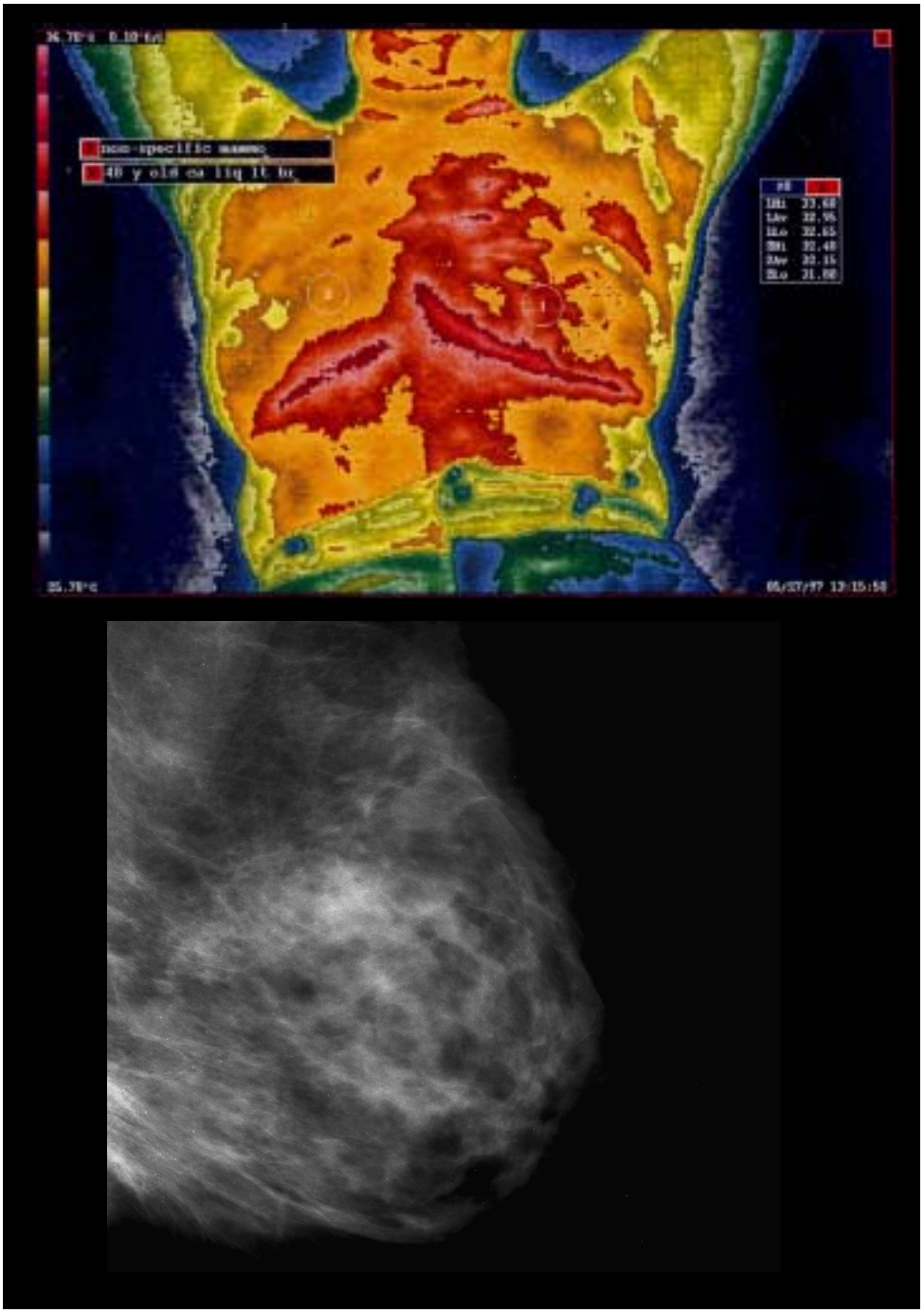
InterACTIONS

CANADIAN MEDICAL PHYSICS NEWSLETTER
Le BULLETIN CANADIEN de PHYSIQUE MÉDICALE



Functional Infrared Imaging of the Breast

COMP OCPM

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

46 (4) octobre/October 2000

About our Cover

High resolution infrared imaging of the breast is providing additional safe, practical, and objective information when produced and interpreted by sufficiently trained breast physicians. Dr. Keyserlingk recently delivered a short course on infrared imaging of the breast at the World Congress on Medical Physics and Biomedical Engineering in Chicago and provided these images

Top: 48 year old patient with significant vascular asymmetry and a temperature difference of .8°C (IR-3) in the lower inner quadrant of the left breast.

Bottom: Corresponding Mammography indicates a non-specific density. ***Surgical histology:*** 1.6 cm. left lower inner quadrant infiltrating ductal carcinoma.

The IR system consisted of a scanning-mirror optical system containing a mercury-cadmium-telleride detector with a spatial resolution of 600 optical lines. Infrared imaging took place in a draft-free thermally controlled room, maintained at between 18 and 20 degrees C, after a 5 minute equilibrium period during which the patient sat disrobed with her hands locked over her head.

Images courtesy of Dr. J. R. Keyserlingk of the Ville Marie Breast and Oncology Center in Montreal and McGill University.

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

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

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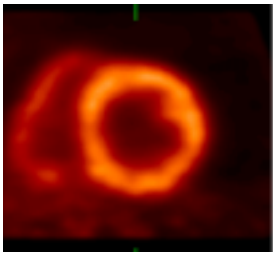

Cardiac Positron Emission Tomography……...…….**135**
Rob deKemp

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Message from the COMP Chair:

This year's AGM was held with the World Congress in Chicago. It was certainly an honor to have the COMP logo exhibited along side the IOMP and AAPM logos and those of the associated engineering associations ...

My predecessor Mike Patterson sent me a "thumbs -up" in his last message. I still do not know what that means as I a start "Chairing" COMP. He will remain on the executive for the next two years, and hopefully, that would be sufficient time for him to clarify his message. I would also like to acknowledge the contribution of Paul Johns during his six-year term on the Executive. His wise counsel would be duly missed. We would like to welcome Clement Arsenault as our new Chair-elect. I know he is looking forward to taking care of all of the COMP problems. Michael Kolios has replaced Peter Munro in the newly formed position of Councilor for Communication, and Pat Cadman has become the Newsletter Editor. Peter had made major enhancements in *Interactions* , and initiated several steps to improve communication between COMP and its members. Both Michael K. and Pat have big shoes to fill, but I am sure they will come to task with vigor.

This year's AGM was held with the World Congress in Chicago. It was certainly an honor to have the COMP logo exhibited along side the IOMP and AAPM logos and those of the associated engineering associations even though COMP did not put a penny for the meeting. The Canadian Nite-out was a success at a reasonable cost. I would like to thank the corporate sponsors for the evening and Sherry Connors for handling the organization of the event.

We did not have the COMP Young Investigator's Symposium this year. In its place, we gave an award to student-papers accepted for the World Congress Young Investigator's Symposium where the first author was a COMP member. The sole recipient of the $250.00 award was Stephen Sticew from the University of Alberta.

We are keeping abreast of various activities of other organizations (e.g., CAP, EFOMP) that may be directly related to COMP by improving the communication we have with them. One of the important goals of COMP is to recruit new members, both regular and Corporate. We will, of course, strive to increase our membership by increasing our profile, but we will also address the problem of delinquents more appropriately. One of the responsibilities of the Executive Director position was to increase Corporate Sponsorship and to increase our profile. As you know, we are still actively recruiting for that position. We have interviewed a few candidates, and hope to come to a decision perhaps, before Christmas (?). Because the position of Executive Director has been vacant, our Secretariat, Barb Callaghan had to quickly assume many of the responsibilities. She has done this admirably, and I would like to acknowledge her efforts.

In closing, I would like to re-iterate the Past-Chair's observation that COMP requires membership participation if it is to continue to thrive. I encourage all of you to consider helping COMP in whichever function you can.

B. Gino Fallone,
gino.fallone@cancerboard.ab.ca

Message from the CCPM President:

I will use this issue's message to review the general state of the College for those of you who were not able to attend our Annual General Meeting. In Chicago we elected 7 new fellows and 14 new members into College. This increase indicates the continued recognition of the importance of certification in Canada. Mike Bronskill, the senior College fel-

low at the AGM, maintained the important tradition established by Doug Cormack by welcoming and congratulating all the new inductees. The CCPM now has 173 fellow and members, so we are in fine shape.

There were a number of changes on the Board this summer. Peter Dunscombe is off the Board after 8 too short years of faithful service. I would like to thank Peter again for his work over those years, and to especially thank him for his help and advice in my freshman year as president (although I will have to talk to him about some of the half truths he told me when he was convincing me to go for the presidency). I am happy to report that Peter will continue to support the College by assisting in developing our policies and by representing Canadians on the CAMPEP Board. The new member of the Board is Narinder Sidhu from the Saskatchewan Cancer Centre; we look forward to taking advantage of his insight and experience. Alistair Baillie has served his term as Registrar for the College and will now sit on the Board as a general member; Chris Thompson has taken over as Registrar. The rest of the Board membership stays the same. I must say that it has been a pleasure to work with this Board.

The College was represented on the Board of CAMPEP for the first time in Chicago, an exciting development that you know we've been working towards for some time. CAMPEP was extremely pleased to have Canadian sponsorship, and the College will endeavor to strengthen the Canadian ties with, and support of, CAMPEP in the next few years.

Chicago saw a number of other long meetings. Much of the College effort was devoted to running the fellowship exams and reviewing the examination results and the examination process. (I would like to thank all who worked on the examinations for this years candidates, this is often a difficult and unacknowledged chore.) As part of our review, Katharina Sixel has been coordinating an update of the Radiation Oncology Section of the membership examination booklet. This work is nearly complete, and a new version of the document will be made available soon. One change that we will undertake will be to make the exam booklet available from the College web site. We believe that this will enable us to keep the booklet more up to date, make the booklet more available to the medical physics community, and make the distribution less arduous for the Registrar. This work is being assisted by Michael Kolios, COMP's new Communications Counselor. We will keep you aware of further developments. The board also spend some time this summer reviewing our policies and procedures, and in documenting the standards for becoming members and fellows of the College. In that vein, I have had some very interesting conversations with senior members of the College from across the country and the United States, discussing where CCPM certification falls in the general scheme of medical physics certification on this continent. It was interesting to hear how CCPM certification is per-

(Continued on page 151)

Another important current issue is recertification. I would encourage those of you who are due for the next year to begin to put your dossiers together.

Jerry Battista Honoured by AAPM

By Jake Van Dyk
London Regional Cancer Centre

Dr. Jerry J. Battista, Director of Physics Research and Education at the London Regional Cancer Centre, was recently awarded Fellowship in the American Association of Physicists in Medicine (AAPM). The award was granted at the AAPM Awards ceremony held in Chicago at the World Congress on 25 July 2000. This award honours AAPM members who have distinguished themselves by their contributions in research, education, and leadership in the medical physics community. Jerry was honoured along with some other well-known medical physicists including Radhe Mohan, Kunio Doi, and Michael Goitein. Jerry joins a select number of Canadians who also received AAPM Fellowships in previous years. These are Jack Cunningham, the late Harold Johns, Ervin Podgorsak, Dave Rogers, Jake Van Dyk, and Martin Yaffe. Congratulations are extended to Jerry Battista for this well-deserved honour!

Other awards granted at the Awards ceremonies that tie in with the Canadian community include the AAPM-IPEM Travel Grant to Charlie Mah (formerly from Ottawa) and the Farrington Daniels Award for the best dosimetry-related paper in Medical Physics in 1999 which went to the Madison group under the direction of Rock Mackie (formerly from Edmonton and Regina).

AAPM Awards and Honors Committee

Short Biographical Sketch

Jerry Battista received his Ph.D. in Medical Biophysics from the University of Toronto (1977). After acquiring some clinical physics experience at the Princess Margaret Hospital, he moved to the University of Alberta. At the Cross Cancer Institute (1979-88), he inspired a research team to develop convolution-based algorithms for 3D dose computations. As an enthusiastic mentor with a "Fenyman style" of teaching, his graduate students have proceeded to earn international acclaim, including the Farrington-Daniels Award (1986). In 1988, he returned to Ontario where he is currently Director of Physics Research and Education at the London Regional Cancer Centre, and a Professor at the University of Western Ontario. He recently helped convince the Ontario government to invest $1M annually in medical physics residency programs. Jerry served on the AAPM Scientific Program Committee and Task Group 65, but you may unknowingly have encountered him as the 'helpful' meticulous referee of your *Medical Physics* articles. He has published over 55 peer-reviewed papers, some of which have spawned new research directions.

