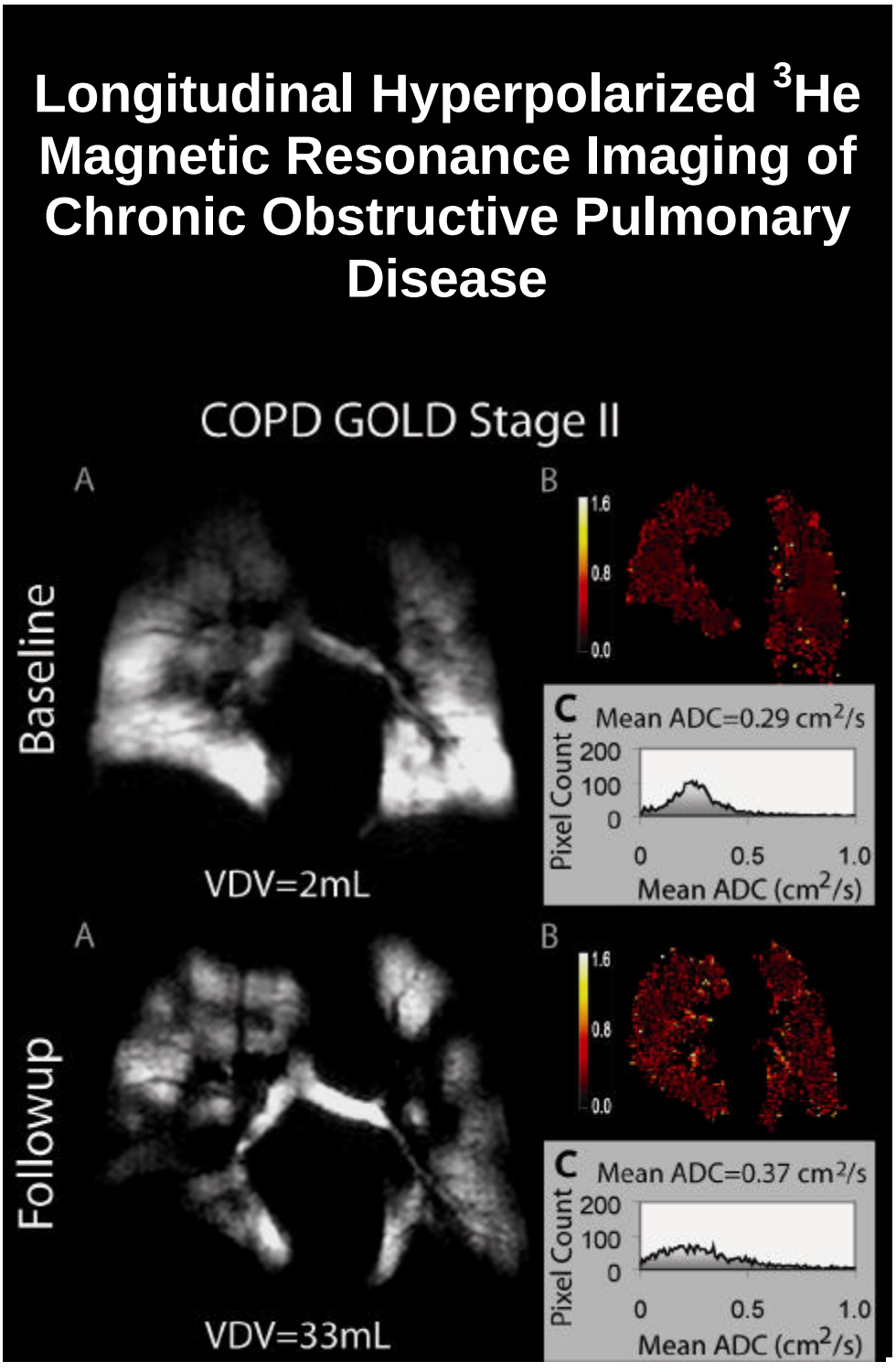
InterACTIONS

CANADIAN MEDICAL PHYSICS NEWSLETTER
Le BULLETIN CANADIEN de PHYSIQUE MÉDICALE

Longitudinal Hyperpolarized ^{3}He Magnetic Resonance Imaging of Chronic Obstructive Pulmonary Disease



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LE COLLÈGE CANADIEN DES PHYSICIENS EN MÉDECINE

56 (1) janvier/January 2010

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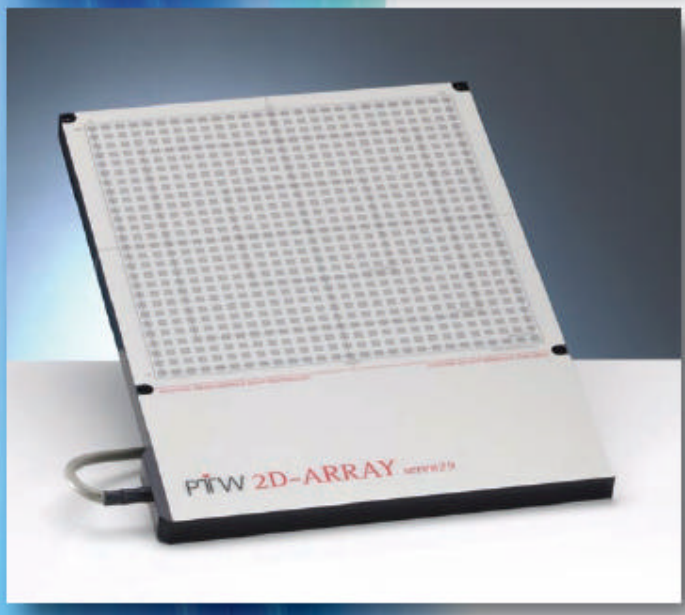

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InterACTIONS

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Cover Image

Chronic Obstructive Pulmonary Disease (COPD) is a progressive, debilitating, terminal lung disease that continues to grow in prevalence in Canada with a scarcity of effective treatments. Hyperpolarized helium-3 (^{3}He) magnetic resonance imaging (MRI) has recently emerged as a non-invasive imaging research method for quantifying COPD lung structural and functional changes, enabling direct visualization *in vivo* at high spatial and temporal resolution. This pilot study in 15 COPD ex-smokers highlights the sensitivity of ^{3}He MRI -detecting significant worsening of lung tissue structure (^{3}He MRI apparent diffusion coefficient) and airway function (new and enlarged ventilation defects) over a 2 year period. Regional *in vivo* ^{3}He MRI measurements provide the necessary and sufficient sensitivity, specificity and precision for quantifying lung changes in small groups of subjects over short periods of time that could not otherwise be detected using established lung function measurements.

Image provided by Miranda Kirkby from the Robarts Research Institute, London, ON. See page 13 for feature article.

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Members of the Editorial Board include:

Tony Popescu — Boyd McCurdy
Michelle Cottreau — Parminder Basran

Please submit stories in MS Publisher, MS Word or ASCII text format. Hardcopy submissions will be scanned to generate an electronic document for inclusion in the Newsletter. Images in Tiff format at 300 dpi resolution are preferred.

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OPTION 3 ($400): Job posting is immediately e-mailed to COMP/CCPM members (no website or InterACTIONS posting)

Message from the COMP President

Mr. Jason Schella

With the holidays quickly approaching (or over, depending on when you read this) I hope that everyone takes the time to enjoy the season, friends, and family.

The COMP board held its mid-year meetings at the end of November in Toronto. These meetings are held in conjunction with the CCPM board meetings which allows the 2 boards to get together and discuss items of common interest, and to update each other on current initiatives. The meetings began with an orientation session for new members of both boards. This is a new addition and was primarily held to give a history of both organizations, the structure of each, and the expectations of being on a board. This was so well received that it has been decided to post a copy of the material on the COMP and CCPM websites for the general membership. This will occur once the material is finalized to allow for input from the session.

Some of the highlights of the mid-year meeting are as follows:

We continue to strengthen our relations with ancillary organizations such as CARO, CAMRT, CAR, CANM, etc… This has been accomplished mainly through the coordination of activities surrounding quality control and education.

We will be reworking and updating what are currently called the CAPCA Technical Standards that are listed on the COMP website. The intent is to turn these documents in technical guidelines that will be managed by COMP in such a way that they can be kept current and be of ongoing use in helping to set up QA programs. These documents will then be reviewed periodically to ensure that the information remains current.

It was agreed that, since our last strategic planning session in 2006 is now 3 years old, we will begin planning for our next session which will be held in 2011. This is a valuable exercise in helping COMP determine the needs of the membership and assist us in planning for the future. We will be seeking input from the membership as we did during the last session.

The COMP Winter School kicks off on January 24th. Thanks to all the hard work that the Science and Education Committee have put into this endeavor, the curriculum is world class and promises to be a success. We fully expect the Winter School to gain in popularity over the next few years.

Finally, the issue of the proposal for a new award recognizing excellence in Canadian Medical Physics (for a physicist still active in the field) was tabled and a consensus was reached on how to put this forth. As there has been much discussion and confusion surrounding this proposal we will be submitting an article for the April issue of InterACTIONS that will summarize these discussions and clarify the proposal. The intent is to communicate the "known" pros and cons in such a manner that will enable the membership to have an informed vote on the issue. The proposal will then be put forward for the membership to vote on (using a simple Yes/No response). We thank you for your patience.

On a very positive note, we were successful in our bid to host the **International Union for Physical and Engineering Sciences in Medicine (IUPESM) World Congress in 2015 to be held in Toronto**. A special thanks to Marco Carlone, Jean-Pierre Bissonnette, Nancy Barrett, and David Jaffray for making this happen. This meeting is co-hosted by the Canadian Medical and Biological Engineering Society (CMBES). The World Congress is a great opportunity to showcase Canadian Medical Physics to a worldwide audience. This will be a tremendous amount of effort and we look forward to your participation and support.

Finally, I would like to thank all those who take the time to volunteer on the various committees as well as those who are volunteering in other ways (reviewing abstract submissions, LAC, etc…). COMP would not be able to function without their help.

If you wish to volunteer with COMP in some way, feel free to contact me at jason.schella@cdha.nshealth.ca or Nancy Barrett at nancy@medphys.ca. There is always room for you.

If you have an article that you would like to share with other COMP members, publishing through InterACTIONS is a great way to do it.

I wish you all the best.

Message from the CCPM President

The mid-year meetings of the CCPM Board were held in Toronto Nov 26-27, and one particular action taken at these meetings is important to current and future members of the CCPM. I will take this opportunity to describe this initiative here.

The CCPM Board has taken concrete action on the requirement for CAMPEP accreditation. This issue was first raised by past CCPM president Brenda Clark in the January 2006 InterACTIONS, after the American Board of Radiology (ABR) indicated its intention to require graduation from a clinical residency program accredited by the Commission on Accreditation of Medical Physics Education Programs (CAMPEP) in order to write Part 1 of the ABR exams. The issue was picked up by our immediate past president, Dick Drost, who devoted many InterACTIONS columns and discussions at AGMs to the rationale and details of this issue.

There are a couple of reasons why it is important for the CCPM to adopt a requirement in line with that of ABR. Certification by CCPM is widely respected in the USA, having long been included in the AAPM Definition of a Qualified Medical Physicist. This helps to provide acceptance of Canadian physicists seeking employment in the USA. As long as CCPM certification is perceived as being broadly similar to ABR certification, then Canadian physicists will continue to enjoy this acceptance. Failure of the CCPM to move in parallel with ABR towards the CAMEP requirement could jeopardize the acceptance of our credentials.

In addition, accreditation of education programs is a well established principle, from school board inspections of elementary schools, standardized testing in high schools, provincial accreditation of universities and graduate programs, CMA accreditation of medical schools, etc. Medical physics graduate and residency programs improve in quality and gain legitimacy by submitting to accreditation, and CAMPEP is the organization sponsored by CCPM, AAPM, ACR, and ACMP to provide accreditation services. Graduation from an accredited medical school and residency program has long been a requirement for certification of physicians, and a similar standard should apply to medical physicists seeking clinical certification.

