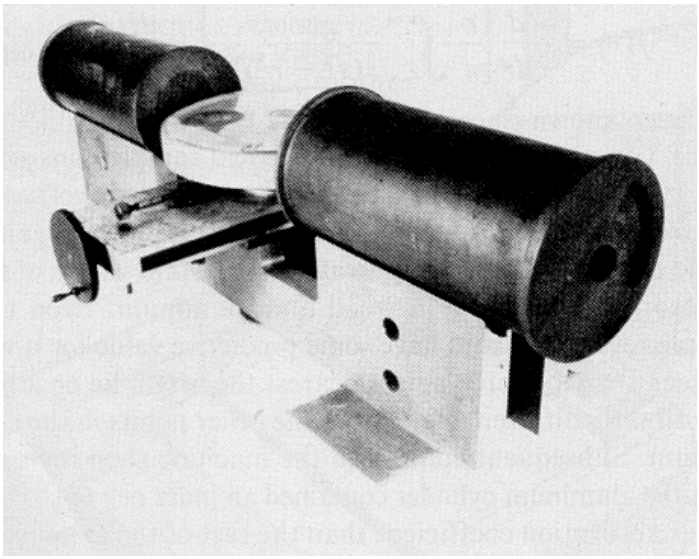
There are several facts about Cormack's life that most readers would find surprising. Firstly, Allan Cormack never obtained a Ph.D. Secondly, the goal of his research was not the development of an imaging device. Cormack worked in a radiation therapy department in Cape Town and he realised that people could not be represented as "a bag of water" as calculation techniques of the time assumed. Thus, Cormack's goal was to measure the distribution of densities within a patient, so that better dose calculations in radiation therapy could be performed.

While Cormack was not a noted traveller he made presentations in Canada on at least two occasions. One was in Edmonton in 1981 (see bottom figure) and the other was at the University of Toronto for the Department of Neurosciences Nobel Laureate series. Thus Cormack had personal contact with a small number of Canadian medical physicists.

I believe that important lessons can be learned by comparing the experiences of Cormack and Hounsfield. Cormack worked with medical colleagues who were not interested in his technology and who did not appreciate the potential benefits of his developments.[1] In contrast, Hounsfield was able to interact with highly enthusiastic medical colleagues who immediately appreciated the potential of CT imaging for diagnosising problems within the head.[2] I believe that the history of CT reveals two lessons: that technological developments will be successful only if applied to the "correct" medical problem; and, the identification of the "correct" medical problem requires the close collaboration of enthusiastic medical colleagues. So, not only did Cormack contribute to the development of the CT, but his experiences revealed important truths about the development of medical technology.

1. A.M. Cormack "Early two-dimensional reconstruction and recent topics stemming from it." Med. Phys. **7**: 277 – 282 (1980).

2. J. Bull "History of computed tomography" in "Radiology of the Skull and Brain: Technical Aspects of Computed Tomography" T.H. Newton and D.G. Potts (eds) Vol. 5 (St. Louis, C.V. Mosby Co., 1981).



Nobel Award Address

Early two-dimensional reconstruction and recent topics stemming from it

A. M. Cormack

Department of Physics, Tufts University, Medford, Massachusetts 02155

With best regards, Allan Cormack Edmonton 3 Sept '81

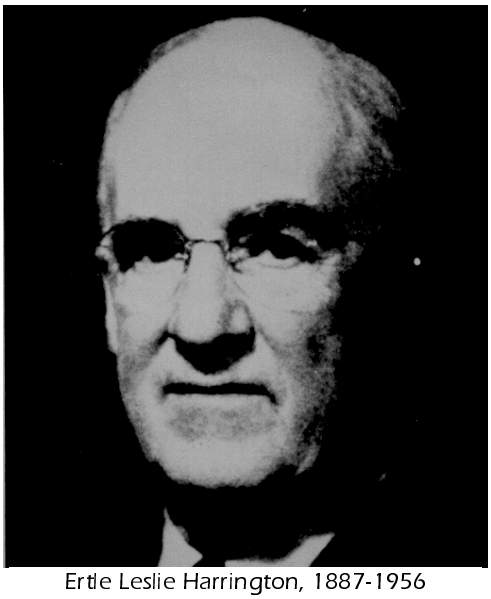
In 1955 I was a Lecturer in Physics at the University of Cape Town when the Hospital Physicist at the Groote Schuur had to be found by measurements made external to the body. It soon occurred to me that this information would be useful

Allan W. Blair, E. L. Harrington and the Development of Medical Physics In Saskatchewan

by Doug Cormack

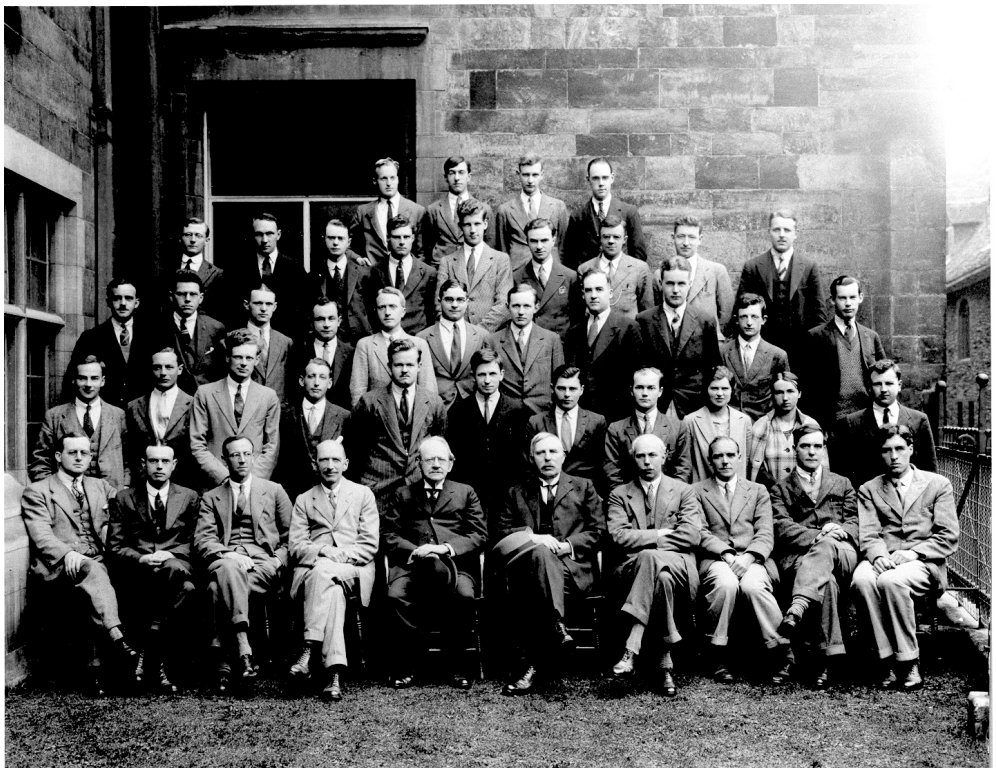
Ertle Leslie Harrington was born in Bucklin, Missouri and received his public-school, high-school and undergraduate university education in that State. He received an M.A. from Harvard in 1915 and a Ph. D. fromthe University of Chicago in 1916 under the supervision of R A Millikan. Harrington's project was a precise measurement of the viscosity of air, a central ingredient in the determination of the charge on the electron from the "oil-drop" experiment. After holding a number of positions in high-school education and in industry, Harrington became a member of the Department of Physics of the University of Saskatchewan in 1920. Four years later he was appointed Head of the Department, a position he held until his retirement in 1952.

In 1929 the Saskatchewan Medical Association appointed a committee to inquire into the facilities then available in the province for cancer treatment . Harrington was the only non-medical member of this committee. One of the main causes of concern was the possession of small collections of radium by hosptials and physicians, and its use by practitioners without adequate training. The committee recommended an organization of the medical profession, the laity and government forces "to provide the most scientific treatment for our cancer patients and that a supply of radium be obtained for that purpose". Two direct results of these recommendations were (a) the establishment of a Saskatchewan Cancer Commission with Harrington as Consulting Physicist (b) the purchase of 1.5 g of radium of which 1 g was in the form of needles and tubes for implants and insertions and the remainder was placed in solution in an "emanation plant" from which the radon could be pumped off at intervals of a few days, collected in fine gold tubing and used for permanent implants. After inspecting several of the radon plants then is use and considering the commercial system available from Failla, Harrington undertook the assembly of the apparatus himself and had it in operation by 1931. The plant produced "seeds" and other treatment devices for the next 30 years.



Ertle Leslie Harrington, 1887-1956

Allan Walker Blair was born in Brussels, Ontario but moved with his family to Regina in 1911 and there completed his public school and high school education. He received a B.A. from the University of Saskatchewan in 1924 and an M.D. from McGill in 1928. After a year in the Winnipeg General Hospital as a surgical resident, he moved to the United States and for the following eight years developed his interest and experience in the treatment of cancer. In 1936 he was on the staff of Memorial University in New York where he attended lectures in radiation physics and radiobiology from Edith Quimby. In 1937 Blair made an extensive tour of cancer centres in Western Europe including Manchester (Paterson, Parker, Tod), London: Royal Cancer Hospital (Mayneord), St Bartholomew's Hospital (where one of the world's first "supervoltage" units had just been installed), Paris (Lacassagne, Regaud, Coutard, del Regato) and Stockholm (Heyman, Thoraeus, Sievert). In 1937 he was appointed Associate Director of the Toronto Institute of Radiotherapy whose Director was Dr Gordon Richards. In 1939 Blair returned to Regina as head of the Regina Cancer Clinic. In 1947 he played a central role



Cavendish Laboratory 1928

Back row: G C Laurence, H M Cave, C A Lea, E A Stewardson 4th Row: G Millington, C E Eddy, F L Arnot, D S Lees, E E Watson, C S Wynn Williams, F A G Ward, J D Cockroft, L H Gray 3rd row: F R Terroux, M L Oliphant, N Feather, R R Nimmo, G H Aston, N A deBruyne, E T S Walton, E L Harrington, M C Henderson, J Chariton, J L Hamshere 2nd row: C F Sharman, E P Hudson, W R Harper, G F J Schonland, W L Webste, D C Rose, E J Williams, T E Alibone, G I Mackenzie, E Salaman, H J J Braddick Front row: G H Henderson, G Stead, J Chadwick, C T R Wilson, Sir J J Thomson, Sir E Rutherford, F W Aston, G I Taylor, P Kapitza, P M S Blackett

Allan Walker Blair, 1900-1948

in the formation of the National Cancer Institute of Canada and acted as its first chairman.