*** CONGRATULATIONS ***

Jerry Battista receiving AAPM Fellowship Award from Kenneth Hogstrom

Cardiac Positron Emission Tomography

By Rob deKemp, Ph.D.
Head of P.E.T. Physics, Cardiac P.E.T. Centre
University of Ottawa Heart Institute

Overview

The clinical use of positron emission tomography (PET) has undergone tremendous growth over the past few years. In the U.S. this is due primarily to nationwide Medicare reimbursement for new indications in oncology and cardiology, and FDA approval of several PET radiopharmaceuticals (tracers) such as ^{18}F-fluorodeoxyglucose (^{18}FDG) which is now available for sale by commercial companies such as PETnet. In Canada reimbursement strategies vary by province, and there is a limited supply of ^{18}FDG to imaging centres that do not have a cyclotron facility for on-site manufacturing. This article presents a brief overview of the clinical applications of PET in cardiology.

Physics

PET is a nuclear medicine imaging technique used to evaluate molecular function in the living body. The positron emitting isotopes ^{11}C, ^{13}N and ^{15}O are ideally suited to label and image molecular compounds found naturally in the body, while isotopes of ^{18}F, ^{62}Cu, ^{82}Rb etc. are used to label molecular analogues. In the process of positron decay, a positron is ejected from the atomic nucleus and travels a short distance according to initial energy (0.4 mm for ^{18}F and 2.3 mm for ^{82}Rb in tissue) before annihilating with an electron. Coincidence detection of the 511 keV annihilation photons allows the non-invasive imaging of absolute isotope concentrations (Bq/cc) which follows the uptake and subsequent metabolism of the labeled molecules.

History

The original positron scanner was first described in 1953 by Brownell and Sweet and used for imaging brain tumours with ^{74}As [1]. PET developed as a powerful but expensive research tool for evaluation of in-vivo physiology including blood flow, metabolism, receptor density, autonomic innervation and recently also for gene expression. Over the last decade, technology has improved markedly and become much less expensive with the introduction of fully-3D volume imaging scanners with high spatial (5 mm) and temporal (5 sec) resolution. Small field of view animal scanners are now available with spatial resolution of 1 mm, which is approaching the fundamental limit imposed by positron range. Currently, the two main clinical applications of cardiac PET are the evaluation of 1) glucose metabolism for viability of the heart muscle (myocardium), and 2) myocardial perfusion for diagnosis of coronary artery disease.

Myocardial Viability

^{18}FDG imaging provides a direct assessment of myocardial viability by evaluating the metabolic demand of the muscle. Glucose metabolic imaging with ^{18}FDG PET identifies viable myocardium in patients with coronary artery disease and impaired ventricular function. A myocardial region with reduced perfusion and preserved ^{18}FDG uptake indicates ischemic but viable 'hibernating' myocardium (Figure 1), and it identifies patients who will benefit from revascularization, with improved left ventricular function and survival [2]. A large multi-centre trial is currently underway to demonstrate prospectively, the clinical value of ^{18}FDG PET viability imaging [3]. These studies are also ECG-gated (Figure 3) to measure left ventricular (LV) function (ejection fraction) which is an important clinical indicator of prognosis. Because of the relatively long half-life of ^{18}F (110 min), ^{18}FDG can be distributed up to several hundred kilometers from the site of manufacture. Therefore, an on-site cyclotron is not absolutely necessary if there is a reliable supply of ^{18}FDG available.

Myocardial Perfusion

Imaging of *relative* myocardial perfusion with PET tracers such as ^{82}Rb (Figure 2) or ^{13}N-ammonia has the highest diagnostic accuracy for non-invasive detection of coronary artery disease [4] due to accurate attenuation correction. This is important for patients (often women) with false-positive defects from breast or diaphragm attenuation, by conventional stress SPECT perfusion imaging with ^{201}Tl or the ^{99m}Tc-labeled tracers sestamibi and tetrofosmin. The greater specificity of PET perfusion imaging can reduce costs by decreasing the need for more expensive and higher risk evaluation with coronary angiography. ^{82}Rb is produced from a ^{82}Sr/^{82}Rb generator which can be easily transported and lasts for up to 10 weeks [5]. ^{82}Sr/^{82}Rb generators have been FDA approved for sale in the U.S. for over 10 years. The cost of ^{82}Rb from generators manufactured on-site at the Ottawa Heart Institute for example, is equivalent to that of the ^{99m}Tc-labeled perfusion tracers. The short half-life (76 sec) requires the use of an automated infusion system to deliver accurate doses, but permits rapid evaluation of myocardial perfusion reserve (stress/rest ratio) and fast serial imaging [6]. The other clinical PET perfusion tracer ^{13}N-ammonia is typically produced on demand where an on-site cyclotron is available. Slightly higher resolution images can be obtained due to lower positron energy compared to ^{82}Rb, however there is some heterogeneity of ^{13}N-ammonia uptake in the lateral wall of the left ventricle. The longer half-life (10 min) allows acquisition of

images with better count statistics by lengthening the scan time.

While *relative* perfusion imaging is the clinical standard, quantification of *absolute* perfusion or myocardial blood flow (MBF) is required for patients who may have global flow impairment in the entire left ventricle. Absolute MBF is measured with dynamic PET imaging and kinetic modeling [7]. With the potassium analogue ^{82}Rb for example, sequential (5-10 sec) dynamic frames are initiated simultaneous with ^{82}Rb intravenous injection. A one-tissue-compartment kinetic model can then be used to quantify MBF [8]. ^{82}Rb in the arterial blood is taken up by the myocardium at a rate of K1 ml/min/g and is washed out at a rate of k2 /min. MBF is determined from the uptake parameter K1 = E×MBF ml/min/g, where E is the extraction fraction of ^{82}Rb. The extraction of ^{82}Rb decreases non-linearly as MBF increases according to $E=1-e^{-PS/MBF}$, where PS is the capillary permeability surface-area product. The washout parameter k2 has also been proposed as an indicator of myocardial viability [7]. The compartmental model assumes that the measured PET signal is a linear combination of the myocardial tissue tracer concentration Cmyo(t), and the arterial blood concentration Ca(t):

$$\begin{aligned} \mathbf{Cmodel(t)} &= \mathbf{FaCa(t) + (1–Fa)Cmyo(t)} \\ &= \mathbf{FaCa(t) + (1–Fa)(Ca(t) \otimes K1e^{-k2t})} \end{aligned}$$

The parameter Fa represents a fraction of arterial blood contained in the measured PET signal, and provides an effective correction for partial volume averaging. Ca(t) is determined from a region of interest placed in the left atrial or left ventricular cavity. The measured PET signal Cpet(t) is obtained for multiple regions placed over the endocardial myocardium. The unknown parameters (K1, k2,Fa) are estimated by fitting Cmodel(t) to Cpet(t) as shown in Figure 4. Similar models are used for ^{13}N-ammonia, which has the advantage of a higher extraction fraction than ^{82}Rb. In contrast, the washout parameter k2 is related directly to MBF for ^{15}O-water, which is a freely diffusible tracer considered to be the gold-standard for the measurement of absolute MBF with PET. However, it is only used for research applications because it is technically difficult to perform and analyse these studies.

Cardiovascular Research

Dynamic ^{18}FDG PET with kinetic modeling is also used to quantify the absolute rate of glucose utilization in μmol/min/g. This technique has been used to show global reductions in glucose metabolism with nitrate therapy for example. Many other PET tracers have been developed to investigate new therapies as well as the basic mechanisms of heart disease. These include ^{11}C-acetate for oxidative metabolism, ^{11}C-palmitate for fatty-acid metabolism, and receptor binding compounds for neurohormonal studies, among many others [7].

Future Developments

Advances in PET instrumentation have reduced costs making this technology more affordable and accessible in clinical imaging centres. Most Canadian PET research centres also have on-site cyclotron facilities, including Montreal, Hamilton, Toronto, Vancouver and Sherbrooke. The cardiac PET centre in Ottawa has demonstrated since 1997 that ^{18}FDG combined with ^{82}Rb perfusion imaging provides a full clinical cardiac PET service without the need for an on-site cyclotron. New cyclotron facilities in Ottawa and Edmonton (and potentially in Quebec City, Montreal and London) can help to meet the clinical demand for ^{18}FDG in oncology, cardiology and neurology. Provincial health plan reimbursement strategies are under development [9], and a strategy is needed for large-scale production and distribution of ^{18}FDG and other PET tracers to imaging centres without cyclotron facilities.

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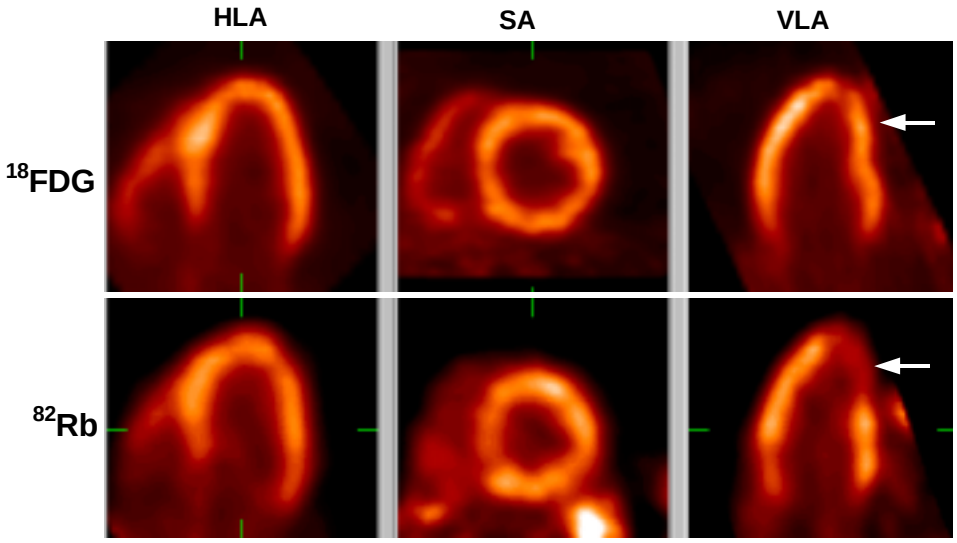

Figure 1. Uptake images taken at rest with the tracers ^{18}FDG and ^{82}Rb. Three orthogonal views are shown: horizontal long axis (HLA), short axis (SA) and vertical long axis (VLA). The relative distribution of the tracers is visualized in the myocardium of the left ventricle. The right ventricle is also visible on the left side of the HLA and SA images. ^{82}Rb activity in the gut is seen at the bottom of the SA image. There is a region of low perfusion with preserved glucose metabolism in the inferior wall (arrows), indicating viable 'hibernating' myocardium that will improve in function following revascularization.

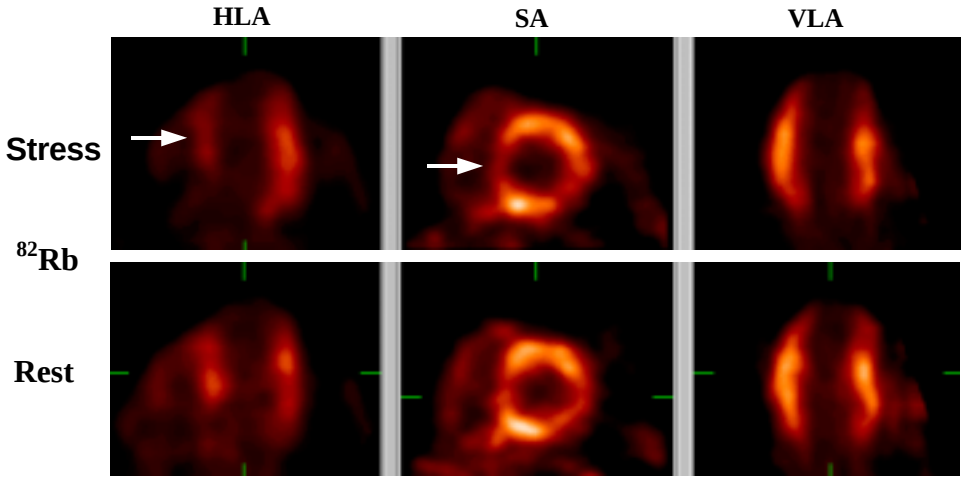

Figure 2. ^{82}Rb stress and rest perfusion studies. There is a severe uptake defect in the apex seen at the top of the HLA and VLA images, which is present in both the rest and stress images indicating previous myocardial infarction in the left anterior descending (LAD) coronary artery. There are mild defects in the septum and lateral wall seen on the rest SA images. The defect in the septum worsens with stress (arrows) indicating reversible ischemia in this territory of the LAD artery.