To this end, the CCPM Board has added the following clause to the CCPM Policy and Procedure E.02 -- Eligibility for Membership:

.07 Effective 1 January 2016, applicants for certification in the Radiation Oncology Physics subspecialty must have completed either a graduate degree granted by a program accredited by the Commission on Accreditation of Medical Physics Education Programs (CAMPEP), or a residency program accredited by CAMPEP. Notwithstanding this requirement, other applicants who do not meet this requirement may be considered in exceptional circumstances at the discretion of the College Board.

Note that this is a change to the CCPM Policy and Procedure Manual, not a bylaw amendment, and as such requires only approval by the Board and not ratification by the membership at an AGM. The bylaws of any organization should be reserved for establishing structure and governance, with daily details of operation described in policies and procedures. The Board feels that the CCPM bylaws already contain too many operational details, and we should avoid adding more. In addition, policies and procedures are more flexible, allowing for changes with Board approval should circumstances change.

At this time, the CAMPEP requirement applies only to the Radiation Oncology Physics subspecialty. There should be enough programs in Radiation Oncology Physics that are currently CAMPEP accredited, or will be in the next few years, to meet the required demand. In Nuclear Medicine Physics, Diagnostic Radiological Physics, and Magnetic Resonance Imaging, there is a relative paucity of accredited programs. There are no immediate plans to introduce a CAMPEP requirement for certification in these subspecialties.

The new paragraph contains a "notwithstanding clause". Since it is not our intention that this CAMPEP requirement should exclude qualified applicants

Dr. David Wilkins

from CCPM certification, we felt that some Board discretion in the application of this requirement might be required in rare and exceptional circumstances.

While the fine Canadian constitutional tradition of a notwithstanding clause is appropriate in this new CAMPEP paragraph, it has been removed from the first paragraph of the same policy and procedure:

.01 Applicants for the Membership examination shall possess a Masters or Doctoral degree *from an accredited ~~university or college~~* in Medical Physics or a ~~rel~~ated subject from a recognized university , Physics, Science with Physics as a major option, ~~Engineering or Applied Mathematics. Notwithstanding, other applicants may be considered in exceptional circumstan~~ces at the discretion of the College Board.

This change is required to bring the P&Ps into alignment with the Bylaws. Article III 1(a) was changed with approval of the membership at the 2008 AGM in Quebec City to remove flexibility regarding the degrees acceptable for membership. This was done as a condition for receiving recognition by the US Nuclear Regulatory Commission of CCPM certification as a qualification for Authorized Medical Physicist status. However, the inclusion of a notwithstanding clause in the CAMPEP requirement will not affect recognition of our certification by the USNRC.

(Continued on page 7)

Message from the Executive Director of COMP/CCPM

.COMP Volunteers – Committed to Continuous Improvement

As I write this article, both the COMP Board and the CCPM Board have just completed their annual mid-year Board meetings in Toronto. As a member, you should know that the Board is working hard on your behalf and is committed to "continuous improvement":

- In addition to serving on one of the many standing committees, Board members are also working in conjunction with other organizations to ensure that medical physics is represented.
- A taskforce has been created to look at ways to expand membership.
- The first formal joint COMP/CCPM Board Orientation session was developed and delivered by David Wilkins (CCPM President) and Jason Schella (COMP President) and was very well-received by both Boards.
- The inaugural Winter School will be taking place at the end of January. Despite the fact that all new ventures have a certain element of risk, the COMP Board has fully endorsed this initiative knowing that the organization has more than adequate financial reserves to manage the potential risk.
- A bid to host the 2015 World Congress in Toronto was presented jointly by COMP and the CMBES in Munich in September and we are pleased to announce that the Canadian bid was successful and won out over 5 other bids. Congratulations to David Jaffray, Marco Carlone and Jean-Pierre Bissonnette for their efforts on the bid. This congress will provide an excellent opportunity to showcase Canadian medical physics.
- Current strategic planning cycle will be concluding in 2010 and the Board wholeheartedly agreed to engage in another planning process in 2011. Your input will be needed to ensure that COMP`s strategic priorities are in line with the needs of the medical physics community in Canada.

Bill C-4 – The New Canada Not-for-profit Corporations Act

We are also monitoring the implementation of Bill C-4 – The New Canada Not-for-profit Corporations Act received Royal Assent on June 23, 2009. This bill is intended to eventually repeal the outdated *Canada Corporations Act* (CCA), which has remained virtually unchanged since 1917.

There are a variety of elements to the new act but the key benefits for organizations like COMP are the following:

- The rights of members are enhanced. Members will now have the right to access corporate records and will be able to submit proposals to members' meetings to amend by-laws, nominate directors or to deal with other matters relating to the affairs of the corporation. Members will also now have the ability to participate in members' meetings by electronic means.
- The NPCA also offers greater protection for Board members by creating a due diligence defense and establishing other measures intended to reduce liability.
- It will be much easier to manage governance documents. For example, the NPCA abolishes the requirement to have by-laws and by-law amendments reviewed and approved by Industry Canada.

We look forward to seeing you at the 2010 ASM in Ottawa. As always, please feel free to contact me at nancy@medphys.ca or Gisele Kite at

Ms. Nancy Barrett,

admin@medphys.ca at any time with your feedback and suggestions.

(Continued from page 6)

The details and timelines of the ABR implementation of their CAMPEP requirement are different from the CCPM implementation, but there are significant differences in the details and timelines of the certification process between the two organizations. We feel that the requirement adopted by the CCPM is broadly parallel to the ABR direction, provides the required support for the principle of accreditation of education programs, and has a feasible implementation date. Canada currently has 7 CAMPEP accredited residency programs in radiation oncology physics and 6 accredited graduate programs, and several more programs have applied and are currently being evaluated. On a per capita basis, Canada has approximately 3 times more accredited programs than the USA.

I will devote future columns in INTERACTIONS to discussion of the ramifications of this new requirement. As always, I welcome feedback on this and any other issue.

COMP Annual General Meeting Minutes 2009

Location: **Victoria Conference Centre**
Date: **23 July 2009**
Chair: **J. Schella** **Secretary: P. Rapley**
Present: **64 full members**

Meeting called to order by J. Schella at 4:10 pm

Adoption of the Agenda
Motion to adopt: P. McGhee **Carried**

Minutes of previous AGM, Quebec City, 2008
Motion to adopt: Will Ansbacher, Bill Ziegler **Carried**

Report of the Chair (J. Schella)

CAPCA Standards

RSTSAC to develop a plan on the future of these documents

IUPESM 2015 Bid

A bid was put forward to host this in Toronto with CBMES
Presentation to be made at the World congress in Munich in September
AAPM has also put forward a bid

CAR's BMD Program

A task group consisting of representatives from the PAC, CCPM, and RSTSAC will meet with CAR reps to discuss how this may go forward.

Inaugural Winter School

Organized by the SEC
January 24-28, 2010 in Banff
Topics: classification of incidents, Reporting, QC, Ethics, Process Control, Failure Mode & Effect Analysis, Legal Aspects, and Human Factors.

Insurance Program

Physics Assistants/Associates

An invitation was extended to join COMP as Associate Members
A number have joined COMP this year and met for the first time during this year's ASM.

New Membership Category

Motion: That the Executive comes back to the membership with a clearer proposal.
(W. Ansbacher) **Carried**

CCPM President's Report (D. Wilkins)

5 new Fellows and 16 new Members were welcomed into the College. There are now a total of 168 Members and 126 Fellows of the CCPM
W. Beckham retired as Registrar and D. Mason who joined the CCPM Board will now be serving as Registrar. Michael Evan's has finished his term as Chief Examiner and will be serving on the Board as a general Board member.
Robert Corns has moved from Deputy Chief Examiner to Chief Examiner and Boyd McCurdy has joined the Board and will be serving in the role of Deputy Chief Examiner.
Recipient for this year's Harold E. Johns Travel Award is Atiyah Yahya from Cross Cancer Institute, Edmonton. She intends to travel to London, Ontario to learn Hyperpolarized gas MR imaging under Giles Santyr.
The award covers travel costs of the recipient for up to $2000 to visit another center or institution.

Treasurer's Report (W. Ziegler)

The 2008 accounts, audited by Nephin Winter and found to be in good order, were presented. **Motion to appoint Nephin Winter as auditor for the current year.**

(W. Ziegler/S. Pistorius) **Carried**

The 2009 Budget was presented and it includes a membership fee increase to $200.
Motion to accept the fee increase.
(W. Ziegler/C. Araujo) **Carried**

Secretary's Report (P. Rapley)

Membership report: At the time of the AGM the membership was as follows:

Category	Sept 2007	June 2008	July 2009	Change 09-08
Full	420	437	453	+16
Associate	11	12	14	+2
Student	113	94	80	-14
Retired	6	9	10	+1
Emeritus	9	8	9	+1
Corporate	19	21	19	-2
Totals	**578**	**581**	**585**	**+4**

Bylaw changes: P. Rapley made the Motion to amend the following bylaws:
Make eligibility criteria more general for the Associate Member category.
Seconded: D.Rogers **Carried**
Wording of the title Chair and Chairperson to the title President (total of 21 occurrences in the bylaws).
Seconded: C**.** Araujo **Carried**
Wording of the title Executive to the title Board (total of 43 occurrences in the bylaws).
Seconded: J.Schreiner **Carried**
Add SEC and RSTSAC chairs into COMP Board.
Seconded: S.Pistorius **Carried**
Change requirement from 50% to 4 of officers certified by CCPM.
Seconded: D.Rogers **Carried**
Change wording for CCPM representation on Board to be consistent with changes in part IV A) .
Seconded: D.Rogers **Carried**
Include electronic records as recording option for secretary.
Seconded: S.Connors **Carried**
Include duties of Chairs of SEC and RTSAC.
Seconded: D.Rogers **Carried**
Delete statement C.
Seconded: P.McGhee **Carried**
Make article more consistent for electronic voting.
Seconded: M.Carlone **Carried**
Make reminder notice timing more specific.
Seconded: J.P.Bissonnette **Carried**

Communications Committee Report (M. Cottreau)

M. Cottreau announced the following:

- The new InterACTIONS editor is Idris Elbakri .
- Thanks given to Parminder Basran for much hard work as the past editor.
- Boyd McCurdy is leaving committee and was thanked for all his hard work and dedication to the committee over the past 5 years.
- The brochure describing medical physics (aimed at students) in French and English will be forthcoming via the website.
- Committee is going through all the old job postings we have archived from previous websites and documenting the details as it may be one indicator of growth in the field.

Committee is currently investigating options to backup website after potential sale of web host fell through at the last minute.

Professional Affairs Committee Report (J. Hayward)

J. Hayward gave a brief description of the Professional Affairs Committee (PAC) Terms of Reference. Current PAC members were listed and it was indicated that there are still 2 vacant positions on the committee. Those from the Nuclear Medicine specialty were especially encouraged to consider serving on the PAC. Several PAC initiatives were briefly highlighted including: (i) exploring Liability Insurance for COMP members, (ii) the membership status of Physics Assistants and Associates, (iii) the creation of a Technical Survey and Evidence of Competency documents, (iv) Professional Representation in other organizations, and (v) the role of Medical Physicists in Bone Mineral Densitometry. Members who have questions or concerns regarding these initiatives were encouraged to contact the Councillor for Professional Affairs (J. Hayward).