Having seen the productive interaction of physicists and physicians in a number of cancer treatment centres, in particular Manchester and New York, Blair recognized the essential role physicists would play in the forthcoming application of high-energy radiations to cancer therapy. In 1944 he contacted Harrington to explore the possibility of creating a joint position for a physicist on the staffs of both the Cancer Commission and the University of Saskatchewan. In his reply Harrington noted "I wish to deal with the question of an associate physicist to work in connection with the cancer clinics. I believe that the suggestion is a very good one and long overdue. I have thought from the first that the cancer clinics needed a Physicist..... I think the move you suggest is in the right direction and I shall be glad to cooperate in any way possible". Having obtained the blessings of their respective administrations, Blair and Harrington proceeded with recruitment and made an offer to Harold Johns, then an Associate Professor of Physics at the University of Alberta. Johns assumed his dual responsibilities in the summer of 1945.

Having established his headquarters in Saskatoon, Johns travelled to Regina to get his clinical job description from Blair. It is reported that the conversation proceeded as follows: Johns: "What do you want me to do?" Blair: "Hell, Johns! You're the physicist. You tell me."

In the summer of 1946 Blair sent Johns on a tour of the major radiation therapy centres of North America where he visited such authorities as Parker, Stone, Glasser, Victoreen, Trump, Quimby and Failla. The final stop on his itinerary was the Toronto General Hospital where W V Mayneord, at the invitation of Dr Gordon Richards, was giving a series of lectures to a group of what we would call today radiation oncologists and residents. Mayneord, Professor of Physics Applied to Medicine of the University of London, had spent a year in the Chalk River Laboratories working with A-J Cipriani and had subsequently been on a fact-finding expedition in the U.S.A. Mayneord was filled with excitement about the possibilities of Co-60 teletherapy and of the betatron which had been developed by Kerst and his colleagues at the University of Illinois. As the only physicist in attendance, Johns was asked to prepare a set of notes on the lectures which in the course of time evolved into "The Physics of Radiation Therapy" and then "The Physics of Radiology", the later editions in collaboration with J R Cunningham.

Upon Johns' return to Saskatchewan, Blair asked him what projects should be undertaken to which the reply was "We should get a betatron and design a cobalt unit". Steps to advance on both these fronts were put into operation almost immediately. The story of Co-60 teletherapy in Canada will be dealt with elsewhere so I shall concentrate on the saga of the betatron in which both Harrington and Blair played central roles. With the enthusiastic backing of the Saskatchewan Government and the University of Saskatchewan and with a modest grant from the Atomic Energy Commission (later the Atomic Energy Control Board), an Allis Chalmers 23-MeV betatron was ordered from their Milwaukee plant. The unit was to be used for both radiation treatments and nuclear physics research. In the spring of 1948 Harold Johns and his colleagues Newman Haslam and Leon Katz travelled to Milwaukee and Urbana/Champaign to check progress in the manufacture of the betatron and discuss installation and operation with Kerst. In a letter to Blair from Champaign, Johns wrote "Our stay at the University of Illinois has been an unqualified success. Dr Kerst has been more than cooperative. He is amazed at the rapidity with which we have pursued our program".

Having established his headquarters in Saskatoon, Johns travelled to Regina to get his clinical job description from Blair. It is reported that the conversation proceeded as follows: Johns: "What do you want me to do?" Blair: "Hell, Johns! You're the physicist. You tell me."

A W Blair at the opening of the new Regina Cancer Clinic, 1948, under the watchful eye of the Hon. T. C. Douglas.

Dr. Blair died suddenly of a heart attack in November 1948. The eminently productive physician-physicist collaboration, however, continued. A few years before, Blair had recruited T A (Sandy) Watson, then at the Christie Hospital, Manchester, as head of the Saskatoon Clinic. Upon Blair's death, Watson was appointed Director of Cancer Services for Saskatchewan and established a highly-effective working relationship with Harold Johns which brought into clinical service the 23-MeV betatron in early 1949 and the Saskatchewan Co-60 unit in late 1951. They had been joined by a Saskatchewan-trained radiation oncologist, C C Burkell, whom Blair had encouraged to spend a few months at the

University of Saskatchewan Physics Staff & Students: 1951-1952
Back row: JE Till, EH Crosby, S Denesuk, E Kornelsen, M Kavanagh, N Pook, SG Burton, K Fowler, N Luciuk, D McPherson, RR Jensen, RJ Horsley, RJ Baker, RG Summers-Gill, WN Roberts, ER Epp, N Kruger Middle row: L Robinson, J Rogers, M Leblanc, DV Cormack, MJ Deslisle, JM Street, R Assaly, CM Costain, LM Bates, OR Small, W Harms, GA Mauchel, KR Hardy,JW Hunt, R Montalbetti, R Kerr, M Morgenroth, GG Shepherd, RN Anderson Front row: J Meek, AH Cox, CA MacKay, A Vallance Jones, L Katz, BW Currie, GF Whitmore, EL Harrington, RNH Haslam, HE Johns, DM Hunten, C Mill

Christie Hospital in 1948 observing the "state-of-the-art" in radiation therapy and the interaction between leaders like Paterson and Meredith.

In 1949, four years after the Hiroshima and Nagasaki bombs, there was a considerable phobia about anything "nuclear". Furthermore, the unexpectedly severe side effects following Stone's neutron treatments in the the early 40's had made physicians very apprehensive about high-energy radiations which could generate detectable (although biologically insignificant) levels of radioactivity in the patients being treated. The use of the 23-MV x-ray beam of the betatron in the treatment of even a few highly-selected patients represented a major break-through. Watson's and Burkell's clinical investigation was the first demonstration of the "usefulness of megavoltage radiations as a radiotherapeutic tool" (Schultz 1975).

Both Blair and Harrington were visionaries. In the years preceding WW II they perceived the benefits to cancer patients which could be achieved by enthusiastic and inspired collaboration between physicists and physicians.

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Acknowledgment: It is a pleasure to express my thanks to Hon. Sylvia Fedoruk for her many contributions to this article and in particular for rescuing Dr Blair's 1936-37 notebook from the jaws of the Regina land-fill. I wish also to thank Dr C Stuart Houston for his encouragement to produce a written version of a talk delivered at the 1998 WesCan meeting in Regina. The photographs of Dr Blair were supplied by courtesy of Saskatchewan Archives.

Are X-rays Safe?

by John R. Cameron

Editors note: One can access the online version of this document and provide feedback to the author at http://www.mindspring.com/~sherouse/MPFAQ/Cameron1.html.

An occasional patient will ask: "Are x-rays safe?" Others will ask about the amount of radiation. As a radiologist you have a responsibility to give a reasonably honest and understandable answer to the patient. You can certainly explain that diagnostic x-rays are safe. There are no data to indicate otherwise. There is evidence that suggest that such low doses may actually reduce the chance of cancer.[1] The question about amount is difficult to answer in an understandable way. First, because it is a rare x-ray unit that has a meter to measure the radiation to the patient and second, because scientific units for radiation dose are not understood. This article is to help you explain radiation to patients in words that they understand. In addition, I present evidence from various human studies to show that low level radiation, comparable to that from a radiograph, may be beneficial and even reduce cancer.

Explaining radiation dose to a patient using the BERT concept

Answering your patient's question about the amount of radiation would be easy if you knew the effective dose. However, it is unlikely the patient would be satisfied if your answer was "the mammogram will give you an effective dose of about 1 millisievert (mSv)." She probably would understand if you converted the effective dose into the amount of time it would take her to accumulate the same effective dose from background radiation. Since the average background rate in the U.S. is about 3 mSv per year, the answer in this case would be about four months. It is likely that she would understand and be satisfied with your answer.