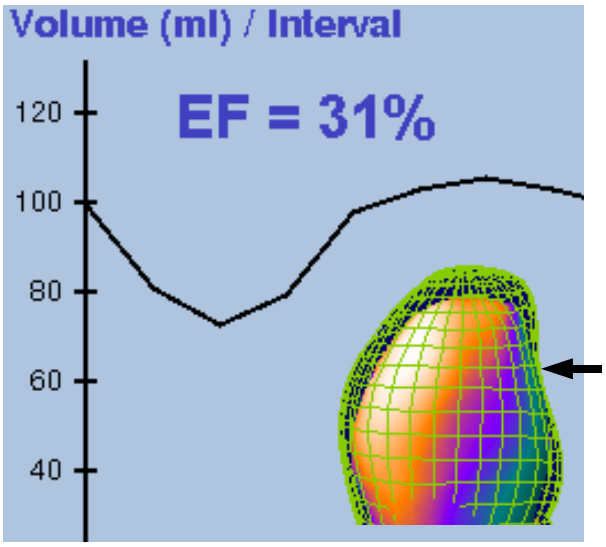

Figure 3. ECG-Gated analysis for ^{18}FDG study in Fig 1. Wire frame shows the LV cavity at end-diastole (ED), and the shaded surface at end-systole (ES). Wall motion is the distance between the two. There is reduced wall motion in the inferior wall (arrow), corresponding to the ^{82}Rb perfusion defect shown in Fig 1. The curve shows LV volume vs. time during the cardiac cycle. The calculated LV ejection fraction (EF = (ED-ES)/ED) is moderately impaired at 31%.

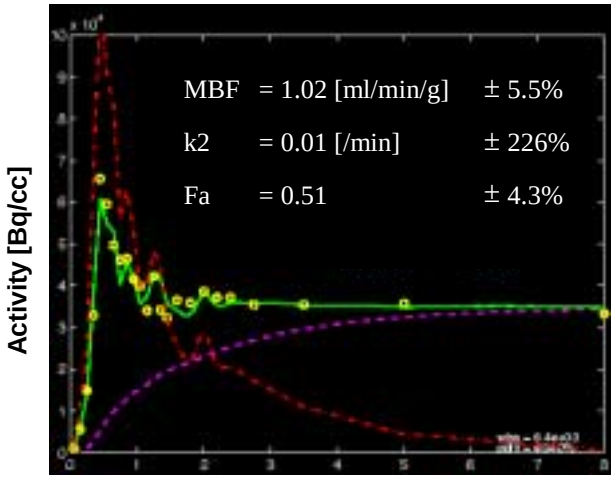

Figure 4. One-compartment model of ^{82}Rb kinetics. Absolute myocardial blood flow (MBF), k2 and Fa are estimated by fitting Cmodel(t) (green line) to the measured signal Cpet(t) (yellow points). The model separates the measured signal into a fraction (Fa) of the arterial input curve (red line), plus a fraction (1-Fa) of pure myocardial tissue (purple line).

Sylvia Fedoruk Award – 2000

In 1986, the Saskatchewan Cancer Agency established the Sylvia Fedoruk Prize in Medical Physics to honor Dr. Fedoruk for her 35 years of dedicated and distinguished service to Saskatchewan's cancer program as a Medical Physicist.

This award is presented for the best paper on a subject falling within the field of medical physics, relating to work carried out wholly or primarily within a Canadian institution and published during the past calendar year. This is the thirteenth year the prize has been awarded.

Winner:

"Algorithms for density and composition-discrimination imaging for fourth-generation CT systems"
Physics in Medicine and Biology, volume 44, pages 1455-1477
Pratondo Busono and Esam Hussein
Department of Mechanical Engineering
University of New Brunswick, Fredericton, NB

Note: The authors were unable to attend the award presentation during the COMP annual meeting in Chicago

The Selection Committee notes:

"The authors propose an extension to CT scanning which would produce a triad of images based on the detection of x-rays which are transmitted or scattered by different tissues. The method could be implemented on existing scanners, providing that all the detectors in the CT ring could be sampled during a normal scan. The work presented in the paper is theoretical and it describes image reconstruction algorithms which produce maps of the attenuation coefficient, electron density, and an indicator of atomic number. This article is well written and clear in its objectives and methodology. Applications to radiation oncology as well as to industrial and security imaging, are evident, following more experimental validation."

Runners-up:

"Monte Carlo simulations of prostate implants to improve and compare planning methods"
Medical Physics, 26(9), 1952-1959
R. Taschereau, J. Roy and J. Pouliot

Digital radiology using active matrix readout: amplified pixel detector array for fluoroscopy"
Medical Physics, 26(5), 672-681
N. Matsuura, W. Zhoa, Z. Huang, J. Rowlands

!!! Congratulations !!!

Annual Report of the COMP/CCPM Radiation Regulations Committee

November 10,1999 to July 23, 2000

By Peter O'Brien
Chair, Radiation Regulations Committee

The current membership of the committee is:

Peter O'Brien , Toronto, (chair)	John Aldrich, Vancouver
Clement Arsenault, Moncton	Harry Johnson, Winnipeg
George Mawko, Halifax	George Sandison, Calgary

There is one new member of the Radiation Regulations Committee- Dr. Harry Johnson, the Head of Imaging Physics and Radiation Protection at CancerCare Manitoba. Dr. Johnson's term will run from December 1, 1999 to November 30, 2002.

The new Nuclear Safety and Control Act and the Regulations under the Act came into force on June 1, 2000. In addition the Canadian Nuclear Safety Commission (CNSC) came into existence and has now replaced the Atomic Energy Control Board. COMP/CCPM members who are radiation safety officers will now face a barrage of new forms, new requirements and new compliance auditing procedures. Each CNSC licensee has been sent details of the changes to licence conditions, which can be significant. There will be a transition period of several months during which the CNSC will update outstanding licences. This may result in the issuance of short-term licences to some large institutions. Of particular interest to radiation therapy institutions are new provisions requiring licences to service radiation therapy equipment and the certification of institutions. These provisions will be phased in before the end of 2000.

The text of the new act and regulations can be found on the CNSC website:

www.aecb-ccea.gc.ca. (Note: The new CNSC website will be www.nuclearsafety.gc.ca)

Other documents of interest from the CNSC include the following:

Information Bulletins:	00-04	Licence Transition Period
Regulatory Documents:	G-121	Radiation Safety in Educational, Medical and Research Institutions
Regulatory Documents: (Out for Comment)	C-200E	Radiation Safety Training for Radioisotope, Medical Accelerator and Transportation Workers
	C-228	Developing and Using Action Levels
Regulatory Documents (Under Development)	C-091R1	Individual Monitoring and Dose Recording
	C-141R1	Licence Application Guide: Unsealed Nuclear Substances
	C-207	Class II Prescribed Equipment Servicing
	C-220	Policy on Quality Assurance programs for Licencees
	C-234	Licence Application Guide: Large Sealed Sources
	C-235	Licence Application Guide: Manual Brachytherapy
	C-237	Licence Application Guide: Nuclear Medicine and Human Research
	C-239	Licence Application Guide: Small Sealed Source
	C-240	Servicing, Installing and Dismantling Devices

Not described on the site but also under development is a guide specifically for radiation therapy – C-120 (rev1) Radiation Therapy Licencing Guide. This will replace document AG-5 on the same topic.

As reported last November the RRC has submitted comments on C-200E, proposed regulatory guide on Radiation Safety Training and on AC-9, The Principles of the Management of Radionuclide Therapies, from the Advisory Committee on Radiological Protec-

(Continued on page 145)

Communications Committee Report

July, 2000

By Peter Munro

Chair Communications Committee

The current members of the committee are: Peter Munro, London (chair); Darcy Mason, Kelowna; James Mainprize, Toronto; Lara Dyke, New York; Rick Hooper, Edmonton; and Warren Foltz, Toronto. An incoming Editor has been recruited (Pat Cadman, Saskatoon) and a new chair is about to be appointed (Michael Kolios, Toronto).

Many of the activities of the Communications Committee are described in each issue on Interactions, so I will only list our accomplishments for the 1999-2000 year and list our future plans. As Editor, I have concentrated on improving Interactions, while in future much more effort will be placed on improving the web site. The Communications Committee can be a very gratifying experience, because most COMP members will immediately benefit from our activities. So anyone looking to contribute to the organization is welcome - there are more than enough tasks to be completed.

Peter Munro

Accomplishments - 1999-2000

a) "New Products" section for Interactions along with a special corporate issue to introduce this section (recruit, retain corporate membership).
b) Introduced a new way of obtaining content, by commissioning articles well ahead of publication deadline.
c) Introduction of colour printing inside Interactions and on cover.
d) ISSN for Interactions (archiving in the National Library of Canada plus listing in Canadiana - the national bibliography).
e) Completed development of archive of back issues of the Canadian Medical Physics Newsletter (three complete archives - National Library of Canada, COMP/CCPM Office, Peter Munro's holdings).
f) Initiated feasibility study of commercial production of Interactions.
g) Increased job advertising revenues and started to receive product advertisements.
h) Developed an itemized list of Editor tasks and developed a strategy to distribute activities of newsletter production, so that all tasks are not the responsibility of one individual.
i) Improved on-line membership directory: (searchable using many fields, improved frequency of updates to every two weeks)
j) Developed e-mail burster services for the executive. The service is integrated with the on-line membership directory - member addresses and permitted senders taken from that database.
k) Initiated program to create on-line abstract submission for the COMP annual meeting.
l) Introduced a new method for Thesis collection with publication in Interactions and soon on the web site.
m) Initiated a project for individual passwords to protect secure areas of the web site.

Future Plans

a) Create an Editorial Board for Interactions
b) Complete individual password and on-line abstract submission projects.
c) On-line form for updating membership directory.
d) VISA payments?
e) Developing methods of separating web site content from formatting so that web site maintenance will be simplified.
f) Add better methods of accessing information in compact space (e.g., pull-down menu forms, DHTML menu lists) so that site is better organized.
g) Developing methods to ensure web site maintenance - tagging files.
h) On-line conference broadcasts.
i) Formatting of on-line membership directory for use by PDA's.

1998 Harold E. Johns Award Report

By Horacio Patrocinio
McGill University Health Centre, Montreal.

Last March, I had the opportunity of travelling to the Swedish Medical Centre in Seattle, Washington as the recipient of Harold E. Johns Travel Award for 1998. The purpose of the trip was to learn a great deal more than the very little I knew about prostate brachytherapy (both permanent and temporary implants). I had chosen the Swedish Medical Centre because of its pioneering work in the field, and decided to attend a short course offered by the staff of Seattle Prostate Institute (SPI) on a monthly basis. Travelling alone is never as enjoyable, and I was lucky to have had the company of one of my colleagues, Mr. William Parker for the duration of the trip.

First of all, I must make the distinction between both institutes. The Swedish Medical Centre is a comprehensive health care facility offering many services to the downtown and surrounding Seattle population, not just oncology or radiation oncology while the Seattle Prostate Institute is a private corporation of physicians that offer brachytherapy services at the Swedish Medical Centre. The latter also offer prostate brachytherapy courses and market several items such as a source stepper-stabilizing unit and a treatment planning system.

The prostate brachytherapy course was given at the beginning of my stay and was very comprehensive. It lasted a little over a day and a half. The first half-day was dedicated to formal lectures covering both permanent seed implants (mainly ^{125}I and ^{103}Pd) and high dose rate (HDR) temporary implants using a ^{192}Ir remote afterloader. All aspects of both techniques were covered, from clinical rationale and implanting technique to clinical results and quality assurance. The speakers were very at ease with catering to the diverse group of students that included radiation oncologists, urologists, medical oncologists, medical physicists, dosimetrists, therapists and nurses. I found the clinical lectures very easy to follow and informative even for my limited and technical mind (like a lot of physicists, I am prone to dosing off during medical talks or even lengthy physics talks).

During the morning, there was a special breakout session for physicists and dosimetrists to cover treatment planning and dosimetry for permanent implants. Pre-planning for permanent implants was discussed at length. This session was the only weak point in the entire course. The dosimetrist giving the course was new and had difficulty fielding some of the questions. This was rather unfortunate for some of the other attendees who would not have the luxury of a prolonged visit like ours to talk to the physicists involved.

That afternoon we were split into groups and allowed to practice permanent implants ourselves. We used jelly-like phantoms and dummy sources, of course. Not only was this highly amusing (simple minds like simple things) but offered an idea of just how critical the implanting technique is. A little too fast in releasing the sources, a bit of instability and the result: a lousy implant. Dr. John Blasko, who worked with our small group showed us the bag tricks that he had developed for ensuring that the implant closely matches the dosimetry pre-plan. At the end of first day, we had another breakout session, this time for HDR implants.