Radiation Safety & Technical Standards Advisory Committee Report (J.P. Bissonnette)

J.P. Bissonette reported on the renaming of the committee as *Quality Assurance and Radiation Safety Committee* - name change to be carried over appropriately. Terms of reference have been revisited, as well as membership. The new committee proposes to serve as a conduit between QA experts and members of COMP to revisit the quality assurance practice across Canada. The committee would take over the responsibility of the current "CAPCA technical QA standards" and revise them to better reflect accepted best practice of radiotherapy QA across the country, facilitate document maintenance and currentness. To these ends, the committee shall endeavor to identify appropriate funding to ensure timely, professional, and effective completeness of the revision process. CPAC is an identified source. Barring that, the committee may petition membership for a fee increase.

Science and Education Committee (M. Carlone**)**

M**.** Carlone gave a brief description of the makeup as well as the responsibilities of the Committee. The new COMP Winter School was described including some faculty and a draft program. Some other initiatives of the SEC were described such as:

Facilitate access to on-line education resources for COMP members
Investigate possibility of Web-based continuing education

Nominations Committee (J. Schella)

The position of Councillor for Communications needs to be filled. Tony Popescu was nominated for the position and was acclaimed.

Michelle Cottreau was thanked for her service as Councillor for Communications and was acknowledged with a plaque.

Parminder Basran was thanked for his service as Editor of InterACTIONS and was acknowledged with a plaque.

Executive Director's Report (N. Barrett)

N. Barrett acknowledged the work of the Victoria LAC and thanked them for putting on an excellent meeting and also thanked the COMP Executive and the committee volunteers for their support and encouraged members who might be interested in volunteering to contact the COMP office.

Future Conferences (J. Schella)

2010: Ottawa June 16-19
2011: Vancouver, joint meeting with AAPM

Other Business

Dave Rogers commented on the new Medical Physics category within NSERC.

Adjournment

Motion: That the 2009 AGM be adjourned.
(P. McGhee) **Carried**

CNSC Feedback Forum

Dose Monitoring: Whose Responsibility Is It?

Mark Broeders and Jeff Sandeman
Class II Nuclear Facilities and Equipment Division
Canadian Nuclear Safety Commission
CNSC, Ottawa ON

While the CNSC endeavours to create regulations that are as clear as possible, at the same time they have to be generic enough to apply to a broad range of licensed activities. This may lead to seemingly ambiguous situations that are difficult for a licensee to resolve without additional guidance. This article attempts to addresses this issue in the specific context of personal dose monitoring for Class II Nuclear Facility and Equipment Division ("Class II") radiation therapy facilities.

Under *Ascertainment and Recording of Doses,* the Radiation Protection Regulations state:

5.*(1) For the purpose of keeping a record of doses of radiation in accordance with section 27 of the Act, every licensee shall ascertain and record the magnitude of … the effective dose and equivalent dose received by and committed to that person.*

5.*(2) A licensee shall ascertain the magnitude of … the effective dose and equivalent dose:*
(a) by direct measurement as a result of monitoring; or
(b) if the time and resources required for direct measurement as a result of monitoring outweigh the usefulness of ascertaining the amount of exposure and doses using that method, by estimating them.

Section 27 of the Act refers to:

> *…each person who performs duties in connection with any activity that is authorized by this Act or who is present at a place where that activity is carried on…*

The licensee, therefore, is responsible to track the dose received by anyone in proximity to or directly involved in the activities described in the license. However, the licensee has some latitude in the method of dose monitoring. This raises a number of questions.

For instance, do the individuals involved need to use personal dosimeters if they are unlikely to be exposed to radiation as a result of their normal duties (e.g. a clinical educator)? The answer is, no; individual dosimeters are not explicitly required. ***However note that some mechanism for evaluating and recording that person's dose is still required.***

This sounds more difficult than it is. It does ***not*** mean that a list must be maintained of every person who works in or visits the hospital, complete with a dose "estimate". Rather, licensees operating Class II radiotherapy facilities are required to retain a record of the shielding calculations and radiation surveys for each facility. These typically demonstrate that doses to non-radiotherapy staff and the general public will be below 50 µSv/y, and effectively constitute a record of the dose estimate for persons occupying those areas. In addition, given the extremely low doses involved, additional dose monitoring actions for such persons clearly are not warranted.

Conversely, staff who work directly with radiation therapy equipment are generally projected to receive doses on the order of 1 mSv and may have a role in responding to incidents or emergencies in which much higher doses may be incurred. These factors, coupled with the relative ease of supplying personal monitors to a relatively small and static group of personal, make direct monitoring of such personal advisable.

Another, more complex issue involves determining who has responsibility for dose monitoring when the activity could be attributed to two different licensees, that is, the responsibilities "overlap".

Consider the following hypothetical situation:

In your role as RSO*, you have been asked to mentor a new RSO, Emily Argyle at Iodinia Regional Cancer Centre (IRCC), a sister clinic within your agency. While doing so, you are confronted with three scenarios.

Case 1: Visiting physician

A physician from nearby Palladium hospital intends to come to IRCC to observe and participate in your prostate implant program, as the Palladium hospital is gearing up to launch their own prostate seed implant program. The physician has asked Emily if he should bring the whole-body dosimeter provided by his employer, or if she will provide one for him. How do you advise Emily? Would you advocate the use of extremity dosimeters, whole-body dosimeters, no dosimeters or some combination?

Case 2: Third party service engineer

Later that same week, Emily calls you to let you know of a pending visit by her service engineer. The service engineer works for Accelerator Repair U.S. Corporation. Accelerators-R-U.S. has their own Class II Prescribed Equipment Servicing licence. As is the case with many Canadian centres,

*Note: Although the implementation and management of the radiation safety program is delegated to an appointed radiation safety officer, ultimate responsibility for actions arising from licensed activities rests with the licensee represented by a member of senior management ("the applicant authority"). In the following fictional case studies, the objective is not to identify an individual RSO responsible but rather to identify which *licensee* is responsible.

Iodinia Regional Cancer Centre also has a service license. Emily is unsure whether the service engineer from Accelerators-R-U.S. should wear a personal dosimeter issued by IRCC or by Accelerators-R-US. How would you advise Emily?

Case 3: Visiting CNSC inspector

As the week is coming to an end, Emily calls you one final time because she has just been informed that a CNSC inspection is being planned for her centre. She is puzzled about who is responsible for ensuring the friendly CNSC inspectors are furnished with personal dosimeters. They are coming to observe her licensed activities so it seems clear that Emily should provide the dosimeter to the inspectors. Do you agree?

Commentary – Class II perspective:

Case 1: Visiting physician

Under the regulations, IRCC is clearly responsible for ascertaining and recording the magnitude of the equivalent dose received by the visiting physician as a result of his participation in IRCC's prostate program. His employer, Palladium Hospital, is not the entity licensed to conduct this activity. Wearing only the TLD already provided by his employer would make it very difficult to establish whether any dose he receives over the wearing period was due to his normal duties or resulted from his visit to IRCC. This would be particularly problematic in the event of an unusually high dose reading.

Given this, the obvious approach would be to use the same method as is used for IRCC physicians for ascertaining and recording the dose to the visiting physician, as this has already been approved by CNSC staff in the licence application process as a component of the IRRC RP program. However, there are a wide range of alternative methods which could potentially be used. Ideally, these would already have been included as options under the IRRC's policy for dose monitoring, but even if they have not, this does not preclude the RSO from contacting their CNSC licensing officer and requesting authorization to use alternate measures, prior to the physician's visit.

For example, the physician could potentially continue to wear his normal dosimeter from Palladium and IRCC could simply provide a "visitor" TLD, which is ***not*** assigned to his SIN, to be worn simultaneously. The dose to this badge would then be solely what he receives as a result of the visit, while his normal TLD would continue to provide an accurate reflection of his occupational exposure for inclusion in his dose record in the National Dose Registry.

External doses associated with prostate implant procedures are generally very low (<< 5 mSv/y). Consequently, there would normally be no requirement to use a dosimeter from a CNSC licensed dosimetry service.

This then potentially allows for other options, such as the use of a real-time direct reading dosimeter.

It may even be acceptable to simply estimate the dose to the physician prior to their visit, based on measurements of the dose rate during a typical procedure, the proximity of the physician to the sources and the dose history of existing IRCC physicians performing the procedure. If the dose is trivially small, such as might be expected if the physician were simply observing the procedure rather than actively participating, then use of a personal dosimeter may not be warranted.

Similar considerations would apply to determining the need for an extremity dosimeter. The level of involvement of the visiting physician, i.e. hands-on versus observation only, would be of primary importance. In this case the physician has indicated that he intends to "participate" in the procedure. Therefore issuing an extremity dosimeter would be prudent.

Case 2: Third party service engineer

In this case, the service engineer is performing servicing under the authority of the license issued to Accelerators-R-U.S., not IRCC. Thus, the method for ascertaining and recording doses to the service engineer should be the one approved by CNSC staff in the licence application process as a component of the Accelerators-R-U.S. radiation protection program. The service engineer would be expected to bring personal monitoring equipment appropriate for the servicing activities. There is no obligation on IRCC to maintain a record of the service engineer's dose.

However, this does not absolve IRCC entirely of its responsibility to ensure that servicing activities being performed at their premises are conducted in a safe manner. They should ensure that the servicing engineer is aware of any IRCC policies, such as those relating to operating limitations or security, which must be observed during servicing. If the service engineer has forgotten or lost their normal dose monitor, IRCC should provide one for them and communicate the resultant dose reading to the Accelerators-R-U.S. administration.

Case 3: Visiting CNSC inspector

Radiation protection procedures for CNSC inspectors are analogous to what you would expect if inspections

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Feature Article
Longitudinal Hyperpolarized ^{3}He Magnetic Resonance Imaging of Chronic Obstructive Pulmonary Disease

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Editor's note: This article is the recipient of the 2nd place in the J.R. Cunningham Young Investigators Award 2009.

INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is a leading cause of morbidity and mortality affecting at least 600 million people worldwide. Airflow limitation is the hallmark of COPD and results from an abnormal inflammatory response in the lungs that is triggered by exposure to noxious particles or gases. The inflammatory response in the peripheral airways leads to airway structural changes and luminal narrowing that is known as small airways disease, and within the airspaces or alveoli, parenchymal destruction that manifests as emphysema. Accordingly, both small airways disease and emphysema contribute to the clinical course of COPD, although the underlying mechanisms of both pathologies and their relationships to outcomes are not completely understood.

The current functional definition of COPD relies on spirometry measurements of airflow obstruction, which is the result of increased time constants for lung emptying because of a lack of elastic recoil due to emphysematous destruction, and because of the increased resistance of the small conducting airways due to airway obstruction or narrowing. The limitations of spirometry in the diagnosis, classification and longitudinal monitoring of COPD is driving the development and validation of new COPD measurements including those derived from non-invasive imaging.

In this pilot study, we explore the potential of hyperpolarized helium-3 (^{3}He) magnetic resonance imaging (MRI) to provide quantitative longitudinal measurements of COPD in a small group of COPD ex-smokers. To our knowledge this is the first reported longitudinal ^{3}He MRI study of COPD.

METHODS

Subjects

Fifteen subjects were enrolled from the general population of the local tertiary health care center as well as directly from the COPD clinics at three local teaching hospitals. All subjects provided written informed consent to the study protocol approved by the local research ethics board and Health Canada and the study was compliant with the Personal Information Protection and Electronic Documents Act (PIPEDA) of Canada. COPD subjects were enrolled who were current non-smokers and categorized according to GOLD criteria and furthermore they required a disease diagnosis of at least one year, having had a smoking history of at least 10-pack-years and fewer than three COPD exacerbations within the last 12 months.

Pulmonary Function Tests

Spirometry was performed using an ndd EasyOne spirometer (ndd Medizintechnik AG, Zurich, CH) reporting forced expiratory volume in 1s (FEV_1) and forced vital capacity (FVC). Whole body plethysmography (MedGraphics Corporation. 350 Oak Grove Parkway St. Paul, MN USA) was also performed immediately prior to MR scanning for the measurement of total lung capacity (TLC), inspiratory capacity (IC) residual volume (RV), and functional residual capacity (FRC).