This method of explaining radiation is called Background Equivalent Radiation Time or BERT.[2,3] The idea is to convert the effective dose from the exposure to the time in days, weeks, months or years to obtain the same effective dose from background. This method has also been recommended by the U.S. National Council for Radiation Protection and Measurement (NCRP).[4] To calculate BERT, I recommend using the average background in the U.S. including contributions to the lung from radon progeny. This is assumed to be 3 mSv/y (300 mrem/y). The background in different parts of the U.S. varies about ± 50% from this value. This uncertainty is unimportant for explaining radiation to patients. The effective dose from common diagnostic x-ray procedures are typically less than the amount of radiation you receive from nature in two years. (See Table 1.) Giving the answer in terms of background radiation has three advantages:

1. it does not imply any risk - it is just a comparison
2. it emphasises that radiation is natural
3. the answer is understandable to the patient

Radiologists should help educate patients about background radiation

It is natural that some patients will confuse x-rays with radiation from radioactivity. They may mistakenly think that man-made radiation is more dangerous than an equal amount of natural radiation. Most patients are unaware that most of their background radiation comes from radioactivity in their own body. Radiologists should explain to them that we are all radioactive. A typical adult has over 9,000 radioactive disintegrations in their body each second - over a half million per minute. The resulting radiation strikes billions of our cells each hour. The idea that radiation to one cell can initiate cancer is illogical - it assumes that the body has no defense or repair mechanisms. The body has several defense mechanisms to protect itself from doses up to about 200 mGy.[1]

TABLE I. TYPICAL EFFECTIVE DOSES AND BERT VALUES FOR SOME COMMON X-RAY STUDIES TO AN ADULT (Adapted from IPSM Report 53)[5]

X-ray Study	Effective Dose (mSv)	BERT The time to get same dose from nature
Dental, intra-oral	0.06	1 week
Chest x-ray	0.08	10 days
Thoracic spine	1.5	6 months
Lumbar spine	3	1 year
Upper GI series	4.5	1.5 years
Lower GI series	6	2 years

Radiographers should be trained to answer patients questions in terms of BERT

Most patients never get to see the radiologist. Questions about radiation are often asked of the radiographer. Radiographers are generally not prepared to answer a patient's question about radiation dose. However, if tables of effective dose and BERT are available at each x-ray unit, any radiographer can answer the patient's question about radiation dose. If the patient desires further information the radiographer should recommend a basic book, such as Understanding Radiation.[6]

Scientific quantities for radiation protection

There are two scientific quantities for radiation protection: equivalent dose and effective dose. Neither of these quantities can be directly measured. Effective dose, E was defined by the International Commission for Radiological Protection (ICRP)[7] and adopted by the U.S. National Council for Radiation Protection and Measurement (NCRP).[8] The concept of effective dose is appealing but unattainable - E was intended to equate the relative risk of inducing a fatal cancer from a partial body dose (such as radon progeny in the lungs) to the whole body dose that would have the same risk of inducing a fatal cancer.

The effective dose cannot be measured and it is difficult to calculate.[9] Physicists use computer simulation programs to estimate the organ doses in a standard patient from typical exposure conditions for various projections. The results of these simulations can be used to estimate E for various patient exposures. Once a table of effective doses is constructed for a particular x-ray unit, it is a simple matter to calculate the BERT - the time to get the same effective dose from background. Typical effective doses and BERT values for some common x-ray projections are given in Table I.

Entrance skin dose (ESD) is not a good indicator of the dose to the patient

Effective dose should not be confused with the entrance skin dose (ESD), which was commonly used for describing patient radiation up until about 20 years ago. The ESD is easy to measure, but it is not a good measure for the amount of radiation to the patient. For example, the ESD for a dental intra-oral x-ray (e.g., a bitewing) is about fifty times greater than the ESD for a chest

radiograph, yet the effective dose from the dental exposure is usually lower than from a chest radiograph.

Fluoroscopic radiation should be measured with a dose-area product (DAP) meter

During fluoroscopy the beam size, the organs exposed and the dose rate change. This makes it impractical to determine the effective dose. However, the fluoroscopic dose is very easy to measure with a transmission ion chamber covering the exit of the collimator. All of the radiation striking the patient must pass through the ion chamber. The ion current collected is a measure of the exposure-area product (EAP). The reading can easily be converted to the dose-area product (DAP). A meter for this purpose has been available for more than 30 years. Fluoroscopic procedures typically give larger doses to the patient than a roentgenogram. The reading from a DAP-meter is approximately proportional to the energy deposited in the patient-the imparted energy. If the kVp and HVL are known the DAP meter reading in Gy m^2 can be converted to the imparted energy in joules (J) deposited in the patient.[5] DAP meters, or their predecessor, exposure-area product meters, are little known or used in the U.S. In the UK and Germany they are required on all medical fluoroscopes. I think the NCRP should recommend that all medical fluoroscopes should include such an instrument and that fluoroscopes used for interventional radiology must have such a meter.

There is no risk from normal diagnostic x-ray doses

To reassure the patient about the lack of risk from low doses of radiation it is useful to explain that no studies of radiation to humans have demonstrated an increase in cancer at the doses used in diagnostic radiology. A number of studies described below indicate that low to moderate doses may improve the health and even reduce cancer.

A-bomb survivors are living longer on the average than unexposed Japanese

A-bomb survivors who had large doses - greater than the equivalent of 150 years of background - had a slight increase in cancer. In the last 50 years there was an average of fewer than 10 radiation induced cancer deaths per year in about 100,000 A-bomb survivors. A-bomb survivors who received a dose less than the equivalent of 60 years of background showed no increase in the incidence of cancer. Survivors in that dose range tended to be healthier than the unexposed Japanese. That is, their death from all causes was lower than for the unexposed Japanese. The improved health of those with low doses more than compensated for the radiation induced cancer deaths so that A-bomb survivors as a group are living longer on the average than the unexposed Japanese controls.

Nuclear shipyard workers were much healthier than non-nuclear shipyard workers

Evidence for health benefits from low dose rate radiation comes from the nuclear shipyard workers study (NSWS) a decade ago.[10] This DOE sponsored study found that 29,000 nuclear shipyard workers with the highest cumulative doses had slightly less cancer than 33,000 job matched and age matched controls. The decreased cancer among nuclear workers was not statistically significant. However, the low death rate from all causes for the nuclear workers was statistically very significant. Nuclear workers had a death rate 24% (16 standard deviations) lower than the unexposed control group. If the nuclear workers had a death rate 24% higher than the controls, it would have made the world news in 1988.

Areas with high natural background have less cancer

Humans receive ionizing radiation from several natural sources - radioactivity inside their body, radioactivity outside their body and cosmic rays. The amount of radiation from these various sources varies with the geographical location and the material used in the buildings where you work and live. In addition, the contribution from radon varies depending on the construction of your home and the amount of uranium in the soil beneath it.

If ionizing radiation is a significant cause of cancer we would expect the millions of people who live in areas with high natural levels of radiation to have more cancer. However, that is not the case. The seven western U.S. states with the highest background radiation - about twice the average for the country (excluding radon contributions) - have 15% lower cancer death rate than the average for the country.[11]

Radon in mines increases lung cancer; radon in homes reduces lung cancer

Uranium miners had a higher incidence of lung cancer from the high concentrations of radon in underground mines. This was the basis for the Environmental Protection Agency (EPA) to estimate that high levels of radon in homes cause thousands of lung cancer deaths each year in the U.S. However, a study of lung cancer death rates in 1600 U.S. counties representing over 90% of the U.S. population shows that counties with the highest radon levels (> 5 pCi/l) have 40% lower lung cancer death rates than the counties with lowest radon levels (< 0.05 pCi/l).[12] It appears that radiation from radon progeny actually prevents some cancers caused by smoking!

Summary and recommendations

Radiologists contribute most of the man-made radiation to the public. The benefits of this radiation are tremendous. There are no data to suggest a risk from such low doses. Radiologists have a responsibility to help educate their patients and others who ask them about radiation. You have a choice. You can increase the patient's fear of radiation by explaining the "official" policy of the NCRP and the American College of Radiology that even the smallest amount of radiation may cause cancer. Based on this assumption, a recent ACR publication[13] shows that the risk of inducing a fatal cancer from a chest x-ray is ten times greater than the risk of dying in a commercial airline flight. The same table shows that a CT scan of the kidneys has a greater risk of inducing a fatal cancer than a cigarette smoker has of dying from lung cancer.

I strongly recommend that each clinical x-ray unit have a table of the effective dose for various projections and patient size. A separate column should give the BERT - the time to obtain the same effective dose from background. The radiographers should be taught how to answer the patient's questions using the BERT method. The BERT concept does not suggest any risk and is understandable to the patient.

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Upcoming COMP Annual Meetings

During this year's COMP meeting a number of decisions about the locations for future meetings were made. The conference locations for the coming years are:

1999 Sherbrooke (with the APIBQ)
2000 Chicago (World Congress)
2001 Kelowna
2002 Montreal – with the AAPM???

The 1999 COMP meeting will take place June 16-19 at the Delta Hotel – a hotel with conference facilities located in downtown Sherbrooke. The room rate will be about $65 per night and student accommodation can probably be arranged at the University of Sherbrooke, which is 4-5 km from the hotel. The 1999 meeting will be held in conjunction with the APIBQ, an organisation that represents biomedical engineers and physicists within the province of Quebec. While the details of how COMP and the APIBQ will combine the meeting have not been worked out yet, the most likely arrangement is for the CCPM symposium and the APIBQ invited speakers to talk about a topic of interest to both biomedical engineers and medical physicists. Dr. Christopher Thompson from the Montreal Neurological Institute is the CCPM exectutive member charged with the task of organising the symposium for next year. Roger Lecompte is the chair of the local arrangements committee.

The 2000 COMP meeting will be held in conjunction with the World Congress on Medical Physics and Biomedical Engineering, which will be held at the Navy Pier in Chicago 23-28 July 2000. The theme for the 2000 World Congress is "Global Information Networking for the twenty-first Century" and as such an comprehensive web page has been set-up to promote the event (see www.wc2000.org). COMP members are directed to this site to keep up-to-date on all of the developments for this meeting. There is one caveat: registration may be as high as $375.00 US for this meeting.

The 2001 COMP meeting will be held in Kelowna, B.C. at the Okanagan University College, which is located about 10 km from downtown Kelowna. The College has complete conference facilities and inexpensive, university style, accommodation. The exact date for the meeting has not been decided yet, but the meeting will be held in July so that COMP members can bring their families to enjoy the Okanagan Valley. The intent is also to make more time available during the meeting for attendees to enjoy the location as well.

The 2002 AAPM meeting will be held in Montreal July 14-18 at the Montreal Convention Centre. No decision has been made yet whether COMP will meet with the AAPM or not. This is your opportunity to consider the benefits and drawbacks of such a joint meeting and send comments to COMP and CCPM executives.

