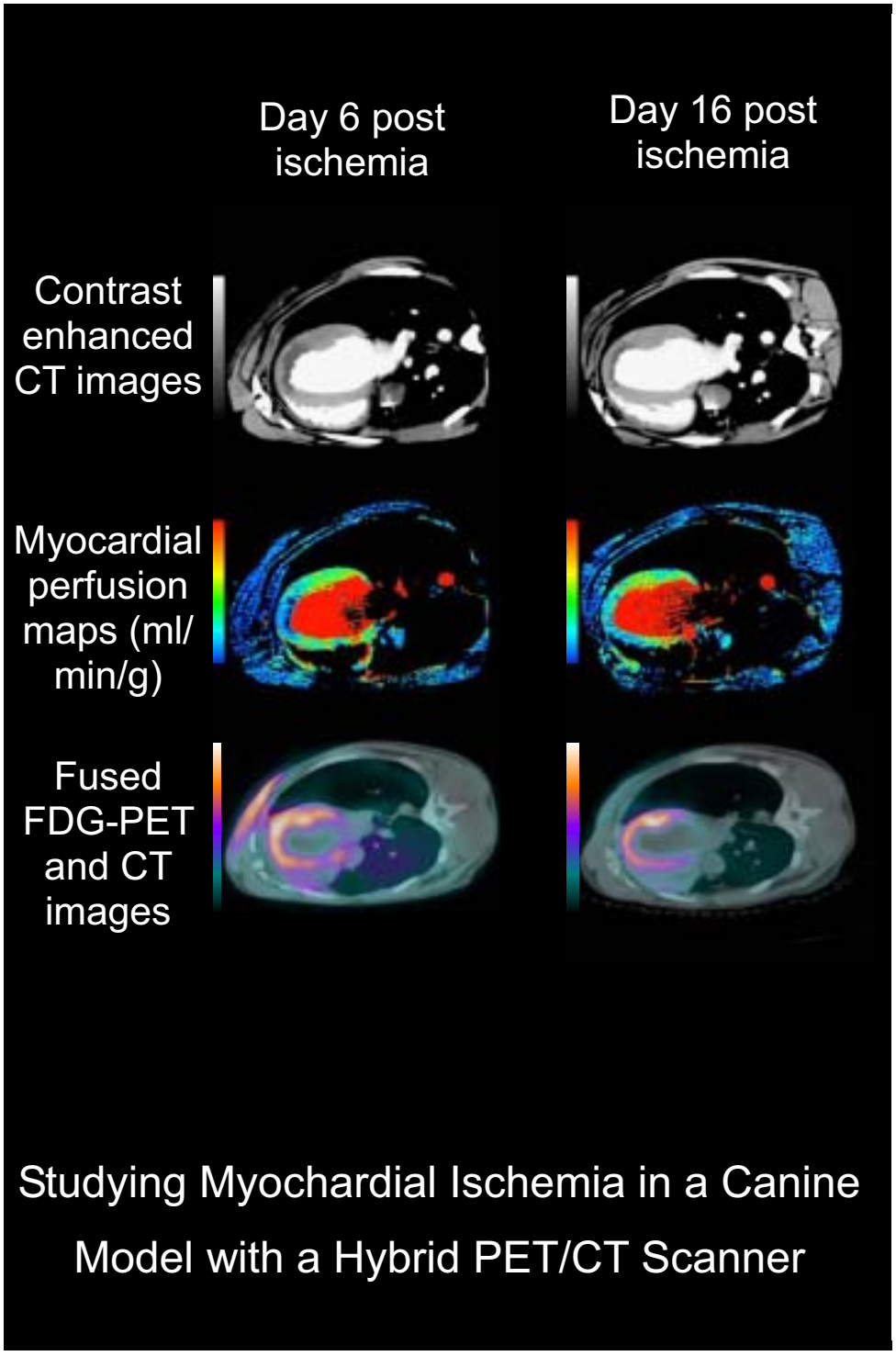
InterACTIONS

CANADIAN MEDICAL PHYSICS NEWSLETTER
Le BULLETIN CANADIEN de PHYSIQUE MÉDICALE



Studying Myochardial Ischemia in a Canine Model with a Hybrid PET/CT Scanner

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

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About our Cover

Recently, a hybrid PET/CT scanner was installed in the Lawson Health Research Institute, London, Ontario. This new scanner is ideally suited to study ischemic heart disease because it can fuse ^{18}FDG-PET images that reflect the rate of glucose utilization in the heart with the highly detailed anatomical images of the heart from CT. The evaluation of myocardial viability can be further improved by monitoring the mismatch between glucose uptake and regional myocardial perfusion (MBF). However, the radioactive tracers used for measuring MBF with PET have extremely short half-lives, under ten minutes, which prevent the practical use of PET in this way. We have been developing means to measure absolute tissue perfusion with CT. With a bolus injection of contrast agent and cine (continuous) CT scanning, perfusion to tissue can be derived from the deconvolution of an arterial and tissue enhancement curves. This technique has been successfully validated in the studies of stroke and brain tumor, and we are currently applying it to measure MBF in a canine model of heart attack. Ischemia is brought on by occlusion of the left anterior descending coronary artery for two hours followed by reperfusion. The pictures in the top row are the averaged first pass images of contrast at day 6 and 16 post reperfusion; middle row are the corresponding MBF maps; and, bottom row are the corresponding fused FDG-PET / CT images respectively. Myocardium in the supply territory of the occluded LAD failed to enhance during first pass of contrast even after 6 days of reperfusion and appeared as a perfusion defect in the MBF map. On day 16 post reperfusion, there was an improvement in the perfusion defect but a reduction in glucose uptake in the same region. The perfusion and glucose uptake mismatch at day 6 post reperfusion is the classical hallmark of hibernating myocardium. We are continuing our investigation of this promising technique in the study of ischemic heart disease.

Images courtesy of Aaron So and Ting-Yim Lee, Lawson Health Research Institute and Robarts Research Institute, London, Ontario.

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

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Please submit stories in Publisher 98, Word 6.0, Word 97, or ASCII text format. Hardcopy submissions will be scanned to generate an electronic document for inclusion in the Newsletter. Images in Tiff format at 300 dpi resolution are preferred. Advertising and corporate enquiries can be made to:

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Inside this issue:

Message from the COMP Chair:

This is a unique opportunity for us that can be quite stimulating and refreshing so I hope you will plan on joining us in Winnipeg next year.

During the last three months, most of the work of the COMP Executive has concentrated on the joint COMP, Canadian Association of Physicists (CAP) and Canadian Astronomical Society (CASCA) meeting to be held in Winnipeg from June 13 to 16, 2004. The meeting will be held at the Delta Hotel, which is next to the Convention Centre. The COMP Conference Committee, which is chaired by our Chair-Elect, Peter O'Brien, will collaborate closely with the Scientific Program Committee of CAP in order to offer our members an exiting program. The format of this meeting will be very similar to past CAP meetings with timeslots of 15 minutes for presentations and several parallel sessions covering a wide range of topics. Such diversity allows us to catch a few talks in areas of physics to which we don't normally get exposed. This is a unique opportunity for us that can be quite stimulating and refreshing so I hope you will plan on joining us in Winnipeg next year.

COMP and the Division of Medical and Biological Physics (DMBP) of the CAP should have many joint sessions, including a joint Young Investigators' Symposium, once the final program is established. A joint symposium (CCPM/CAP/CASCA) on imaging is also being discussed. COMP will again apply for CAMPEP credits for all COMP or CCPM sponsored sessions.

The main website for the meeting will be the CAP website (www.cap.ca). You will be able to register and submit your abstracts through this website. The Call for Papers should come out during the month of October, which is a little earlier than we are use to, while the deadline for abstract submission should be the beginning of February. Please visit the CAP website regularly for more information.

Our own website will undergo major renovations in the upcoming months. During the AAPM Meeting in San Diego, the AAPM Executive Committee approved the COMP proposal to have our website managed by the AAPM Information Services Department. Our new server has been received by the AAPM IS department, and is presently being prepared for data entry. Our Communications Committee will then start the process of transferring the data from our old server. Thanks to this arrangement, many features and future developments of the AAPM website will also be available on our website. For example, the new abstract submission system presently under development by the AAPM will be available to us once completed. We are hoping that this feature will be ready for our next stand-alone meeting in Hamilton in 2005.

Finally, I would like to welcome Boyd McCurdy as our new Editor of InterActions. I wish him a lot of success and a lot of CONTRIBUTIONS FROM OUR MEMBERS! So, if you have any "InterActions" worthy materials including local medical physics news, don't hesitate to send them to Boyd.

Message from the CCPM President:

The current policy of the Board of the CCPM is to issue one certificate and rely on the member or fellow to take appropriate care to keep it safe. We are generally not sympathetic to requests for duplicate or replacement certificates. The cost of the paper and printing is minor but acquiring the seal and the appropriate signatures is tedi-

ous. However, a recent request from a member who shall remain anonymous gave us a good laugh. This physicist had just returned from a stint as a locum for a friend in a small, 1 physicist centre in the US. The agreement was to provide the physics service to the clinic for three weeks and also to baby sit the house and the dog while the local physicist and his family went on vacation. To ensure success with the US customs, our physicist took his CCPM certificate out of it's frame and, together with his graduate degree certificate, packed it into his bag for the trip and, you've guessed by now, the dog chewed them both up one night. Although this is an excuse more usually used in kindergarten rather than by PhD physicists, we have agreed to replace his certificate at cost. So the moral of the story is: if you remove your CCPM certificate from it's frame, make sure the dog doesn't mistake it for a bone!

Topics for discussion at the mid-year CCPM Board meeting at the end of November include: details of the oral membership examination process, a strategy to encourage and support applications from imaging physicists and criteria for nomination to emeritus membership. Please contact any Board member if you have a contribution to make on any of these topics.

The Board of the CCPM is committed to "Continuous Quality Improvement" and we welcome input from the membership on all aspects of the certification process. For example, you may consider suggesting changes or submitting a new written question for the examination booklet.

You are probably all aware that there are currently a considerable number of employment opportunities for medical physicists across North America, if not word-wide. This has prompted an interesting proposal by the Physics Trustees of the American Board of Radiology, stated in the July/August issue of the AAPM newsletter.

"In order to assure a higher and uniform standard for candidates seeking certification in Radiologic Physics, the ABR, beginning in 2012, is considering successful completion of CAMPEP accredited residency as an eligibility criterion."

My understanding of the motive for this proposal is to encourage the growth of clinical training programs to address the lack of qualified medical physicists and also to encourage centres offering this training to seek CAMPEP accreditation. The concern is that when the profession is expanding rapidly, it becomes more difficult to maintain standards and experience has shown that accreditation by CAMPEP provides a means to set and maintain appropriate educational standards. Clearly with only 6 centres currently offering accredited residency training programs, there is a considerable shortfall in graduates which would have to be addressed before this proposal could be implemented. Please let us know your opinion of this proposal. Should the CCPM consider a similar course of action?

Brenda Clark

Experience has shown that accreditation by CAMPEP provides a means to set and maintain appropriate educational standards.

Message from the Executive Director of COMP/CCPM

Over the past number of years, medical physics has been growing as a profession, both in numbers and in significance in the Canadian health care system.

Over the next few weeks, COMP members will see a major re-vamp of our website, www.medphys.ca, an outcome of the ground-work of Mike Kolios and the Communications Committee. As the new Chair of Communications, Darcy Mason has been hard at work continuing negotiations with AAPM and planning for the new website.

There are many advantages of hosting our website with AAPM, including the synergies created that will allow us to take advantage of new developments and services developed by the AAPM as well as giving us the benefit of AAPM's experience in website operations for a professional organization.

Our website will be completely independent of AAPM, the content controlled by COMP and hosted on a stand-alone server. COMP and CCPM members can look forward to enhanced services and a more integrated package. We are fortunate to have Darcy Mason chairing the Communications Committee with his experience in managing the abstract submissions for the Kelowna meeting in 2001.

Over the past number of years, medical physics has been growing as a profession, both in numbers and in significance in the Canadian health care system. With this growth has come the recognition that issues sometimes arise that question the scope of practice boundaries between medical physics and other professions, including engineering. This has most recently become apparent both in British Columbia and Ontario.

Your executive has decided to take a proactive role in addressing this issue and will be communicating with each provincial licensing and professional accreditation body to ensure that any discussions regarding scope of practice in any profession that might overlap or encroach on medical physics as a discipline is identified and that COMP and medical physicists are consulted prior to the contemplation of changes.

About the time you receive this newsletter, you should receive the new directory in the mail. The maintenance of the directory is a significant task managed by Barb Callaghan (COMP Secretariat) and the COMP secretary, Alanah Bergman. Many thanks to Barb and Alanah for their diligent work on this annual project. We are fortunate that many of our corporate members support the production of the directory by placing ads, which substantially cover the cost of printing. I encourage COMP members to let your corporate contact know that we appreciate their support of this project.

Before long, we will be reaching your executive and board's mid-year meetings.

These meetings are crucial for your leadership in planning for the next annual meetings, the upcoming certification and examination processes, and in co-ordinating with the various committees. If you note issues, concerns, or opportunities that should be brought to the board's or executive's attention, please drop a note to myself, Clement Arsenault, or Brenda Clark.

On a final note, this is the first edition to be edited by Boyd McCurdy. Many thanks to Boyd for taking the helm of this publication from Pat Cadman. The task is significant, not only in the detail of editing for size and position, but also in soliciting, cajoling, and occasionally begging members to submit copy for the newsletter! We are thankful to have Boyd as our new editor – he has big shoes to fill after Pat Cadman, and we are confident that Boyd will continue to make InterActions a successful publication.

As always, your comments, suggestions, and advice are welcome – feel free to call or email.

Michael Henry
Executive Director
COMP/CCPM

BLACKOUT !

By Peter O'Brien, Toronto-Sunnybrook Regional Cancer Centre, Toronto, ON

The lights went out at about 4:10 on a Thursday afternoon at the Sunnybrook Cancer Centre. It soon became apparent that it was not just the lights but everything that was powered from the Ontario electrical grid. We were fortunate in the medical physics department to have a battery powered radio which soon gathered a small crowd listening to reports of the outage across the entire north-eastern U.S and southern Ontario.

The Sunnybrook, as with all other hospitals, has an emergency power system based upon diesel powered generators. The cancer centre has outlets and lights throughout the building connected to that system and that system kicks in within seconds of an outage. We had often grumbled about the weekly testing of this emergency system – but no more!