Imaging

Hyperpolarized ^{3}He gas was provided by a turn-key, spin-exchange polarizer system (HeliSpin™, GEHC, Durham, NC). Doses (5 mL/kg) were administered in 1 L plastic bags (Tedlar®, Jensen Inert Products, Coral Springs, FL) diluted with ultrahigh purity, medical grade nitrogen (Spectra Gases, Alpha, NJ). Magnetic resonance imaging was performed on a whole body 3.0 Tesla Excite 12.0 MRI system (GEHC, Milwaukee, WI USA) with broadband imaging capability. Two-dimensional multiple slice coronal ^{1}H scans were acquired prior to the ^{3}He imaging with subjects scanned during 1L breath-hold of ^{4}He/N_2 from functional residual capacity (FRC). For hyperpolarized ^{3}He diffusion-weighted imaging, multi-slice coronal images were obtained using a fast gradient-echo method (FGRE) with centric k-space sampling acquired immediately after subjects inhaled ^{3}He gas administered from a 1 L Tedlar bag during a 14 sec breath hold. Two interleaved images, with and without additional diffusion sensitization, were acquired to compute ADC maps. For ventilation or spin density imaging, multi-slice coronal images were also obtained using the same fast gradient-echo method (FGRE) with centric k-space sampling, with a 14s breathhold multislice 2-D simultaneous acquisition of a ventilation image (no T1-weighted sensitization) and a T1-weighted image. All scanning was completed within approximately 7-10 minutes of first lying in the scanner.

Image Analysis

A single expert observer analyzed images for ^{3}He ADC and ventilation measurements in an image visualization environment (digital copy) with room lighting levels equivalently established for all image analysis sessions. Mean ADC and ADC maps were processed using in-house software programmed in the IDL Virtual Machine platform (Research Systems Inc., Denver, CO) with b = 1.6 s/cm^2. Spin density images were examined for analysis and manual segmentation of the defects by a single observer blinded to subject identity, disease status and timepoint using custom-designed image visualization software. Ventilation defect volume (VDV) was determined by manual segmentation of regions of signal void, known as ventilation defects, in all slices following two-dimensional rigid single point image registration of the ^{1}H and ^{3}He slices based on the carina.

Statistical Methods

Comparison of baseline and follow-up means were performed using two-way paired t-tests using SPSS 16.00 (SPSS Inc., Chicago, IL, USA LEAD Technologies, Inc., Chicago, IL). The

(Continued on page 21)

Letter to the Editor:

We read with great interest the "Message from the CCPM President" from Dr. David Wilkins in the most recent newsletter (1) in which he referred to the Decay Constants of radioactive isotopes. Simply put, are they *constant*? The answer, of course, is maybe!

In 1906 Rutherford wrote regarding the decay constant: "As far as observation has at present shown, its value is independent of physical or chemical condition." (2). Indeed there were several experiments to determine if there was any change in activity due to pressure or temperature with negative results (3,4). This confirmation of the constancy in the decay constant was established using alpha or beta emitting isotopes. It was suggested by Segrè in 1947 (5) that for isotopes decaying by electron capture, the effects of differing chemical environments on the electron density at the nucleus should be measureable. Atomic electrons are also part of the process of internal conversion and by extension gamma decay. It was Bainbridge in 1951 who first measured differences in the decay rate for different chemical forms of ^{99m}Tc isotopes (6,7).

Since 1906 however, there has been a wide variation in the reported half lives of radioactive isotopes, especially ^{226}Ra. Rutherford decided on a value of 1300 yr in 1906 (8). In 1911 Madame Curie wrote, "Radium has not an infinite life either, but the rate of disappearance is far less, it disappears by half in about 2000 years." (9) In the Report of the International Radium-Standards Commission entitled "The Radioactive Constants as of 1930" (2) the half life of ^{226}Ra is given as 1590 yr and that of ^{222}Rn is 3.825 days. Subsequently there have been many values proposed for the half life of ^{226}Ra, including 1602 yr, 1617 yr and 1622 yr, whilst that of ^{222}Rn has remained close to 3.8 d.

For those radioactive isotopes which can be readily observed over multiple half-lives direct observation of the rate of decay can lead to a measurement of the half life. When the decay is very slow, direct measurements are not very accurate even if at all possible. The half life must then be inferred from measurements of the specific activity (10). The specific activity of ^{226}Ra was initially determined to be 3.7×10^{10} disintegrations per second (dps) (2), however in 1959 it was determined to be 3.655×10^{10} dps (11), thus leading to another change in the half life determined by this method.

Clearly the decay constant is not always constant under any circumstance.

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Report on a Year Down Under

Boyd McCurdy, PhD, FCCPM

CancerCare Manitoba

Winnipeg, MB

I would like to share with you some highlights of my recent experience in Australia. My family and I spent May 2008 to April 2009 in Newcastle, Australia, a small city about two hours drive north of Sydney. The purpose of this stay was a research sabbatical, taken in the Radiation Oncology Department of the Calvary Mater Newcastle Hospital. The hospital offers comprehensive Radiation Oncology services for a large (by Australian standards) catchment population of approximately 700,000. My collaborator there was medical physicist Dr. Peter Greer, who has a strong track record in electronic portal image dosimetry research. I spent time on several research projects related to portal imaging dosimetry, including time-resolved dosimetry and the use of cone-beam CT data sets for patient dose calculation. However, I won't focus on the nitty gritty details here (this is InterACTIONS after all, not the Medical Physics journal!) – those interested can read the scientific articles as they are published. I will instead discuss some background on how the sabbatical was setup and executed, some insight into the Australian Medical Physics community, as well as provide a few stories from our time in Australia.

I will warn anyone contemplating a sabbatical, especially one outside of Canada, that there is a huge amount of up front work to do. To be honest, if I had known ahead of time how much effort was required, I might never have tried. This is one of those examples of where ignorance is bliss! Composing a written research proposal and additional supporting documentation to 'sell' the sabbatical concept to the entire line of managers up to and including the CEO of our institute, was certainly a challenge. I was fortunate to have outstanding support from my clinical manager and our department head. They were kind enough to attest that the sabbatical would be beneficial to myself and the department and, very importantly, that they could get along for a year without me. Having your managers argue this latter point to the CEO on your behalf is a bit disconcerting, since you don't want to cross that line of implication that your staffing numbers could be permanently reduced by one physicist! In parallel with obtaining the needed local institutional approval, one needs to work with the institute at the intended sabbatical location. This almost certainly requires that you have a contact there that can navigate the paperwork required on that end for your visit. This involves such things as obtaining letters of invitation from the institute, dealing with Human Resources, and applying for local research grants that can offset some of your travel costs or salary reduction (note a salary reduction commonly accompanies a long-term sabbatical). In fact, there is a significant amount of work required by your contact (likely to be your collaborator). Again, I was extremely fortunate to work with an outstanding scientist who efficiently navigated these channels. And once the academic arrangements have been made

A bike ride along the ocean to Nobbie's Lighthouse, at the entrance to the Newcastle Harbour.

(Continued on page 32)

News from the Ottawa LAC

Well Christmas is behind us and we're into the Conference Submission Season. You know, that time when you think long and hard about submitting something and then wait until 2 hours before the deadline to actually write it. Perhaps a New Year Resolution is required:

"I will submit my abstract early this year"

or, much better:

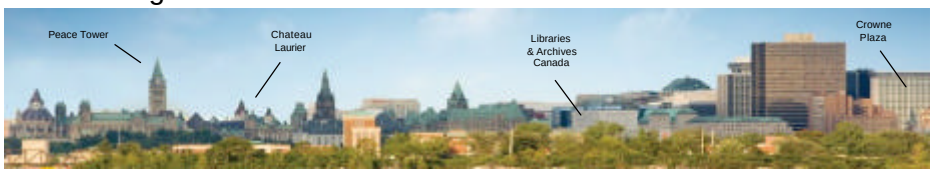
"I will submit my abstract to the COMP ASM early this year".

There may be other conferences to go to but the City of Brotherly Love (a random pick, you understand) just doesn't compare, in my opinion, to the Capital of the Dominion of Canada. Where else can you enjoy the intimate atmosphere of a single lecture room, sample beers without "Bud" in the title, avoid the guilt about missing the 7:30 am sessions and run a 5 km trail in a country where "kilometre" has meaning?

So what can you expect in Ottawa in June? Well, our plan is that it will be a pleasant experience from the moment you arrive to the day you leave. Transport, whether you're driving from Toronto or Quebec City or flying from further afield, is straightforward and stress-free. The Crowne Plaza hotel is located close to Parliament Hill, the Ottawa River and the historic **Byward Market**.

Most of the major attractions of the city are within walking distance and June in Ottawa is generally very pleasant – sunny and warm (the feared humidity comes later in the summer).

We're very excited about the **COMP Public Lecture**, which will focus on the internationally-renowned work of the University of Ottawa Heart Institute. Make sure you're in town early enough to catch this on the Wednesday evening of the meeting!



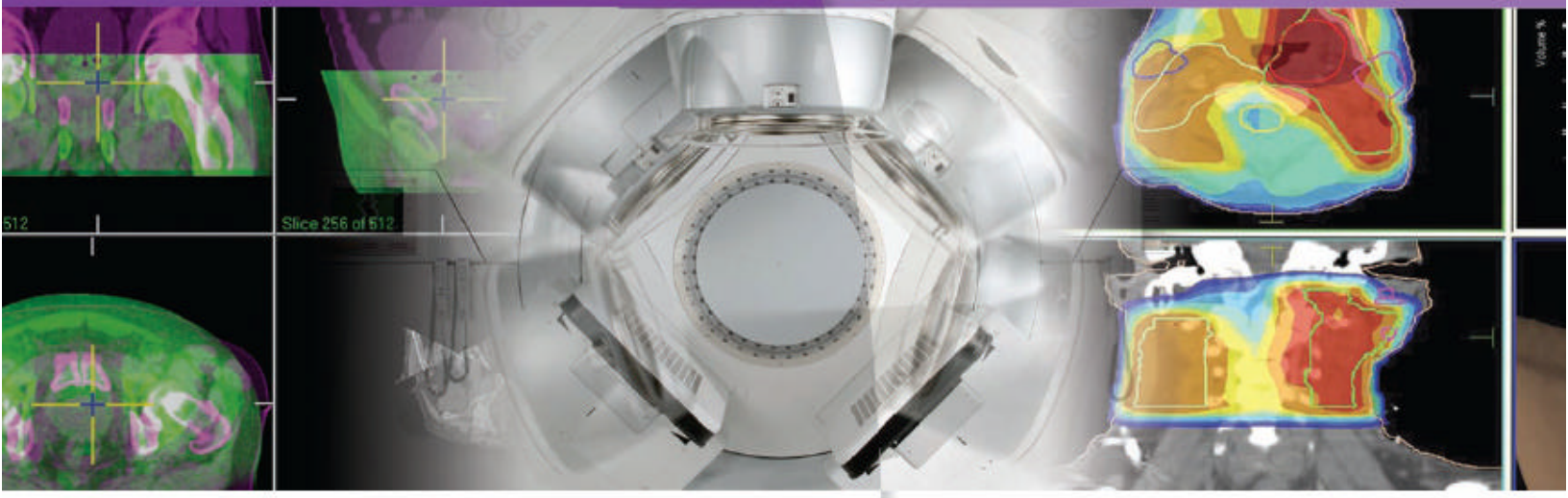
As to the banquet location, I can now confirm that we will be dining in the wonderful space of the **National Gallery of Canada**. I'm sure this will be a sell-out event so make sure you get your tickets early.

As for the science? Well, we in the LAC can do nothing about that – it's down to you. So get writing and submit that abstract!