Since it was this particular application that I was really interested in I quickly rushed to what turned out to be one of the highlights of the course.

Dr. Timothy Mate gave an excellent talk on HDR implants. He is a very colourful character and his approach to the subject is very direct. He pointed out the difficulty in obtaining good permanent implants and that these are labour intensive. In contrast "HDR is used to treat 'real' tumours and to fix poor permanent implants". He then went on to describe the technique in detail with many anecdotes. .

On the following day I had the opportunity to see several procedures in the operating theatre and several more on closed-circuit TV. One live procedure was a temporary implant performed by Dr. Mate to be treated with HDR. As I mention earlier, this was the real subject I had come for and the procedure is worth going through.

The patient was placed under a general anaesthesia in the early morning. While an epidural injection can be used, the general anaesthesia is recommended if the patient can tolerate it and when a centre is first starting off with this technique. The implanting of the catheters was done with the guidance of a trans-rectal ultrasound unit. The probe was mounted on to the stepper-stabilizer along with the needle template. The latter was loosely attached to the patient using surgical string. Although plastic needles are used for the 1-day implant, steel needles were first used to define each channel. The loading technique used is peripheral loading where channels are placed mainly to the posterior and lateral aspects of the prostate where disease is more likely to occur and away from the urethra. The needles were not implanted all the way to the apex of the prostate since it is difficult to judge the base of the bladder on ultrasound images. A post-implant cystoscopy was then performed by the radiation oncologist and a urologist, during which each needle was pushed in until in forced against the bladder wall. This could be very clearly seen on the cystoscopy image. The needle template was then tightened and the patient was given time to recover. The entire operating room procedure took under 45 minutes including a few unforeseen failures of the ultrasound probe. A CT scan was performed later in the morning and the target volume was identified on each image (printed on film). The images were then digitized into the treatment planning computer and dose points were placed along the surface of the target volume to allow for dwell-time optimization of the source positions. A dose of 18 Gy in 3 fractions was prescribed to the outside of the prostate in addition to the 45 Gy the patient had already received by external beam radiotherapy.

Swedish Medical Center, Seattle, WA

The remainder of my time at the Swedish Medical Centre was spent with Dr. Michael Gribble (an expatriated Canuck) who is the physicist responsible for the HDR dosimetry. Unlike the course, where commercial endorsements and equipment discussions were not allowed due to some ACR accreditation rules, my discussions with Dr. Gribble covered all aspects of the technique, including peculiarities with different HDR afterloaders and planning systems. He was extremely helpful in discussing equipment selection, commissioning and quality assurance and his sense of humour made the time spent with him very enjoyable. He gave us a good tour of the facility and we quickly realized that while brachytherapy is given special attention at the Swedish Medical Centre, external beam radiotherapy is surprisingly Spartan. A conventional simulator (without CT) is used to plan all prostate and breast treatments, as well as most other sites. They are looking at 3D treatment planning for the future and IMRT as well but lack the manpower to implement too many new techniques.

As a Canadian, I found one remark that I overheard during the course to very amusing. Several American physicians were questioning each other on whether HDR or permanent implants should be favoured in a specific clinical situation. One of them responded: "You should do the procedure for which you can bill the most". It is quite interesting to note how different the motivating factors can be in different countries. In Canada, we might be tempted or forced to go for the technique that costs less money. But in the US, billing becomes a greater factor, particularly with early stage disease where there are several competing modalities such as watchful waiting, hormonal therapy and surgery.

During our stay, I also had the opportunity to discover Seattle and the surrounding areas. The city of Microsoft, Boeing and Frasier Crane is extremely clean and the downtown area quite safe. The Boeing Everett facility, located north of the city, was definitely a thrill for this aviation enthusiast. Unfortunately, it was very hazy in March and Mt. Ranier was only visible from the city on one of the days.

In retrospect, this was a very enjoyable trip and a very educational one. We are currently in the process of starting a HDR prostate brachytherapy at the McGill University Health Centre and I know that my experience in Seattle will be useful in that respect. I would like to thank the CCPM for allowing me this opportunity and Dr. Peter Grimm, director of the SPI, for supporting my interest in the subject. I would also like to thank the entire staff of the SPI and the Swedish Medical Centre for their welcome and hospitality.

McMaster Institute of Applied Radiation Sciences

McIARS

By David Chettle
Department of Physics & Astronomy
McMaster University

Is this perhaps a new clan, arising from generations of Scottish influence in Canada? Well, maybe. It is certainly Canadian and there is some Scottish influence. However, the roots lie deepest in the region of Hamilton, the main influences are Canadian, spiced with a global mixture.

McIARS stands for the McMaster Institute of Applied Radiation Sciences. It is a research institute created by the University earlier this year. The mission is to address medical and industrial applications of radiation science. Because there are valuably overlapping interests and complementary sets of expertise, the field of applications does spread broader, but studies directed towards health and medicine and applications in industry provide the predominant flavour.

Of course, there is a substantial history of achievement in applied radiation sciences in Hamilton. Some of the original work sprang from Professor H.G. Thode's collaborations with colleagues in Hamilton's hospitals. In more recent years, partnership amongst Hamilton Health Sciences Corporation, the Hamilton Regional Cancer Centre of Cancer Care Ontario and McMaster University has been an established feature of interdisciplinary work. Physical science expertise has been directed towards current problems in health care. The institutional backing is vital, but it is the commitment and hard work of specific individuals working together as a team that has undergirded both the research and educational programmes.

As well as the huge investment of time and talent made by particular people, there are landmark assets of the most tangible nature. McMaster Nuclear Reactor has refocused its efforts so that production of medical radioisotopes has become a strong theme. At the moment, ^{125}I for brachytherapy represents by far the largest isotope production output. However, other isotopes are routinely produced and alternatives are under development. Neutron radiography and neutron activation facilities within the Reactor have received significant investment via the Canada Foundation for Innovation and the Ontario Innovation Trust. In addition, research laboratories attached to the Reactor are being refurbished to bring them fully up to state of the art standards.

McMaster's Accelerator Laboratory is in a building adjacent to the Reactor. Within the Laboratory, an old work horse KN Van de Graaff continues to operate. Capabilities will be considerably extended by a new higher current machine, also operating in the low energy (less than 4 MV) regime. At present, the main use of these accelerators is in the development and application of techniques for assessing human body composition non-invasively, with a special focus on toxic trace elements. This research theme is extended by both source excited and polarised x-ray fluorescence housed in the Accelerator Laboratory. Again, these techniques are directed towards *in vivo* body composition studies.

The Hamilton Health Sciences Corporation houses the positron emission tomography facility, with which the name of Steve Garnett will always be associated. There is also substantial Medical Physics investment here in body composition research, with new ventures into determination of bone and joint architecture. On the mountain at Hamilton Regional Cancer Centre are the laboratories developing photodynamic therapy and other aspects of laser and light propagation in tissue where, for example, many of the Medical Physics graduate students pursue their research. Clustered around these major radiation science facilities (reactor accelerator, cyclotron) is a constellation of further equipment. Again, much of this has been brought up to date through Federal and Provincial investment in research infrastructure. All this serves to set the scene for a growing multidisciplinary team concentrating on real world problems. After all, it is ***applied*** radiation sciences. That the science should spread across both disciplinary and institutional borders is reflected by the fact that McIARS draws strength from Hamilton Health Sciences Corporation, Cancer Care Ontario and the Faculties of Science, Health Sciences and Engineering at McMaster.

Having displayed the laurels, it is only fair to state that there is far more interest in where we are going than in where we have come from. The firm intent is to build on a fruitful track record of partnerships involving health care, industry, universities and government. This applies both to our own wider region of southern Ontario and also to further flung collaborations and other arrangements for which the mix works. One specific step forward is represented by the tenure track faculty position in Medical Physics that is advertised in this edition of Interactions. As this person joins the team, she/he will help to shape our vision as well as being part of our ongoing development.

1999 Harold E. Johns Award Report

By Craig Beckett
Alan Blair Cancer Centre
Regina, Saskatchewan

I am pleased to report on a trip to Japan that was made possible by the 1999 Harold Johns Travel Award. While in Japan I attended IRPA10, The 10th International Congress of the International Radiation Protection Association. The Japan Health Physics Society hosted this conference in Hiroshima, Japan May 14-19, 2000. As well as attending the meeting, I toured a number of facilities while in Hiroshima.

The International Congress of the International Radiation Protection Association is held every four years in a host city. It will be held next in Madrid, Spain in 2004. The theme of the Hiroshima meeting was ``Harmonization of Radiation, Human Life and the Ecosystem''. The program and tone of the meeting was partly scientific and partly political. Invited lecturers from UNSCEAR, ICRP, and ICRU underscored the political and social aspects of the congress. The attendees derived from a wide range of disciplines and included health physicists, nuclear engineers, radiobiologists, physicians, medical physicists, wildlife biologists, journalists, lawyers and others to be sure.

Figure 1: The A-Bomb Dome in Hiroshima

Hiroshima's role in the field of radiation protection has of course been significant in the historical, social, and scientific sense. So powerful is this legacy that the scientific meeting seemed merely complementary to a pilgrimage to Hiroshima. Since its destruction in 1945, the city has prospered along with the rest of Japan. Today Hiroshima is a thriving metropolis of 1 million with a public policy of world peace and nuclear disarmament. The mayor of Hiroshima regularly submits formal protests to each nuclear weapons test conducted by other nations.

My first site visit was to the Radiation Effects Research Foundation (RERF), formerly the Atomic Bomb Casualty Commission, formed in 1947 to study the effects of the atomic bomb on the population of Hiroshima and Nagasaki. This institution is most famous for the Life Span Study (LSS) in which more than 200,000 survivors of the bombings and their children have been followed. As well as the medical follow up work that is key to the LSS, recently genetic analysis of the survivors has been performed using modern techniques. Basic research in genetics and radiobiology is also ongoing.

In 50,113 LSS survivors with an acute colon dose above 5 mSv there have been 4,565 nonleukemia cancer deaths during the period 1950-1990, an excess of 334 cases[1]. The dose response relationship appears to be linear without threshold (LNT). However, the statistical significance of the data in the very low dose region as well as recent experimental results in the field of radiobiology have caused many in the radiation protection community to question the scientific validity of the LNT theory at low doses and low dose rates. Some now question its validity as a guide in radiation protection. This debate was alive and well at IRPA10. I attended the sessions on the LNT debate and found particularly interesting the results from recent radiobiology experiments. Many of these experiments reveal a hormetic effect of chronic exposures at low dose rate including those conducted right here in Canada by the radiobiology group at Chalk River[4]. The Chalk River experiments involve exposing cell lines to chronic low doses of radiation followed by acute high doses. Cell lines so exposed show a significantly greater resistance to the damage of the acute high dose insult than do the controls.

By far the greatest debate centered around a proposal by the ICRP outlining a new radiation protection philosophy[3]. Scientific opinion that the current recommendations (ICRP60) overestimate risk at low dose rate has precipitated this review of policy. This issue is of particular concern regarding the costly cleanup of contaminated sites such as decommissioned nuclear facilities and accident sites. This new proposal indicats that individual dose should be controlled from sources that are reasonably controllable. It was suggested that the concept of dose limits could be replaced with a scale of individual dose with action levels. The implication is that constraints on occupational and public exposure will be eased. As well as being hotly debated in the meeting, these issues were taken up by protesters outside the conference center.

I also attended sessions on the protection of flora and fauna. The policy of the ICRP with respect to the environment has been that if mankind is protected to the level of its recommendations, the environment will likewise be protected. There certainly are exceptions to this general rule, the most notable being waste sites. Some advocate the introduction of guidelines to protect flora and fauna independently. Given the lack of scientific knowledge

for individual species, it is unlikely in my view that any measures will be introduced to protect individual species in the immediate future.

There were sessions considering the latest data from the Chernobyl accident. Of interest to me was a talk on the techniques of retrospective dosimetry that have been employed[5]. Electron paramagnetic resonance with teeth can detect doses above 100 mGy. Extracted teeth are collected from dentists, the dentine is removed by a drill or by chemical means and subsequently ground or precipitated to a grain size that is appropriate for the extraction of the signal in a magnet (0.35 Tesla). Thermoluminescence and optical stimulated luminescence have been used on building bricks and can detect doses above 10 mGy. As well as yielding the absolute dose to the brick, one can examine many bricks in a wall to obtain information about the source geometry and location.