We treat up to 400 patients a day on 13 high energy units. We also operate an evening treatment clinic using several machines. The immediate actions required then were to cancel all patients for the remainder of the day and to switch all linac ion pumps to emergency power. Staff staggered their departure times that evening – there was some gas siphoning to allow those low on fuel to get home! It was a warm, clear evening and the canopy of stars visible in the city was something not seen since 1965 (the last big blackout). The next morning those who could get to work – again, no gas was available in this city of commuters and the subway was not working – found that power had been restored at the cancer centre. Machines were warmed up and ready to go at 7:30 am when the power went out again. This time the decision was made to cancel patients for the remainder of that day (Friday). It was about 30 degrees outside and at least that warm inside except for the treatment bunkers which stayed quite cool.

Canceling and re-scheduling of patient visits was probably the biggest single task caused by the blackout; the radiation therapists who look after that are to be commended. There was one interesting aspect of that exercise. The database of patient demographics – including telephone numbers – is only in electronic form and is on a server which, in the event of a power failure is powered by a UPS. The UPS battery in this case was low and ran out before all patients could be contacted! This was an important lesson. A review of emergency outlets throughout the building showed that several were not used when they should have been.

Power was restored to the hospital by Friday afternoon but with the prediction of rolling blackouts, several power saving measures were introduced during the next work week. All non-essential staff stayed home, others had shifts changed to avoid peak power usage hours. The air conditioning set point was increased (to just below unbearable) and computers were shut off when not in use.

After the SARS crisis earlier this year, this was really a rela-

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From the (New) Editor

Greetings from the 'Peg!

I have recently taken over the role of editor for our InterACTIONS newsletter. On behalf of the readership I would like to thank my predecessor, Pat Cadman, for a wonderful three years of hard work on InterACTIONS. Well done, Pat!! Now begins three years of me bugging you with layout questions, etc., that need your experienced input!

I hope to maintain the great level of quality we have all come to expect from InterACTIONS. This is easy to do when the readership (that means **YOU**!) continue to submit articles, pictures, and other interesting tidbits of information. Please keep them coming! I have always enjoyed the wide range of material in the newsletter: good science in the feature articles, entertaining recounts of conferences or meetings, cool pictures or images, professional affairs and activities, and happenings from specific provinces or institutions across this great country of ours. The list is endless!

This is your newsletter, so don't be afraid to submit material! I look forward to begging, pleading, and possibly harassing content from many of you over the next few years!

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COMP ANNUAL GENERAL MEETING
Edmonton, Alberta
July 6, 2003

Chair: Clement Arsenault
Secretary: Alanah Bergman

Quorum was met.
Meeting called to order by C.Arsenault: 4:15 PM

1. **Adoption of the Agenda:**
Motion to adopt agenda: Alan Cottrell moved to adopt the COMP1 2003 AGM agenda. ***Second:*** Peter O'Brien. ***Vote:*** Carried.

2. **Minutes of COMP July 14, 2002 AGM (Montreal, Quebec):**
Motion to accept the minutes from the July 14, 2002 COMP AGM: C.Duzenli ***Second:*** J.Andrew ***Vote:*** Carried.

3. **Business Arising from the Minutes:** No items.

4. **CCPM President Report:** (B.Clark)

a) ***Membership -*** 17 new members (MCCPM). The radiation safety component was implemented for the first time this year. All membership candidates passed this section. Bylaw changes ratified at CCPM 2003 AGM. Membership exam now has oral component to complement the written exam. To be implemented next year. Membership to represent competency in medical physics.

b) ***Fellowship -*** 6 new fellows (FCCPM). Bylaw changes ratified at CCPM 2003 AGM. Fellowhip to represent excellence in medical physics.

K.Sixel (Chief Examiner) thanked for her effort. It was noted that the CCPM structure is evolving.

5. **COMP Chair Report**: (C.Arsenault)

a) ***Services Offered to COMP Membership***
   1) Website is undergoing major renovations (M.Kolios to discuss in Item #7)
   2) Newsletters (COMP-InterActions and IOMP-Medical Physics World)
   3) Membership directory (updated annually)
   4) Liability insurance (D.Wilkins to discuss in Item #6)
   5) Annual Scientific Meeting

b) ***2003 COMP Meeting, Edmonton, Alberta -*** Sherry Connors, the Local Arrangements Committee, the Scientific Program Committee, Michael Henry, and BarbCallaghan were thanked for their efforts to ensure the Edmonton COMP was successful. The 2003 COMP meeting is CAMPEP accredited. AAPM abstract submission service used this year. Program tailored to meet Canadian content requirements (e.g. added short paper format). Some glitches encountered (e.g. problems with .pdf converter, 1 missing paper from proceedings).

c) ***Conference Committee -*** Undergoing restructuring. Identification of all tasks and redistribution of duties in progress.

d) ***Government Relations -*** C.Arsenault met with Hon.C.Bradshaw (Federal Minister of Labour and Minister of Parliament-Moncton). M.Henry prepared briefing notes w/important issues (e.g. research funding/capital equipment/human resources). Minister receptive, but non-commitive. M.Henry and joint COMP/CCPM executive to contact their MPs to increase profile of medical physics in government. Briefing notes to be reviewed and updated.

e) ***Provincial Liscensure -*** C.Arsenault wrote a letter of support for the Quebec medical physicists. BC physicists also in process of persuing provincial liscensure.

f) ***CAUT (Canadian Assoc. of University Teachers) -*** Asked COMP for support for proposed Post-Secondary Education Act. CAUT mandate to pressure government to establish a federal act that defines goals/money distribution for post-secondary education (similar to Health Act). COMP Chair will write letter of support.

g) ***CRISM (Canadian Radiation and Imaging Societies in Medicine) -*** P.Johns has been representative for several years. CRISM comprised of COMP, CARO, CAR, CANM, CAMRT, CSDMS. Goal to establish joint meetings and to present briefs to senate on common issues.
P.Johns – over years, interst waned. Plans to dismantle this collective.

h) ***Committee Representation -*** Membership should note that there are many national/international committees that have COMP representatives. A comprehensive list available in the membership directory.

i) ***Administrative -*** No bylaw changes this year.
Some clarification about Full/Student membership requirements as it relates to the situation where a Full member returns to studies. Bylaws support the following:
   If a COMP member is also a CCPM member, Full membership is retained.
   If a Full member returns to studies, but continues to work professionally, Full membership is retained.
   If a Full member returns to studies and does not work professionally, Student membership applies.

j) ***Election of Officers -*** The current COMP bylaws define how to approach a call for nominations. However, the bylaws do not indicate a process if no nominations are received. COMP Executive will word something formally and circulate for comment.

k) ***Duties of Officiers -*** Some duties as defined in the bylaws may be changing (e.g. Conference Committee).

Note: Any proposed bylaw changes will be submitted to the membership for comment and the finalized wording will be voted on at the next AGM

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6. **Councillor for Professional Affairs:** (D.Wilkins)

a) ***Scope of Practice -*** SOP for radiation therapy medical physicists completed and has been published in InterActions newsletter. Now working on a sister document for imaging. Need a volunteer from the clinical imaging physics community to help. Medical Physicists in provinces taking steps to licensure should find this document useful.
K.Sixel – How is the Scope of Practice document different from the "Role and Function" document?
D.Wilkins – The SOP is more detailed in terms of day to day activities. It is broader and covers issues such as education, certification, re-certification etc. Two documents complimentary.

b) ***UK Certification*** – compared for equivalency with CCPM certification. Draft report to be published in InterActions in the fall. A review of Australian and French certifications pending.

c) ***Engineers Act and Scope of Practice*** – COMP working with CAP to monitor potential changes to legislature that may effect the practice of physics. Ensuring that "natural sciences exemptions" are present in any changes to Act. C.Arsenault and M.Henry to send information packages to provincial governments.

d) ***Canadian Strategy for Cancer Control – Human Resources Action Group*** - A federal government initiative to assess and react to percieved shortages in cancer care (e.g. medical physicists). COMP/CCPM has four representatives involved in Task Groups #1-4 (Cancer Workforce Problem, Supply System, Staffing Patterns, and Information Data Systems). May result in more funding for education programs.

e) ***Professional Liability Insurance Program*** – COMP responded to requests to arrange for liability insurance packages. PAC organized a broker and the information was sent out in a mailing and was published in InterActions. Response to date quite poor. Private insurance provider may drop the program if demand is too low. Application forms / information available from the COMP office.

C.Arsenault thanked David Wilkins for his past four years of service to the COMP Executive.

7. **Councillor for Communications:** (M. Kolios)

a) ***Webpage Renewal*** – AAPM responded to Request for Proposal (30 page document). COMP Executive agreed to accept their proposal. AAPM to manage COMP website. COMP to use content tools to edit information. AAPM will not handle Canadian money (dues / registration etc.). H.Patrocinio (COMP Treasurer) looking into alternatives. New updates to management system will be available to COMP. Price: $21,000 USD first year, $9,000 USD annual.

Advantages:
i) tools provided by a Non-Profit Organization with same structure/goals as COMP
ii) web interface allows for direct updating by COMP without middle-man
iii) AAPM will be around for a long time. Had previous problems small service providers.
iv) tools for website are well documented and constantly updated

Disadvantages:
i) price
ii) COMP website content will have to be moulded to comply with their system.
iii) AAPM will make small modifications but big modifications must be charged at contract rates.
iv) machine server physically located in USA

Website contract must still be approved by AAPM Executive. Not expecting any problems. Based on American Association of Dosimetrists experience, should take 6 - 12 months to convert COMP website.
K.Sixel – during transition, what is process to get updated material to old website? *M.Kolios* – send to Chair of Committee.

b) ***Electronic Abstract Submission*** – system went down close to deadline, snow caused delay bringing back on line. Pdf converter had problems (e.g. fonts). One paper was not published in the proceedings. Apologized for any inconvenience.

c) ***InterActions Newsletter*** – Pat Cadman thanked for 3 years of service as Editor. Boyd McCurdy new editor. Laura Rodriguez thanked for her efforts to attract corporate sponsorship (ads) to the Newsletter. M.Henry taking on her responsibilities.

d) ***Committee Membership -*** M.Kolios term ending as Chair (Nominations Committee to report). Requested volunteers for Committee.

8. **Radiation Safety and Technical Standards Advisory Committee (RSTSAC):** (G.Mawko)
P.Dunscombe (Chair) not available - G.Mawko to report

a) ***Title / Mandate*** – New name / Terms of Reference approved by Executive. Published in InterActions. Will appear in updated Directory.

b) ***National QA Standards*** – Committee has been reviewing protocols (developed under the auspices of Canadian Association of Provincial Cancer Agencies) that will establish a national standard for radiotherapy equipment use in Canada. Feed-back is being processed and protocols are being finalized.

c) ***CRPA (Canadian Radiation Protection Association)*** - COMP has been informally involved in CRPA (e.g. RSO certification process). COMP/CCPM composed a joint letter of support to CRPA offering a more formal relationship. Positive response. P.Dunscombe to represent COMP.

9. **Treasurer Report**: (H.Patrocinio)
Overhead presentation of statements.

a) ***New Treasurer*** - Stephen Pistorious thanked for his past 3 years of service as Treasurer. The transfer of accounts to the new Treasurer (H.Patrocinio) went smoothly.

b) ***Audit*** - Randy Miller audited the 2002 financial statement. Documents found to be in good order. Recommends asking him to review the 2003 financial statements.
Motion to nominate Randall Miller to audit the 2003 COMP financial statements:H.Patrocinio ***Second***:L.J.Schreiner ***Vote:*** Carried

c) ***2002 Financial Year -***

i)	Net worth:	$176,403.	
ii)	GIC Investments (reserve): (trying to keep 1.5x – 2x operational budget in reserve)	$121,221	(+$4,100 from 2001).
iii)	2002 Total Dues:	$ 47,600	
iv)	2002 Dues Collected by 2002 financial year-end:	$ 32,954	

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ii) 2002 COMP Banquet Income: $ 12,150 (budgeted $12,600)
iii) PMB Subscription Loss: $ 853
(Due to increasing rates not reflected in 2002 dues notices. Rectified for 2003.)
iv) InterActions Newsletter: Broke even
v) Budgeted Transfer from reserve to balance operational budget: $ 30,900
Actual Transfer: Not required due to small COMP net profit of: $ 2,453

d) ***2003 Interm Report*** -

i)	Net Worth:	$180,000	
ii)	Balance Chequing Account:	$ 45,519	
iii)	2003 Dues:	$ 47,834	2003 Dues Collected to date in 2003: $35,994
iv)	Transfers to LAC for 20003 Meeting:	$ 15,000	
v)	Anticipated Revenue from Meeting:	$ 18,000	
vi)	Total Cash Assets:	$ 60,519	
vii)	Key Expenses:		
	AAPM abstract submission / webpage	$ 14,689	
	IOMP dues	$ 1,367	
	CMA dues	$ 855	
	InterActions printing charges	$ 5,425	

e) ***Budget Variance*** -

i) Newsletter budgeted loss: $ 5,500 (actual, $ 0 - broke even due to sponsors)
ii) Subscriptions budget: $ 0 (actual, $ 853 loss – due to increases in PMB)
iii) CAMPEP Meetings budgeted loss: $ 5,000 (actual, $ 0 – meeting at AAPM)
iv) Overall budgeted deficit: $33,000 (actual,$4,000 profit)
Over the last few years, this has consistently shown a discrepancy. Some activities are not budgeted to make money (e.g. scientific meeting), yet vendor support results in some revenue.

K.Sixel – why budget for a Newsletter loss if it will break even?
H.Patrocino – This break-even status has only happened the last couple of years. Could monitor and change at a later date.

f) ***Balance Sheet*** -

i) 2002 Assets less Liabilities same as 2001: $176,000.
ii) Conference 2002 (Montreal)
Budgeted amount and net amount quite close (Budgeted: $12,590 / Actual: $12,145)
Meeting made a profit of: $12,000
M.Evans – where did the $12,000 come from? *H.Patrocinio* – from sponsorship for the COMP "Nite Out".

P.Johns – at what point does COMP cross GST line? *H.Patrocinio* – ~ $200,000. Industry Canada Website states NPO should have no more in reserve than "what is reasonable" (e.g. 1 – 1.5 x operating expenses).
M.Henry - $30,000 income limit (rolling quarter). However, for an NPO this would not include membership fees, sponsorships, or publications. Contacted CCRA - most COMP revenue except interest, is not calculated in $30,000 figure. If the $30,000 limit is reached, COMP will have to pay GST.

g) ***2004 Budget*** -

i) Income section – dues will be adjuted to reflect what we are actually taking in. Usually budget $42,000. Figure is closer to $47,000
ii) Deferred Revenue - The 2003 scientific meeting will bring in money. Use revenues from this meeting to offset expenses in 2004
iii) Society Memberships – Include IOMP, Canadian Council for Research etc.
iv) COMP/CCPM Representation – Increase support for individuals to go to external organization executive meetings (e.g CAMPEP, CMA)
v) "CCPM" Budget Item – has been replaced with "Office Expenses"

Motion to approve 2004 budget: H.Patrocino ***Second:*** C. Arsenault ***Vote:*** Carried

h) ***On-line Payments of COMP Dues / Conference Registration*** – COMP accounts are at TD Canada Trust. They offer an on-line payment package that can handle Canadian and US dollars. Some set-up costs, montly fees, transaction fees involved. Will pursue further.

i) ***Possible Dues Increase*** - AAPM website development / maintenance charges of $9,000 USD is expensive. Discussed this issue with Executive. Will make efforts to find corporate revenues to offset costs. However, may have to consider increasing dues. The $100 full membership fee has not changed since 1990.