Peter Munro

ORDCF Funding Success for Brian Rutt

Shortly after his success at being awarded the Barnett/Ivey/Heart and Stroke Foundation of Ontario Chair at the Robarts Research Institute [see 44 (1) January 1998 issue of the Newsletter pp. 10], Brian Rutt has another notable accomplishment. He was the lead grant writer for a recently successful Ontario Research and Development Challenge Fund (ORDCF) grant, submitted jointly by the John P. Robarts Research Institute and the London Health Sciences Centre. The announcement of this success was made by Minister of Energy, Science and Technology, Jim Wilson, at a press conference in Waterloo on June 5, 1998. Four other imaging scientists from London were listed as co-investigators on this grant: Aaron Fenster, Ting Lee, David Holdsworth and Ravi Menon. The application, entitled "The Centre for Advanced Vascular Imaging Research" is aimed at training research personnel and developing advanced imaging technologies for the study and prevention of cardiovascular and cerebrovascular disease. Eventually it is hoped that the technologies developed by these funds will be commercialised. The ORDCF is a $500 million program (over 10 years) established in May 1997 by the Ontario government to foster university/industry links and to encourage the commercialisation of university research. Each application must have a minimum of 1/3rd funding from the private sector. The private sector partners in this case included: GE Medical Systems, Life Imaging Systems, Siemens Electric, Eli Lilly, and Schering/Berlex.

While the amount granted by the ORDCF to this new Centre is unknown at this time because contract negotiations have not been completed, the amount could reach several million dollars over the five year period of the grant.

Peter Munro and Brian Rutt

BOOK REVIEW

Title: The Physics of Radiotherapy X-Rays from Linear Accelerators

Authors: Peter Metcalfe, Tomas Kron and Peter Hoban

Publisher: Medical Physics Publishing, Madison, Wisconsin 1997, 493pp.

Price: $119.95 US-hardcover, $98.95 US-softcover.

Medical Physics Publishing made available a copy of the above text to be re-

viewed for the COMP newsletter.

This book focuses exclusively on external photon beam radiotherapy. The first four chapters (Chapters 1-4) describe the linac components, the production and interaction of electron and photons with matter, the dosimetry of x-rays and the properties of x-ray beams. The last four chapters (Chapters 5-8) describe x-ray radiotherapy treatment planning, modeling of photon beams, inhomogeneity corrections, recent developments in photon algorithms such as Monte Carlo and convolution methods and finally, topics in tumor and normal tissue response.

The book covers all aspects of linear accelerator based x-ray production, dosimetry and use of x-rays for treatment planning. Detailed descriptions of medical linear accelerators along with extensive dosimetry instrumentation is a strong point, supplemented with a large number of figures and equations. The topic of inhomogeneity corrections is well presented. Newcomers to the field will appreciate the succinct treatment of stereotactic radiosurgery (linac based) and Monte Carlo and convolution/superposition algorithms. There is a fine introduction to the biological parameters useful for treatment planning optimization. All the chapters are supported by an extensive and recent reference section which I personally found very useful especially on x-ray dosimetry equipment and techniques and, on the photon algorithms.

The book does not cover radiotherapy topics such as electron beam dosimetry, therapy or brachytherapy physics and techniques. The overall approach of the authors to x-ray radiotherapy physics is more theoretical than clinical when compared to other texts. However, it does include the basic patient dosimetry systems and calculations.

"The Physics of Radiotherapy X-Rays from Linear Accelerators" is an excellent reference for anyone wishing to get a good introduction to modern x-ray radiotherapy physics, algorithms and dosimetry instrumentation. Professionals in radiotherapy such as dosimetrists and planners, who wish to update their knowledge, will find it an excellent resource on treatment planning algorithms and inhomogeneity corrections.

Dimitris N. Mihailidis, Ph.D.
Cross Cancer Institute

Extreme Sport and Radiotherapy

Bringing the Systems Physiologist to Medical Physics

This light-hearted piece is based on the idea that some form of extreme excitation and agitation has the ability to change the physiology and biophysics of living organisms to enhance both treatment response and recovery profiles.

If you are the kind of reader who wants to see the beef before you eat the burger, then go to the last paragraph, otherwise lend me you thinking -lobes for a few minutes.

Radiotherapy in general is carried out in sedate sub-optimal quiescent conditions. Under these conditions most of the system of the body are in the low energy (or high entropy) state. A highly abnormal state compared with real-life.

It is well known that certain carefully controlled whole-body agitation and non-atomic excitation can be quite beneficial as either treatment modes or adjuncts to treatment for certain cancers. Examples include, hyperthermia, hyperbaric oxygen, and thermography. On the other hand, emotional states are intrinsically coupled to the nervous system, which can have a lot of influence on the system dynamics. Anecdotal evidence (at least) exist for the remarkable effect of the so-called mind over matter phenomenon in sudden recoveries of otherwise hopeless cases of cancer.

Consider the benefit of combining the two effects with radiation therapy. That is in a Triple-Triumphate Treatment (or TT&T). This is best illustrated with a fictional account.

The TT&T Fiction

Dr. Johnson, the chief physicist , can still remember that fateful Wednesday morning , eighteen months ago when he had walked into the treatment room and announced that he was going to change the treatment sheet of Mrs. Robinson who was on top of the list of the near-hopeless cases. He had declared that just before her treatment starts she is going to be taken through two pre-treatment exercises: A 120 m Bungee Jump followed by 22 minutes on the Sky-Hawk Roller-Coaster Ride conveniently located at the YMCA by the Hospital. Naturally, there were the usual protests from the cacophony of modern day prophets, of doom or

(Continued on page 85)

Medical Physics E-mail and WWW Services

The canada-l mailing list is now being managed by Majordomo. Send messages to:

canada-l@irus.rri.uwo.ca

If you want to subscribe or unsubscribe, you can send mail to <Majordomo@irus.rri.uwo.ca> with the following command in the BODY of your e-mail message:

subscribe canada-l you@your.email.address
unbscribe canada-l you@your.email.address

For more information, you can send mail to <Majordomo@irus.rri.uwo.ca> with the following command in the body of your e-mail message:

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.

Frank Sargent
fsargent@irus.rri.uwo.ca
System Manager, Robarts Research Institute

COMP/CCPM Web Site

In addition to the Canada-l burster, CCPM and COMP now maintain a www site that can be accessed via

http://www.bic.mni.mcgill.ca/ccpm

It contains descriptive pages on CCPM and COMP, and plans are to expand the range of information available on this Web site.

Suggestions for improvement of the Web site are welcomed and should be forwarded to Peter Munro in London (pmunro@lrcc.on.ca).

(Continued from page 84)

otherwise. From placard-bearing conveniently concerned citizens to infernal professional boards and salivating lawyers of all stripes. All had concerns which, even a cursory analysis will reveal had little to do with either cancer or Mrs. Robinson.

However nothing could stop Dr. Johnson, to the singular delight of Mrs. Robinson.....

Well that was then. Today he is looking forward to the dinner date with the decidedly different Mrs Robinson and a certain Mr. Rodriguez 25, formerly of Tihuana, where she had been vacationing.

But before he leaves the office, he had one phone call to make. Larry Abrahams was working on the next complete dynamic model for the next patient who may require a day in a white-water raft plus 35 minutes on the Fireman's Drill. Systems Physiologist tend to take their work seriously.

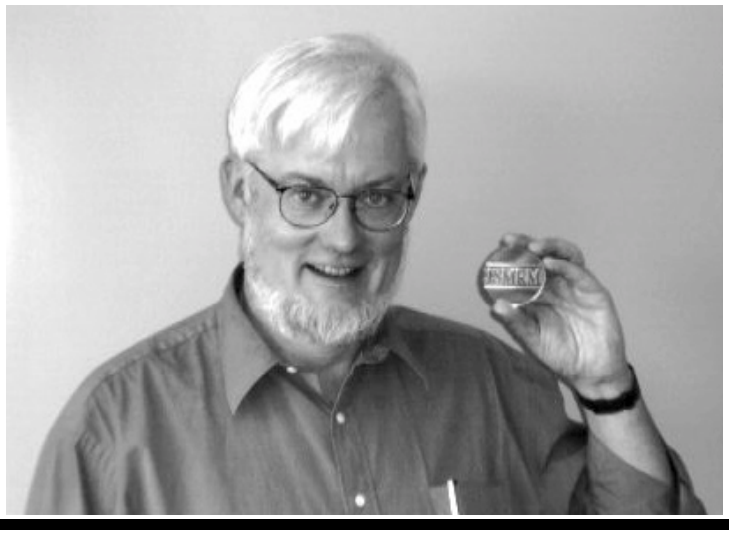
I. Larchie
DalTECH, Dalhousie University

Your intrepid Newsletter editor on a photographic safari, hunting big game (COMP and CCPM executives).

Gold Medal for Mark Henkelman

Once again a COMP member has received a major international award. Mark Henkelman, Vice-President, Research, Sunnybrook Health Science Centre, and Professor, Departments of Medical Biophysics and Medical Imaging, University of Toronto, received the Gold Medal from the International Society of Magnetic Resonance in Medicine (ISMRM). Presented at the annual meeting of the ISMRM in Sydney, Australia in April 1998, the award represents the highest honour of the Society. Mark Henkelman joins a small group of illustrious individuals recognised by the society including P. Lauterbeur for the discovery of MR imaging and S. Ogawa for the discovery of the BOLD effect, the basis of functional MRI. The inscription of the award presented to Mark Henkelman reads:

R. Mark Henkelman, Ph.D.
For pioneering scientific contributions to magnetic resonance in medicine and biology
ISMRM
1998



(Continued from page 96)

> *NCIC), Connie Eaves (current NCIC President) ...and, of course, myself. All knew about, and greatly respected, the contributions that Harold made to cancer research and cancer control in Canada. They also knew about his insistence on high scientific standards, and his longtime interest in attracting talented young people into research."*

As I write this, the COMP meeting has just finished. While there was not enough time to create a full report of the meeting for this issue of the Newsletter, I can say that it was a very successful meeting. Not only was it the largest COMP meeting ever, but despite the concerns of the local arrangements committee in handling the large number of attendees, the meeting went very smoothly. And as always in a COMP meeting, the quality of the scientific presentations, both oral and poster, was superb. Indeed, as you will find in the report of the awards committee, they faced a great challenge because of the large number of high quality presentations that deserved merit.