Check out our website – www.physics.carleton.ca/comp2010

Malcolm McEwen, Chair, Ottawa LAC

Beyond technology there are intelligent solutions



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April 30, 2010	**End of early registration**

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(Continued from page 13)

relationship between ^{3}He MRI measurements and pulmonary function measurements at baseline and follow-up were determined using linear regression and Pearson correlation coefficients using GraphPad Prism version 4.00 (GraphPad Software Inc, San Diego California, USA). The relationship between annualized rates of change of ^{3}He MRI measurements and smoking history were determined using linear regression and Pearson correlation coefficients using GraphPad Prism version 4.00. In all statistical analyses, results were considered significant when the probability of making a Type I error was less than 5% ($p < 0.05$).

RESULTS

Research Subjects

Fifteen COPD subjects (n=9 stage II COPD, n=6 stage III/IV, mean age=68) were scanned at baseline and returned for follow-up 26±2 months later (range=23 - 30 months). All COPD subjects were non-smokers at baseline with a mean smoking history of 47 ±22 pack-years (range=11 - 85 pack-years).

Longitudinal Pulmonary Function and ^{3}He MRI measurements

Table 1 shows mean whole lung (WL) and center slice (CS) hyperpolarized ^{3}He MRI measurements for COPD subjects. The absolute change and annualized rates of change of FEV_1 and hyperpolarized ^{3}He MRI measurements are provided in Table 2. Paired t-tests indicated that all ^{3}He MRI measurements were significantly different at follow-up whereas no significant change was observed in $FEV_1\%_{predicted}$. Figure 1 shows ventilation images, ADC maps and ADC histograms for two representative COPD subjects at baseline and follow-up.

Correlations between ^{3}He MRI, pulmonary function measurements, and smoking history

The change in $FEV_1\%_{predicted}$ showed significant negative correlations with the change in CS VDV (r=-.66, p=.007), but not ADC (r=.13, p=.66). Figure 2 shows the relationships between COPD patient smoking history (years non-smoker at baseline) with the changes in ^{3}He MRI measurements and FEV_1. The number of years non-smoker at baseline showed no significant correlation between change in CS VDV, WL VDV, CS ADC or $FEV_1\%_{predicted}$.

DISCUSSION

Several important observations were made in this pilot study. First, we observed that mean ^{3}He ADC and VDV significantly increased (worsened) during the 26 month follow-up period in the 15 ex-smoker COPD subjects whereas pulmonary function measurements of airflow obstruction and lung volumes did not significantly change. These findings indicate there was a significant increase in both emphysema and ventilation defects as measured by ^{3}He MRI in COPD which is suggestive of COPD progression, not predicted based on FEV_1. Second, we showed that the change in ^{3}He MRI measurements of ventilation defects showed a significant inverse correlation with the change in FEV_1, whereas the change in ADC showed no such relationship. This result suggests that ^{3}He MRI ventilation defect measurements may be more predictive of airflow limitation than ^{3}He MRI ADC. Finally, we showed no significant correlation between smoking history (years non-smoker at baseline) and changes in ^{3}He MRI measurements or FEV_1. This result sug-

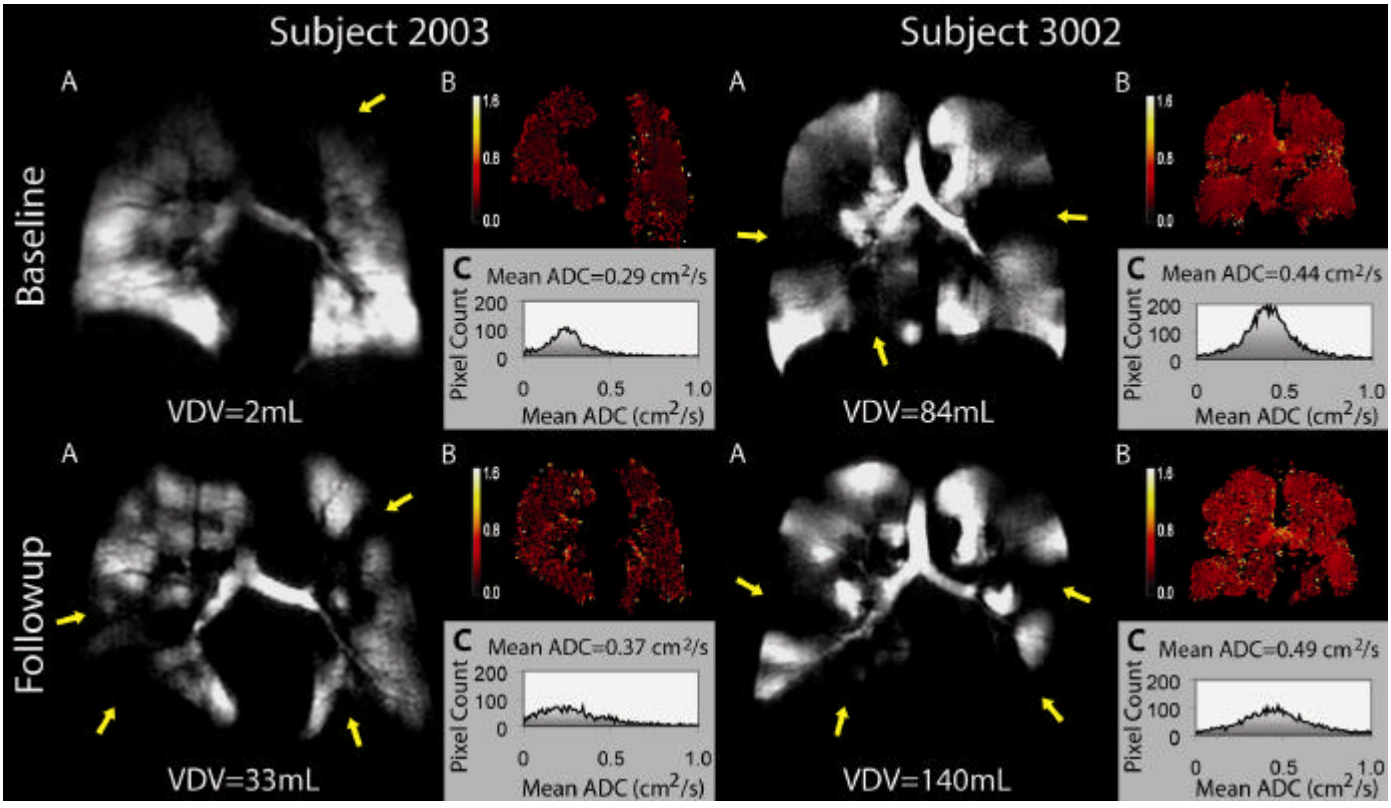


Figure 1. Representative hyperpolarized ^{3}He MR VDV and ADC changes during follow-up in COPD
Left panel subject 2003 71 year old male stage II COPD: top panel is baseline and bottom panel is follow-up: (A) ventilation image (B), ADC map (C) and ADC histogram. Right panel subject 3002 62 year old male stage III COPD: top panel is baseline and bottom panel is follow-up: (A) ventilation image (B), ADC map (C) and ADC histogram.

Table 1. ^{3}He MRI ADC and Ventilation Defect Measurements at Baseline and Follow-up

	COPD Subjects (n=15)	
	Baseline	Follow-up
CS ADC (±SD) cm^2/s	0.44 (0.09)	0.47 (0.08)
WL VDV (±SD) L	0.52 (0.54)	0.92 (0.93)
CS VDV (±SD) L	0.056 (0.053)	0.11 (0.11)

ADC=Apparent Diffusion Coefficient, VDV=Ventilation Defect Volume, VDP=Ventilation Defect Percent, CS=Center Slice, WL= Whole Lung, SD=Standard Deviation

Table 2. Annualized changes in pulmonary function and ^{3}He MRI measurements for COPD subjects at follow-up

	Absolute Change	Annualized Rate of Change (/year)	Significance of difference
			p*
FEV1 (%)	-1	-0.4	0.91
CS ADC(cm2/s)	0.03	0.01	0.003
WL VDV (L)	0.4	0.20	0.04
CS VDV (L)	0.05	0.03	0.01

FEV_1=Forced Expiratory Volume in 1s, ADC=Apparent Diffusion Coefficient, VDV=Ventilation Defect Volume, VDP=Ventilation Defect Percent, CS=Center Slice, WL= Whole Lung
* paired t-tests

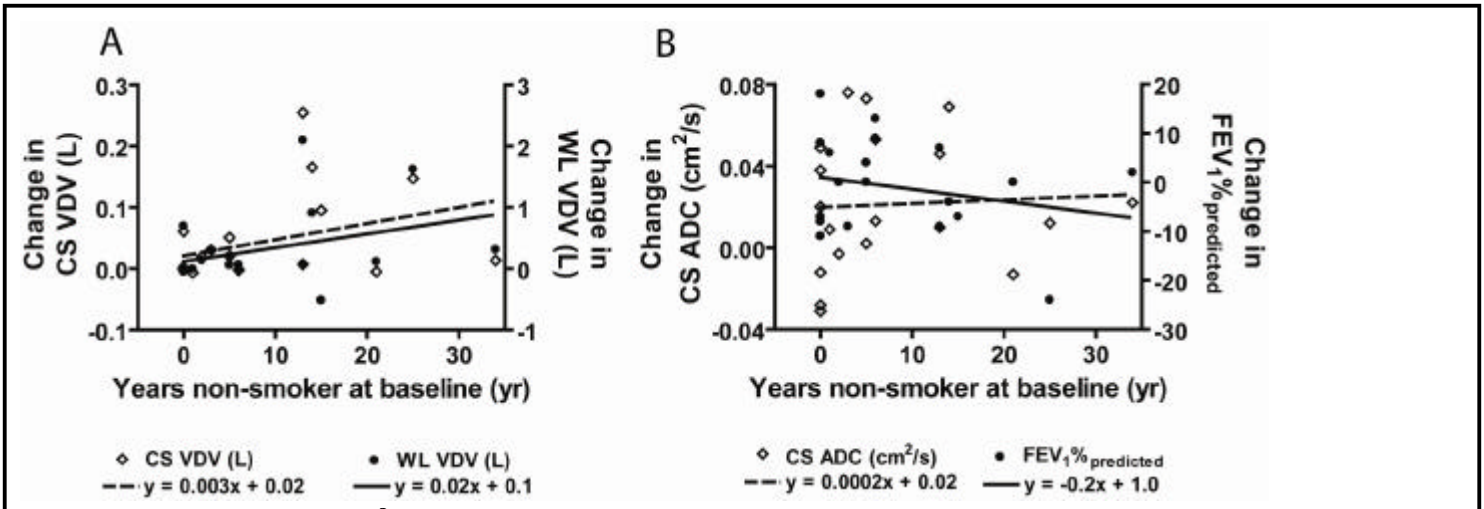


Figure 2. Relationship between ^{3}He MRI measurements and smoking history
Scatterplots showing the relationship between smoking history and (A) change in CS VDV (r=.36, p=.12), and change in WL VDV (r=.36, p=.12), (B) Change in CS ADC (r=.05, p=.83), and change in $FEV_1\%_{predicted}$ (r=-.24, p=.31).

(Continued from page 21)

gests that lung structural and functional decline is accelerated in COPD ex-smokers independent of the number of years since smoking cessation.

CONCLUSIONS

In summary, we observed that in non-smoking COPD subjects, ^{3}He MRI detects airway functional and emphysematous changes that are occurring over short periods of time before FEV_1 changes or perhaps within the FEV_1 silent zones. Longitudinal changes in ^{3}He MRI ventilation defect measurements correlated significantly with changes in FEV_1, whereas changes in ADC did not, suggesting that ^{3}He ventilation defect measurements provided the dominant contribution to spirometry measurements of airflow limitation. Finally we noted that there is no correlation between the number of years non-smoker at baseline with COPD disease changes measured using ^{3}He MRI, suggesting that COPD disease progression in ex-smokers is independent of the number of years since smoking cessation.