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10. **Secretary Report**: (A.Bergman)

a) ***Membership -*** As of May, 2003:

Category	May 2003	July 2002	Change
Full	342	331	+11
Associate	3	1	+ 2
Student	56	32	+24
Retired	1	4	-3
Emeritus	11	10	+ 1
Corporate	19	17	+2
Totals	**432**	**395**	**+ 37**

b) ***IOMP Directory*** - Membership information updated (COMP Executive members, General membership numbers, etc.). 2003 invoice forwarded to COMP Treasurer (H.Patrocinio). IOMP Membership fees are calculated based on membership population ($2.60 US/member). COMP is eligible to nominate two IOMP delegates. Currently the delegates are: C.Arsensault (COMP Chair) and B.Clark (CCPM President).

11. **Nominations Committee**: (G.Fallone)

Call for Nominations published in InterActions.

a) ***Councillor for Communications*** – No prior nominations received by the committee. Using Robert's Rules of Order, nominations from the floor for Councillor for Communications called out 3x. No nominations from floor. Committee nominated: Darcy Mason (Kelowna, BC). Darcy wins by acclamation.
Michael Kolios thanked for his service as Councillor. C.Arsenault – offered a plaque to M.Kolios on behalf of COMP in recognition of his efforts.

b) ***Councillor for Professional Affairs*** – No prior nominations received by the committee. Using Robert's Rules of Order, nominations from the floor for Councillor for Professional Affairs called out 3x. No nominations from floor. Committee nominated: Peter McGhee (Thunder Bay, ON). Peter wins by acclamation.
David Wilkins thanked for his service as Councillor. C.Arsenault – offered a plaque to D.Wilkins on behalf of COMP in recognition of his contribution.

12. **Upcoming Meetings**

a) ***Winnipeg 2004*** – Joint meeting with CAP/CASCA June 13 – 16 at the Delta Hotel. S.Pistorius on LAC. Next week, S.Pistorius is meeting with CAP/CASCA. Will propose a separate COMP/DBMP sessions. COMP will produce own proceedings. Chair Conference Committee is P. O'Brien.

b) ***Hamilton (Brock University) 2005*** – Presentation by Joe Hayward (Hamilton Regional Cancer Centre).
Motion that the 2005 Annual Meeting be held at Brock Universtiy July 6 – 9th: J.Hayward ***Second:*** P.O'Brien. ***Vote:*** Carried

c) ***Joint Meetings*** (C.Arsenault) – Would like feedback on the concept of joint meetings. Suggestions have been made to meet with CARO and again with AAPM.
K.Sixel – what would be the frequency of joint meetings? *C.Arsenault* – For AAPM at least not until after 2009.
K. Brightman – If COMP does meet with AAPM, ensure that we are not paying twice for abstract submission (already paying for this feature with their website service)
M.Kolios – would have to insist on a stronger presence (e.g. more logos, COMP booth)
M.Evans – noted that although the AAPM did the bulk of the organizing, the meeting was still a lot of work for the COMP LAC.
P.Dickof - suggested an identifyable COMP session
S.Connors – currently sitting on conference committee of AAPM. It is up to local host to decide how much to contribute. Important to do all financial considerations up front.

13. **Other Business**

a) ***Plaque of Appreciation*** - C.Arsenault presented on behalf of COMP a plaque of appreciation to Pat Cadman. Pat is stepping down as Editor of InterActions

b) ***Awards Committee*** (L.J.Schreiner) – Looking for volunteer to act as Chair of Awards Committee.

14. **Non-Agenda Items**

a) ***ISBN Numbers*** (J.P. Bissonnette) – Noted that COMP has ISBN numbers on reserve at the national library for COMP proceedings.

b) ***Closing Remarks*** (C.Arsenault) - Thanked Sherry Connors for her efforts in organizing the 2003 Edmonton conference

15. **Adjournment** – ***Motion to adjourn 2003 COMP AGM:*** N.Kulkarni ***Second:*** J.P. Bissonnette. ***Vote:*** Carried.

Meeting adjourned: 5:43 PM.

COMP Treasurer's Report

June 2003 AGM, Edmonton, AB

By Horacio Patrocinio, McGill University Health Centre, Montréal, PQ

2002 Financial Year

The financial statements of the COMP for 2002, prepared by Dr. Stephen Pistorius, were audited by Mr. Randall Miller and found to be in good order, and to accurately describe the financial state of COMP. The following are some of the key highlights of the 2002 financial year:

1. As of Dec 31, 2002 the net worth of the organisation stood at $176,403, which is very close to that of the Dec 31, 2001 figure. Some $59,776 was in our current account (4% above that of 2001 year end), but there was over $6,000 liabilities associated with our Credit Card and cheques that have been issued but not cleared. The value of our GIC investments (reserve) stood at $121,221, which is up by $4,100 over last year (a 3.4% return on investment).
2. 2002 dues brought in $47,600 (Corporate $11,350; Full $35,450 and Student $800) well above the budgeted $42,000. However only $33,000 of these dues were received in the 2002 financial year. 2003 dues had brought in $11,840 by year-end, allowing us to exceed the $42,000 that we budgeted for in the 2002 financial year.
3. The 2003 Budget, which was approved by the membership at the 2002 AGM, has been restructured as discussed. From this it can be seen that in order to balance our operating budget in 2003 we will need to transfer $16,750 from our reserve. The reserve currently is at approximately twice our annual operating expenses and should we be unable to trim our budget in 2004 or make an unbudgeted profit from the Scientific Meeting, an increase in membership dues may be required in order to maintain an appropriate balance in reserve and support any one time development costs.
4. The COMP 2002 Banquet in Montreal made a profit of $12,150, which was very close to the estimated budget of $12,600. Vendor support was some $2,000 lower than was anticipated, but slightly lower costs offset this difference.
5. A $853 loss has been incurred for subscriptions, but subscription costs for PMB have been increased in order to return us to a break-even position in 2003.
6. "Interactions" has broken even.
7. Our 2002 budget had anticipated the need to transfer $30,900 from our reserve in order to balance our operational budget. This was not required and we ended up making a small profit ($2,453). This is largely due to lower than anticipated CAMPEP, Committee, mid-year meeting and Newsletter expenditures.

COMP 2003 Interim Report

As of May 31st, 2003, the balance in our checking account was 45518.91$. An additional amount of 15000$ had been transferred to the COMP 2003 LAC account earlier this year. The total cash assets for the COMP are therefore 60518.91$ that when combined with our current GIC investments of 119129.12$ result in a net worth of approximately 180000$. Our cash assets are lower than last year's amount by approximately 13000$. This is entirely due to a payment to the AAPM for abstract submission and web services of 14689$ made earlier this year. Other key expenses to date include IOMP dues (1366.54$), CMA dues (855$) and printing charges for Interactions (5424.55$). Overall, 2003 dues have brought in 47833.91$ (35993.91$ in 2003). It is anticipated that the annual meting will make a profit of 18000$.

The annual summary form and fee have been submitted to Industry Canada. Mr. Randall Miller has agreed to audit the financial statements of COMP for 2003, subject to the approval of the membership.

BALANCE SHEET (December 31, 2002):

Account	Description	January 1, 2002	December 31, 2002	Notes
ASSETS				
6644-0717-0308413	Bank Account	$57,341.16	$59,776.58	
6644-8044395	GIC Accounts	$117,127.49	$121,221.48	1
	Office Float	$2,000.00	$2,000.00	2
Total Assets		*$176,468.65*	*$182,998.06*	
LIABILITIES				
4520 7080 0044 4449	Credit Card Balance	$331.40	$3,484.84	
6644-0717-0308413	Cheques not cleared		$3,010.24	
Total Liabilities		*$331.40*	*$6,495.08*	
ASSETS LESS LIABILITIES		**$176,137.25**	**$176,502.98**	

Notes 1. Includes interest compounding in investment accounts
2. $2000 float maintained for use by Secretariat

INCOME STATEMENT
January 1, 2002 through December 31, 2002

Account Balance at Jan. 1, 2002 was $57,341.16

REVENUE	
CCPM	
Deposit Adjustments	
HEJ	$560.00
Dues (2002)	$32,954.21
Dues (2003)	$11,840.11
Newsletter	$9,622.54
Other	$149.25
Scientific Meeting	$30,870.49
Subscription	$10,948.89
Interest	$37.53
Membership List	$400.00
TOTAL REVENUE	**$97,383.02**
EXPENSES	
ABR/CMA Accreditation	$835.00
Awards/Support	$1,193.32
Bank Charges	$35.58
CAMPEP	
CCPM	$367.15
Committee Expenses	$1,268.38
Corporate Fees	$30.00
Deposit Adjustments	$43.54
HEJ	$1,093.50
Directory & Publications	$5,261.08
Executive Director	$18,060.04
Mid Year Meeting	$8,894.07
Miscellaneous / Other	$17.47
Newsletter	$9,758.36
Office	$2,171.67
President's Discretionary Fund	$3,976.16
Scientific Meeting	$21,751.35
Secretariat	$6,960.00
Society Memberships	$1,332.03
Subscriptions	$11,802.30
Plaques	$96.60
TOTAL EXPENSES	**$94,947.60**
TRANSFERS	
Transfers to GIC Account	
TOTAL TRANSFERS	**$0.00**
Income less Expenses	**$2,435.42**
Account Balance at Dec 31, 2002	**$59,776.58**

BUDGET

Description	**2003**	**2004**
GENERAL INCOME		
Dues	$42,000.00	$47,000.00
Interest on Chequing Account	$100.00	$100.00
Deffered revenue (2003)		$14,000.00
Membership List	$500.00	$500.00
TOTAL	$42,600.00	$61,600.00
OPERATING EXPENSES		
Awards/Support	$2,000.00	$1,500.00
Bank Charges	$200.00	$100.00
COMP/CCPM Representation		$6,000.00
CAMPEP/CMA/CCS/CAPCA	$4,000.00	
Society Memberships/Sponsor	$2,500	$3,000.00
CCPM	$500.00	
Corporate Fees		$30.00
Committee Expenses	$1,000.00	$1,500.00
Directory & Publications	$3,000.00	$4,000.00
Newsletter	$4,000.00	$4,000.00
Executive Director	$19,000.00	$19,000.00
Mid Year Meeting	$12,000.00	$10,000.00
Office Expenses	$2,000.00	$2,500.00
Plaques	$150.00	$200.00
President's Discretionary Fund	$1,000.00	$1,500.00
Secretariat	$8,000.00	$8,300.00
TOTAL EXPENSES	$59,350.00	$61,630.00
NET (income - expenses)	*-$16,750.00*	*-$30.00*
TRANSFER from Reserve	*$16,750.00*	*$30.00*
RESERVE (first of year)	$118,000.00	$96,650.00
Anticipated Growth	$3,400.00	$3,000.00
Archive	-$1,000	
Web Site Development	-$10,000.00	-$20,000.00
Transfer to Operations	-$16,750.00	-$30.00
RESERVE (end of year)	$93,650.00	$79,620.00
NET CHANGE IN RESERVE	*-$24,350.00*	*-$17,030.00*

Interactive Large Field-of-View Real-time Magnetic Resonance Imaging of the Peripheral Arterial Tree: A Work-in-Progress

By Mohammad Sabati, M Louis Lauzon, Nirupama Nagarajappa, Richard Frayne
Seaman Family MR Research Centre
Foothills Medical Centre / University of Calgary, Calgary, Alberta, Canada

1. INTRODUCTION

Peripheral vascular disease (PVD) is a highly prevalent and painful disorder, which is typically a result of the development of focal lesions [1]. Over time these lesions may lead to claudication, rest pain, tissue loss and, eventually, limb-threatening ischemia, a clinical disaster [2]. While individual lesions are normally focal, PVD tends to be a systemic disease [1] and often affects many vascular segments in the lower extremities. It is imperative that exact information about the number, location, length and severity of each vascular lesion be obtained [1-3]. At most institutions, pre-surgical or pre-interventional planning is done primarily using contrast x-ray angiography in the digital subtraction angiography (DSA) suite [4,5]. While contrast x-ray angiography in the majority of cases provides the required information, it has some limitations and is not without risk, including: exposing the patient and staff to ionizing radiation [3], arterial puncture, and potential allergic reactions to the injected iodinated contrast medium [6], to cite some obvious limitations. Magnetic resonance (MR) angiography (MRA) has been an active area of research for nearly twenty years. Recently, numerous groups have had encouraging results using intravenous gadolinium-based contrast agents in conjunction with MRA, particularly in the carotid arteries, abdomen and the lower extremities [2,3,7-9]. In general, contrast-enhanced MRA (CE-MRA) techniques greatly reduce the scan time and artifacts due to disturbed, in-plane or slow flow [9,10]. These improvements are all due to the large blood signal caused by the T1-shortening effect of gadolinium chelates [11]. Moreover, unlike iodinated contrast agents used in x-ray angiography [12], MR contrast agents have a significantly lower toxicity [13].

The major challenge to all existing and contemplated peripheral MRA techniques is the diffuse nature of PVD and, therefore, the large vascular territory that needs to be covered at moderate-to-high resolution, ideally, in a single examination. Typically coverage of more than 100 cm in the superior-inferior direction is required [3,14,15]. Typical MR imaging techniques are limited to an imaged field-of-view (FOV) of less than 45 cm. A number of investigators have achieved modest-to-good success using MR contrast agents to improve the diagnostic accuracy of peripheral MRA studies [3,7-10,14-17]. Current favoured methods fall into one of two major groups: (1) those that use multiple contrast injections to examine multiple anatomic stations (*e.g.*, pelvic, thigh and calf/foot stations) [16,17], and (2) those that follow the passage of a single injection by rapidly - yet discretely - moving to more inferior anatomic stations [3,8,14]. Some limitations associated with these strategies include the need to synchronize the MR data acquisition to the arterial phase of the contrast agent in all stations, time inefficiency due to delays required for table movement, and the potential for discontinuities at the intersection of the different FOVs. As a result they require a degree of planning prior to imaging and all acquisition procedures are somewhat inflexible.