There was, for me, one very important decision made at the 1998 COMP meeting. This was the creation of a Communications Committee that would be responsible for the Newsletter, Web site, e-mail burster, and any other communications activities needed by the organisation. A number of people have volunteered to be on the committee and I hope that you will see the results of our efforts soon.

I am also looking for people to volunteer to act as "reporters" for the Newsletter in various geographical areas or at various medical physics institutes within Canada. ***This does not mean that you have to write any articles!*** You would just have to keep me abreast of any newsworthy developments in your particular institute or geographic region and tell me who to contact. I find that there a is a fall-off in articles in the Newsletter the further one gets from the home of the Newsletter editor (perhaps someone could characterise the PSF for this phenomenon for me). I would like to minimise any geographic bias and receive equal numbers of submissions from all areas of Canada. So please, volunteer to let me know what is going on.

As always, if you have any articles ..

Peter Munro
London Regional Cancer Centre

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		Wednesday June 17, 1998	
	19:00	**Welcome Barbecue** (Delaware Hall)	
	20:00	**CCPM Mammography Forum** (for those concerned with mammography physics assessment under the CAR accreditation program)	**Chair: Ian A. Cunningham**
		Thursday June 18, 1998	
	8:15	Welcome	P.C. Johns, A. Fenster, P.B. Dunscombe
		CCPM Symposium - Functional Imaging: Frontiers and Applications	**Chair: Ting Y. Lee**
S-1	8:30	Brain Mapping: A Computational Approach to the Study of Normal Brain and Neuropathology	A.C. Evans
S-2	9:05	Advances in Positron Tomography	C. Nahmias
S-3	9:40	Spatial and Temporal Characteristics of Functional Magnetic Resonance Imaging (fMRI)	R. Menon, J. S. Gatti, B. G. Goodyear, F. Graydon, C. G. Thomas
	10:15	**COFFEE**	
S-4	10:35	CT Evaluation of Cerebral Blood Flow	T.-Y. Lee, D. H. Lee, A. J. Fox, D. G. Nabavi
S-5	11:10	Functional Imaging using Ultrasound	A. Fenster, D. G. Nabavi
S-6	11:45	Cerebral Vascular Anatomy and Blood Flow: 3-D CRA and Digital Cine Angiography during Intervention	D. W. Holdsworth, R. Fahrig, A. J. Fox, S. Lownie
	12:20	**Opening of Commercial Exhibits**	
		LUNCH / POSTER VIEWING / VISIT COMMERCIAL EXHIBITS Box lunches will be provided in the Exhibit area.	
		CCPM Professional Development Workshop	**Chair: Ting Y. Lee**
	14:00	Introduction	
W-1		Rationale for a New Dosimetry Protocol in Canada	D. W. O. Rogers, C. K. Ross, J. P. Seuntjens, K. R. Shortt
	15:40	End of CCPM Symposium and Workshop	
	15:50	**CCPM AGM** (For CCPM Members and Fellows) (Coffee provided)	
		POSTER VIEWING / VISIT COMMERCIAL EXHIBITS (coffee in exhibit area)	
	18:00-22:00	**COMP Poster Session and Reception**	**Chair: Michael S. Patterson**
P-1		A CT Simulated Rotating Half-Block Technique For Treatment Of The Breast Or Chest Wall And Draining Lymphatics	M. Olivares, M. D. C. Evans, C. R. Freeman, V. Benk, M. Gosselin, E. B. Podgorsak
P-2		Treatment Planning For 5 Field Irradiation Of The Breast Including Internal Mammary Lymph Nodes	S. Connors, R. Scrimger, S. Halls
P-3		Dose Uniformity Through Optimizing Wedging In Irradiation Of The Breast	A. Roberge, P. Dunscombe, E. Lederer
P-4		Monte Carlo Investigation Of Electron Beam Relative Output Factors	G. G. Zhang, D. W. O. Rogers, J. Cygler
P-5		MCRTP: A New EGS4 User Code for Monte Carlo Electron Treatment Planning	B. A. Faddegon
P-6		Evaluation Of The New Electron Beam Algorithm in Theraplan Plus 3D Planning System	J. E. Cygler, G. X. Ding, K. C. Ash, G. G. Zhang
P-7		An Evaluation Of A Commercial 3D Electron Beam Treatment Planning System	G. X. Ding, M. K. Yu, J. E. Cygler, G. G. Zhang
P-8		A Two-Source Model For Electron Beams: Calculation Of Relative Output Factors	J. Z. Chen, J. Van Dyk, C. Lewis, J. J. Battista
P-9		An Investigation Of The Method Of Depth Dose Flattening Of Electron Beams Using A Wire Mesh Bolus	J. Robins, R. Mooney, D. Hertzman
P-10		Improvement Of Dose Calculation Accuracy Under Small Blocks For High-Energy Photon Beam By Using An Effective Block Transmission Factor	J. Sun, U. Orhun, J. R. Cunningham
P-11		A Method Of Calculating Head Scatter Factors For Fields Shaped With A Siemens Multi-Leaf Collimator	D. E. Wilkins, J. Szanto, L. H. Gerig
P-12		Accounting For Detector And Source Size Effects On Photon Beam Penumbra	P. Charland, E. El-Khatib
P-13		Dosimetric Verification Of A 3D Treatment Planning System Based On A Pencil-Beam Algorithm	C. J. Arsenault, J.-C. Anctil, P. Courteau, E. R. Lawrence
P-14		A Structure Map As A Visualization Aid in Three Dimensional Treatment Planning	D. M. Robinson
P-15		Impact Of Organ Motion Uncertainties On Computerized Optimization Of Radiation Treatment Plans: An Example	E. Wong, J. Van Dyk, J. J. Battista
P-16		Automatic Image Correlation Based 3-D Stereotactic Position Verification System	L. M. Sirois, B. G. Fallone
P-17		A High-Dose-Rate Brachytherapy Computed Tomography Scanner	A. Berndt, J. Bews, S. Rathee, D. W. Rickey

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P-18		A Feasibility Study Of A Tomotherapy Unit Based On Cobalt-60 Radiation Sources	G. Gallant, A. Kerr, E. Heath, L. J. Schreiner
P-19		The Long Term Stability Of The Siemens Virtual Wedge	P. Dunscombe, P. McGhee, S. Humphreys, T. Chu
P-20		Comparison Of Quality Assurance Protocols For Medical Linear Accelerators	T. K. Yeung, S. Humphreys, P. Dunscombe
P-21		How Can We, Medical Physicists, Cope With The New HARP ?	T. Chu, T. K. Yeung
P-22		An Optical And Ionizing Radiation Digital Detector For Setup Verification In Radiosurgery	B. Poffenbarger, T. Falco, M. Lachaîne, E. B. Podgorsak, B. G. Fallone
P-23		The Assessment And Redesign Of A Prostate Treatment Planning Process	B. G. Clark, C. Zankowski
P-24		An Assessment Of The Suitability Of Simulator-CT Images For The Treatment Planning Of The Prostate	B. Arjune, S. P. Gulavita, O. Ogboola, M. L. Anthes , P. L. McGhee
P-25		Calibration Of The Varian Portal Imager For Dose Measurements	S. Ozard, E. El-Khatib
P-26		A Kilovoltage X-Ray Source For Portal Imaging	P. Munro, D. C. Bouius
P-27		Dosimetry of β-Emitting Solution, Injected In A Rabbit Artery, Using A Dose Point Kernel Approach	S. Le Bail, R. Carrier, J.-F. Corbett, G. Leclerc
P-28		Applications Of Fuzzy Logic In Medical Decision Making	R. N. Tremewan, S. Alexander, C. Manning, D. Campbell
P-29		Digital Fluorescein Test	M. F. M. Costa, S. Franco
P-30		Early Screening Of The Visual System Of Infants	M. F. M. Costa, J. M. Jorge
P-31		Effects Of Beam Polychromaticity On X-Ray Scatter Imaging	R. J. Leclair, P. C. Johns
P-32		Scintillation Light Emission Studies Of LSO Scintillators	A. Saoudi, D. Rouleau, C. Pépin, D. Houde, R. Lecomte
P-33		Pediatric Effective Doses In Diagnostic Radiology	W. Huda, N. A. Gkanatsios, R. J. Botash, A. S. Botash
P-34		An Image Display Workstation For Digital Mammography	A. Bloomquist, V. Young, J. Byng, G. Mawdsley, M. Yaffe
P-35		A Prototype Photodiode/CCD X-Ray Detector for Mammography	N. Ford, J. G. Mainprize, B. Starkoski, S. Yin, M. Yaffe, T. Tumer
P-36		Artifacts Inherent To The Noise-Power Spectrum Of Digital Imaging Systems	H. Lai, I. A. Cunningham
P-37		Predicting Acoustic Response Of A Microbubble Population For Ultrasound Contrast Imaging	C. T. Chin, P. N. Burns
P-38		High Frequency (50 MHz) Colour Doppler Imaging Of Blood Flow In The Microcirculation	D. E. Goertz, D. A. Christopher, P. N. Burns, F. S. Foster
P-39		Detecting And Correcting Brain Tissue Deformation Using Intra-Operative Ultrasound Imaging In Interactive Image Guided Neurosurgery	R. M. Comeau, D. G. Gobbi, A. Fenster, A. F. Sadikot, T. M. Peters
P-40		Level-Set Surface Segmentation And Registration For Computing Intrasurgical Deformations	M. A. Audette, T. M. Peters
P-41		Aortic Wall Imaging With MR	Y. H. Chia, C. K. Macgowan, C. A. Webster, M. L. Wood
P-42		Interpreting fMRI Data Using ROC Analysis	W. Huda, N. M. Szeverenyi
P-43		MRI Of Hyperpolarized Xenon	P. Sévigny, G. Santyr, J. Wallace, S. Breeze, S. Lang, J. Xu, I. Moudrakovski, B. Simard, J. Ripmeester
P-44		Polyvinyl Alcohol Phantoms For Use In MR And US Imaging	K. J. M. Surry, C. C. Blake, K. C. Chu, M. Gordon, B. K. Rutt, A. Fenster, T. M. Peters
P-45		Mapping Temperature Gradients In Liver Using MRI And Thermocouple Temperature Measurements	J. C. Wallace, W. K. Myint, R. L. Clarke, G. E. Santyr
P-46		Gradient Coil Magnetostimulation In MRI	B. A. Chronik, B. K. Rutt
P-47		Design Of Multiband Selective RF Pulses In MRI	C. H. Cunningham, M. L. Wood
P-48		T_2-Selective RF Excitation (TELEX) Applied to White Matter	M. S. Sussman, J. M. Pauly, G. A. Wright
P-49		CMPG Imaging At 4.0 Tesla For Estimation Of Multi-Component T2 Relaxation In Vivo	P. Gareau, R. Mitchell, S. Karlik, B. Rutt
P-50		An Optimized CPMG Imaging Sequence For Multi-Component T2 Measurements At 4.0 T	P. Gareau, R. Mitchell, S. Karlik, B. Rutt
P-51		Differences Between The Kinetics Of Two MR Contrast Agents In A Canine Spontaneous Breast Tumour Model	E. Henderson, J. Sykes, E. Jensen, R. S. Pereira, D. Drost, B. K. Rutt, F. Prato, H.-J. Weinmann, T.-Y. Lee
P-52		Diagnosing Equine Cervical Vertebrae Malformation (Wobbler's Syndrome) Using Magnetic Resonance Imaging (MRI): Potential Use For MRI In Veterinary Medicine	S. P. Holmes, M. B. Hurtig, H. Dobson, G. S. Toole, E. G. Janzen
		Friday June 19, 1998	
		Session 1. Radiation Therapy: Planning and Dosimetry	**Chair: Jake van Dyk**
1-1	8:05	Evaluation Of A 3D Treatment Planning System Using The AAPM TG23 Test Package	K. E. Sixel, K. Mah
1-2	8:15	Improvement of CADPLAN Algorithm For Tangential Fields	Y. Archambault, Y. Hervieux, W. Wierzbicki