The Ionizing Radiation Standards Group

invites you to a

1-day Workshop

on

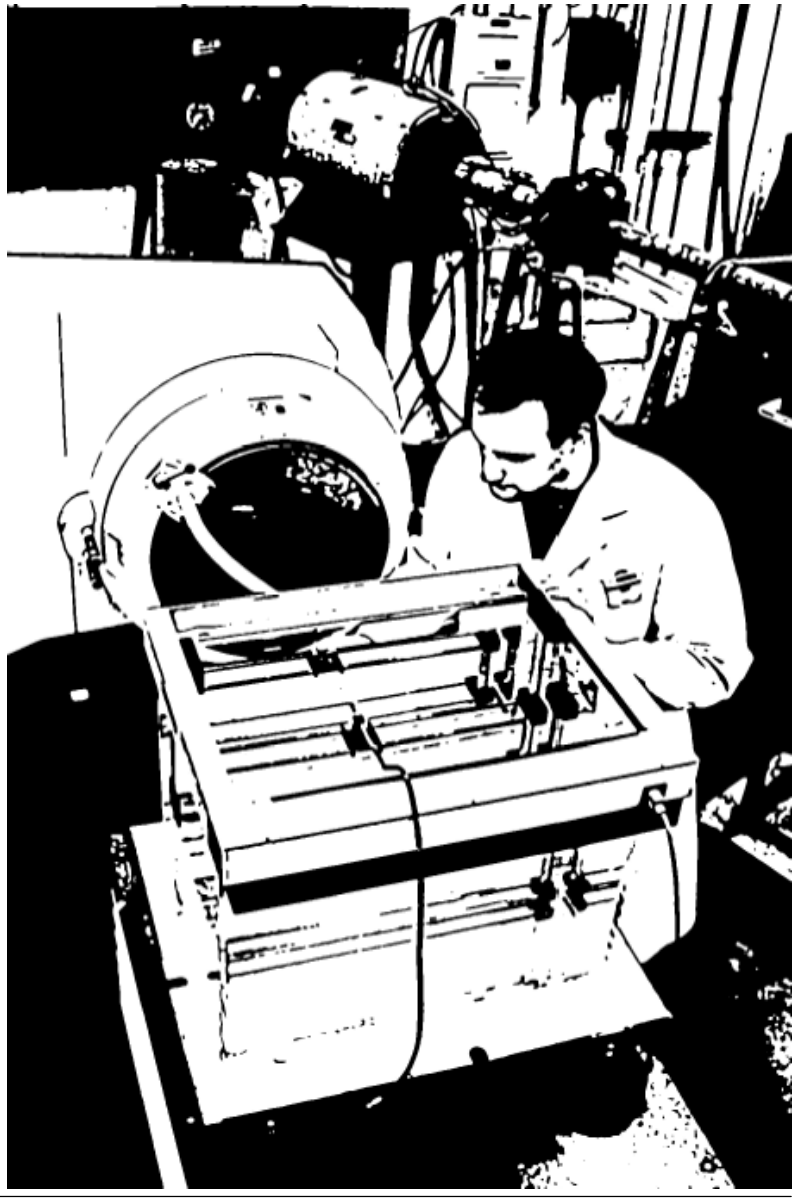
Primary Standards, Calibration Services and Research Capabilities

16th June 2010
Institute for National Measurement Standards
Ottawa, ON

Scheduled to coincide with the 2010 COMP Annual Scientific Meeting being held in Ottawa this summer (June 16-19) this workshop will describe the activities and accomplishments in radiation dosimetry of the IRS Group at NRC.

Presentations will cover:

X-ray dosimetry, brachytherapy, ^{60}Co & ^{137}Cs standards, linac-based research and protocols, radiation protection (beta-rays and neutrons), radioactivity standards, Monte-Carlo simulations, an overview of calibration services. There will be tours of the IRS facilities and a round-table session to provide feedback on the IRS program and discuss future work. This will be an opportunity to find out that we do a lot more than simply calibrate your ion chamber!



There will be a nominal fee for the workshop to cover printed material, food (lunch will be provided) and transport between the COMP conference hotel (Crowne Plaza) and the NRC Ottawa Campus. The workshop will finish in plenty of time for participants to get back to the conference hotel for the opening of the meeting and the public lecture on the Wednesday evening. If you are interested please mark the date in your diary and plan to come to Ottawa a day early.

Please contact Claudiu Cojocaru (claudiu.cojocaru@nrc-cnrc.gc.ca, (613) 993 9352) if you would like further information. More details and a registration form will be available later in the spring.

An Introduction to the First Canadian Post-Graduate Dosimetry Certification for Radiation Therapists (CDS)

Submitted by the CAMRT Dosimetry Specialty Certificate Committee

In the last few years, changes in radiation therapy practice have radically changed the face of Medical Dosimetry and the practice of radiation therapists working in those areas. The practice of planning radiation therapy treatments now demands an expanded skill set to meet the requirements of new technology and diagnostic techniques, including Respiratory Gating, Tomotherapy and PET-CT. Continuing professional development (beyond entry-level knowledge) for radiation therapy planning has traditionally been acquired "in house". In more recent years, radiation therapists have also taken the certifying exam for the American Certificate in Medical Dosimetry (CMD). Although this requires self study to accumulate the didactic knowledge necessary to pass the exam, there is currently no associated course or practical assessment involved. The radiation therapists' professional association the Canadian Association of Medical Radiation Technology (CAMRT) recognized this gap, and the need for a national certification that combined an accessible distance-learning course and exam process with a method of assuring the candidate has the necessary practical skills. A working group was formed consisting of radiation therapist dosimetry experts and educators representing a wide range of Canadian practice and experience. The result is the CAMRT Dosimetry Specialty Certificate, the first Canadian post-certification specialty program in this area.

It is important to note that the term "dosimetry" is used somewhat differently by radiation therapists as opposed to medical physicists. After consultation with physics colleagues, the term "dosimetry" as used in the CAMRT Dosimetry Specialty Certificate is understood to refer to the knowledge base and expertise necessary to generate radiation dose distributions and calculations. This includes knowledge of the overall functionality and clinical relevance of radiation oncology treatment machines and equipment to enable the design and optimization of clinical radiation treatment plans.

Program components

- A comprehensive initial review of basic planning principles and a provided series of data sets designed to step through several standard treatment plans in common sites
- Didactic modules examining current and future trends and technologies. Examples include Image Guided Radiation Therapy (written by Dr. David Jaffray), Biological Modeling (Dr Vitali Moissenko) and Stereotactic (Dr. James Robar).
- An interprofessional approach that includes comprehensive peer review and support by COMP members.
- A flexible and wide-ranging Summary of Clinical Competence to attest to practical skills in Dosimetry, which can be evaluated by Medical Physicists.
- A research component to demonstrate the candidate's ability to conduct an independent research project leading to a paper publishable in a radiation therapy peer-reviewed journal.
- Expert support for candidates available at every step.

Candidates who successfully complete the didactic, clinical and research components are eligible to receive the Specialty Certificate in Dosimetry and use the credentials CDS (Certificate in Dosimetry Specialty) in Canada.

Currently, radiation therapists from around the globe enrolled at every stage of the process, including the final research component. It is hoped that this Canadian program will become the post-graduate dosimetry credential of choice for radiation therapists. Medical Physicists can assist their radiation therapy colleagues enrolled in the program through mentorship and support. In addition, please promote the program at your center. More information is available at:

http://www.camrt.ca/english/pro_dev/dosimetry_specialty_cert.asp

The committee would like to acknowledge the contributions and invaluable support of the following people who were instrumental in the development of the CDS:

Parminder S. Basran PhD MCCPM
Wayne Beckham PhD FCCPM
Lesley A Buckley PhD
Robert Corns PhD FCCPM
Joanna E. Cygler PhD FCCPM
Stewart Gaede PhD
David A. Jaffray PhD DABR
Daniel Létourneau PhD DABR
Marc A MacKenzie PhD MCCPM
Miller MacPherson PhD FCCPM
Vitali Moissenko PhD MCCPM
Horacio J Patrocinio MSc FCCPM DABR
William A Parker MSc FCCPM,
James L Robar PhD MCCPM
Russell Ruo MSc MCCPM DABR
Jake Van Dyk PhD MCCPM
Elizabeth White RTT BSc

(Continued from page 12)
were being conducted under a "license to inspect". This includes radiation safety training, designating inspectors as Nuclear Energy Workers, and provision of personal dose monitors (TLDs) to all inspectors. The CNSC Radiation Protection Division maintains dose records for all CNSC inspectors. Inspectors will visit a variety of locations and deal with many different types of facilities and radioactive materials in the course of their work. This is similar in many ways to the service engineer in Case 2. As in that case, there would be no expectation that IRCC would specifically monitor the dose received by the inspector or maintain a record of that dose. However, IRCC should verify that the inspector has their TLD with them, be able to provide personal monitoring for the inspector in the event that they do not, and communicate the resultant dose reading to the CNSC.

Commentary – Licensee perspective

Two licensees were invited to provide comment from the perspective of the radiation safety officer. Dr. Wayne Beckham and Dr. Ingvar Fife agreed to participate.

Wayne Beckham, PhD
Medical Physics Leader
British Columbia Cancer Agency

Case 1: Visiting physician

Procedure will involve x-ray fluoroscopy as well as radioactive seeds, so both extremity and whole body monitoring would be indicated. The program is operating under IRCC's CNSC licence and so all folk involved (even visitors) need to be monitored by the IRCC personal dosimetry process. Emily should tell the Palladium hospital physician that he should not wear the monitor provided by his normal employer, but that she will provide him with monitors for whole body and extremities. This process ensures that any dose accumulated from the prostate seed activities at IRCC is the only dose appearing on the monitors so directly attributable to that IRCC licensed activity. Any dose accumulated at IRCC will be added to the National Dose Registry (NDR) and flagged in the NDR report that this person is active in more than one group. Their NDR cumulative dose will be recorded correctly. If instead, the physician wears his own monitors, then dose accumulated at IRCC will be indistinguishable from dose they accumulated at the Palladium Hospital and so if an excessive dose is recorded, it would be difficult to determine where the dose came from. The guiding principle here is to make sure that any monitored dose accumulated by people taking part in the normal licensed activities in your institution, is uniquely attributable to those activities.

Case 2: Third party service engineer

The service engineer is an independent contractor, is not under instruction by IRCC staff and is therefore responsible for their actions including radiological safe practice. So the work being done by the contractor at IRCC is under the Accelerators-R-U.S. CNSC servicing licence. This makes the company responsible for monitoring their staff. Having said this, the IRCC radiation safety officer would be advised to ensure that the service engineer is following appropriate radiation safety procedures and actually has their employer provided monitor. If not, a visitor one could be provided for their visit. Another example of where IRCC radiation safety officer might get involved is if say the engineer is working near the target of the accelerator, they may not have an appropriate radiation survey meter to assess the radiation emanation to decide if it is safe to continue to work or wait for the radiation levels to decay. An in-house survey meter should be supplied for this purpose. It would be prudent for Emily to confirm with CNSC that Accelerators-R-U.S. actually do have a current CNSC licence, or ask the company to fax over a copy of their current licence.

Case 3: Visiting CNSC inspector

Under section 32 of the Nuclear Safety and Control Act, inspectors have powers allowing, among other things, unrestricted access to places where licensed activities are taking place. These powers place them outside of the local institutions licensed activities and so the CNSC inspectors should carry personal dosimeters issued to them by the CNSC

Ingvar Fife, PhD
Head, Radiation Protection and Imaging Physics Division of Medical Physics
CancerCare Manitoba

In healthcare and industry it is common place that there are often employees of different employers and legal entities working independently or together in rooms or environments where the area and equipment is owned by one or another legal entity (or even shared). It is the legal entities or individuals representing them that have the responsibility for providing protective measures and are described as the licensee by the CNSC. The licensee may delegate tasks and allocate functions required by regulations to suitably trained individuals but cannot delegate responsibility.