Recently, we have proposed a novel CE-MRA approach for imaging the entire peripheral vascular tree using continuously moving table methods [18-20]. In these methods, a large FOV (LFOV) is constructed by acquiring MR data as the patient table is continuously translated. Preliminary results with these techniques have shown promise in eliminating some limitations of the discrete station methods. In contrast to multi-station CE-MRA techniques, *our approach images the entire FOV in one session during a single injection of the contrast material, i.e., a single-station/single-injection approach*. The proposed approach uses a new technique known as *Interactive Large FOV Imaging* [19,20]. In this research, we investigated the trade-offs between the space and time properties of a continuously moving table method for peripheral CE-MRA [21,22]. In implementing this technique on an MR scanner, however, significant technical issues arise [23,24]. In this study, the feasibility of implementation of a fully interactive technique has been investigated. We have developed a unique real-time LFOV imaging system for whole-body imaging and peripheral angiography on a clinical MR scanner. Thus far, the results from phantoms and volunteers show the possibility of rapidly acquiring isotropic, seamless images of the whole body and the entire peripheral vascular system during a single examination. Theoretical development, computer simulations, technical implementation challenges and their discovered solutions along with some results are presented here, briefly.

2. LARGE FOV IMAGING

2.1. Theoretical development

MR raw data are acquired in the spatial frequency domain, known as **k**-space. In Figure 1, the hypothetical acquisition of a whole-body image is illustrated. The LFOV is built up by acquiring **k**-space data as a local FOV_x (<40 cm) is translated down the body (in the x-direction, Figure 1a) [18-20]. Initially, a superior limited region is encoded and some **k**-space data are acquired. LFOV acquisitions at a particular (k_y,k_z) phase-encoding value acquire all k_x data in this region during a single readout and this is immediately Fourier transformed and placed into a hybrid $(x\text{-}k_y\text{-}k_z)$-space (Figures 1b and 1c). As FOV_x is translated the entire $(x\text{-}k_y\text{-}k_z)$ space is collected except in the superior/inferior edge regions (dotted regions in Figures 1b and 1c). The superior portions of the image are reconstructed by Fourier transformations in k_y- and k_z- directions of the acquired data [19,20].

(Continued on page 127)

Large FOV MRI (Continued from page 126)

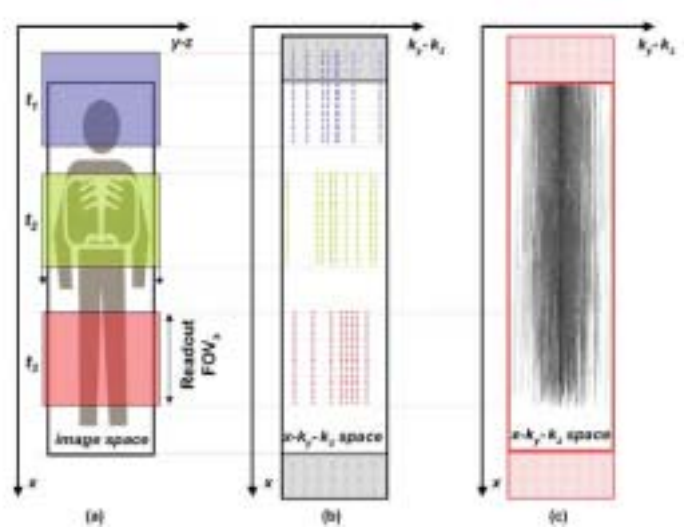

Figure 1: Illustration of the Interactive LFOV Imaging technique. The large FOV is built up as (a) a local FOV$_x$ is continuously translated along the patient. Shown are three FOV$_x$ locations at time-points t_1, t_2, and t_3. Data are immediately converted from k_x to x and placed in (b) a hybrid (x-k_y-k_z)-space. As data are acquired and the FOV$_x$ is translated, the hybrid-space is filled-in. (c) Shows a typical acquisition in hybrid space where the (k_y,k_z) phase-encodings to acquire are determined randomly. Reconstruction is achieved by inverse Fourier transformations in the k_y- and k_z- directions [19].

The proposed LFOV imaging when applied to dynamic imaging such as the passage of a contrast agent is a logical extension of the 4D (3D space + time) sampling problems associated with time-resolved MRA [16]. In peripheral angiography, the challenge is to optimize the space-time properties of the MR data acquisition and match these properties with those associated with the bolus [16,17,21]. To achieve optimal quality in continuously moving table CE-MRA, the translation of the local FOV$_x$ (*i.e.*, the patient table) needs to occur during the arterial passage of the contrast agent, otherwise either enhancement from veins and surrounding tissues will negatively impact image quality or an unenhanced image will be obtained. The goal is to follow the contrast and to keep the contrast-enhanced region-of-interest (ROI) inside the effective imaging area of the scanner. Most 3D "bolus track" peripheral MRA approaches [3,14] use a slow infusion (0.3 to 0.6 mL s^{-1}) of contrast and collect data over tens of seconds. Slow infusion minimizes the uptake of contrast by surrounding tissues. It also spreads out the bolus and allows distal portions of occluded vessels to be enhanced via the collateral circulation.

A naïve LFOV implementation for CE-MRA uses constant translation of the patient table [18]. One limitation of this method, which matches the prescribed table translation to the data acquisition, is that bolus physiology and dynamics vary tremendously from region-to-region and patient-to-patient. A second limitation is that in CE-MRA the acquisition time is restricted if only the first arterial passage of the contrast is to be followed. Rather than restrict the continuously moving table technique to a constant translation rate, a more general approach is investigated in this research. In our approach, the table motion is independent of data acquisition and the readout translation follows (or "chases") the bolus of contrast. Therefore, one can match the table motion to the contrast physiological dynamics with the caveat that portions of **k**-space may not be fully sampled. The major challenge to this technique is that an algorithm needs to be developed to determine the order in which **k**-space data (*i.e.*, which phase-encoding) should be collected. We have proposed acquisition patterns that select the (k_y,k_z)-encoding using flexible phase-encodings distributions [19-22]. This is based on the same assumption as used in time-resolved MRA [16,17], since in general the distributions favour acquisition of phase-encodings near the centre of **k**-space (*i.e.*, **k**= **0**) that contains most of the image power. In conjunction with real-time reconstruction of the hybrid-space, the control of the table translation is tailored, in principle, to patient-specific contrast dynamics. The images are reconstructed and displayed (with minimal latency) to the operator conducting the procedure so the operator can move the table in response to the visualized data.

If a large non-contrast-enhanced image is desired, then the LFOV technique is no longer limited to the bolus transit time, and can be used in a mode where the acquired spatial resolution is inversely proportional to the table velocity. This provides an intuitive interface whereby resolution improves by acquiring more data when the operator slows down or stops the table.

2.2. Simulations

To verify the interactive LFOV imaging technique and to understand its space-time relationship when applied to contrast imaging, computer simulations were performed. New undersampled acquisition schemes for achieving optimal trade-offs between the space and time properties of peripheral contrast imaging were proposed [21,22]. Deterministic and stochastic models were used to select the undersampled phase-encodings. Low spatial frequency acquisitions of hybrid (x,k_y,k_z)-space were used in the deterministic models. For stochastic acquisitions, the (k_y,k_z) phase-encodings were treated as two potentially correlated random variables and five probability distribution functions were evaluated [19-22]. A continuously moving table 3D acquisition scheme was simulated using mask (*i.e.*, non-contrast-enhanced) and contrast-enhanced data acquired from a four-station/four-injection peripheral 3D CE-MRA technique obtained from clinical patients with PVD on a 1.5 Tesla whole-body MR scanner (Sonata; Siemens, Erlangen, Germany). Prior to simulation, the data were registered and concatenated to produce large images which were then resampled to large matrices using sinc and bilinear interpolations. A piecewise linear velocity model was assumed for the contrast. The global root-mean-square (RMS) error was used over the entire image for large-scale quantitative comparisons and for optimization purposes [19-22]. The local RMS error was used for multi-scale evaluation of the methods over smaller ROIs. A new local error assessment method was proposed in which LFOV-size local RMS error maps were generated using an operational window scanning across the projection of the subtracted (enhanced minus mask) images [21]. Four ROIs were selected for local error assessment (defined in Figure 2a). Figure 2a illustrates a

(Continued on page 128)

Large FOV MRI (Continued from page 127)

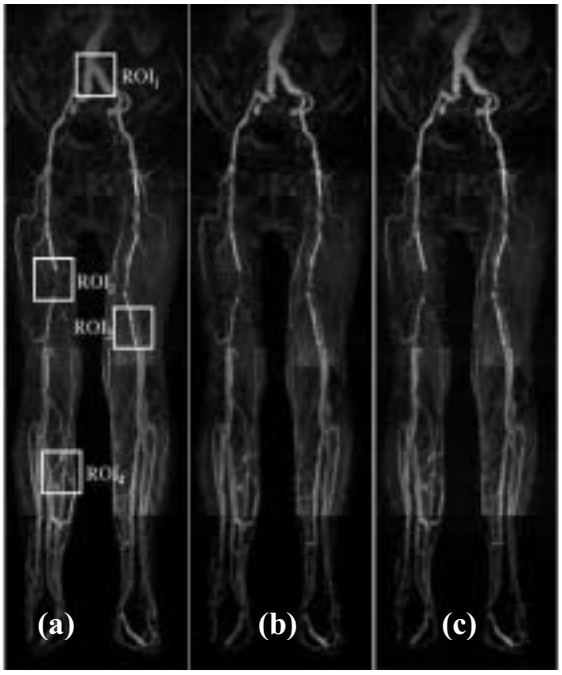

Figure 2: Coronal projection images of (a) full, (b) low-pass, and (c) stochastic acquisitions. The vessels are well depicted using the proposed undersampled acquisitions with some degradation in the spatial resolution. ROI_{1-4} were used for local errors assessment of the undersampled patterns (see text) [21,22].

subtracted image reconstructed after a sequential acquisition of the full hybrid-space assuming a very short pulse repetition time (TR). While this is not a tractable approach (since a TR < 1 ms is needed), it provides a reference image. Figures 2b and 2c were obtained with TR = 5 ms and hybrid-space coverage of about 15% using low-pass and optimal Normally-distributed acquisition patterns, respectively [21,22]. Total acquisition time was assumed to be limited to one minute. The vessels are well depicted. The local RMS error was smaller for deterministic than for stochastic acquisitions inside large vessels (ROI_1). For small vessels (like in ROI_2, ROI_3, and ROI_4), stochastic acquisitions showed a smaller error [21].

3. IMPLEMENTATION

3.1. Scanning procedure and design issues

The acquisition of a LFOV peripheral angiogram consists of preparing the patients with their feet at the magnet iso-centre, zeroing a table position-encoding system, acquiring a LFOV mask image by slowly moving the patient into the scanner, injecting the contrast agent intravenously at slow infusion, monitoring its arrival in the abdominal aorta, and then "chasing" the bolus down the legs. The mask image acquires all hybrid-space data for a high-resolution image. The contrast-enhanced image acquires as many data as possible, *but* the hybrid-space coverage would be limited by the bolus velocity. To implement this technique on an MR scanner three significant issues need to be considered (Figure 3): (a) table positions must be recorded precisely so that the readout data can be placed into hybrid-space correctly, (b) real-time acquisition, reconstruction and display must be developed, and (c) scanner-operator interaction must be enabled [19-24].

3.2. Implementation on a clinical MR scanner

Fast spoiled gradient-recalled echo MR pulse sequences were modified to work in real-time mode with undersampling excitations and acquisitions options [20-22]. We developed a real-time interface for our 3.0 Tesla whole-body MR scanner (Signa; GE Medical Systems, Waukesha, WI) that reconstructs the images rapidly on a dual-processor research workstation installed for this project [23,24] (Figure 3). To avoid latency in transferring data from the scanner host computer, a fibre-optic bus-to-bus adapter was used for the hardware connection. Software, written in Visual C++, Tcl/Tk, and the Visualization Toolkit (VTK), reads the MR raw data directly from the scanner memory. The program performs the Fourier transformations on the readout and the phase-encoding directions independently, each on a separate processor, using a multithreaded method and reconstructs the images continuously. It is capable of displaying six to thirty 2D images per second and two to six projection images per second (constructed from 3D acquisitions) with less than a half second delay on an in-room, MR-compatible, touch-screen monitor accessible to the operator conducting the procedure (Figures 3 and 4c). We have designed and successfully tested a linear, high-resolution (25 μm), wide-range (> 2.5 m), bidirectional, MR-compatible position-encoding system. The encoder module (Figure 4a) consists of a mylar polyester coded disk and a phased-array optical encoder unit built of a lensed optical source and a monolithic detector integrated circuit (E6S; US Digital, Vancouver, WA). The encoder module is mounted to the end of the patient table (Figure 4b), and slides safely inside the magnet bore. A quadrature encoding optically-isolated circuit was designed to read the table position at every TR. Simultaneously, it triggers a software routine that integrates the position information with the sampled readout echoes to accurately build the hybrid-space.

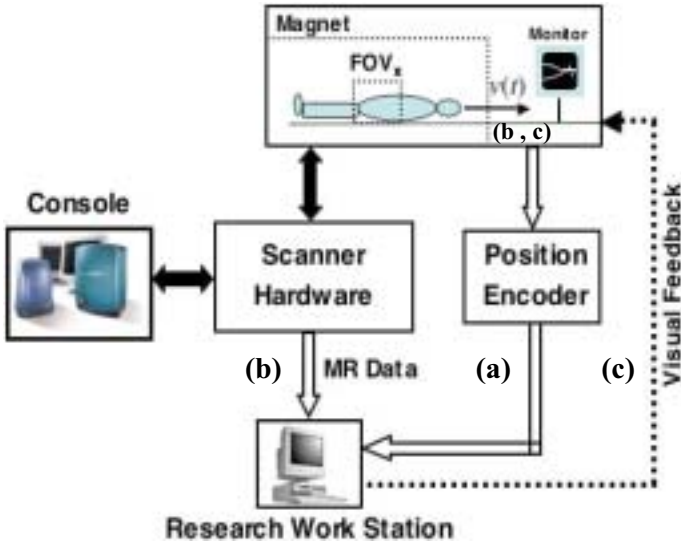

Figure 3: Implementation of the Interactive Real-time LFOV Imaging method on a clinical MR scanner. Additional hardware and software connections and equipments have been added to a conventional scanner (see text for a, b, and c) [23,24].

(Continued on page 129)

Large FOV MRI (Continued from page 128)

Figure 4: (a) Custom-designed position encoder module and (b) how it is mounted to the end of patient table. The position-encoding system provides position information to the workstation in real-time. (c) The operator interacts with the scanner via a "floating" table according to the visualized contrast dynamics displayed on an in-room, MR-compatible monitor [24].

Currently, the system is capable of acquiring, reconstructing, and displaying 2D LFOV images on the in-room monitor while the patient table is translated interactively (Figure 4c). It also provides real-time 3D measurements and projection reconstructions [23,24]. We are currently extending our system for a fast full 3D LFOV reconstruction and visualization.