Radon progeny contribute a significant portion of the annual dose to the public as well as being a hazard to miners. One talk outlined how normal corrective vision eyeglasses can be used as a dosimeter[2]. The lenses are commonly composed of allyl-diglycol carbonate, an alpha-particle detecting plastic. The tracks that the alphas leave in the plastic are scanned and the track density is correlated to dose.

Other site visits included Hitachi Babcock and Mazda. Hitatchi Babcock manufactures power plant related equipment and my tour included the foundry that builds nuclear pressure vessels. I was impressed to witness the bending of sheets of steel 20 cm thick that will make up the cylindrical walls of a 1300MW unit currently being manufactured. The tour of the Mazda plant included their mixed assembly line. Here any number of different vehicle types can be assembled at the same time; there is no retooling for separate production runs. Mazda has produced a prototype hydrogen vehicle and is testing it in a community in Japan. The vehicle's power plant is not fuel cell but a rotary type internal combustion engine!

One of my most memorable visits was to the Hiroshima Peace Memorial Museum. The museum tells the terrible tragedy of the atomic bombing of Hiroshima. The bomb caused the death of 140,000 of the 350,000 people in the city at the time of the bombing. It stirs deep emotions to contemplate the destruction of so many lives in such a short time.

My visit to Hiroshima and the IRPA10 conference has provided me with a perspective on radiation protection that I could never have obtained by reading the annals of the ICRP. The entire experience including the culture was most rewarding. I would like to thank the CCPM and the Harold Johns endowment for providing me with this excellent opportunity.

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tion (AC-9 has recently been published by the AECB). Also, Dr. John Aldrich has written an article for Interactions (April 2000) on the proposed new federal diagnostic X-ray regulations under the revised Radiation Emitting Devices Act.

The Committee continues to monitor provincial radiation regulations matters. Dr. Clement Arsenault is maintaining a compilation that summarizes the situation in each province and we are now receiving minutes of the meetings of the Federal Provincial Territorial Radiation Protection Committee.

There is now a Steering Committee for the implementation of a National Quality Assurance Program for Radiation Therapy Facilities. Peter O'Brien chairs this committee. Other medical physicists on the committee are Dr. George Sandison (Calgary) and Jacques Blanchette (Ste-Foy). Several medical physicists have now been contracted to write quality control documents for major radiation therapy equipment. There will be documents for linear accelerators, cobalt units, kilovoltage x-ray units, conventional simulators, brachytherapy devices, CT-simulators, IMRT systems, treatment planning systems, radiation therapy management systems, electronic portal imaging systems, multi-leaf collimators and major dosimetry equipment. COMP has agreed to vet these documents and also to investigate the introduction of an electronic database of incidents and potential incidents in radiation therapy. The Canadian Association of Radiation Oncologists has also agreed to play a leadership role in the QA process. The proposal is that there will be a Joint Quality Assurance Committee, composed of radiation therapy professionals, which will run the national QA program. This committee will report to CARO. There is now a first draft of the Standards for Quality Assurance in Canadian Radiation Therapy Facilties. It is hoped that this document and the QC documents can be completed within 2 years.

Submitted by,

Peter O'Brien
Chair,
Radiation Regulation Committee

1999 Professional Survey

By Richard Hooper
For the Professional Affairs Committee, COMP

The format and data collection procedure for the 1999 COMP Professional Survey was similar to that used for the 1998 survey. Approximately 250 questionnaires were mailed out to all COMP full members currently residing in Canada, and 137 surveys were returned to the COMP Secretariat. All survey responses were handled in the strictest confidence so as to ensure the anonymity of respondents. Responses are summarized by geographic area and degree/certification in tables 1 and 2 below. Four surveys were incomplete and were excluded from further analysis.

Salaries

A summary of the salary data for Medical Physicists working in Canada is provided in table 3 below. Full statistics are provided for groups with at least 11 respondents. Only average and median results are provided for groups of 5 to 10 respondents. Data for groups of fewer than 5 could jeopardize confidentiality and thus are not listed.

A comparison of average and median salaries for 1998 and 1999 is provided in table 4. Only groups with at least 11 respondents in both years are included in this table. Figure 1 depicts percentile ranges of primary income from 1996 through 1999 for all Medical Physicists working in Canada, and also for subgroups by degree and certification.

The 1999 income data presented is for income received *during* 1999. Some groups obtained retroactive salary increases for 1999 after January 1, 2000, and some individuals were still waiting (as of July 1, 2000) for retroactive contract settlements. These salary increases are not included in the 1999 summary, but will be included in the report for 2000.

Individuals were asked to specify by what percentage their salaries increased or decreased between 1998 and 1999. Of the respondents who had at least three years experience in medical physics and had not changed jobs in the past two years, 4% reported that their salary decreased, 18% reported that their income did not change, and 78% reported that their income increased. For all these individuals the average increase was 5.6% and the median increase 4.0%. For the 78% who reported an increase in income the average increase was 7.7% and the median increase 5.0%.

The regular hours of work specified in employment contracts for full-time employees was, on average, 37.1 hours per week.

Benefits

The average annual vacation allotment was 22.6 days per year.

Some employers allocate each of their physicists an annual personal travel and/or professional expense allowance, while other employers reimburse these expenses on an ad-hoc basis. Of all the respondents who listed themselves as full-time employees, 68% reported receiving an allowance or reimbursement of at least $100, 61% reported receiving reimbursement of at least $1,000, 16% reported receiving no allowance or reimbursement, and 16% did not answer the question. For those receiving at least $1,000 the average allocation was $2,870 and the median allocation $2,000.

REGION	Number of Responses
British Columbia (BC)	11
Alberta (AB)	11
Saskatchewan (SK)	7
Manitoba (MB)	10
Ontario (ON)	61
Quebec (PQ)	28
New Brunswick (NB)	3
Nova Scotia (NS) and Prince Edward Island (PE)	4
Newfoundland (NF)	1
Not Specified	1
Total	137

Table 1: COMP 1999 Professional Survey responses by geographical region.

Other benefits data is summarized in table 5.

Additional information regarding salaries or benefits, such as a detailed summary for a particular geographical region, is available upon request provided the data can be reported without jeopardizing confidentiality. Requests for further information or comments regarding the survey should be directed to Richard Hooper (rick.hooper@cancerboard.ab.ca).

	Certification				
Degree	None	CCPM(M)	CCPM(F)	Other	Total
Bachelors	4	0	3	0	7
Masters	22	14	8	4	48
Doctorate	28	15	32	6	81
Other	0	0	1	0	1
Total	54	29	44	10	137

Table 2: COMP 1999 Professional Survey responses by degree and certification

1999 Professional Survey cont.

			PRIMARY INCOME				TOTAL INCOME			
		Ave Yrs	Average	Percentiles			Average	Percentiles		
	Number	Exper	Income	20th	Median	80th	Income	20th	Median	80th
OVERALL (Canada)	133	12.4	73.7	56.0	72.0	90.9	76.5	57.8	74.0	91.0
PROVINCE										
BC + AB + SK + MB	39	11.8	78.7	61.6	78.0	91.7	80.8	63.6	80.0	93.4
ON	57	14.0	77.1	57.9	75.0	101.4	81.2	59.2	75.0	106.2
PQ	28	10.4	59.7	48.0	60.0	71.8	61.4	48.3	60.0	72.9
NB + NS + PE + NF	8	9.0	72.0		71.3		72.5		71.3	
EMPLOYER										
General Hospital	37	10.9	65.6	51.5	60.0	76.4	71.2	51.7	65.0	84.2
Cancer Institute	72	12.4	79.3	60.0	75.0	101.3	81.3	60.0	75.0	103.7
University or Government	19	12.4	70.4	54.3	75.0	77.7	70.8	54.7	75.0	77.7
FUNCTIONS (>= 50%)										
Clinical Service	77	9.9	69.3	57.8	70.0	80.1	71.2	58.0	72.0	82.0
Teaching + R&D	32	14.1	76.1	55.0	75.0	94.7	80.6	59.5	75.5	105.1
Administration	18	19.3	89.4	61.0	97.3	115.6	94.2	61.0	97.3	115.6
SPECIALTIES (>= 50%)										
RT	92	11.1	74.5	56.0	70.6	92.2	76.3	57.7	72.3	92.2
DR + NM + MR	26	14.4	74.4	57.8	75.0	87.8	82.3	59.7	76.0	101.8
RP	9	15.3	64.1		70.0		64.2		70.0	
YEARS EXPERIENCE										
< 5	29	2.5	50.2	43.9	51.0	57.7	51.9	43.9	51.6	58.0
5 - 9.9	35	6.8	68.8	60.5	70.0	75.0	70.1	61.0	72.5	76.5
10 - 14.9	21	11.5	77.1	66.5	74.3	89.1	78.6	67.2	75.0	90.6
15 - 19.9	16	16.5	90.8	78.5	88.4	108.0	93.1	79.6	91.0	108.6
20 - 24.9	15	22.1	86.8	65.0	92.0	107.6	96.1	67.5	99.9	119.0
25+	17	29.1	92.4	71.8	89.5	116.1	96.0	74.7	89.5	116.4
DEGREE/CERTIFICATION										
Bachelors/all	5	15.7	58.4		55.0		60.0		60.0	
Masters/all	46	11.8	66.5	51.5	65.5	76.3	68.3	51.9	70.0	77.3
Masters/no cert.	20	7.6	54.6	46.2	51.9	66.5	55.3	46.2	52.5	67.6
Masters/CCPM(M)	14	10.1	70.8	60.0	70.5	74.7	75.2	70.0	72.8	84.0
Masters/CCPM(F)	8	21.2	86.8		81.6		87.3		81.6	
Masters/CCPM(M or F)	22	14.2	76.6	62.7	72.3	87.4	79.6	70.0	74.5	87.5
Masters/other cert.	4									
Doctorate/all	81	12.3	78.3	59.8	75.0	95.8	81.8	60.0	76.0	105.0
Doctorate/no cert.	28	9.0	68.3	50.5	63.5	82.2	69.6	50.5	65.1	84.9
Doctorate/CCPM(M)	15	8.5	70.8	63.0	70.0	77.5	74.8	63.0	72.0	82.8
Doctorate/CCPM(F)	32	17.4	89.7	73.8	88.1	108.0	95.2	75.0	89.4	108.4
Doctorate/CCPM(M or F)	47	14.6	83.7	66.3	78.0	105.2	88.7	69.6	82.0	108.0
Doctorate/other cert.	6	9.5	83.5		77.5		84.5		78.0	
DEGREE/YEARS EXPER.										
Masters/< 10	24	4.4	56.0	47.6	52.8	67.9	59.0	47.6	56.2	72.9
Masters/10+	22	19.9	78.0	67.5	72.0	87.4	78.3	67.7	72.0	87.4
Doctorate/< 5	12	2.2	51.3	44.0	55.0	58.2	51.6	44.0	55.0	58.2
Doctorate/5 - 9.9	26	6.6	69.8	61.0	71.0	76.6	70.6	61.0	73.5	78.2
Doctorate/10 - 19.9	25	13.6	87.3	74.6	86.0	106.5	89.9	75.0	88.2	108.0
Doctorate/20+	18	25.3	96.1	80.2	96.9	114.5	106.8	80.5	105.5	137.2

Table 3: Salary data for Medical Physicists working in Canada. Salaries are in thousands of dollars. In order to ensure confidentiality, data are not listed for subgroups of less than 5, and only average and median values are reported for groups of 5 to 10 respondents.