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1-3	8:25	Monte Carlo Calculations Of Fluence Spectra In Air For Several ^{192}Ir Source Configurations	J. Borg, J. Seuntjens, D. W. O. Rogers
1-4	8:35	An EGS4 Monte Carlo Examination Of The Spencer-Attix Cavity Theory For Solid State Detectors Irradiated In Megavoltage Electron Beams	P. N. Mobit, G. A. Sandison
1-5	8:45	Experimental Evaluation Of Interface Dose In Geometries Relevant To The Head And Neck Region And Comparison To Analytical Calculations And Simulation Using GEANT	B. H. Shahine, D. Axen, M. S. A. L. Al-Ghazi, E. El-Khatib
1-6	8:55	Calculation of Photon Beam Quality Specifiers	C. L. Yang, D. W. O. Rogers, J. Seuntjens
1-7	9:05	Dosimetry of Moving Jaws For Dynamic Beam Delivery Systems	R. A. Corns, M. D. C. Evans
1-8	9:15	Treatment Planning For X-Ray Rotation Therapy: The Solution Of The Inverse Problem	U. Oelfke, T. Bortfeld, W. Schlegel
1-9	9:25	Dosimetry Of Radioactive Stents: Quantification of "Hot Spots"	R. Carrier, S. Le Bail, J.-F. Corbett, G. Leclerc
1-10	9:35	The Great Debate: Optical CT vs. MR Imaging Of 3D Radiation Dose Distributions In FBX-Gel	R. G. Kelly, K. J. Jordan, K. C. Chu, B. K. Rutt, J. J. Battista
		Session 2. J.R. Cunningham Young Investigators Symposium	**Chair: Aaron Fenster**
2-1	10:20	Contrast-Enhanced MR Angiography At 0.5 Tesla With Two Novel Blood Pool Agents	S. Clarke, H. J. Weinmann, E. Dai, A. Lucas, B. K. Rutt
2-2	10:32	Design Of Ultrasound Linear Arrays For Interstitial Thermal Therapy	R. Chopra, M. J. Bronskill, F. S. Foster
2-3	10:44	Dynamic Range Of A Single Shot T_1 Mapping Method	C. A. McKenzie, R. S. Pereira, F. S. Prato, Z. Chen, D. J. Drost
2-4	10:56	Study Of A Metal/A-Se -Based Portal Detector	T. Falco, B. G. Fallone
2-5	11:08	The Effects Of Uniform And Non-Uniform Scatter And Attenuation Compensation For Quantitative Brain SPECT	R. Z. Stodilka, B. J. Kemp, P. Msaki, F. S. Prato, R. L. Nicholson
2-6	11:20	Characterization Of A Dual Wavelength Time Domain System For The Determination of Hemoglobin Saturation Through Comparison With Continuous Wave And Frequency Domain Systems	R. J. Hunter, M. S. Patterson, R. A. Weersink, J. T. Bruulsema, J. E. Hayward
2-7	11:32	Dosimetric Verification of Intensity-Modulated Photon Beams With A Portal Imager	A. J. Curtin-Savard, E. B. Podgorsak
2-8	11:44	The Development Of An In Vivo Procedure For Routine Aluminum Monitoring In Human Bone By Neutron Activation Analysis	A. Pejovic-Milic, F. E. McNeill, D. R. Chettle
2-9	11:56	Computed Rotational Angiography: 3-D CT Images of Cerebral Vessels	R. Fahrig, A.J. Fox, S. Lownie, D.W. Holdsworth
2-10	12:08	Optimization And Benchmarking Of Monte Carlo Calculated Dose Distributions In Megavoltage Photon Beams	D. Sheikh-Bagheri, D. W. O. Rogers, C. K. Ross, J. P. Seuntjens
2-11	12:20	Assessment Of Myocardial Viability And Determination Of Partition Coefficient In Vivo Using MRI and Gd-DTPA	R. S. Pereira, F. S. Prato, J. Sykes, G. Wisenberg
	12:32	**LUNCH / POSTER VIEWING / VISIT COMMERCIAL EXHIBITS** Box lunches will be provided in the Exhibit area.	
		Session 3. Radiation Biophysics and Nuclear Medicine	**Chair: Frank S. Prato**
3-1	13:50	The In Vivo Measurement of Trace Toxic Elements	F. E. McNeill
3-2	14:00	The Biophysics Of IUdR K-Edge Radiosensitization: Dosimetric Considerations and Biological Consequences	S. J. Karnas, E. Yu, J. J. Battista
3-3	14:10	Accuracy Of The Diffusion Approximation In Determining The Optical Properties Of A Two-Layer Turbid Medium	G. Alexandrakis, T. J. Farrell, M. S. Patterson
3-4	14:20	Pinhole SPECT: Towards Clinical Thyroid Tomography	T. A. Hewitt, B. T. A. McKee, M. J. Chamberlain
3-5	14:30	Investigation Of Detector Response Models For Statistical Iterative Image Reconstruction In High Resolution PET	V. Selivanov, R. Lecomte
3-6	14:40	In Vivo Quantification Of Presynaptic Dopamine Synthesis By PET/FmT In The Human Brain: Towards A Better Input Function	M.-C. Asselin, L. M. Wahl, C. Nahmias
		Session 4. X-Ray Imaging	**Chair: David W. Holdsworth**
4-1	14:50	Detective Quantum Efficiency of Direct, Flat Panel X-Ray Imaging Detectors For Fluoroscopy	D. C. Hunt, W. Zhao, J. A. Rowlands
4-2	15:00	Design And Optimization Of A Direct Conversion Detector For Digital Mammography	J. G. Mainprize, M. J. Yaffe, W. Hamilton, T. Tümer
4-3	15:10	Investigation Of Laser-Produced Plasma X-Ray Source For Application in Angiography In DESA Regime	A. Krol, J.-C. Kieffer, Z. Jiang, C. C. Chamberlain, P. Galant, D. A. Bassano, J. Yu
4-4	15:20	Screening Mammography Program Of British Columbia (SMPBC): A Physics Perspective	A. Bergman, C. Duzenli, K. Luchka, R. Rajapakshe
4-5	15:30	Radiology QA Programme At The Winnipeg Children's Hospital	J. M. C. Gallet, M. H. Reed, J. Hlady
4-6	15:40	How Does Radiation Dose And Display Contrast Affect Low Contrast Phantom Image Visibility?	C. C. Chamberlain, W. Huda*, A. R. Wojtowycz
	15:55	**COMP AGM** (coffee provided)	
	18:30	**CONFERENCE BANQUET** **Announcement of Winner of Sylvia Fedoruk Prize, JR Cunningham Young Investigator Awards, Poster Awards**	