3.3. Evaluation

The entire LFOV imaging system underwent successful testing phase in phantoms and humans, without and with contrast injection [23,24]. A 125 cm-long angiographic phantom was constructed of plastic tubes of different sizes representing the aortic bifurcation and distal arteries in the legs. The phantom was filled with water pumped at a flow rate of 1.2 L min^{-1}. The following scan parameters were used: FOV_x range 30 cm - 48 cm, TR range 4 ms - 20 ms, and total scan time range 40 s - 90 s using a volume body coil. Contrast dose of 20 mL - 40 mL was injected at 0.5 mL s^{-1} - 1.0 mL s^{-1}. No image post-processing was performed. Figure 5a illustrates a position-time profile of the table for a real-time acquired 2D LFOV phantom image shown in Figure 5e. Figures 5b-5d show real-time FOV_x-size images reconstructed at 5 s, 20 s and 60 s after the injection of the contrast material. The local moving FOV_x, the LFOV, and the total scan time were 40 cm Δ 40 cm (256 Δ 128 acquisition matrices), 145 cm Δ 40 cm (928 Δ 128 reconstruction matrix), and 88 s, respectively. The tubes are visualized with minimal artifact. Note the non-uniform velocity and the inverse motion of the table at 32 s (circled in Figure 5a) without affecting the image quality. Figures 6a-6c show real-time FOV_x-size projection frames obtained at 3 s, 30 s, and 85 s from a 3D acquisition of a healthy volunteer without contrast. Figure 6d shows a middle slice of the 120 cm-long LFOV volume. The local moving FOV_x, the LFOV, the hybrid-space coverage and the total scan time were 35 cm Δ 35 cm Δ 10 cm (256 Δ 256 Δ 24 acquisition matrices) and 120 cm Δ 35 cm Δ 10 cm (877 Δ 256 Δ 24 reconstruction matrix), 12.5% and 88 s, respectively. Initial peripheral angiograms were also obtained from a healthy volunteer. No difference was seen when applying phase twisting along each readout data for subpixel registration required in the constantly moving table method [18]. Overlapped acquired data were linearly averaged. Interestingly, the proposed acquisition patterns greatly reduced the geometric distortions – due to the gradient fields non-uniformities – in the final LFOV images; although image distortions appear at the two ends of fast-reconstructed FOV_x-size frames [24]. Typically, the gradients

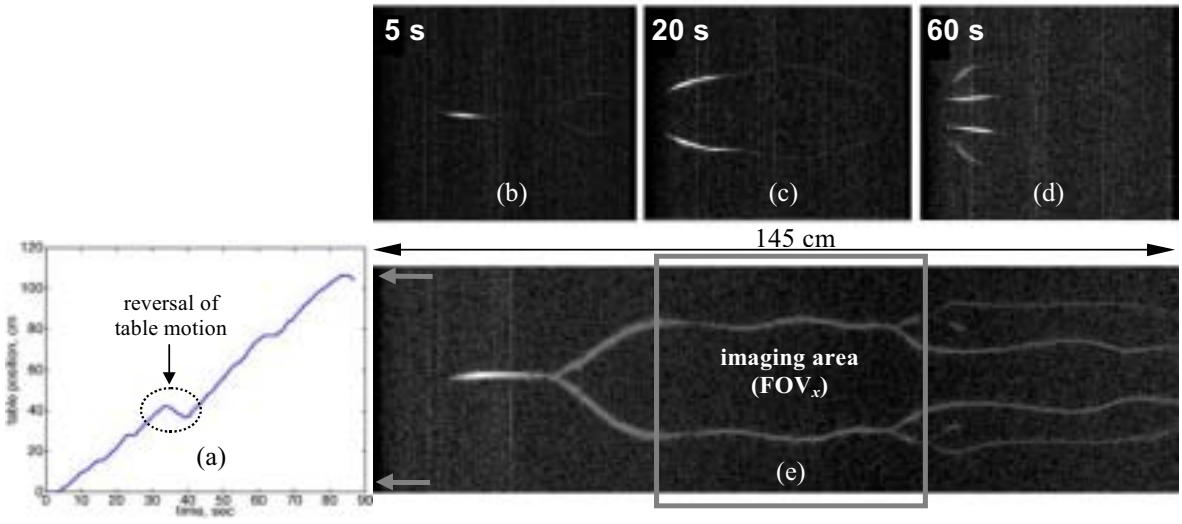

Figure 5: Evaluation of the Interactive LFOV CE-MRA using an angiographic phantom. (a) Table position-time curve, (b,c,d) Real-time FOV_x-size frames reconstructed at 5 s, 20 s, 60s after a bolus of MR contrast agent was injected and as the table was being moved to follow the contrast. (e) The final LFOV angiogram. Contrasts dose of 20 mL was injected at 0.5 mL s^{-1} [23,24].

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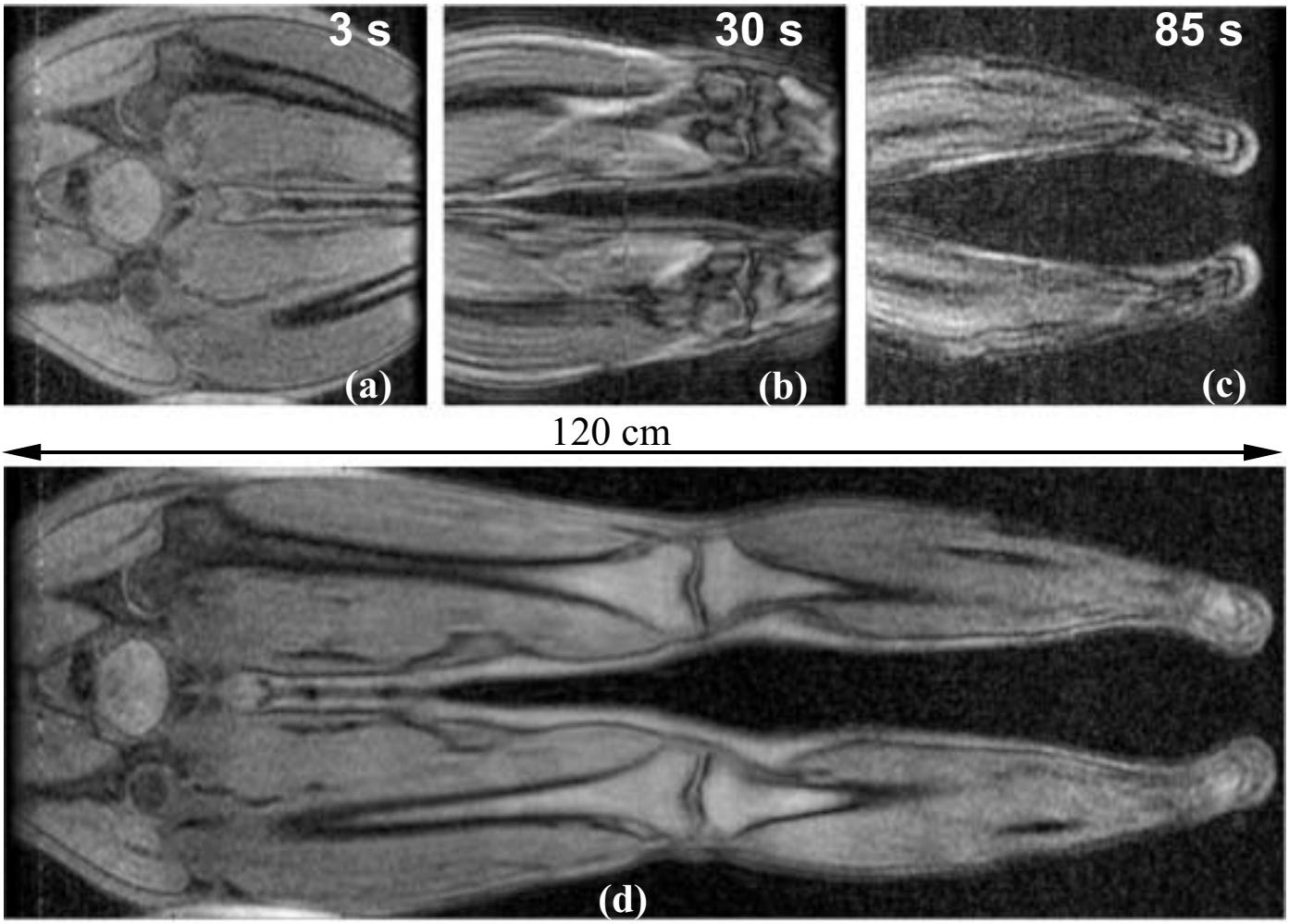

Figure 6: Evaluation of the Interactive LFOV Imaging technique in a healthy volunteer without MR contrast agent. (a,b,c) Real-time FOV_x-size projection frames at 3 s, 30 s and 85 s as the patient table was being moved. (d) One slice from the real-time acquired 3D LFOV volume. Note how the gradient warping effects are greatly reduced and only appeared at the two end of the large image. Hybrid-space coverage was only 12.5%, TR = 4.0 ms, and the total scan time = 88 s [24].

fields become increasingly non-linear when further from the scanner centre. The signal-to-noise ratio (SNR) of the images can be improved by using a dedicated peripheral receiver coil. However, the scanning parameters and the implemented LFOV imaging system need to be optimized for the best image quality.

4. DISCUSSION

A novel strategy for fast and accurate whole-body MR imaging is proposed in this research. We have shown the feasibility of a real-time, interactive LFOV imaging technique for peripheral angiography during the use of a *single* injection of an MR contrast agent. This new technique is based on interactively moving the acquired data window in conjunction with the use of novel data acquisition orders and real-time reconstruction. The imaging strategy used in the interactive LFOV technique is based on the realization that the 3D Fourier reconstruction is a decomposable process. This allows one to define a large hybrid (x-k_y-k_z)-space with the same length as the table displacement while acquiring the MR data [18-20]. Every sampled readout echo can be precisely placed in the proper location of the hybrid-space providing accurate measurements of the table position [23,24].

The suitability of decoupling the table motion from the **k**-space acquisition scheme for the continuously moving table technique was also investigated. A key advantage of the proposed technique is the operator interaction via a "floating" table during the passage of contrast, by which s/he can move the table independently of the playout of phase-encoding views, optimize the imaging procedure and correct some artifacts (Figure 4c). The primary means of achieving this interaction is by matching the rate of table motion to the contrast passage through the legs (Figure 5). In principle, it is also possible to move FOV_x superiorly (*i.e.*, ante-grade) if a particular slow-filling pathology is of interest (Figure 5a).

In this study, we also investigated optimal trade-offs between the space and time properties of the LFOV imaging method to produce high-resolution peripheral CE-MR angiograms. Two undersampling acquisition strategies were proposed in this

(Continued on page 131)

Large FOV MRI (Continued from page 130)

regard. In general, a complex relationship between the hybrid-space coverage, acquisition order and the table velocity is seen when the scan time is limited such as in dynamics imaging. While this study indicates that optimal patterns and parameters exist, the best strategy is not yet known [19-22].

We have developed a real-time prototype applicable for acquisitions of continuously moving table whole-body MR imaging and peripheral CE-MRA methods. Fast MR sequences that have high SNR together with undersampled acquisition schemes were implemented in this system. Initial assessments of the proposed technique in *in vitro* and *in vivo* studies, with and without contrast, show encouraging results in rapidly producing large seamless images without requiring computationally-expensive corrections for gradients distortions. However, implementation of a fast full 3D reconstruction algorithm is necessary for chasing the contrast down the legs allowing a comprehensive 3D study of the entire peripheral arterial tree in a few minutes.

5. CONCLUSION

Developing robust and patient-friendly techniques for assessing PVD and potentially for following the response to therapy is highly important. In order to select between current medical, surgical and interventional therapies, high-quality angiograms of the entire peripheral circulation are necessary. Our ongoing research is towards developing an optimal *Interactive Large FOV Peripheral MRA* technique that will provide a minimally invasive, quick, and painless method for evaluating PVD with image quality similar to DSA, without any of the aforementioned risks.

ACKNOWLEDGEMENTS

This research is supported by the HSFC, the AHFMR, the NSERC, and the Whitaker Foundation. Mohammad Sabati is the recipient of a Doctoral Research Award from the HSFC. Richard Frayne is an AHFMR Medical Scholar and a HSFC Research Scholar. We thank Raymond W. Lau and Ben Wong for their technical help.

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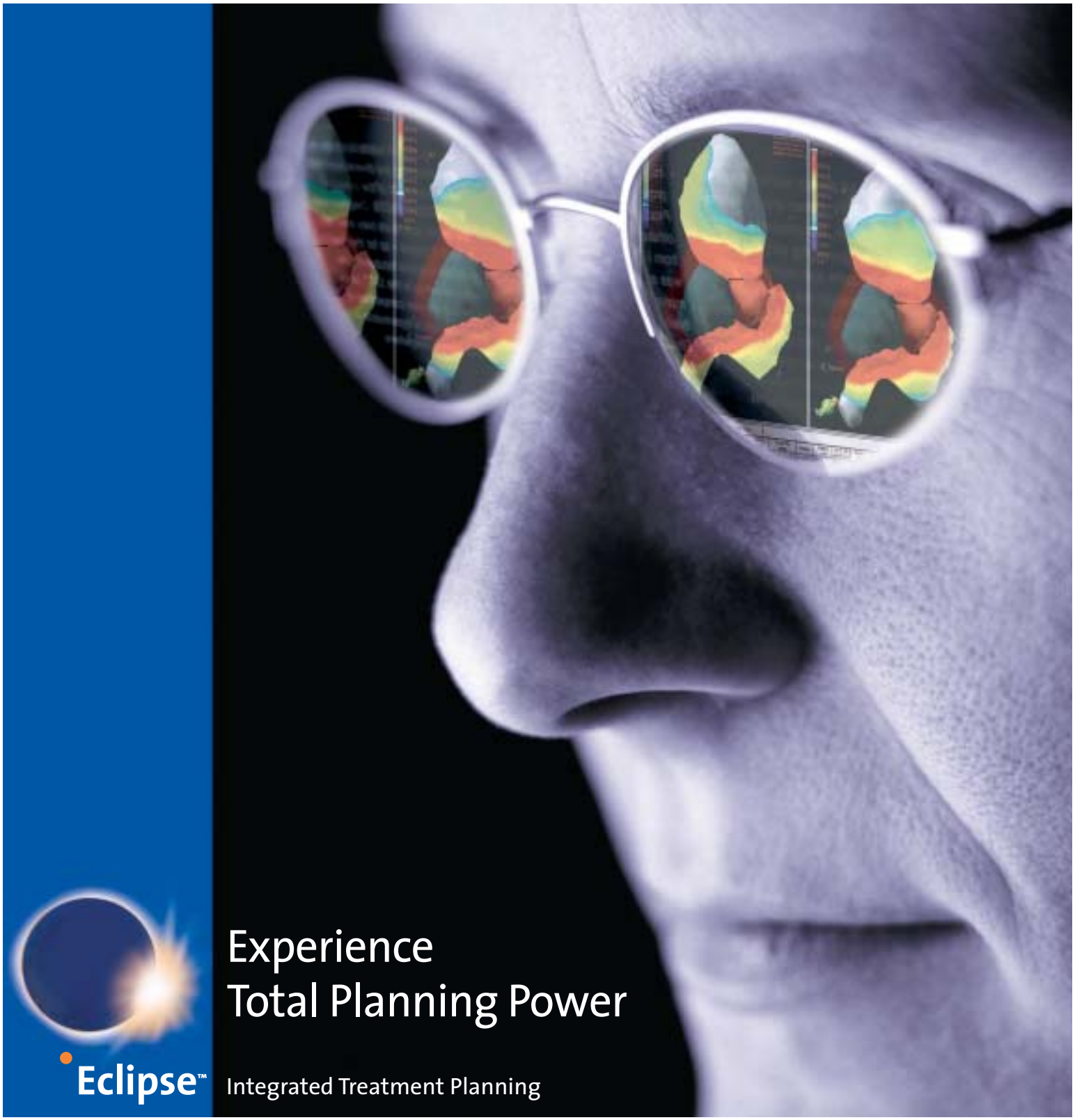

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OF MEDICAL PHYSICISTS

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Fax: (780) 432 8615
E-mail: gfallone@phys.ualberta.ca

An election by mail ballot will be conducted in the spring. The results will be reported at the Annual General Meeting in Winnipeg in July 2004.