1999 Professional Survey cont.

	PRIMARY INCOME				CHANGE IN PRIMARY INCOME (% of 1998 Income)	
	1998		1999			
	Average	Median	Average	Median	Average	Median
OVERALL (Canada)	69.6	70.0	73.7	72.0	5.9%	2.9%
PROVINCE						
BC + AB + SK + MB	73.9	74.5	78.7	78.0	6.5%	4.7%
ON	71.4	70.2	77.1	75.0	8.0%	6.8%
PQ	59.9	60.0	59.7	60.0	–0.3%	0.0%
EMPLOYER						
General Hospital	62.9	60.0	65.6	60.0	4.3%	0.0%
Cancer Institute	73.2	70.5	79.3	75.0	8.3%	6.4%
University or Government	68.2	71.1	70.4	75.0	3.2%	5.5%
FUNCTIONS (>= 50%)						
Clinical Service	64.6	63.0	69.3	70.0	7.3%	11.1%
Teaching + R&D	69.6	70.6	76.1	75.0	9.3%	6.2%
Administration	88.8	90.5	89.4	97.3	0.7%	7.5%
SPECIALTIES (>= 50%)						
RT	71.0	69.5	74.5	70.6	4.9%	1.6%
DR + NM + MR	67.3	69.5	74.4	75.0	10.5%	7.9%
YEARS EXPERIENCE						
< 5	47.5	48.0	50.2	51.0	5.7%	6.3%
5 - 9.9	63.6	62.5	68.8	70.0	8.2%	12.0%
10 - 14.9	78.8	75.0	77.1	74.3	–2.2%	–0.9%
15 - 19.9	81.0	80.0	90.8	88.4	12.1%	10.5%
20 - 24.9	79.4	85.0	86.8	92.0	9.3%	8.2%
25+	88.2	84.0	92.4	89.5	4.8%	6.5%
DEGREE/CERTIFICATION						
Masters/all	64.0	60.0	66.5	65.5	3.9%	9.2%
Masters/no cert.	51.9	49.0	54.6	51.9	5.2%	5.9%
Masters/CCPM(M or F)	72.7	71.5	76.6	72.3	5.4%	1.1%
Doctorate/all	72.7	71.8	78.3	75.0	7.7%	4.5%
Doctorate/no cert.	64.8	64.2	68.3	63.5	5.4%	–1.1%
Doctorate/CCPM(M or F)	78.7	76.0	83.7	78.0	6.4%	2.6%
DEGREE/YEARS EXPER.						
Masters/< 10	49.8	50.0	56.0	52.8	12.4%	5.6%
Masters/10+	75.4	73.5	78.0	72.0	3.4%	–2.0%
Doctorate/< 5	49.2	48.9	51.3	55.0	4.3%	12.5%
Doctorate/5 - 9.9	65.9	64.6	69.8	71.0	5.9%	9.9%
Doctorate/10 - 19.9	82.3	80.0	87.3	86.0	6.1%	7.5%
Doctorate/20+	90.1	91.0	96.1	96.9	6.7%	6.5%

Table 4: Comparison of average and median values for primary income in 1998 and 1999. Income values are in thousands of dollars, and change in income is specified as percentage of primary income in 1998. Only groups with at least 11 respondents in both years are included in this table.

1999 Professional Survey cont.

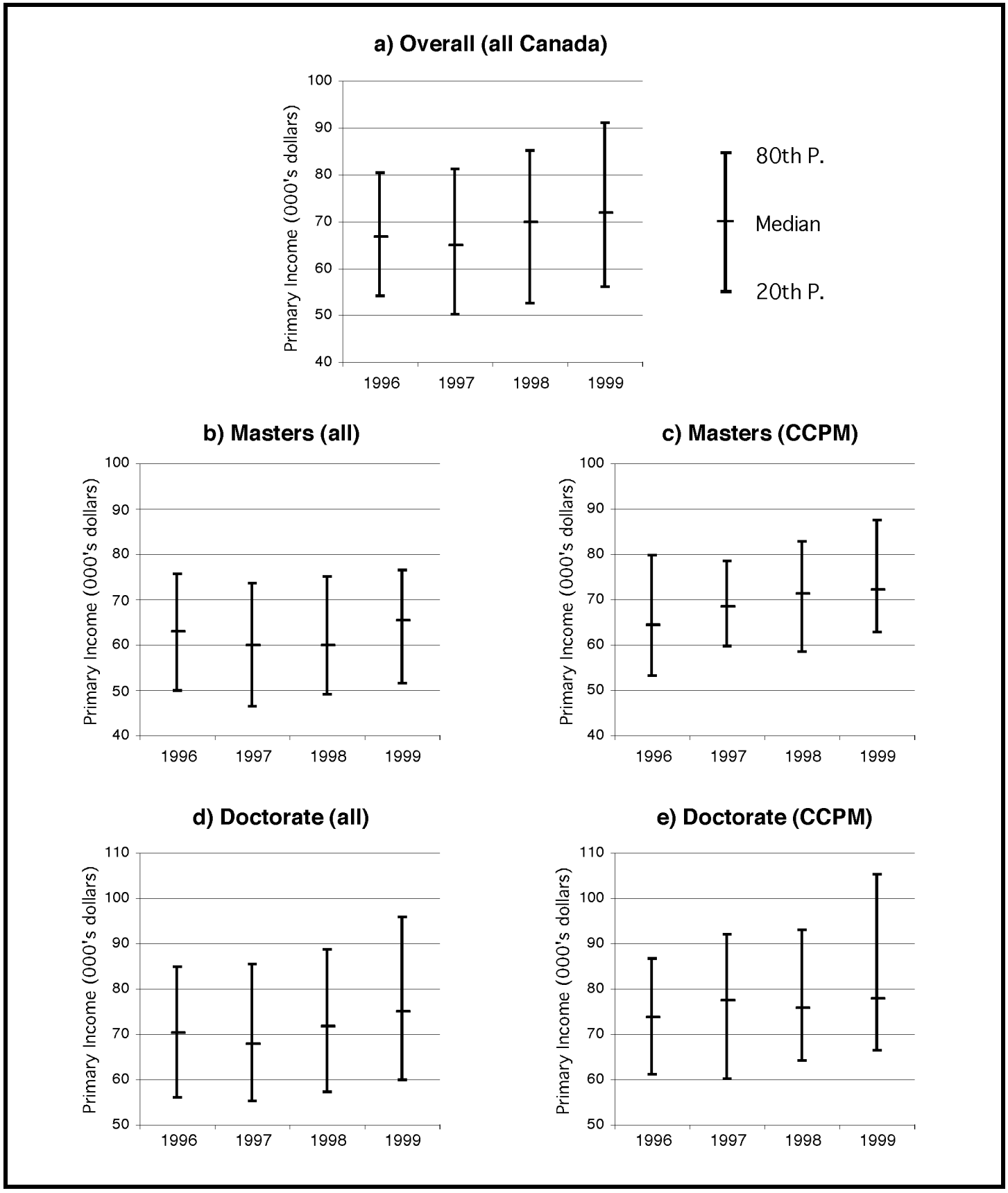


Figure 1: Percentile ranges of primary income from 1996 through 1999 for all Medical Physicists living in Canada, and for subgroups by degree and certification. CCPM designation includes both members

1999 Professional Survey cont.

Benefit	Yes (%)	No (%)	Unknown or N/A (%)
Basic and/or supplementary medical coverage	75	12	12
Dental coverage	77	13	9
Term life insurance	72	12	16
Disability insurance	67	15	18
Retirement pension plan (exclusive of CPP or QPP)	85	6	9
Sabbatical leave	23	50	27
Tuition benefits (self)	20	55	25
Tuition benefits (dependent)	12	66	22

Table 5: Percentage of full-time employees who received at least 50% funding from their employer for the listed benefits. Due to roundoff error, totals do not necessarily add up to 100%.

Accreditation of the Residency program in Radiation Oncology Physics At McGill University

The residency program in radiation oncology physics at McGill University received a full five year accreditation on July 1, 2000 from the *Commission on Accreditation of Medical Physics Educational Programs, Inc. (CAMPEP).* The Commission is sponsored by the American Association of Physicists in Medicine (AAPM), the American College of Medical Physics (ACMP), the American College of Radiology (ACR), and the Canadian College of Physicists in Medicine (CCPM).

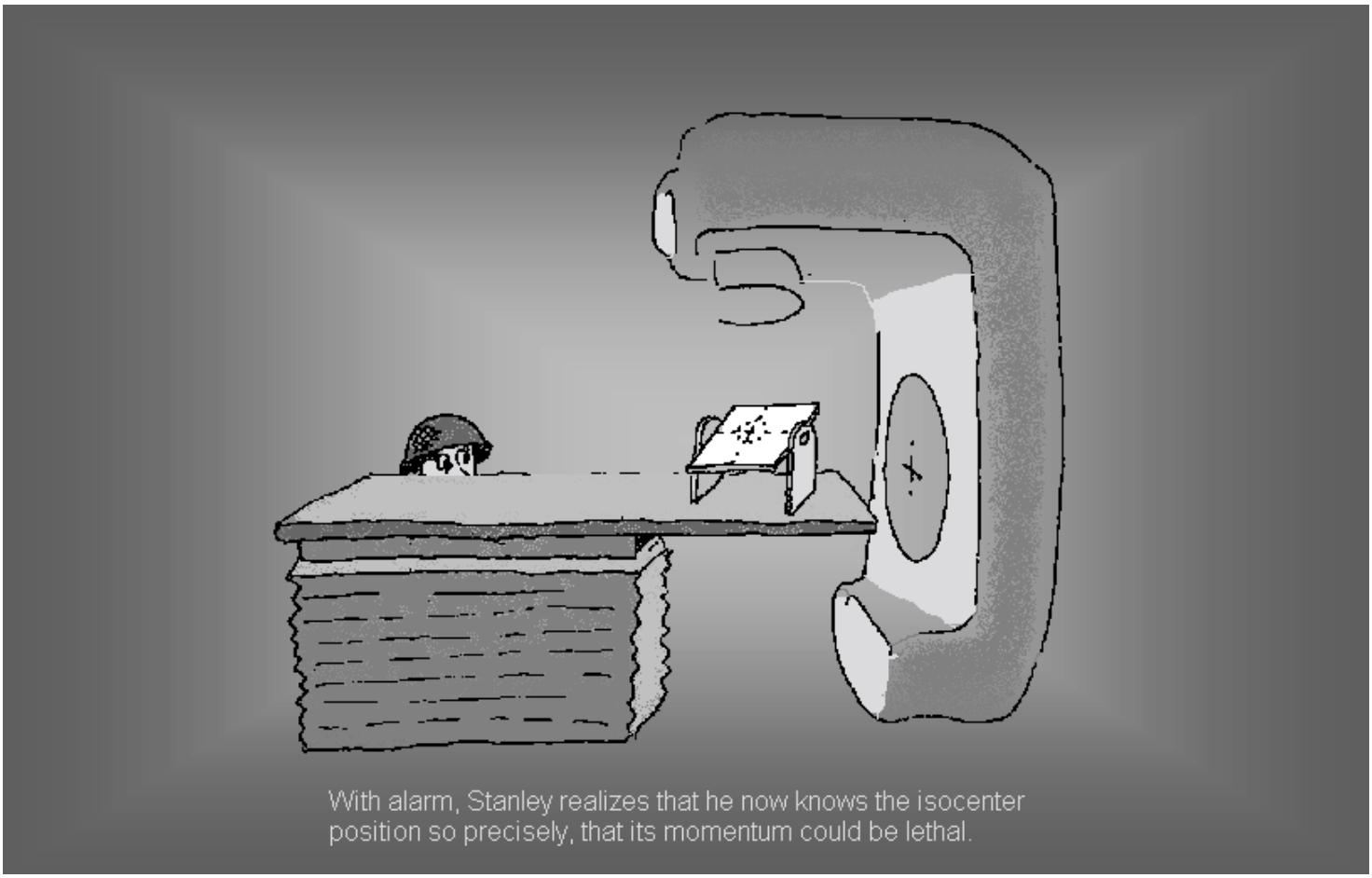
The McGill residency program is of two years' duration and upon completion the resident is prepared to assume responsibilities in the clinical practice of radiation oncology physics. Minimum requirement for admission to the residency program is an M.Sc. or a Ph.D. degree in physics; however, candidates with graduate degrees in medical physics are given priority. The residents are integrated into the Medical Physics department of the McGill University Health Centre and have access to a complete assortment of modern radiotherapy treatment and calibration equipment as well as an electronic shop, machine shop, and mold room.

The residency requirements consist of a didactic and a clinical component. The didactic component consists of five courses: *Radiation physics*; *Radiation biology*; *Applied dosimetry*; *Health physics*; and *Laboratory in radiotherapy physics.* The residents attend courses with M.Sc. graduate students and must fulfill all course requirements including examinations. The clinical component of the residency consists of 6 clinical rotations of 4 months each*: External beam QA and calibration*; *Treatment planning and dosimetry*; *Standard external beam dose delivery*; *Brachytherapy*; *Special techniques in radiotherapy*; and a *Research project.*

McGill's residency program in radiation oncology physics is in operation since 1997 and to date two residents have completed the program

Ervin B. Podgorsak.

Is it physics or is it funnies?
By Brennan MacDonald



CCPM President Report
(Continued from page 133)

ceived by the medical community with which we work. The reviews of our certification process will continue at the November Board meetings, and I will keep you informed of developments along these lines.

Another important current issue is recertification. I would encourage those of you who are due for the next year to begin to put your dossiers together. The bylaws and appendix in the Medical Physics Directory will give you some guidelines. The Board will try to provide some additional guidance in the next while. In a related topic, the general consensus at the Annual General Meeting supported a publicized registry of members and fellows, and this will be pursued by the College.