The three scenarios described are examples of this type of situation. There are others offering similar challenges including, maintenance contractors, physics staff, linear accelerator (and X-ray) installation and service engineers, when agency staff are used or when medical consultants work for more than one health authority etc. A teaching hospital or medical school often has both academic and hospital staff working together. These arrangements should be documented and reviewed regularly as appropriate.

There should be co-operation and appropriate exchange of information between licensees when employees work on another licensee's premises.

The allocation of responsibility should be agreed between licensees. This should ensure that protection is optimised and exposures are restricted to a level as low as reasonably practicable (ALARP).

This exchange of information by licensees should be done via the RSO who will be able to identify any training required for visiting workers.

The licensee (employer) of the visiting worker must arrange for appropriate dosimetry assessment to be provided for the worker.

The licensee in control of the area that the visiting worker is working must have facilities for estimating the radiation dose accrued. Any information on the dose measured must be shared with the visiting worker.

Specific case comments:

Case 1: Visiting physician

Sharing of all prior risk assessments is encouraged, especially radiation risk assessments performed by the experienced institution and RSO.

An open discussion of planned work is crucial and recommended. Clinically, there are a variety of methods to perform prostate seed implantation. These alternatives also employ a choice of sealed sources. Where staff exposure is from external sources (other than low-energy beta emitters with no significant bremsstrahlung emission), personal monitoring could be by means of dosemeters worn on an appropriate part of the body.

A direct reading device may also be worn if an immediate indication of the dose received is necessary. This is also a good approach when starting, refining and optimising protocols and techniques. Depending on the methodology chosen, extremity monitors are also helpful initially. The extremity monitoring may be relaxed once appropriate and optimised clinical protocols have been established.

Specifically:
The visiting physician should bring their own Palladium supplied dosemeter and should be supplied with an IRCC active whole body dosemeter and extremity dosemeter if visiting physician is closely involved with procedure.

Case 2: Third party service engineer and Case 3: Visiting CNSC inspector

Please see comments above.

Specifically:
The RSO should ensure that the visiting engineers and the CNSC inspectors have their own appropriate dosemeters and if needed or desired, active dosemeters should be made available for these situations and issued to them while on site.

MEDICAL PHYSICISTS

Career opportunity in Charottetown, Prince Edward Island

The Prince Edward Island Cancer Treatment Centre (PEICTC) Radiation oncology department is recruiting for 2 permanent full-time Medical Physicists.

The Medical Physics Department of the PEI CTC has a working affiliation with the Capital District Health Authority (CDHA) at the QEII Health Sciences Centre in Halifax. Through the CDHA we offer job classifications and salary scales that are competitive with similar positions in Canada.

Qualifications

- Fully trained medical physicist with post graduate degree
- Completion of radiation oncology physics residency would be preferred
- Excellent written and oral communications skills are required

Salary to commensurate with qualifications and experience.

The Cancer Treatment Centre is located in beautiful Charlottetown, Prince Edward Island. Charlottetown **(www.city.charlottetown.pe.ca).**

For further more information please contact Dawn MacIsaac, Acting Manager PEICTC at

djmacisaac@ihis.org or go to **www.healthjobspei.pe**

Live Island Style
healthjobspei.ca

Prince Edward Island
CANADA

2010 Sylvia Fedoruk Prize in Medical Physics

The Saskatchewan Cancer Agency is pleased to sponsor a competition for the 2010 Sylvia Fedoruk Prize in Medical Physics. This award is offered annually to honour the distinguished career of Sylvia Fedoruk, former Lieutenant-Governor of Saskatchewan and previously physicist at the Saskatoon Cancer Centre.

The prize will comprise a cash award of five hundred dollars ($500), an engraved plaque and travel expenses to enable the winner to attend the annual meeting of the Canadian Organization of Medical Physicists (COMP) and the Canadian College of Physicists in Medicine (CCPM), which will be held on June 16-19, 2010 in Ottawa, ON.

The 2010 Prize will be awarded for the best paper on a subject falling within the field of medical physics, relating to work carried out wholly or mainly within a Canadian institution and published during the 2009 calendar year. The selection of the award-winning paper will be made by a panel of judges appointed by COMP.

Papers published in *Physics in Medicine and Biology* and *Medical Physics*, which conform to the conditions of the preceding paragraph, will automatically be entered in the competition and no further action by the author(s) is required. All other papers should be submitted electronically to:

Nancy Barrett
Executive Director
Canadian Organization of Medical Physics
E-mail: nancy@medphys.ca.

Each paper must be clearly marked: "Entry for 2010 Sylvia Fedoruk Prize" and must reach the above address no later than **Monday, February 1, 2010**.

The award winners from the last six years were:

Karl Otto, "Volumetric modulated arc therapy: IMRT in a single gantry arc", *Medical Physics 35, 310-317* (2008)

Magdalena Bazalova, Luc Beaulieu, Steven Palefsky, Frank Verhaegen, "Correction of CT artifacts and its influence on Monte Carlo dose calculations", *Medical Physics 34, 2119-2132 (2007)*

Brian Nieman, Ann Flenniken, S. Lee Admanson, R. Mark Henkelman, John G. Sled, "Anatomical Phenotyping in the Brain and Skull of a Mutant Mouse by Magnetic Resonance Imaging and Computed Tomography", *Physiol Genomics* ***24****:154-162* (2006)

Guy-Ann Turgeon, Glenn Lehmann, Gerard Guiraudon, Maria Drangova, David Holdsworth, Terry Peters, "2D-3D registration of coronary angiograms for cardiac procedure planning and guidance. *Medical Physics,* ***32****(12): 3737-49* (2005)

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

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

CALL FOR NOMINATIONS

The CAP-COMP Peter Kirkby Memorial Medal for Outstanding Service to Canadian Physics

The CAP-COMP Peter Kirkby Memorial Medal recognizes outstanding service to Canadian physics. The medal is intended to recognize service to the physics community by strengthening the Canadian physics community, by enhancing the profession of physical scientists, by effectively communicating physics to the non-scientific community, or by making physics more attractive as a career. It is intended to provide a lasting memorial to Peter Kirkby and to recognize in others the qualities for which he is remembered best: a vision of a strong Canadian physics community, dedicated efforts to support that vision and, in all things, fairness, and honesty.

The Peter Kirkby Memorial Medal was introduced in 1996 and is awarded biennially. The previous winners were:

- 2008 – Peter Calamai, The Toronto Star
- 2006 – Dr. Michael Steinitz, St. Francis Xavier University
- 2004 – Dr. Robert Barber, University of Manitoba
- 2002 – Dr. John R. (Jack) Cunningham, Camrose, Alberta
- 2000 – Dr. Paul Vincett, FairCopy Services Inc.
- 1998 – Dr. J.S.C. (Jasper) McKee, University of Manitoba
- 1996 – Dr. Donald D. Betts, Dalhousie University

The next medal will be awarded in the year 2010. The deadline for nominations is January 8, 2010. Nominees must be a member of at least one of CAP or COMP.

Nominations should be made through the web. Please follow the instructions given on the CAP website: http://www.cap.ca/awards/kirkby.html The winner of this joint CAP-COMP medal is selected by a committee struck by the CAP and the COMP.

Harold Johns Travel Award Announcement
Deadline for Application: 9th April 2010

The Board of the Canadian College of Physicists in Medicine is pleased to honour the Founding President of the College by means of the Harold Johns Travel Award for Young Investigators. This award, which is in the amount of $2000, is made to a College member under the age of 35 who became a member within the previous three years. The award is intended to assist the individual to extend his or her knowledge by travelling to another centre or institution with the intent of gaining further experience in his or her chosen field, or, alternately, to embark on a new field of endeavour in medical physics.

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

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

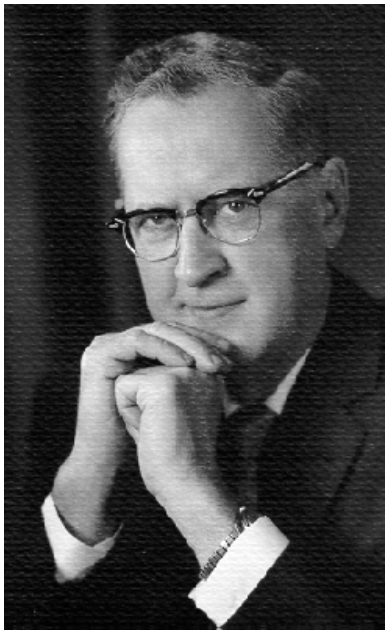
The award is intended both to assist the individual in their medical physics career and to enhance medical physics practice in Canada. Recipients are therefore expected to remain in Canada for at least one year following their travel. Applicants should be working in Canada but need not be Canadian citizens.

Successful candidates will have two years after their application deadline to complete their travel. They will be required to submit a short report to the InterACTIONS newsletter. The award recipient will be chosen by a committee consisting of the Chairman of the Examining Board, The Registrar and the President of the College. Their choice will be based upon 1) the written proposal submitted by the candidate, 2) references obtained by the committee and 3) membership exam results. The award will be announced at the Annual General Meeting of the College.

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

Applications should be sent to:
Mr. Darcy Mason
Registrar
Canadian College of Physicists in Medicine
c/o Durham Regional Cancer Centre,
1 Hospital Court,
Oshawa, ON L1G 2B9

Contributions to the HE Johns Fund



CCPM wishes to recognize and thank the following members for their 2009 donations to the Harold Johns Travel Award. The list below has been updated to reflect all contributors this year. For many years the HE Johns Travel fund has been awarded to young medical physicists to support their travel to another center so that they may gain further experience in their specialty. With the economic downturn, investment return is minimal. Donations to the fund have to sustain the annual expenditure in the current economic environment. Please consider donating to the fund this year so that we may continue this legacy of education. Further details on the award can be found on the CCPM website.

The 2009 award winner is Dr. Atiyah Yahya of the Cross Cancer Institute in Edmonton, Alberta. She will be hosted by Dr. Giles Santyr of the Robarts Research Institute in London, Ontario, to learn about hyperpolarized gas MRI of lungs and its potential applications to radiation treatment planning.

HE Johns—Officer of the Order of Canada, Ph.D., LL.D., D.Sc., Emeritus University Professor and Professor Emeritus in the Department of Medical Biophysics and Radiology, University of Toronto

Dr Johns was born of missionary parents while in West China. During his scientific career, he published over 200 peer-reviewed papers, trained over 100 graduate students, many of whom hold key positions in the field of Medical Physics across Canada and around the world. He has won many prestigious awards and has published four editions of "The Physics of Radiology", the premiere textbook in the field.

His developments in the late 1940's of the Cobalt 'bomb' led to a new career in the pioneering field of Medical Biophysics. This in turn led to international reputation among scientists. His many awards and accolades reflect the respect and admiration in which he was held by academics and scientists around the world. He was inducted into the Canadian Medical Hall of Fame in 1998. Dr Johns passed away on August 23, 1998.