Les résultats seront rapportés à la réunion générale annuelle à Winnipeg en juillet 2004.

Canadian College of Physicists in Medicine Examination Schedule 2004

Membership Examination:
Applications due: 9 January 2004
Examination date: Written 20 March 2004
Oral 29 May 2004
Fee: $150.00
Decisions announced on February 6

Fellowship Examination:
Applications due: 9 January 2004
Examination date: 9 June 2004

Fee: $200.00 (in Winnipeg)
Decisions announced on February 6 (or later for those who do the membership exam)

Note:

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

It is critical for the success of your application that you respect the deadlines.

For further information contact the Registrar:

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

Canadian College of Physicists in Medicine
Chief Examiner's Report 2003

By Katharina Sixel,
Toronto-Sunnybrook Regional Cancer Centre, Toronto, ON

Membership Examination 2003

24	Candidates
21	Radiation Oncology
2	Magnetic Resonance Imaging
1	Diagnostic Radiology
17	Pass
7	Fail
71%	Pass rate

Pass candidates: Ian Cameron, Gordon Chan, James Chow, Alexei Chvetsov, Frédéric Dubé, Ermias Gete, Elizabeth Henderson, Scott Karnas, Tomas Kron, Richard Lee, Cathy Neath, Chor-Yi Ng, James Robar, Giles Santyr, Stephen Sawchuck, Carrie-Lynne Swift, Christine Yu

All successful candidates were elected Members of the Canadian College of Physicists in Medicine at the Annual General Meeting on June 5, 2003 in Edmonton.

Fellowship Examination 2003

9	Candidates (all Radiation Oncology)
6	Pass
3	Fail
66%	Pass rate

Pass Candidates: Jeff Chen, Robert Corns, Tony Falco, Tomas Kron, Paul Ravindran, Wieslaw Wierzbicki

All successful candidates were elected Fellows of the Canadian College of Physicists in Medicine at the Annual General Meeting on June 5, 2003 in Edmonton.

Congratulations to all new Members and Fellows and Welcome to the College!

On behalf of the CCPM, I thank all Invigilators and the Examination Committees of both exams. The exam process would be impossible without the participation our members.

I would also like to take this opportunity to remind anyone considering the exam for next year of the bylaw changes voted upon at this year's AGM. In 2004, the Membership exam format will change to include an oral component. The oral exam will be held after completion and evaluation of the written portion, and will test practical clinical competency in the candidate's specialty. The bylaw changes can be found in the new COMP/CCPM directory. Further details of the new examination process will be posted on the COMP/CCPM web site as of October 1. Finally, anyone seeking additional information or clarification regarding the exam should always feel free to contact me by email or telephone.

Medical Physicists of British Columbia, UNITE!

Submitted by Darcy Mason,
Centre for the Southern Interior, BC Cancer Agency, Kelowna, BC

A new medical physics organization has been formed in British Columbia, due to the efforts of six physicists working for the BC Cancer Agency. The British Columbia Association of Medical Physicists was formed in response to a proposed re-writing of the Professional Engineers' and Geoscientists' Act (which would have had an impact on the practice of medical physics in BC). Formation of the association is the first step toward recognition of Medical Physics under the BC Health Professions Act.

The constitution states that the purposes of the society are:

a) to represent the interests of medical physicists practising within British Columbia;
b) to promote within British Columbia the recognition of the importance of certification by the Canadian College of Physicists in Medicine (CCPM) and to encourage eligible society members to become Members or Fellows of CCPM;
c) to promote and encourage the development of scientific knowledge towards the applications of physics to medicine;
d) to further the exchange and publication of scientific and technical information relating to the science and practice of medical physics;
e) to promote educational opportunities in those disciplines which support the science and practice of medical physics;
f) to assist in the development and protection of professional standards in the discipline of medical physics, and
g) to link to the activities of other societies, associations or organizations, whether provincial, national or international, having objectives relevant to the foregoing.

The six applicants for incorporation automatically become the first directors until elections at the first Annual General Meeting. They are:

Past President - Wayne Beckham
President – Greg Kennelly
Vice President – Rasika Rajapakshe
Secretary – Alistair Baillie
Treasurer – Ingrid Spadinger
Counsellor – Cheryl Duzenli

The annual membership fee is $20. A membership of at least fifty is required to qualify for registration under the Society Act, which would protect the occupational title "Medical Physicist" within the province of British Columbia. Everyone involved with medical physics in B.C. is encouraged to consider joining.

The present and future of Intensity Modulated Radiotherapy in Canada

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

The Clinical Trials Group of the National Cancer Institute of Canada is investigating the feasibility and timing of initiating radiotherapy trials involving the new treatment technique of Intensity Modulated Radiation Therapy. To gauge the level of interest in IMRT both now and in the future and to understand where Canadian centres are today with respect to this new technology, a survey was conducted in the Fall of 2002. The survey forms, which were distributed to the heads of radiation oncology and physics in 32 centres, sought information in seven general areas. Responses from the two groups were 75% and 100%(following threats and inducements) respectively although incomplete information was sometimes returned. A brief summary of the information gleaned is as follows.

There is very strong interest in the Canadian radiotherapy community in participating in NCIC sponsored trials involving IMRT. Over 90% of centres confirmed their interest through this survey.

About 25% of centres stated they are ready now to support such a trial. A further 50% thought they would be ready in 1-2 years.

In terms of current technical capabilities, over half the centres have treatment planning systems which can perform inverse planning and 60% can fuse CT and MR images. Both these numbers are predicted to rise to 100% in the future. A range of treatment planning systems is in use across the country. CADPlan, Pinnacle, Theraplan and Helax are all represented at multiple sites. Approximately one third of the centres surveyed had already inverse planned an IMRT treatment in the head and neck region with slightly fewer having developed such plans for other sites. As a delivery verification method, film is the most widely used followed by measurement(s) in an anthropomorphic phantom. Although six centres reported having treated patients with IMRT only four have treated more than 30 each.

The step and shoot delivery method is currently the most widely available and is predicted to remain so into the future.

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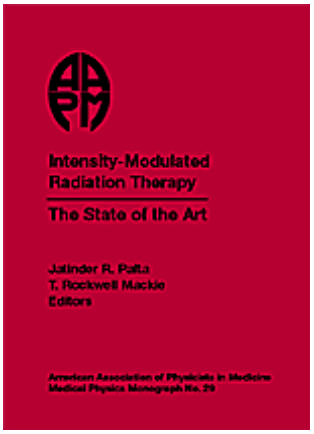


Book Review

Intensity-Modulated Radiation Therapy: State of the Art

AAPM Medical Physics Monograph No. 29
Editors: Jatinder Palta and T. Rockwell Mackie
Publisher: Medical Physics Publishing
ISBN 1-930524-16-1

Reviewed by: Patrick Cadman, Saskatoon Cancer Centre

This AAPM monograph provides the proceedings from a five-day program on IMRT presented at the 2003 AAPM summer school in Colorado Springs, Colorado. The preface to the book states that "the goal of the program is to present a snapshot of the current IMRT planning and delivery technology, to discuss issues that confront safe implementation of IMRT, and finally to encourage a reflection on the future of IMRT." The book certainly does all this.

The editors should be congratulated on the diversity and scope of the topics covered and their selection of contributing authors. They point out that the presentation is designed for practicing medical physicists who are not specialists in IMRT. I believe that anyone with a professional interest in IMRT (including administrators) would find important and interesting information presented, from historical to future perspectives, technical and social issues and clinical considerations.

As a proceedings, this book lies somewhere between a reference text and a general compilation of knowledge accumulated to date on IMRT. Certainly there is no general index to point you to a particular word or concept so finding a specific piece of information might prove a little difficult. However, the chapter headings are adequately descriptive and progress nicely to cover most general topics of interest in IMRT. Also, the monograph might have less editorial input than a regular reference text and the quality of the presentation do vary somewhat, but generally they stay on topic and represent a considerable and quality effort on the part of the authors. Even though the nitty-gritty details may be purposely omitted, there are always plenty of references to more complete and academic works.

The general feeling that I get from the presentations is that IMRT is still in its infancy (maybe a pre-teen) and that attitudes vary greatly about the clinical acceptability of IMRT techniques at this stage of development. It is interesting to observe that IMRT has evolved to the point where the experts are able to reflect on the main issues that have arisen, in a meaningful way. Many of the authors direct us to think carefully about the issues before adopting IMRT in clinical practice; from this perspective alone, the book is worth a careful read.

A list of acronyms (so that's what MEAT really means) and a CD which contains pdf files of the chapters in the book. In some cases, color reproductions of the figures in the book are provided. There are also animated files by Paul Keall et al. from their chapter on Dynamic MLC IMRT.

Usually reading a good book makes me curious to see the movie but in this case reading the book makes me wish I had attended the summer school. Unfortunately, since I was unable to attend, I cannot comment on how well this monograph reflects the quality and content of the presentations in Colorado Springs. However, I do feel that it makes an excellent stand-alone reference on IMRT. Is there still room for more technical and clinically oriented books on IMRT? Definitely. Would I consider this book an essential addition to my fledgling library on IMRT? Most definitely.

The Present and Future of Intensity Modulated Radiotherapy in Canada
(Continued from page 137)

This is followed by dynamic MLC (sliding window) and intensity modulated arcs.

Those centres, the majority, which had not yet implemented IMRT were asked to rank, from a list, the biggest impediment to its introduction. By a good margin the greatest obstacle was thought to be the shortage of manpower. This was followed by the capability of the treatment planning system, linac hardware and the problems of verification. Lack of interest in IMRT on the part of radiation oncologists and physicists was rarely identified as an impeding factor.

Those centres which had established clinical IMRT programs were asked to rank the challenges they had faced during the implementation phase. Once again manpower headed the list. This was followed by verification activities, treatment plan generation and set-up/delivery time on the machine.

Overall our survey has confirmed the significant interest in participating in IMRT trials by Canadian cancer centres. Although only 4 centres have significant clinical experience in this area, 75% of centres estimate they will be in a position to contribute to such a trial within the next two years. Both for centres active in the field and those intending to be, manpower issues seem to constitute the greatest impediment.

Matt Parliament and Peter Dunscombe
for the Radiation Oncology Quality Assurance Committee

The CTG Physics Quality Assurance Survey: 2002

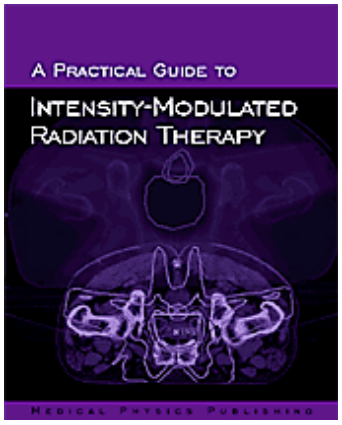
By Peter Duncsombe (for ROQAC), Tom Baker Cancer Centre, Calgary, AB

In 2000 the Radiation Oncology Quality Assurance Committee of the Clinical Trials Group carried out a survey of physics quality assurance activities in participating CTG centres in Canada. The primary intention of this self reporting survey was to accumulate documentation sufficient to confirm that adequate standards in this regard were being met across the country. The survey required the responses to nine straightforward questions and thus was not onerous for the heads of physics to whom it was directed.

The survey was repeated, using the same questionnaire, between December 2002 and March 2003. The results are reported briefly here.

All 32 centres contacted did eventually respond with 75% reporting that they did participate in the quality assurance program of the Radiological Physics Center (RTOG). Of particular significance in the responses is that no beam of all those checked (probably in excess of 400 beams) using the mail out TLD service of the Radiological Physics Center failed to meet the 5% criterion of accuracy of output, cGy/MU. Over 90% of responding centres reported having had their local dosimetry ion chamber calibrated by an approved facility within the previous 3 years. 70% of centres stated that their quality control protocol for treatment machines is consistent with the TG40 document of the AAPM, with the remainder complying with the provincial standard developed in Ontario. The only notable difference between this recent survey and that of 2000 is that implementation of the new AAPM dosimetry protocol, TG51, has doubled from 25% to 50%. This conversion to the new protocol is expected as it was endorsed by the Canadian medical physics community some time ago. However the migration is relatively slow.

In conclusion, this self reporting exercise has confirmed, once again, that standards of physics quality assurance and dosimetry in radiotherapy across the country are at least satisfactory.



Book Review

A Practical Guide to Intensity-Modulated Radiation Therapy

Authors: Memorial Sloan-Kettering Cancer Centre

Publisher: Medical Physics Publishing
ISBN 1-930524-13-7

Reviewed by: Heather Thompson, Cross Cancer Institute, Edmonton, Alberta

This text is exactly what the title suggests: A practical guide to IMRT. It was written by the staff at MSKCC as a resource for physicians and physicists embarking on the implementation of an IMRT program.

Introductory chapters cover the basics of imaging, optimization, and intensity modulation. Current imaging technologies are discussed as well as those that haven't yet entered into routine clinical use, such as MRSI. The discussions are not always comprehensive, but there are many references for the reader who wishes to investigate further.

Later chapters on IMRT system acceptance, commissioning, and QA are detailed enough to serve as useful guidelines for implementing an IMRT program. Varian linacs are used in the examples given, but the tests described could be translated to MLCs from any manufacturer.

The concluding chapters cover the treatment planning and delivery of IMRT treatments in various clinical situations: prostate, head and neck, breast, pediatric cancers, lung, and large field treatments. Most of these chapters follow the treatment process from CT through to outcomes and would be useful to all members of the treatment team.