Finally, I would like to comment on the Colleges continued excellent relationship with COMP. It is great to attend meetings at which Canadian Medical Physicists are working together for common goals. It has been a pleasure to work with Michael Patterson (who has stepped down as COMP Chair) and I look forward to working with Gino Fallone. I would like to also acknowledge Peter Munro who brought the Canadian Medical Physics Newsletter to a high standard that will be a benchmark for future editors. I have heard that the job can be difficult, and I do not think we can praise Peter enough for his dedication and innovation. As I say goodbye to Peter, I would like to welcome Pat Cadman. I look forward to working with him and hope that he will continue the tradition established by Peter by letting me bend the deadlines by a touch each issue.

L. John Schreiner
September 2000

In Brief

Changes at the COMP/CCPM Office

With the resignation of Brighid McGarry, **Barb Callaghan** has taken over the day-to-day running of the COMP/CCPM Office. This has resulted in changes to the contact information for the office - as of 4 August 2000. The mail address is:

COMP/CCPM Office
PO Box 39059
Edmonton, AB, T5B 4T8
Telephone: (780) 488-4334
Facsimile: (780) 482-4425
e-mail: compoffice@powersurfr.com

For courier items the address is:

COMP Box 39059
c/o Nolan Drugs Post Office
8901 118th Avenue
Edmonton, AB, T5B 0T5
Phone: (780) 477-2748

Peter Munro

Inaugural Meeting of Radiotherapy Service Engineer's Association

World Congress 2000 saw the inaugural meeting of a professional society for those responsible for oncology equipment repair and maintenance, provisionally called the Radiotherapy Service Engineer's Association. The 48 registered attendees included two Canadians, Steve Kloster from the Kingston Regional Cancer Centre and Richard Whitham from The Princess Margaret Hospital. Some representatives from manufacturers and vendors (Siemens and Elekta) also attended. The group formed several committees which will be constructing the framework for the association over the coming months. Progress reports and communications from the committees will initially be distributed via the Linac Engineering mail list. Instructions on joining this list can be obtained by e-mailing stephen.kloster@krcc.on.ca.

Stephen Kloster

(Continued on page 153)

CCPM Chief Examiner's Report

July 22, 2000

By Ting Lee

Membership Examination:

24	Candidates from 8 centres	14	Pass
21	Radiation Oncology	10	Fail
3	Diagnostic Radiology	58%	Pass

Invigilators: Clement Arsenault, John Andrew, Dave Wilkins, Chris Thompson, Katharina Sixel, Jeff Bews, Peter Dickof, Brenda Clark

Pass candidates: Gendi Pang, Robert Heaton, Alex Vitkin, Ramaseshan Ramani, Karl Otto, Alanah Bergman, Brett Poffenbar, Wayne Beckham, Kurt Luchka, Jean-Pierre Bissonnette, Dimitre Hristov, Normand Freniere, Maryse Mondat, Lara Dyke

New By-Law

"Candidates who are unsuccessful in the examination on three sittings must re-apply for permission to write. The candidate may not write the examination again until 3 years have elapsed since the last attempt. (This will take effect after the 2000 examination.)"

Fellowship Examination:

7	Pass	0	Fail

Pass Candidates: Wayne Beckham, Patrick Cadman, George Ding, Cheryl Duzenli, Andrew Kerr, Randall Miller, Maryse Mondat

The Full Monte (Carlo)

MDS Nordion and the National Research Council (NRC) have signed a technology licensing agreement that will see MDS Nordion incorporate a stand-alone Monte Carlo dose calculation engine into its oncology planning programs (see: http://www.mds.nordion.com/source/press/aug17_00.html). MDS Nordion is licensing the code developed by Iwan Kawrakow of the Ionising Radiation Standards group of NRC, which implements a version of the voxel Monte Carlo calculation technique. Initially, the calculation engine will simulate only electron beams but photon beams will be simulated in the future. Details of the calculation approach are available in a recent publication [Kawrakow and Fippel " Investigation of variance reduction techniques for Monte Carlo photon dose calculation using XVMC " Phys Med Biol **45 (8):** 2163-2183 (2000)]. Through the use of variance reductions techniques such as photon splitting, electron history repetition, Russian roulette and quasi-random numbers, as well as optimising many transport parameters such as electron energy cut-off, maximum electron energy step size, and photon energy cut-off, Monte Carlo treatment planning can become practical using existing computing hardware. According to the publication, a common treatment plan (6 MV photons, 10 x 10 cm^2 field size, 5 mm voxel resolution, 1% statistical uncertainty) can be calculated within 7 min using a single CPU 500 MHz personal computer. The licensing deal is one of the larger software licensing agreements signed by NRC and should ensure that the Ionising Radiation Standards group is able to continue their Monte Carlo developments.

Peter Munro

Report from the Professional Affairs Committee of COMP/CCPM

July 12, 2000

By Dave Wilkins
Chair Professional Affairs Committee

The current membership of the committee includes:

Dave Wilkins, Ottawa (chair)	Jean-Pierre Bissonnette, Montreal
Jacqueline Gallet, Winnipeg	Peter Raaphorst, Ottawa

Ting Lee, Lee Gerig and Rick Hooper have left the committee. Rick Hooper has kindly offered to continue his excellent work on the annual COMP Professional and Person-power Survey. Katharina Sixel (Toronto) and Konrad Leszcaynski (Sudbury) have agreed to join the committee.

The College of Medical Radiation Technologists of Ontario of Ontario has applied to the Ontario Ministry of Health for changes to the Regulated Health Professions Act, to require the regulation of diagnostic medical sonographers and magnetic resonance imaging technologists. In addition, the College has requested minor changes to the Act to authorize medical radiation technologists to perform certain controlled acts. The Professional Affairs Committee has participated in a public consultation process conducted by the Health Professions Regulatory Advisory Council to ensure that the profession of medical physics is not adversely affected by the proposed changes in the legislation. So far there does not appear to be any cause for medical physicists to be concerned, but the PAC will continue to monitor this process.

World Congress Awards

Since the COMP Annual Meeting was held in conjunction with World Congress 2000, the COMP YIS and poster award competitions could not be held this year. As an alternative, the COMP executive decided to award $250 to any COMP member (had to be a member as of 31 January 2000) who became a finalist in the World Congress YIS competition. The following were Canadian finalists in this year's YIS competition:

1. **Design, Development, and Implementation of a High Adaptability Whole Body Counting System**, S Steciw*, L Filipow, UofA, Edmonton, AB
2. **Dynamic 3D Computed Tomography: Non-Invasive Method for Determination of the Aortic Dynamic Elastic Modulus**, M Lee*, D. Holdsworth, A. Fenster, UWO, London, ON
3. **Homologue Classification of Human Chromosome Images Using An Iterative Centromere Segmentation Algorithm,** P Mousavi*, R Ward, M Sameti, P Lansdorp, S Fels, Department of Electrical and Computer Engineering, UBC, Vancouver, BC
4. **Novel Dental Imaging Using Simultaneous Photothermal Radiometry and Luminescence,** L Nicolaides*, A Mandelis, S Abrams, Department of Mechanical and Industrial Engineering, UofT, Toronto, ON

Of these only Stephen Steciw was a COMP member and so only he received the $250 award. Despite the paucity of COMP members in the YIS competition, Canadians still can be proud. Parvin Mousavi received the second place prize in the YIS competition - maintaining the success of Canadians in international speaking competitions. For more details see: http://www.wc2000.org/prspc.asp.

Peter Munro

In Brief *(Continued from page 152)*

Expansion in PEI

The PEI Cancer Treatment Centre has now been open for just over a year and we are already planning for an expansion. No firm dates are set yet, but a linear accelerator will be acquired and installed within the next few years. The functional plan is due to be delivered at the end of September with the architectural drawings work to begin soon after its delivery. Any helpful hints people care to share about expanding a facility and its capabilities are welcome.

Judy Hale

Indiana Bound

After 4 outstanding years as Director of Medical Physics of the Tom Baker Cancer Centre, in Calgary, Alberta, George A. Sandison, PhD, FCCPM is leaving. He is moving to West Lafayette, Indiana to become Head of the School of Health Sciences at Purdue University. A replacement is being sought

David Spencer

Open Letter About the COMP/CCPM Archive

Dear Medical Physics Colleague:

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

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

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

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

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

Thank you!

J.J. Battista

Survey of Items of Historical Significance in Canadian Medical Physics

1. Please identify yourself and your location:

2. Please describe the items you currently possess:

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

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

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

ITEMS	LOCATION

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

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

Cummulative Table

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Vol 46 (4) octobre/October 2000

Letter to the Editor

By Alex F Bielajew

Dear Sir:

With regards to:

The endorsement and recommendation of the TG-51 protocol by the COMP TG-51 committee

in the July 2000 article ``Report of the COMP TG-51 Committee" by Ervin Podgorsak.

I was astonished to see that the COMP TG-51 committee endorsed and recommended the adoption of the TG-51 protocol, given that TG-51 has come under criticism. I note that the endorsement was not unanimous but a majority decision, with one (out of seven) against the endorsement. The dissenting opinion and the technical discussion concerning it were not brought to light. I believe that the COMP membership deserves more complete information before such an important decision is to be taken. In the follow-up article in the July 2000 Interactions (page 106, "Why to Use TG-51"), no reference was given to the debate concerning the specification of photon-beam quality factor. A partial reference list pertinent to this debate is given below.

Since its introduction, objections to TG-51 have been published. One such criticism (Khan, see below) proclaimed that the former AAPM protocol, TG-21is adequate since``one could easily update the TG-21 parameters, especially the stopping power ratios and the new correction for central electrode. "Rodgers, Niroomand-Rad and Lundsten (see below) say that TG-51 was endorsed by US agencies "In spite of a very modest gain in accuracy of the TG-21 protocol" and that "clinical implementation of the TG-51 protocol, especially for electron beams, is cumbersome.". However, the sharpest criticism to date has come from Pedro Andreo, the current Head of the Dosimetry and Medical Radiation PhysicsSection of the IAEA, who takes issue with TG-51's photon beam quality index, PDD(10)x, arguing instead for the familiar TPR_20,10. In reply to this, Dave Rogers, Group Leader of Ionizing Radiation Standards at the NRCC, has mounted a vigorous defense. References to this discussion below make for fascinating reading.

I urge the COMP TG-51 Committee to withdraw its endorsement and recommendation pending further technical discussion on this issue. Frankly, I found that the justifications given: "Canada has made a considerable contribution to the AAPM TG-51 Protocol..." and "...membership of D. W. O. Rogers on the AAPM TG-51 committee" to be, well, embarrassing. Canadian content is fine for the Arts but is NOT proper motivation for the adoption of a dosimetry protocol. As for the remaining 4 reasons, some are under debate and by no means certain and require further study. Reason 3, that the US is adopting TG-51 and therefore Canada should follow suit (this is a paraphrase) is ill-conceived. What if the community eventually decides that TG-51 is a bad idea? Shall we go back to pounds and gallons just because the US uses them? I reckon not. For something this important, a more careful decision should be taken.

References:

American Association of Physicists in Medicine, "TG-51 protocol for clinical reference dosimetry of high-energy photon and electron beams" Med. Phys. 26 1847-1870 (1999)

Andreo P "A comparison between calculated and experimental photon beam quality correction factors" Phys. Med. Biol. 45 L25-L38 (2000)

Andreo P "On the beam quality specification of high-energy photons for radiotherapy dosimetry" Med. Phys. 27 434-440 (2000)

Andreo P 'Reply to "Comment on 'On the beam quality specification of high-energy photons for radiotherapy dosimetry' " Med. Phys. 27 1693-1695 (2000)

Andreo P, Burns D T, Hohlfeld K, Huq M S, Kanai T, Laitano F, Smyth V and Vynckier S. "Absorbed Dose Determination in External Beam Radiotherapy: An International Code of Practice for Dosimetry Based on Standards of Absorbed Dose to Water" IAEA Technical Report Series published in the name of IAEA, WHO, PAHO, and ESTRO (IAEA Vienna 2000, in press)

Khan F M 'Comment on ``AAPM's TG-51 protocol for clinical reference dosimetry of high-energy photon and electron beams" Med. Phys. 27 445-447 (2000)

Rodgers J E, Niroomand-Rad A and Lundsten L 2000 Comment on clinical implementation of of the AAPM's Task Group-51 protocol for calibration of high-energy photon and electron beams Med. Phys. 27 1995-1996 (2000)

Rogers D W O 'Comment on ``On the beam quality specification of high-energy photons for radiotherapy dosimetry" Med. Phys. 27 434 - 440 (2000)

Sincerely,

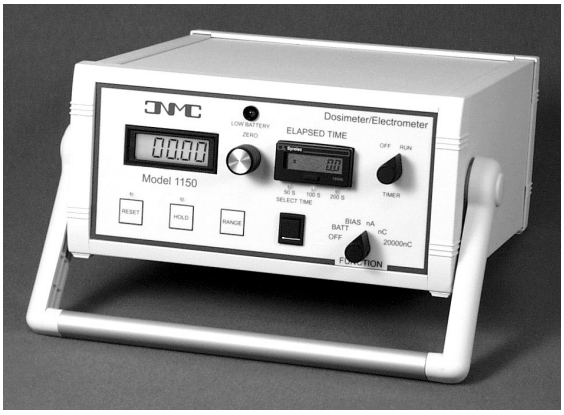
A. F. Bielajew
The University of Michigan,
Department of Nuclear Engineering and Radiological Sciences,
2355 Bonisteel Boulevard,
Ann Arbor, Michigan 48109-2104,
tel: 734 764 6364,
fax: 734 763 4540,
email: bielajew@umich.edu

New Products

All-in-one pocket-size X-ray meters by *UNFORS* cut costs and substantially improves accuracy.