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		Saturday June 20, 1998	
		Session 5. CT and MR	**Chair: Maria Drangova**
5-1	8:05	On Alleviating The Effects Of View Aliasing Artifacts In Computed Tomography	R. R. Galigekere, D. W. Holdsworth
5-2	8:15	Application of Dynamic Contrast Enhanced Computed Tomography To Interstitial Laser Photocoagulation	T. Purdie, M. Iizuka, M. Sherar, A. Fenster, T.-Y. Lee
5-3	8:25	In-Vivo X-Ray CT Measurements Of Cerebral Blood Volume In Brain Tumours	A. Cenic, T.-Y. Lee, R. A. Craen, A. W. Gelb
5-4	8:35	Multislice Adiabatic Saturation Recovery T1 Measurement For Quantitative Dynamic Contrast-Enhanced Breast MRI	G. O. Cron, G. E. Santyr, F. Kelcz
5-5	8:45	Quantitative Volume Flow Measurement Technique For Assessment Of Valvular Disease	M. Drangova, A. Wheatley, D. Galea, D. R. Boughner
5-6	8:55	Real-Time MR Measurement Of Flow Using Volume-Localised Excitations	C. K. Macgowan, C. A. Webster, M. L. Wood
5-7	9:05	Fourier Velocity Encoding To Measure Peak Velocity Using MRI	D. Galea, L. Lauzon, B. K. Rutt, M. Drangova
5-8	9:15	MRI Diffusion Measurements Of Gd-DTPA In PVA Cryogel Phantoms	M. J. Gordon, K. C. Chu, A. Margaritis, B. K. Rutt
5-9	9:25	Coronary Venous Oximetry Using MRI	W. D. Foltz, N. Merchant, G. A. Wright
5-10	9:35	Creation Of A Non-Linearly Warpable 3-D Functional Atlas For Image-Guided Neurosurgery	K. Finnis, P. St-Jean, R. Kasrai, D. Clonda, T. M. Peters
		Session 6. Ultrasound	**Chair: F. Stuart Foster**
6-1	10:20	A Novel Nonlinear Ultrasound Imaging Technique For Microbubble Contrast Agents	D. H. Simpson, P. N. Burns
6-2	10:30	Ultrasound Biomicroscopy Of Normal And Osteoarthritic Articular Cartilage	G. A. Joiner, K. Harasiewicz, K. P. H. Pritzker, E. Bogoch, F. S. Foster
6-3	10:40	An In-Vitro System For The Investigation Of Flow Within The Stenosed Carotid Artery Bifurcation	T. L. Poepping, A. Fenster, R. N. Rankin, H. N. Nikolov, D. W. Holdsworth
6-4	10:50	Accuracy In Measurement Of Left Ventricular Cavity And Myocardial Volumes Using 3D Echocardiography	S. K. Nadkarni, M. Drangova, D. Boughner, A. Fenster
6-5	11:00	Automatic Needle Segmentation For Ultrasound-Guided Biopsy And Therapy	K. Draper, C. Blake, L. Gowman, D. Downey, A. Fenster
6-6	11:10	Semi-Automatic Segmentation Of 3D Ultrasound Images Of Ovarian Follicles Using An Inflating Balloon Model	H. M. Ladak, A. Fenster, D. A. Steinman
		CAP Lecture	**Chair: Paul C. Johns**
L-1	11:20	Laser-Based Studies of Negative Ions	H. K. Haugen
	12:00	**LUNCH / POSTER VIEWING / VISIT COMMERCIAL EXHIBITS**	
	13:00	**Close of Commercial Exhibits**	
		Session 7. Cancer Therapy: Clinical Applications	**Chair: Jerry J. Battista**
7-1	13:00	Enhanced Dynamic Wedge Factors	M. D. C. Evans, T. Etmektzoglou
7-2	13:10	A Feasibility Study Of Compensators For Conventional And Intensity Modulated Beam Therapy	H. Thompson, M. D. C. Evans, B. G. Fallone
7-3	13:20	The Effect Of Anatomical Uncertainties On Conformal Treatment Planning	T. Craig, E. Wong, J. J. Battista, J. Van Dyk
7-4	13:30	MR Thermometry For Image-Guided Minimally-Invasive Therapy: Progress Towards Monitoring Thermoco-agulation Therapy of Human Prostate In Vivo	R. D. Peters, J. C. Chen, J. A. Moriarty, J. A. Derbyshire, G. A. Wright, D. B. Plewes, M. J. Bronskill, J. Trachtenberg, S. Bell, W. Kucharczyk, R. M. Henkelman
7-5	13:40	Ultrasound Guided Prostate Implants At T-SRCC	W. Que
7-6	13:50	Fuzzy Logic In Portal Decision Making	K. Leszczynski, D. Provost, S. Cosby, R. Bissett
7-7	14:00	Glaring Errors In Transit Dosimetry	P. Munro, D. C. Bouius, J. Moseley, L. Martin, Y. Zhang, D. A. Jaffray
7-8	14:10	A Novel Phantom Material For Monitoring 3-D Heat Distributions In Thermal Therapy	L.-S. Bouchard, M. J. Bronskill
7-9	14:20	Magnetic Resonance Calorimetry to Measure Tissue Ultrasound Absorption	Y. Wang, F. S. Foster, D. B. Plewes
	14:45	**Depart for Research Tours: London Regional Cancer Centre, Lawson Research Institute, Robarts Research Institute**	
	16:00	**Forum On Prostate Brachytherapy** (at London Regional Cancer Centre)	**Chair: William Que**
		Introduction	W. Que
		Ir and I Prostate Implants at Hamilton Regional Cancer Centre	J. Szabo
		Prostate Implants at the Vancouver Clinic	B. Clark
		Prostate Implants at London Regional Cancer Centre	F. Chisela
		Optimization of Dose Distribution for Prostate Implants at L'Hôtel-Dieu de Québec	J. Pouliot
		Physics Aspects of Ultrasound Guided Prostate Implants	W. Que
		Sunday June 21, 1998	
	11:00	**Golf Tournament**	**Organizer: Ian A. Cunningham**

Professional Practice Leader

Medical Physics
Fraser Valley Cancer Center (FVCC)
Surrey, British Columbia

The British Columbia Cancer Agency is a multidisciplinary diagnostic, treatment and research center dedicated to cancer care of the highest quality. At present it operates four cancer centers located in Vancouver, Victoria, Surrey, and Kelowna.

The FVCC is a state of the art facility serving 2500 new patients annually and is equipped with three linacs (2 dual 6/18 MV photon and electron machines with multileaf collimators and portal imaging and one 6 MV linac), a Cobalt unit, LDR afterloading unit, HDR afterloading unit, an orthovoltage unit, a conventional simulator and a CT simulator, a CADPLAN treatment planning system and well equipped machine and electronics shops.

The position of Professional Practice Leader is available immediately and the opportunity exists for the leader to select several of the staff. Responsibilities will be to oversee Clinical Physics Services at the Center. This includes selecting, acceptance testing, commissioning and calibrating high energy radiotherapy equipment, treatment planning, and the establishment of proper quality assurance programs.

Suitably qualified candidates are encouraged to obtain an academic appointment at the University of British Columbia and may supervise graduate students and participate in provincial training programs. Applicants should have a Ph.D. in Medical Physics or a similar field and at least 5 years+ related experience in Medical Radiation Therapy Physics. Leadership experience and certification by the CCPM are preferred.

In accordance with Canadian Immigration requirements, priority will be given to Canadian citizens and permanent residents of Canada. Please submit a resume with the names of three referees to Ellen El-Khatib, Ph.D., FCCPM, Provincial Professional Practice Leader, Medical Physics, BC Cancer Agency, 600 West 10th Ave., Vancouver, BC, V5Z 4E5, FAX 604 877-6059, Tel. 604 877-6000 x 2021.

The closing date for this competition is July 31, 1998.

Medical Physicist

Fraser Valley Cancer Center (FVCC)
Surrey, British Columbia

There is an immediate opening for a Clinical Physicist who will provide clinical physics services to Radiation Therapy at the Fraser Valley Cancer Center.

The British Columbia Cancer Agency is a multidisciplinary diagnostic, treatment and research center dedicated to cancer care of the highest quality. At present it operates four cancer centers located in Vancouver, Victoria, Surrey, and Kelowna.

The FVCC is a state of the art facility serving 2500 new patients annually and is equipped with three linacs (2 dual 6/18 MV photon and electron machines with multileaf collimators and portal imaging and one 6 MV linac), a Cobalt unit, LDR afterloading unit, HDR afterloading unit, an orthovoltage unit, a conventional simulator and a CT simulator, a CADPLAN treatment planning system and well equipped machine and electronics shops.

The successful candidate will be expected to participate in clinical service such as treatment planning, selecting, acceptance testing, commissioning and calibrating high-energy radiotherapy equipment. Clinical research and teaching will be encouraged.

Candidates should hold a Ph.D. or M.Sc. degree in Medical Physics or a related field. A minimum of two years+ experience in Radiation Therapy Physics is required and preference will be given to applicants with membership in the CCPM.

In accordance with Canadian Immigration requirements, priority will be given to Canadian citizens and permanent residents of Canada.

Please submit a resume with the names of three referees to Ellen El-Khatib, Ph.D., FCCPM, Provincial Professional Practice Leader, Medical Physics, BC Cancer Agency, 600 West 10th Ave., Vancouver, BC, V5Z 4E5.
FAX 604 877-6059, Tel. 604 877-6000 x 2021.

POSITION: **MEDICAL PHYSICIST**

LOCATION: **QUEEN ELIZABETH HOSPITAL**

CHARLOTTETOWN, PRINCE EDWARD ISLAND, CANADA

The Queen Elizabeth Hospital, a 275-bed acute care facility, is seeking a permanent full time medical physicist to provide services to the people of Prince Edward Island. Picturesque Prince Edward Island offers a relaxing, safe, community-oriented lifestyle for individuals and families who can appreciate beautiful scenery, wide-open spaces, miles of pristine, uncrowded beaches and an endless variety of recreational activities (world-class golf courses, fishing, cross-country skiing).