One of the features I appreciated most about this text was the honesty of the authors. They do not overstate the case for IMRT. They warn of pitfalls and point out shortcomings of currently available planning and delivery systems. They discuss problems they have encountered in their IMRT program and describe their solutions to the problems they have solved, and openly admit that there are problems that have not yet been solved.

As pioneers in the field of IMRT, the authors of this text are particularly well qualified to present the topic. This would be a useful addition to the library of any institution embarking on an IMRT program or evaluating the state of their current program.

Report on the Medical Physics Summit

By Alain Gauvin
CHUM—Hôpital Hôtel Dieu
Montréal, PQ

On July 31st, I attended the "Medical Physics Summit", a meeting of representatives from multiple professional societies in which medical physicists are involved. The meeting took place in Pasadena, California. I was representing the Canadian College of Physicists in Medicine which had been invited to send a representative. The meeting has been organized by Dr. Rick Morin, a medical physicist closely involved with the American College of Radiology, to discuss professional topics of interest to all medical physicists.

Medical physicists from the following professional organizations were presents:

-American College of Radiology (ACR)
-American Association of Physicists in Medicine (AAPM)
-American Brachytherapy Society
-American Society for Therapeutic Radiology and Oncology
-Canadian College of Physicists in Medicine (CCPM)
-American College of Medical Physics
-Society for Computer Applications in Radiology
-International Society for Magnetic Resonance in Medicine
-American Board of Radiology (ABR)

The meeting started with a presentation by Dr. Rick Morin about the ACR standards and accreditations.

Two main categories of standards are now identified by ACR: practice guidelines and technical standards. The former is more general in nature, and defines the general ACR requirements for performing a certain procedure. Such requirements comprise the qualifications of the individuals involved and the reporting of results. Perhaps of greater interest to physicists are the technical standards, which as their name indicates are more technically detailed in specifying what equipment is required for carrying out certain procedures, and in identifying the associated quality control that accompany them.

An overview of the various accreditation programs of ACR was then presented. The mammography accreditation program was the first such program, and was for a long time the only accreditation program run by ACR. That program was adopted by the Canadian Association of Radiologists (CAR), which manages it in Canada. Many other accreditation programs have now been established by ACR: radiation oncology, stereotactic breast biopsy, breast ultrasound, general ultrasound. MRI, nuclear medicine, CT and radiography/fluoroscopy. None of those other programs has so far been adopted by CAR, but it was mentioned during the meeting that various facilities outside of the US, including in Canada, have directly inquired to the ACR about accreditation in some of those programs. ACR does not limit the accreditation applications which it receives to US facilities.

A discussion followed the presentation of Dr. Morin. Some suggested that the ACR standards were having a limited impact on the practice, by virtue of the adoption process which requires a large consensus, possibly watering down requirements. The possibility for the ACR to team up with appropriate organizations to come up with "joint standards" was also raised.

A discussion about the creation of reimbursement codes ("CPT codes", used by US health insurers) followed. Concern was expressed about the process. It was felt that codes for procedures employing new technologies in imaging or therapy were sometimes created despite a lack of sufficient scientific evidence for the validity of those new methods. Ways for physicists to bring an input to such code creation were discussed, particularly the possibility of combining the participation of physicists from many societies, and fund an evaluation effort through some existing grant programs. Such an entity, if established, would then "filled the gap" between the FDA approval of new technologies, and the creation of corresponding CPT codes as the former does not always justify the latter.

Two other discussion topics were then raised.

Firstly, the emergence of state licensure in some US states, such as New York. In some cases, it was felt that the process was intensely bureaucratic and expensive. The principle of state licensure was however regarded favourably in one respect: it generally carries the requirement of certification for physicists who seek that licensure, and effectively makes certification a legal requirement in those states.

Secondly, the rewriting of NCRP Report 49 (the classic document dealing with facility shielding) under the auspices of both NCRP and AAPM was mentioned. Two rewritings are under way, one for diagnostic radiology which is nearing completion, and another one for radiation oncology which is somewhat further from being finalized. A concern for the possible inclusion of a 0.25 mSv dose limit, which originates from NCRP Report 116, was brought up and raised unanimous concern by all participants to the meeting from the low risk associated with such a dose level, no matter which risk model is employed.

In the afternoon, Dr. Stephen Thomas presented an overview of the upcoming certification renewal process for holders of ABR certificates, including both physicians and physicists. Since 2002, ABR certificates have been emitted for a limited duration, 10 years. Once the 10 year period is elapsed, the renewal is conditional upon the success in meeting the renewal criteria, which are yet to be finalized. Dr. Thomas exposed the various components under evaluation for the renewal of ABR certificates. One interesting feature which might be part of the process is that it might be ongoing, and would allow candidates to follow up their progress towards meeting the renewal

(Continued on page 141)

Report on the Medical Physics Summit *(Continued from page 140)*

requirements prior to the expiration of the certificate. The participants demonstrated interest for some aspects of the process used by CCPM, notably the inclusion of teaching and scientific activities towards renewal. Interest for some aspects of another Canadian renewal, process, this time as used by the Royal College of Physicians and Surgeons, was expressed. Until the renewal requirements are finalized, holders of certificates emitted in 2002 or after do not currently know how they will have to renew those certificates, but this fact might be initially taken into account.

Another Intersociety meeting will be held next summer, this time in Quebec City, on August 1st 2004. Some of the topics that this meeting is likely to include are the intersociety technology assessment effort discussed during the 2003 meeting, the coordination of recognition for continuing education opportunities in light of the multiple providers for such opportunities, an update on the process of ABR recertification, and a discussion on intersociety cooperation. Further planning towards preparing that meeting should take place during the fall of 2003.

Report on the AAPM Summer School: IMRT State of the Art

By Boyd McCurdy
CancerCare Manitoba
Winnipeg, MB

All I can say is, 'WOW'! This was a fantastic summer school. Some may say that, this being my first summer school, I was easily impressionable. But I have to say to them, 'WOW'! This year's AAPM Summer School took place at beautiful Colorado College in Colorado Springs, CO, June 22-26. Attendance was approximately 450, significantly higher than the initial hard-cap maximum of 250 set earlier in the spring. The audience was primarily from the USA, but there was plenty of international representation from neighbour's Canada and Mexico, as well as Europe, Asia, Australia, and South America.

The daily schedules were set up by some sort of demonic, slave driver! Lectures began at about 7:45 am and ended around 5:15 pm, with a lunch break in the middle. You'd think that would be enough, right? Of course not!!! We're masochistic medical physicists! After a short dinner break, an evening lecture/ discussion period ran from 7:30-9:30 pm. At least there was beer and snacks at the evening sessions, which ensured a good turnout for these. Some of us tried in vain to convince the organizers to extend this 'carrot' to the afternoon sessions (sigh).

The scientific program directors were Rock Mackie and Jatinder Palta. They did an excellent job ensuring an absolutely top-notch group of speakers. The quality of the talks was, in general, very good. These were among the best scientists in this field in the world, giving 45 minute lectures on topics they are intimate with. I found the long talk format much more educational than the shorter oral presentations typically delivered at annual conferences. I was very proud to see some fellow Canadians (and ex-pat's too) making presentations, including Jerry Battista, David Jaffray, Rock Mackie, Michael Sharpe, and John Wong. The 888 page tome which comprises the proceedings for this summer school will be a critical reference in the field for many years to come (note: see Pat Cadman's review of the proceedings text elsewhere in this issue).

The after-dinner discussions were also useful and informative. They were delivered in an open atmosphere (ie. not typical lecture theatre style), and there was always plenty of lively discussion surrounding the evening topics. Often, deliberations among several attendees would last well into the evening (I do not think this had anything to do with the convenient free beer, but I could be mistaken). I found one of the most useful aspects of this summer school were the informal discussions with fellow attendees (not necessarily faculty) on what problems they are enduring at their own centres. This gives you a real sense of the practical issues that people are encountering, and how they are dealing with them.

Of course, it wasn't ALL work! Every lunch break allowed time for games of ultimate frisbee, beach volleyball, or soccer (or just a good old-fashioned walk). This was a brilliant strategy for staving off the post-lunch doldrums, although not always 100% effective! We also managed to get together a large group of Canadians (with the occasional Aussie and American thrown in) for a few pints at a downtown venue late one evening. On the final evening of the school, an "AAPM Idol" contest was scheduled in place of the typical discussion session. Throughout the week, attendees were urged to sign up for this public humiliation. Surprisingly, at this physics conference where introverts ran amok, a few people did actually perform! There were a couple of brave Canadians among the entries. Michael Hale did an excellent job on a traditional highland folk song. Jerry Battista provided guitar and accompanying vocals for the musical quartet *Art and his Old Farts,* consisting of himself, Art Boyer, Sam Hancock, and Larry Langrill. They performed several well-known songs with the lyrics rewritten to reflect the theme of the summer school. The audience was often reduced to tears, and the entire evening was enjoyed by all. Art Boyer was kind enough to send me the lyrics, which appear here. I myself had a lower lip muscle strain (consumption related) which prevented me from showcasing my internationally renowned kazoo playing talent… yeah, that's the ticket!

The organizers clearly did a lot of work to make this summer school the great success that it was, and they deserve a huge amount of credit for their efforts. Note that COMP/CCPM

(Continued on page 142)

Report on AAPM Summer School (Continued from page 141)
members Sherry Connors and Will Parker contributed well to this organizing team. Good job!

If you get a chance to go to a future AAPM summer school (and you are interested in the main topic, of course), then GO! You will not be disappointed!

Photographs on the following pages are courtesy of Michael Tassotto, Northwestern Ontario Regional Cancer Centre, Thunder Bay, ON, and Sherry Connors, Cross Cancer Institute, Edmonton, AB.

AAPM Idol (aka 'Talent Night')

Now, with kind permission of the offending artists, here are some of the lyrics of **Art and His Old Farts** (Larry Langrill, Jerry Battista, Sam Hancock, and Art Boyer):

(to the tune of "Song of Old San Antone")
– mostly Art's fault

Refrain

Deep within my heart lies a melody
A song of IMRT
Where in dreams I live with a memory
Of life before IMRT

Verse

It was late at night, and all the staff did flee
My plan did not have a CTV
The screen did flash "your file cannot go free"
You need a password from I.T.

Repeat Refrain

(to the tune of "Blowin in the Wind")
– mostly Larry's fault

How many times must you alter a plan, before the doc signs and dates?
Yes and how sharp a shoulder must the target line have, before it's a good DVH?
And how many moves can a prostate make, before the MU's terminate?
The answer my friend, is breaking in the wind, the answer is breaking in the wind.

How many times will you QA a plan, before the pronouncement is "good"?
Yes and how many films in a Rando phantom man, before the result's understood?
Yes and how many times must you begin again, when you're not in the greatest of moods?
The answer my friend, is breaking in the wind, the answer is breaking in the wind.

(to the tune of "It's a Wonderful Day")
– mostly Jerry's fault, as sung by "Satchmo" Louis Armstrong

I see tungsten leaves, some moving too.
I see them zooming, for me and for you.
And I think to myself, what a wonderful plan.
I see skin turning red, and techs turning white,
The light field is set to the radonc's delight.
And I think to myself, what a wonderful plan.
The accountants for the doctors, so pretty in their ties,
Are counting up the charges with dollars flying by,
I see lawyers shaking hands, saying how do you do.
They're really saying --- is we'll screw you.
I hear physicists cry, I watch them go.
They'll learn much more than I'll ever know
And I think to myself, what a wonderful plan.
Yes I think to myself, what a wonderful plan. Oh Yeah!

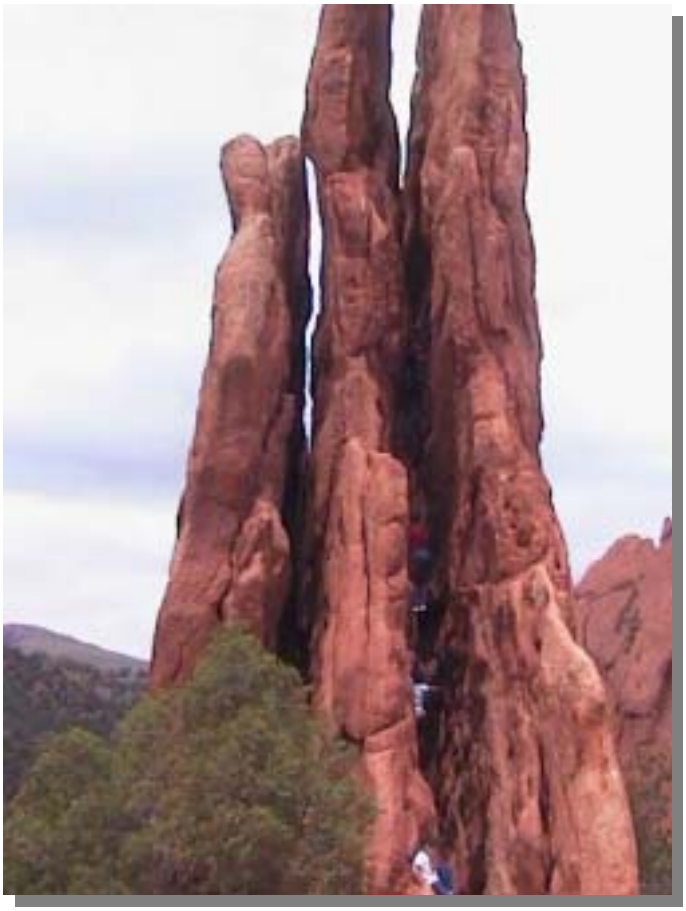
Jerry rocks out with "Art's Old Farts"

David Jaffray helps out the German contingent with their vocals.

Free beer and munchies…. a motivational concept that WORKS!

Post-lunch, and all eyes still open… a good sign!

The climactic outdoor banquet…. remember to bring your own square-dance shoes!



Overflow seating was located on top of this rock formation.

An evening squabble… er.. discussion session with a panel of experts.

Don't let Rock talk too long, or you may end up buying something!

A little volleyball to shake out the cobwebs, but one-on-three doesn't look fair!

Ultimate frisbee gets the blood flowing (at least to the legs)!

Some of the organizers of the 2003 AAPM Summer School…. CONGRATULATIONS ON A GREAT SUMMER SCHOOL!!!

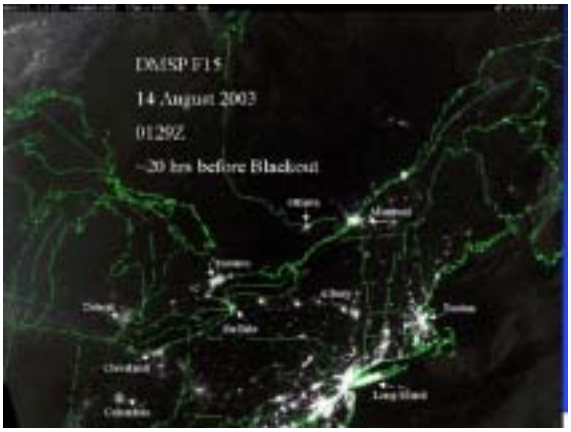
A rousing soccer game... don't head the ball, or you may knock out some IMRT knowledge!