Generous Donors to the HE Johns Fund for 2009

John W. Andrew
Will Ansbacher
Clément Arsenault
Chantal Audet
Alistair Baillie
Jerry Battista
Craig Beckett
Wayne Beckham
Kenneth C. Chu
Sherry Connors
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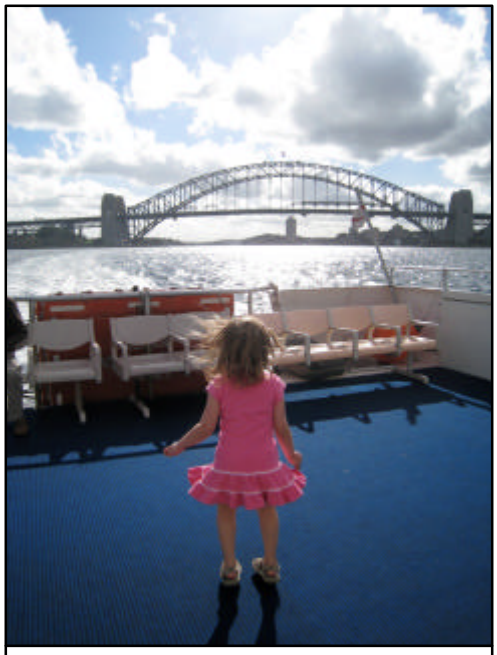
Michael Tassotto
Pierre Therrien
Christopher Thompson
Jake Van Dyk
Shuying Wan
Heather Warkentin
Bradley Warkentin
Ellen Wilcox
David E. Wilkins
PIPSC Medical Physicist Group in Ontario



Dancing on the deck of a ferry in Sydney Harbour

(Continued from page 15)

with all the official approvals in place, you can start working through the task list required to move your entire household to another city! This is even more challenging when that city is 14,000 km away in a foreign country!! For example, visa applications have to be made, arrangements to take care of your home during your absence, packing suitcases for a 12 month 'trip' -- the list is long and seemingly grows as your departure date approaches. For my wife and I, the most stressful decision was what to do with our house. I think I have the typical, conservative demeanor of a medical physicist, so the thought of having strangers rent our house was causing us major stress. We had taken the step of advertising on the local university website, and I fielded several phone calls that made me doubt the sanity of our decision. Luckily we were able to convince two graduate students in our program that staying in our house for a year would be great fun. I think this saved me an ulcer. In contrast, the least stressful decision was what swimming trunks to pack – we took them all!

For those who are unfamiliar with the Australian health care system, it is an interesting one. It is a two-tiered public/private system with a private option introduced in the mid-1980's. However, the private system is fairly tightly regulated, thus keeping a reign on pure profiteering. As we know from our US neighbours, Radiation Oncology is one area of health care that lends itself to privatization. The radiation treatment delivery services in Australia are composed of primarily public facilities, but with a significant presence of private facilities. This has resulted in more, smaller facilities of 1-3 linac size, with only a handful of larger 'Canadian-like' facilities. In fact, in terms of linac numbers, the Calvary Mater Newcastle Hospital is the largest radiation treatment facility in New South Wales (which includes Sydney, pop. 4.5 million), while the largest treatment facility in Australia is the Peter MacCallum Institute located in Melbourne. The hospital I worked at had four linacs with a fifth now installed, an HDR program, orthovoltage unit, and two CT simulators. The medical physics staff there were a great group, friendly and fun-loving in classic Australian style. Unfortunately they were understaffed during my time there (yes, this creates a tempting situation, but I did return to Winnipeg!). However, even with the stress of staff shortages, they always made time to help out the Canadian! My impression is that there still continues to be a shortage of experienced medical physics professionals across Australia and New Zealand. The medical physics community in Australia has many similarities to Canada. They are a small yet active group of professionals with a strong sense of community. Like Canucks, they generally have a reasonably conservative approach to implementing new technologies with patient safety of paramount importance. More information can be found at the website of the Australasian College of Physical Scientists and Engineers in Medicine (ACPSEM), their professional organization, www.acpsem.org.

Coming from Winnipeg (although I suspect any Canadian would do the same), we were heck-bent on finding accommodations near the ocean. The city of Newcastle has numerous beautiful beaches, so luckily this was not a huge problem. The move from the geographic centre of North America to a 'beach city' was a shock to our system. But oh, what a very, very good shock! A cold winter day there would barely hit +16 C, a tad warmer than the mind-numbing, albeit invigorating, -35 C of a Winnipeg January! I had many good laughs when my work colleagues there would complain about their cold weather. We arrived in May (late fall in Australia), and had the beaches nearly to ourselves until the late spring. We met several other international families on the beach during the winter (Finns, Swedes, other Canadians), since it was too cold for the locals to venture there! This is a great illustration of temperature being a relative concept for humans.

One motivating factor for selecting Australia as a sabbatical destination is that they speak English. However, this *theory* was nearly disproved – combine a relatively broad Australian accent (we were in 'rural' Australia after all, which apparently is defined as anything outside of Sydney) with more than the usual Aussie preponderance for slang, and it took us *weeks* before we could consistently understand the locals. Ok, ok, actually months really. Early in May, I went through a most embarrassing situation when I had to ask a sales clerk to repeat her comments to me **three** times. She looked at me as though I was a complete jerk…. all I could say was "I'm sorry, I'm from Canada, eh?".

Traveling in Australia is very easy. Domestic airfares are relatively cheap, roads are typically in very good shape, and it's not like you have to worry too much about blizzards wreaking havoc with your travel plans (although there is the possibility of flood or bush fire, just to keep you on your toes). The Australians are very welcoming and friendly, and they like

Walking on a beach at Shoal Bay, a small village north of Newcastle. Note the long sleeves and lack of anyone else on the beach, it is winter!

A summer evening on Newcastle Beach (200 m from our apartment). It looks like it was a good day for surfing.

Canadians. Despite the challenge of having two young children under four years of age, we did manage to do a bit of travel, although mostly weekend driving trips. I think we mapped out most of the tourist sites, national parks, and beaches within about a 200 km radius from Newcastle. For the record we were not killed or injured by any sharks, crocodiles, poisonous spiders, even more poisonous snakes, scorpions, vampire bats, stinging jellyfish, 'Aussie Rules' football players, or rabid koalas.

For a Canadian, the Christmas/New Year's holidays are a strange experience at +30 C, especially when you are accustomed to a snow covered December (Environment Canada rates Winnipeg with nearly a 100% chance of a white Christmas). Almost all of your visual cues are missing, although we did see plenty of decorative lights twinkling in the heat of the night. We had thought that we would feel a bit homesick around that time, missing out on our reasonably large family gatherings. But frankly we had a great time! Sun, warmth, ocean, sand, why hadn't we tried this sooner?

Of course, you must be very careful about sun exposure. Australia is located at latitudes much closer to the equator than Canada, and also the ozone layer in general is thinner in the southern hemisphere. Indeed, in the peak of a summer afternoon we experienced UV index ratings of 15-16 vs a high of 8-9 during a sunny Winnipeg summer day. Hats, sunscreen and UV-protective swim suits are must-haves on the beach there (well, anywhere really), a country with the highest rate of skin cancer in the world. There was one hot summer day in particular where we were out later than usual (normally we tried to get inside and out of the sun by 11 am), and I swear I could smell my skin cooking, basting in 50 SPF sunscreen – the heat generated in the skin was uncomfortable. Woe to those who might fall asleep on the beach!

Another great feature of Newcastle is it's proximity to the Hunter Valley wine region (45 min drive), the largest of many wine growing areas in the country. However, I suspect that about 95% of the population of Australia live within a short drive of at least one winery! Good wine is plentiful and inexpensive there, which makes for a delicious but potentially dangerous combination. Luckily for our livers our two children don't really sleep a lot, so we had to be on reasonably good behaviour (conversely this is extremely unlucky for another useful organ, the brain)!

We had the interesting experience of being on foreign soil during the Beijing Olympic games. If you feel the American TV coverage of the Olympics is biased towards their athletes, you need to check out the Australian coverage (which makes the American coverage look like an impartial and balanced view from a non-participant)! The Aussies are huge sporting enthusiasts, and to their credit their Olympic athletes enjoy tremendous popular support and high public profiles. The Australian sporting enthusiasm was driven home when our four year old came home from nursery school one day during the Olympics chanting 'Aussie, Aussie, Aussie, oi, oi, oi!'! Needless to say we have been busily deprogramming her since our return to Canadian soil!

Our year Down Under provided us with fantastic experiences and wonderful friends. Professionally, the experience has been invaluable, providing insight on how other medical physics departments operate, and helping to generate research funding and ongoing research collaborations. If you have the opportunity to take a sabbatical, you simply must go for it.

Editor's Note

Idris Elbakri
CancerCare Manitoba, Winnipeg, MB

When it "feels like" -29 degrees outside, what better to do on a Sunday afternoon that to write my InterACTIONS editorial?

Thank you to everyone who emailed me after the publication of my first issue as editor of the newsletter. I hope I continue to meet your expectations. Thanks especially to those who offered some suggestions and criticism. I have attempted in this issue to implement some of them. Please keep your suggestions, corrections and feedback coming. This is the only way for me to know if this newsletter is serving you like it should.

As editor, I get to participate in the meetings of the COMP communications committee, headed by Tony Popescu. One of the ideas we are considering is a point/counter point feature in InterACTIONS. If you have any thoughts on this idea, or want to suggest a topic, please let me or other members of the communications committee know.

The profession of medical physics is undergoing some interesting changes, with growing emphasis on accreditation of training programs and professional certification. David Wilkins, CCPM President, addresses this issue and discusses some of the related decisions taken recently by the CCPM board. This is an important issue. I know from my place of work that it is the subject of many lunch and coffee break discussions. I expect future issues of InterACTIONS to have more on this topic and I encourage our readers to use the newsletter as a forum to share their thoughts and concerns.

As I write this, the prairies are gripped by a wave of extreme cold that came on the heels of an unusually warm Fall. I could not help feel some warmth (and, I confess, jealousy) as I read through Boyd McCurdy's report on his sabbatical in Australia. I browsed through some earlier issues and found reports of international travel by several colleagues. COMP has also several members who are placed internationally. I encourage our members to share their international experiences through InterACTIONS.

I wish everyone a productive and happy 2010. I hope that on your list of resolutions for the new year is to write for InterACTIONS at least once!

Did you know…

Inter**ACTIONS** is published four times a year:
January , April, July, October

Next deadline for the
April issue is
March 1!
Get your material in early!

Dates to Remember

COMP Winter School
January 24-28, 2010
Banff, AB

SPIE Medical Imaging
February 13-18, 2010
San Diego, CA

COMP ASM
June 16-20, 2010
Abstracts April 2, 2010
Ottawa ON

ITART 2010
June 21-22, 2010
National Harbor, Maryland

AAPM Annual Meeting
July 18-22, 2010
Abstract March 3, 2010
Philadelphia, PA

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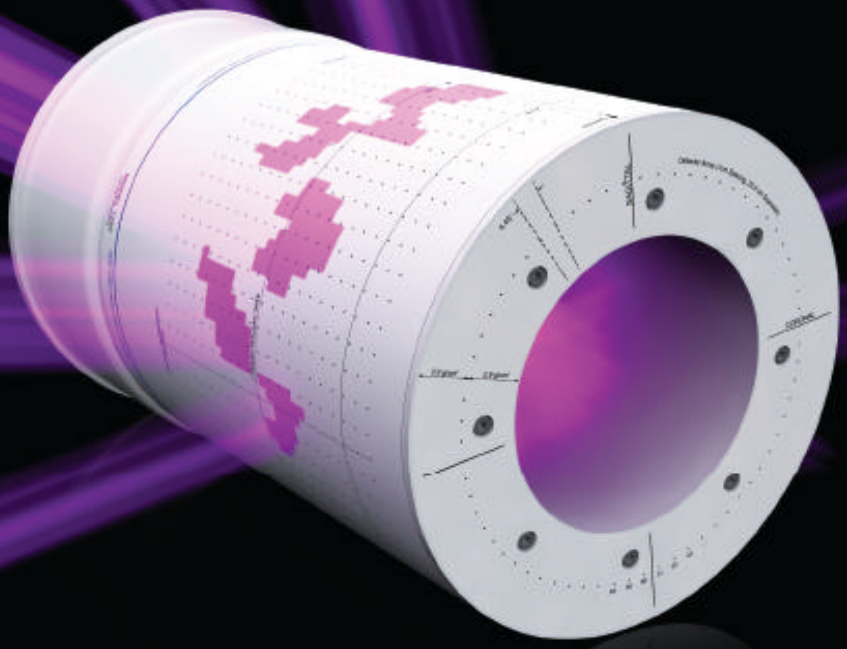

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