As part of the Queens Regional Health Authority, the Queen Elizabeth Hospital is a dynamic, patient and family oriented facility that is shaping itself to meet the needs of the community it serves by providing integrated and speciality acute care services to the people of Prince Edward Island. This includes the construction of a new wing and future home of state-of-the-art radiation oncology services which is expected to open in 1999.

The Queen Elizabeth Hospital is the central referral facility serving other Island hospitals and provides speciality services including Radiation Oncology, Laboratory, Neonatal Intensive Care, Paediatrics, and a full range of modern Diagnostic Imaging Services.

The successful candidate must have a Masters (M.Sc.) or doctorate (Ph.D.) in physics (preferably medical physics) with eligibility for Certification from the Canadian College of Physicists in Medicine and experience in radiation oncology.

Qualified individuals are invited to submit applications by August 1, 1998.

CONTACT:

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Manager of Diagnostic Imaging
Queen Elizabeth Hospital
P.O. Box 6600
Charlottetown, PE, Canada C1A 8T5
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FAX: (902) 894-2424

Hamilton 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 Hamilton Regional Cancer Centre (HRCC). We are currently seeking a **full-time…**

MEDICAL PHYSICIST

We require an experienced Medical Physicist for the Department of Medical Physics. The successful applicant will join a group of eight other physicists and eighteen technical staff working in a modern facility which opened in 1992. The Department provides clinical service to a large radiation treatment program based on eight high energy units, three simulators, a new 3D treatment planning system and brachytherapy facilities. Research programs exist in photodynamic therapy and medical laser applications and candidates will be expected to develop their own research projects in these or other areas. Qualified candidates will also be eligible for academic appointment at McMaster University and can participate in active undergraduate and graduate programs in medical and health physics. Hamilton offers a small city lifestyle with easy access to the Toronto metropolis and rural areas.

Applicants for this position should hold a Ph.D. in physics or a related discipline, be certified by the Canadian College of Physicists in Medicine, and have at least two years' experience in clinical radiation physics. Outstanding candidates with M.Sc. degrees will also be considered.

The deadline is August 15, 1998 and applications, including a complete curriculum vitae and the names of three references, or requests for further information should be directed to:

Dr. Michael S. Patterson
Head of Medical Physics
Hamilton Regional Cancer Centre
699 Concession Street
Hamilton, Ontario
L8V 5C2

Phone	**(905) 387-9711, ext. 7005**
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E-mail	**mike_patterson@hrcc.on.ca**

CCO is an equal opportunity employer.

NEW MEMBERS

FULL or ASSOCIATE Membership

Sunnybrook Health Science Centre Toronto, ON
- Christie A. Webster (B.A.Sc. - 1992 - Engineering Science-Physics)
- Victoria Young (B.A.Sc. - 1997 - Mammography)
- Nancy Ford (B.Sc. - 1997 - Imaging Mammography)
- David Elfstrom (B.Sc.E. - 1997 - Mammography)
- Aili Bloomquist (B.A.Sc. - 1997 - Mammography)
- Donald B. Plewes (Ph.D. - 1977 - Biophysics)
- Graham A. Wright (Ph.D. - 1991 - Electrical Engineering)
- Jeff Byng (Ph.D. - 1997 - X-ray Imaging Mammography)

Institute for National Measurement Standards, National Research Council
- Jette Borg (Ph.D. - 1996 - Heath Physics)
- Chunli Yang (Ph.D. - 1996 - Medical Physics)

McMaster University Hamilton, ON
- Dr. David R. Chettle (Ph.D. - 1975 - Medical Physics)

Hopital Maisonneuve-Rosemont, Montreal, PQ
- Yannick Hervieux (M.Sc. - 1996 - Astronomie)

Saskatchewan Labour Board, Saskatoon, Saskatchewan
- Stephen T. Webster (M.Sc. - 1992 - Physics (Radiation))

St. Agnes Medical Center Fresno, CA, USA
- Ayoola Akinradewo (Ph.D. - 1987 - Radiation Oncology)

Newfoundland Cancer Treatment & Research Foundation, St. John's, Nfld
- Xiofang Wang (M.Sc. - 1994 - Medical Physics)

Hamilton Regional Cancer Centre Hamilton, ON
- Joseph E. Hayward (Ph.D. - 1993 - Lasers and Electro-Optics)

Tom Baker Cancer Centre, Calgary, AB
- Dr. Stephen P. Sawchuk (Ph.D. 1990 - Applied Math)

C.H.U.M., Montreal, PQ
- Gilles Beaudoin (Ph.D. - 1990 - Physiques Des Particules)

Robarts Research Institute, London, ON
- Hanif M. Ladak (Ph.D. - 1998 - Image analysis)
- David Steinman (Ph.D. - 1993 - Imaging)
- Ramesh R. Galigekere (PhD - 1997 - Imaging)

Hopital Miasonneuve-Rosemont Montreal, PQ
- Genevieve Lafreniere (M.Sc. - 1994 - Physique du solide)

Centre Hospitalier Regional de Trois-Rivieres, Trois-Rivieres, PQ
- Daniel Michaud (M.Sc. - 1991 - Science de l'Energie)

Kingston Regional Cancer Centre Kingston, ON
- Greg Salomons (Ph.D - 1998 - Physics)

London Regional Cancer Centre London, ON
- Eugene Wong (PhD - 1992 - Medical Physics)

National Oncology Institute, Habana, Cuba
- Roldofo Alfonso-Laguardia (Ph.D. - 1986 - Nucl. Eng.)

STUDENT MEMBERS

McGill University, Montreal, PQ
- Luc Sirois (B.Sc. - 1996 - Physique)
- Heather Thompson (B.Eng. 1996)

University of Western Ontario London, ON
- Sharon Clarke (B.Sc. - 1997 - Biophysics)
- Melissa Gordon (B.E.Sc. - 1997 - Engineering)
- Perry Radau (M.Sc. 1994 - Medical Physics)
- Jeffrey A. Kempe (M.Sc. - 1997 - Physics)
- Mauro Tambasco (M.Sc. - 1997 - Physics)
- Luciana Parlea (Undergraduate Student)
- Vikesh Dhir (undergraduate student)
- Ali Sodagar (H.B.Sc. - 1997 - Medical Imaging)
- Misbah Gulam (Hons. B.Sc. - 1998 - Biophysics)
- Jeremy Gill (M.Sc. - 1996 - Laser Physics)

University of Toronto (Sunnybrook), Medical Biophysics, Toronto, ON
- Charles Cunningham (B.A.Sc. - 1996 - MRI)
- Yee Hong Chia (B.Sc. - 1996 - Physics)
- David Goertz (M.Sc. - 1994 - Ultrasound)
- Glenn Joiner (B.Sc. - 1997 - Medical Physics)
- Yao Wang
- Chien Ting Chin (M.Sc. - 1993 - Ultrasound Img.)

McMaster University, Hamilton, ON
- David Hertzman
- Erin Niven (M.Sc. - 1998 - Health Physics)
- Michelle Arnold (B.Sc. - 1996 - Physics and Mathematics)
- Derek Hyde (B.Sc. - 1997)

CHUM - Campus Notre-Dame Montreal, PQ
- Laëtitia Menant (Ingenieur - 1997 - Physique)

Carleton University, Ottawa, ON
- Narine Kizilian (Masters - Expected 1999 - Biophysics)

Universite de Sherbrooke, Sherbrooke, PQ
- Vitali Selivanov (M.Sc. - 1996 - Applied Mathematics and Informatics)
- Abdelhamid Saoudi (Ph.D. - 1994 - Instrumentation)

Joined During the 1998 COMP Meeting
- Rebecca Thornhill
- Norma Freeman
- Quan Yang
- Yasar Saleh
- Corey E. Zankowski
- Eric Jensen
- Deidre Batchelar
- Hao Lai

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From the Editor:

As you can see there has been a substantial change in the appearance of the Newsletter. A major impetus for these changes has been the access to new technology. I have replaced my ageing 486 computer, which was used to generate the last two issues of the Newsletter, with a PII computer and I have started to use desktop publishing software (Microsoft Publisher 98) rather than word processing software to generate the layout for the issues. I hope that you will agree with me that the results are worth the extra effort that these changes have entailed. In addition, there has been a change in how the Newsletter is reproduced. Rather than supplying a hardcopy version of the Newsletter I can now supply an electronic version to the printers, so that the Newsletter can be reproduced using a high volume laser printer. The result is much better image reproduction and the potential for colour reproduction. Such improved reproduction capabilities are essential, with my increased emphasis on images and photographs.

The function of the Newsletter is to inform readers about what is happening in the Canadian medical physics community. However, it often seems that everyone is too busy to prepare submissions for the Newsletter. So following the adage that "a picture is worth a thousand words" I have introduced a pictorial feature for the front cover of the Newsletter. Using this pictorial format I would like to highlight the research, development, and clinical activities of COMP members. Do you want to get wide spread attention for your activities? If so, send me a photograph or image along with a figure caption that best illustrates your work. Not only will it help your profile in the community, but it will help me create an interesting Newsletter. If successful, I will expand this idea to include pictorials within the body of the Newsletter, as well. I especially encourage COMP members performing clinical activities to make submissions. So please help me eliminate the curse of a photographically challenged Newsletter! I want to issue a special thanks to David Holdsworth and Rebecca Fahrig who so kindly volunteered to become pioneers for my new pictorial. Please follow their lead and volunteer photographs or images to the Newsletter.

I would like to thank all of those people who sent me information about items in the April 1998 issue of the Newsletter. I now know who directed Avis Favaro to call me about vascular restenosis (Peter Dunscombe) and I have a better idea of how the Harold Johns Award of the NCIC was established. This information came from Jim Till – a colleague of Harold Johns who is about to become president of the NCIC – via Doug Cormack.

"Several people were involved. They included Bob Phillips (current Executive Director of the

(Continued on page 85)

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pmunro@lrcc.on.ca

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