Roving photographer Michael Tassotto testing out a pedestrian cross-walk in Colorado Springs. Thanks for the pics!

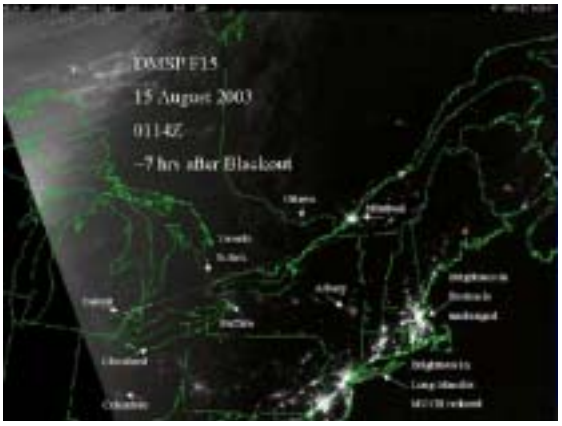
(with apologies...) I was *blown away* by this years' AAPM Summer School!

BLACKOUT! (Continued from page 119)
tively minor event at the cancer centre but did demonstrate our vulnerability and caused us to re-examine our emergency procedures. On another level the call for power conservation showed many of us how much we waste and how beautiful summer nights in the city can be without the hum of air-conditioning and the glare of electric light.

~20 hours before blackout



~7 hours after blackout



NEW GADGET AT SUNNYBROOK!!

Courtesy Kathy Mah, Toronto-Sunnybrook Regional Cancer Centre, Toronto, ON

On August 18, 2003, a new Philips GEMINI PET/CT scanner arrived at Toronto Sunnybrook Regional Cancer Centre. This unit is the second PET/CT scanner in Canada and the first to be installed in a radiation oncology planning department. Its acquisition was possible through the combined efforts of the Nuclear Medicine and Radiation Oncology Programs at Sunnybrook and Women's College Health Sciences Centre and a combination of funds from Cancer Care Ontario and a private donor. The GEMINI will be used for both clinical CT-simulation and for PET/CT research in radiation oncology. Pictured with the GEMINI are physicists (from left to right) Peter O'Brien, Curtis Caldwell, Kathy Mah, and Parminder Basran. Look for a full report on the acceptance and performance of this unit in a future edition of Interactions!

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Fax: (650) 493-5637
website: www.varian.com
Contact: Ms. Jan Roth
JRoth@os.varian.com

POSITION: **MEDICAL PHYSICS RESIDENTS**

LOCATION: London Regional Cancer Centre
London, Ontario, Canada

The London Regional Cancer Centre is committed to providing leadership in cancer treatment, research, and education. Current treatment resources include 8 megavoltage therapy machines, many with MLC and portal imaging, a CT-simulator, 2 simulators, HDR and LDR units, and specialty programs in IMRT, ultrasound-guided prostate brachytherapy, stereotactic radiosurgery, and photodynamic therapy. Access to MRI and PET/CT is available in partner institutions. A prototype helical tomotherapy system is installed and is a major focus for R&D activity. Related research is underway in IMRT, gated tomotherapy, 3-D gel dosimetry, optical CT, dose optimization, radiobiological modeling, treatment uncertainty propagation and the use of imaging in oncology.

While the primary intent is to provide the Resident with a practical foundation in clinical physics, interaction with the research group will be encouraged via a research project which occupies 20% of activities. The training period ends with an oral examination for certification as a radiation oncology physicist within Ontario.

The preferred entry requirement is a Ph.D. in (Medical) Physics or a related subject. Minimum entry requirement is a M.Sc. in Medical Physics.

London, Ontario is a pleasant and affordable university and health care city of 350,000 people nestled in south-western Ontario within a short drive to Toronto, Windsor (Detroit), and Niagara Falls (Buffalo). Proximity to Canada's Great Lakes region offers a wide range of recreational activities during all seasons.

In accordance with Canadian immigration requirements, priority will be given to Canadian citizens and permanent residents of Canada. Cancer Care Ontario is an equal opportunity employer. We thank all those who apply; however, only candidates chosen for interview will be contacted.

CONTACT: Jake Van Dyk
London Regional Cancer Centre
790 Commissioners Road East
London, Ontario, Canada, N6A 4L6
Phone: 519-685-8607 Fax: 519-685-8658
E-mail: jake.vandyk@lrcc.on.ca Website: http://www.lrcc.on.ca/

La Régie régionale de la santé Beauséjour, située à Moncton au Nouveau-Brunswick, est le plus vaste regroupement francophone de services de santé dans la région de l'Atlantique. Elle regroupe l'Hôpital régional Dr-Georges-L.-Dumont, l'Hôpital Stella-Maris-de-Kent, le Centre médical régional de Shediac, l'Unité de médecine familiale de Dieppe, le Programme extra-mural et le Centre de santé des anciens combattants. Nous sollicitons des candidatures pour un poste de :

PHYSICIEN MÉDICAL

Centre d'oncologie Dr. Léon-Richard
à Moncton (Nouveau-Brunswick)
Numéro de concours : 03-012E

Notre département est équipé de trois accélérateurs linéaires Siemens (dont un avec MLC), un projecteur de source µSelectron HDR, un projecteur de source Selectron LDR, un appareil d'orthovoltage, un simulateur, et trois systèmes de planification de traitement.

Présentement nous traitons environ 1100 patients par année. Parmi les techniques spécialisées développées au Centre, nous retrouvons la curiethérapie de la prostate (HDR et LDR) et la curiethérapie gynécologique (HDR et LDR).

Sommaire des responsabilités :

La personne retenue participera aux activités suivantes :

- dosimétrie et planification des traitements
- contrôle de qualité des appareils de traitement et de mesure
- étalonnage des appareils de traitement
- radioprotection
- projets de recherche visant l'amélioration de techniques actuelles et le développement de nouvelles techniques de traitement
- travail en soirée occasionnel
- service de garde pour les traitements de curiethérapie

Compétences requises :

- Posséder une maîtrise ou un doctorat en physique médicale (ou un domaine connexe);
- Détenir la certification en radio-oncologie du Collège canadien des physiciens en médecine (ou l'équivalent);
- Maîtriser le français et avoir une connaissance fonctionnelle de l'anglais.

Les personnes intéressées sont priées de faire parvenir leur curriculum vitae avant le 1 décembre 2003, accompagné du nom de 2 répondants, à l'attention de :

Agent de recrutement
Régie régionale de la santé Beauséjour
330, avenue Université
Moncton (Nouveau-Brunswick) E1C 2Z3
courriel : ressourceshumaines@health.nb.ca
site web : www.beausejour-nb.ca

If you are a dedicated health care professional seeking new challenges and new opportunities, then consider joining the Northeastern Ontario Regional Cancer Centre (NEORCC). The NEORCC is located in Sudbury, Ontario. Only 4 hours drive from Toronto, this multicultural community boasts a wide range of year-round sporting and recreational activities. Nature lovers and outdoor activity enthusiasts will be especially attracted to the area.

NEORCC is a partner of Cancer Care Ontario (CCO), a provincial agency that is responsible for the development of an integrated cancer control system in Ontario. NEORCC, which is affiliated with the University of Ottawa and the Laurentian University, is currently seeking a full time…

Medical Physicist

The Radiation Treatment Program currently has 4 megavoltage therapy machines - two Siemens Primus accelerators with MLC; one Siemens MX-2 accelerator; a Theratron 780C; a Siemens Stabilipan orthovoltage unit and a Siemens Mevasim-S simulator. We are also equipped with a Nucletron high-dose rate brachytherapy unit, the IMPAC record and verify system and electronic portal imaging. Three dimensional CT-based treatment planning is available on the Helax-TMS treatment-planning system.

The centre is currently undergoing a major expansion scheduled for completion in 2004, which will see the addition of 30,000 square feet of space and replacement of megavoltage units (2 new Primus accelerators scheduled for operation Fall 2003). One additional accelerator will also be installed, bringing the total to 5 (all with MLC and EPID), as well as a CT-simulator.

Clinical physics research is underway in projects related to IMRT, portal imaging and radiation therapy quality assurance. The successful candidate will join an active and progressive team of four Medical Physicists and will participate in all aspects of clinical and academic radiotherapy physics. She/he will participate in teaching physics to Radiation Oncology residents, Medical Physics residents, Medical Physics graduate and Radiation Therapy students. The Medical Physicist will also participate in the supervision of Medical Physics residents, graduate students, and undergraduate students.

Salary range is governed by the collective agreement with the Professional Institute of the Public Service of Canada. This position is also eligible for a Northern Allowance bonus. Relocation assistance is available.

Applicants require a postgraduate degree in Physics from a recognized university or equivalent (Ph.D. preferred), plus a minimum of two years' experience in radiotherapy physics, completion of the equivalent of Peer Review A of Cancer Care Ontario and certification, or eligibility for certification, by the Canadian College of Physicists in Medicine. Applicants with an established record of excellence in clinical, research and educational activities are preferred. Knowledge of French is an asset. In accordance with Canadian immigration requirements, preference will be given to Canadian citizens and permanent residents of Canada.

For more information or to apply, please forward a curriculum vitae to: Dr. K. Leszczynski, Chief Physicist, Northeastern Ontario Regional Cancer Centre, 41 Ramsey Lake Road, Sudbury, Ontario, Canada, P3E 5J1. Tel: (705) 522-6237, Ext. 2147, Fax (705) 523-7335. E-mail: kleszczynski@neorcc.on.ca. Website: www.neorcc.on.ca

CancerCare MANITOBA

Radiation Oncology Physicist

The Radiotherapy Physics Service at the CancerCare Manitoba has a vacancy for a Radiation Oncology Physicist. Operating within the Division of Medical Physics, we provide clinical support for 6 linacs (equipped with multileaf collimators, dynamic wedges and EPIDs), a cobalt unit, an orthovoltage unit, an HDR unit, a CT-simulator, a conventional simulator and a multi-workstation state-of-the-art treatment planning computer. We also provide physics support to a Leksell Gamma Knife® at the adjacent Health Sciences Centre. Most of the equipment is housed in new premises completed this year. Approximately 2,800 radiation therapy patients are treated per year.

The Division of Medical Physics at CancerCare Manitoba has university and teaching hospital affiliations with state-of-the-art clinical facilities and an active research and teaching program. Our research activities include exciting development work in virtual-reality-guided brachytherapy, theoretical and experimental studies of dosimetry using electronic portal imaging devices, and development of a radioactive-source-based CT-imaging system. Strong electronics, mechanical and information technology staff and facilities support the department.

The position requires a minimum of a Master's degree and two years post-degree clinical experience in radiation oncology physics. More than two years experience and a Ph.D would be preferred. Membership, or eligibility for membership of the Canadian College of Physicists in Medicine or equivalent certification is required.

Winnipeg is a medium-sized city offering a wide range of cultural, entertainment and sports activities. There are two universities, a large community college and a good school system. Excellent facilities for hiking, sailing, canoeing and cross-country skiing are available nearby. Attractive, inexpensive housing can be found close to work, while other costs of living, such as electricity and automobile insurance, tend to be lower in Winnipeg than elsewhere in North America.

For further information please visit the following websites: www.CancerCare.mb.ca, www.umanitoba.ca, www.manitoba.worldweb.com, www.city.winnipeg.mb.ca.

CancerCare Manitoba acknowledges all forms of human diversity and respects the rights, dignity, pride and privacy of all persons. We provide a smoke free workplace.

Candidates should submit a current résumé including the names and addresses of three references and quoting competition number 70-03-714203007 on or before October 31, 2003. We thank all those who apply, but only those who are selected for interview will be contacted. For further inquiries, please contact Ms. Ardelle Jacques at (204) 787-2305. Applications are to be submitted to:

Department of Human Resources
CancerCare Manitoba
675 McDermot Street
Winnipeg, Manitoba
R3E 0V9, CANADA

e-mail: jobs@cancercare.mb.ca

2004 WINNIPEG

cCAPcCASCAcCOMP

CAP/CASCA/COMP 2004 CONGRESS
Canadian Association of Physicists
Canadian Astronomical Society
Canadian Organization of Medical Physicists
Biophysical Society of Canada

CONGRÈS ACP/CASCA/OCPM 2004
Association canadienne des physiciens et physiciennes
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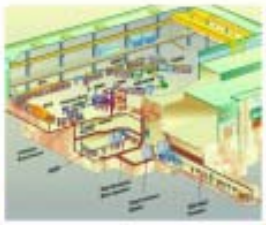
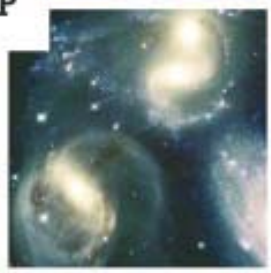
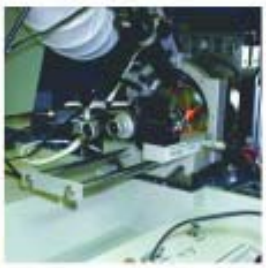
Organisation canadienne des physiciens médicaux
Société de biophysique du Canada

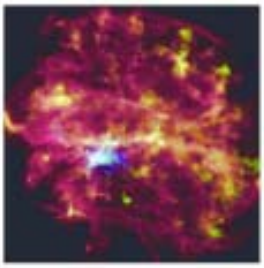


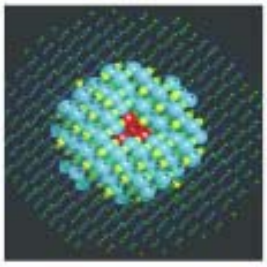


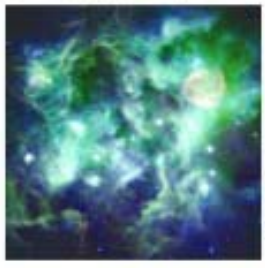
Delta Winnipeg Hotel, Winnipeg, Manitoba
Organized by the Department of Physics and Astronomy,
University of Manitoba
JUNE 13-16, 2004

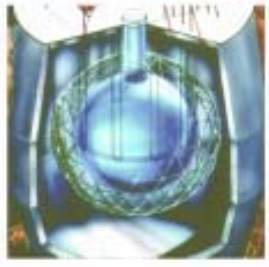
13-16 JUIN, 2004
Hôtel Delta Winnipeg, Manitoba
Organisé par le département de physique et astronomie,
Université du Manitoba











For more information and forms:
www.physics.umanitoba.ca/Congress2004

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