Easily fitting into a technician's breast pocket, both the single-parameter Test-O-Meter and the multi-parameter Mult-O-Meter are precisely configured for your specific equipment evaluation. The accuracy of these meters surpasses not only regulations but anything in the field today.
Should your needs require strictly a single purpose meter, the Unfors Test-O-Meter is configured to test one parameter for maximum accuracy at minimum cost. More commonly, you will need multi-parameter measurements on a variety of modalities. The Unfors Mult-O-Meter has more than 300 configurations available, often across modalities. With the Unfors Mult-O-Meter and its included probe/s, unique tiny detector/s allow for accurate measurements including kVp, dose, dose rate, exposure time, pulses, and dose/frame in only *one exposure*. No set up time is required. Controls are simplicity itself; an on/off button and a "parameter" key to display the scrolling results on a high contrast custom LCD. It is powered by a single 9v battery (about 30 exposure hours per).
With the Mult-O-Meter, there are three optional enhancements available. These include an Extended Function (allowing for a 75% trigger level, selectable delays for kVp, and normalisaton of dose); an IR (infrared) interface for computer capture; and Excel (tm) add-in software for spreadsheet analysis.
Both the Unfors Test-O-Meter and Mult-O-Meter are ISO 9001 and EN 46001 certified. Prices vary on configuration. Typical delivery times are between 4-6 weeks.
After measuring hundreds of thousands of exposures, I believe this outstanding product is an exciting, cost effective, breakthrough – about which you can learn more by visiting the manufacturer's site http://www.unfors.com.
Here in Canada, for more direct information including features unique to you, pricing, delivery and other data, you should contact unfors@xicl.com, or call ***Lois Brown at Xray Imaging Consultants, Ltd., 519-942-1923***.
Xray Imaging Consultants, Ltd. is a Corporate Member of COMP.

CNMC Model 1100/1150



CNMC introduces the new Model 1100/1150 Dosimeter/ Electrometer. It is a high-quality, compact and affordable dosimeter/electrometer that can meet the needs of most mammography, radiology and therapy applications, including brachytherapy.

Standard units of measurements are electrical (nC and nA). Dose and dose rate units (cGy, cGy/min or R, R/min) can be preset at the factory for use with a specific ion chamber. The input connector can be either BNC or TNC.

The Model 1150 includes a built-in timer circuit for timed accumulation of data. The time can be set for 50, 100 and 200 seconds and is shown on a separate display on the front panel.

A unique, simple design eliminates many of the current leakage problems associated with complicated electrometers. Bias power supply is electronic, and an internal rechargeable battery powers the unit.
This dosimeter/electrometer meets or exceeds the requirements of the AAPM and has features found in electrometers costing far more.

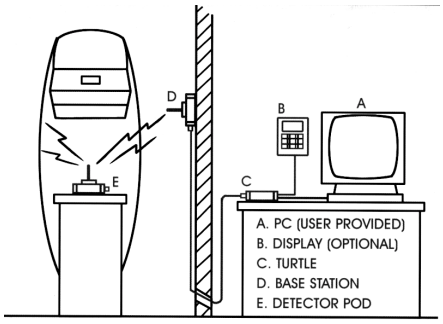
The pricing of The Model 1100/1150 is such that, when packaged with a Farmer-type ion chamber, it compares very favorably with the cost of a Sr-90 constancy check source. The added benefit of comparing your dosimetry system against a second electrometer/chamber set is the convenience of having a back-up system.

Rf-IVD™ Wireless Dosimetry

With the advent of advanced radiation treatment techniques, verification of patient dose has become even more important. As a result, patient radiation monitoring (In-vivo dosimetry) has become the accepted "standard of care".

In-vivo dosimetry (IVD) benefits both clinician and patient. By focusing on the actual dose delivered, in-vivo dosimetry provides valuable feed-back which can be used to both verify and improve the overall treatment.

The new **rf-IVD™**; operates similarly to our original IVD™ system except - without the wires.



There are no cables running from the treatment couch, and no cables on the therapy vault floor. The detectors are connected to small transmitters that lie, on the couch, next to the patient. Each transmitter radios real-time dose measurements to a receiver mounted on the wall, inside the vault. The receiver is then connected, via cable, to the user interface, at the console. With the new **rf-IVD™**, the detectors are totally independent of the system, making patient movement much easier and eliminating cable "tangle" problems. However, should the rf link go down for any reason, the system may be hard-wired together for continued real-time operation.

While the **rf-IVD™** will interface to a computer, it is not required. All functions, including set-up and calibration, can be performed through the proprietary display module. Each **rf-IVD™** detector pod contains memory, so that, should the rf link go down for any reason, the data may be read out of each pod anytime after the treatment has been completed.
The **rf-IVD™** measures the active junction temperature of each detector. With this information all measured values are automatically temperature corrected.

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LAP OF AMERICA
LASER APPLICATIONS L.C.

"ASTOR" a new Green DPSS patient alignment laser from LAP of America, L.C.

To complement their full line of room lasers the "Astor" is a new manually adjustable green DPSS laser. The ASTOR, like the LAP solid state red laser, allows external adjustments. This feature not only saves time and effort but completely eliminates the need for reiterative adjustments.

The latest development in solid state green lasers are diode pumped YAG-Nd lasers. These lasers are made on yttrium-aluminum neodymium garnet pumped by a diode resulting in a green laser light with a wavelength of 532 nm. In our experience this type of laser is very stable, long lasting and produces a bright, finely collimated green line. To extend the life if the lasers LAP incorporates intelligent, active cooling devices in all green lasers.

Other lasers available are the "Apollo" range, remote controlled Red and Green and the "PatPos Compact" manually adjustable red diode lasers. As well as leading the market in CT Simulation marking laser systems.

ADAC Laboratories, Milpitas, CA announces the introduction of SmartSim™ and P³IMRT™, two fully integrated products on the Pinnacle³ radiotherapy planning system.

SmartSim allows seamless integration of simulation and planning functions on one database utilizing a single redesigned user interface. SmartSim can be easily interfaced to any existing or new DICOM CT allowing for increased configuration flexibility to match the needs of any radiotherapy department.

Recently Dr. Sheldon Johnson, Radiation Oncologist from Mary Bird Perkins Cancer Center in Baton Rouge, Louisiana stated, "With our Pinnacle³ SmartSim Wide Area Network configuration linked to our existing GE scanners, we were able to go well beyond our original plan. We can now offer comprehensive CT Simulation and treatment planning at all three of our centers regardless of where our staff is on any particular day." Dr. James Gerstley from Advanced Radiation Oncology Services of Nyack, NY stated, "ADAC's Pinnacle³ with SmartSim™ is our sole simulator at AROS of Nyack. This system fulfills all our simulation needs from palliative cases to complex 3D conformal plans with superb accuracy and the flexibility we demand for our patients".

ADAC has also announced the release of their initial IMRT product. The P³IMRT package provides the clinical tools to design three-dimensional treatment plans that are more conformal to the target volume while reducing normal tissue doses using forward planning intensity modulation techniques. The next phase of P³IMRT will provide full inverse planning IMRT capabilities (not available for sale, pending 510(k) clearance). Plans may be rapidly optimized based on dose or dose-volume based treatment objectives creating optimized fluence maps. The fluence maps may be converted to either compensators or "step and shoot" MLC segments for treatment delivery.

P³IMRT as well as our SmartSim CT simulation software are fully integrated with the Pinnacle³ planning system providing all of these powerful capabilities on a single platform.

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McMaster University

Medical Physics - Tenure-Track Appointment

McMaster University invites applications for a tenure-track appointment in the Medical Physics and Applied Radiation Sciences Unit of the Department of Physics & Astronomy. The position is targeted to begin on 1st July, 2001, although some flexibility either way can be accommodated. Candidates should possess a PhD and have demonstrated both an excellent research record and an aptitude to teach. The ideal candidate will possess core strengths in the fundamentals of medical imaging. She/he would be expected to contribute particularly to the graduate programmes in Health & Radiation Physics and Medical Physics through mounting one or more courses, attracting research funding and mentoring graduate students. There would also be some expectation that the person appointed would contribute to undergraduate education through, for example, the Honours Medical and Health Physics or other Physics programmes.

McMaster has been successful in winning investment from the Canadian Foundation for Innovation and the Ontario Innovation Trust to the Medical Physics and Applied Radiation Sciences area. The University itself has supported these initiatives through the creation of this Unit and the creation of the McMaster Institute of Applied Radiation Sciences, as well as through financial investment. This has built on strong, long standing partnerships with Hamilton Health Sciences Corporation and Cancer Care Ontario in bringing together research and education in Medical Physics. The successful candidate for this position will join an enthusiastic, multidisciplinary, multi-institutional team that is looking forward to capitalizing on its recent success to build further opportunities in the future.

Existing research fields within the Medical Physics and Applied Radiation Sciences Unit include laser and light propagation in tissue for photodynamic therapy and tissue characterization; the cellular and molecular basis of photodynamic therapy; the role of DNA damage and DNA repair processes in carcinogenesis and in the response of tumour cells to radiotherapy and chemotherapy; novel methods of imaging bone architecture and joint structure non-invasively; dosimetry of diagnostic and brachytherapy radioisotopes; imaging in PET and MRI, particularly for neurological and cardiac studies; and nuclear and atomic techniques used for body composition studies. McMaster has major facilities for Radiation Science research, including a nuclear reactor, an accelerator laboratory and a cyclotron used for production of PET isotopes. Candidates should consider how they would interact with and extend existing research and be able to exploit facilities.

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

Applications, including a statement of research interests and letters from three referees should be sent by November 30th, 2000 to Dr. D.R. Chettle, Medical Physics and Applied Radiation Sciences Unit, Department of Physics & Astronomy, McMaster University, Hamilton, Ontario, L8S 4K1, Canada. Telephone (1) 905 525 9140 ext 27340, FAX (1) 905 528 4339, e-mail: chettle@mcmaster.ca.

From the Editor:

Welcome to the all-new, completely revamped, COMP/CCPM newsletter. What's that you say? This looks exactly like the last Interactions and the one before that? Quite right, and for good reason: if it ain't broke, don't fix it. As the new editor of Interactions I am indebted to those editors who have come before, especially Peter Munro, for the high quality of the production and for the excellent organization of Interactions, making the my job more of a joy than a chore.

I would like to explain an initiative (Peter Munro at work here again) that will help ensure future content and preserve the color of the last few strands of dark hair that remain on my head. An editorial board has been created consisting of Peter Munro, Lara Dyke, Michael Kolios, and Alain Gauvin (see inside cover for email addresses). The board members will be responsible for generating content and soliciting articles for Interactions. It is hoped that this will help distribute the work involved in producing the newsletter and reach out to a larger number of contributors.

As the new guy on the block, I feel that I must provide my personal vision for Interactions. As well as the "official" function of reporting from the COMP and CCPM, the newsletter should provide us with the things that perhaps we can't get anywhere else. In Interactions we have a unique opportunity to share with each other through articles, announcements, opinions, stories, and yes, even funnies. It is the variety in Interactions (and ourselves as people and physicists) that I think makes it attractive. I hope to encourage you all to contribute, whether it be news of a colleague or something exciting happing at your institute. I welcome your ideas for new features and feedback on what you see. This is really our newsletter and I think we can continue to make it something that we look forward to reading, amongst all the other things we are obliged to read.

Finally, I would like to express my thanks to Peter Munro for making the transition easy for me and future editors and for graciously answering yet another question. I would also like to thank Lara Dyke for taking on the corporate and advertising responsibilities, leaving me with much less to worry about. These are exciting times in medical physics and in our organizations and I hope you will share your experiences with your colleagues and friends through Interactions

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Pat Cadman