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IN MEDICINE



LE COLLÈGE
CANADIEN
DES PHYSICIENS
EN MÉDECINE

61 (3) July/juillet 2015



MICHAEL PATTERSON, PHD

**2015 COMP/OCPM
GOLD MEDAL WINNER**

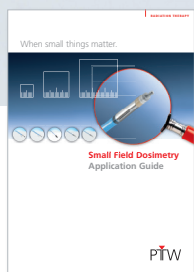
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InterACTIONS

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Please submit stories MS Word or ASCII text format. Images in Tiff format at 300 dpi resolution are preferred.

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Message from the COMP President

In my message to you in the last issue of *InterACTIONS*, I discussed the upcoming World Congress on Medical Physics and Biomedical Engineering. By the time you read this, this event will have passed, and we will all, hopefully, be moving on to the lazier parts of summer and enjoying some time off with our families and the warmer weather. In reflecting back on the experience of putting the World Congress together, I think the biggest lesson I have learned is the significance of good collaboration.

We all hear very often how important it is to collaborate. But knowing that it is important to collaborate and then actually forming good collaborations is not necessarily as simple as it may seem. As President of COMP, one of the things I enjoy the most is that I often get invited to meetings hosted by other societies that have relationships with medical physicists. Just this last week, I attended a CAR (Canadian Association of Radiologists) and CAMRT (Canadian Association of Medical Radiation Technologists) roundtable stakeholders meeting. The theme of the discussion was "Collaborative Care." To generate ideas and discussion points for the roundtable discussion, these two associations invited people from North America and Europe to present short views on how their organisations promoted collaborative care. In this regard, we heard views on collaboration from the vice-president of the American College of Radiology, the CEO and president of the American Society of Radiologic Technologists, the president of the RSNA, the president of the Société Française de Radiologie, and the vice-president of the Association Française du Personnel Paramédical d'Electroradiologie. These are major radiologic organisations representing several hundred thousand radiology professionals. Also included in

the presentations was a sixth by Mr. Brian Liszewski, who is a radiation therapist at the Odette Cancer Centre, and in this case was representing the CAMRT as part of the Canadian Partnership for Quality Radiotherapy (CPQR).

Hopefully, many of you know of CPQR as COMP is a major contributor to this partnership. I am very pleased to say that of the six presentations, the one that generated the most discussion, and was by far the most impactful, was the presentation by Mr. Liszewski. I would say that the collaborative model that the CPQR has adopted is truly innovative and, as evidenced from this discussion, has the potential to be impactful at the international level. In listening to the comments about the benefits and barriers in inter-professional collaborations it was very evident to me that physicists have particular advantages in this area.

As I attempted to explain to this group, and in trying to not be too self-promoting, I spoke of how technology can either be a very useful tool for collaborations, or a complete hindrance if not done well. In radiology, as the group heard, one of the barriers in inter-professional collaboration is that PACS systems remove the human interaction between the technologist and the radiologist, i.e. the technologists don't take films and manually hand them to radiologists anymore; they push images to a PACS system, which are remotely viewed by the radiologist. The human interactions are greatly diminished, and the natural collaborations are harder to foster. In radiotherapy clinics, an environment that I know much better, we too have most of our equipment digitally connected. And yet, as many people in this group commented, the inter-professional collaborative environment in radiotherapy still seems to work well, as evidenced by work done by groups such as the CPQR. I



Marco Carlone

believe that we physicists have very good skills at integrating health care technology in such a way as to maintain a healthy collaborative environment. This is a skill that I think we don't often recognise in our profession, and as a result we undervalue. However, I am quite certain that our skills are well appreciated by our clinical colleagues, even if we do not realise it.

This brings me back to the collaborations we needed to put together for the complex event of the World Congress. We know that several things help collaborations: common goals, complimentary skills or knowledge, etc. What I have also realised is that for a successful collaboration, it is very helpful if the world view of the collaborators align in some way. This may seem obvious, but I suggest it is much more subtle than it appears at face value. In working with the engineers, who have a similar world view as physicists, both sides had to work hard to bridge the different perceptions we had of some problems. In the end we were able to align our views and this helped to produce a very good

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Message from the CCPM President

Well here goes my first column as President of the College! It will be a busy and exciting three years, I suspect!

This year is a transition year for the CCPM Board. There will be new faces in practically every position on the Board. Firstly, as you already have noticed, I have replaced Matthew Schmid as president of the College. Matt is stepping down after six years on the Board (a three-year term as vice-president, followed by a three-year term as president). During his tenure, the Canada Not-for-Profit Corporations Act was implemented and required a complete review of our by-laws and regulations. This was not trivial. His understanding of the issues was instrumental in guiding us through these changes, all the while making sure we were able to meet the deadlines imposed by the Canada Act. We all owe Matt a great deal of thanks for his efforts.

Boyd McCurdy is finishing his three-year term as chief examiner and is stepping down from the Board. He has done an exceptional job in keeping the exam processes (MCCPM and FCCPM) working smoothly. All of us on the Board realize the amount of personal time and effort that is required from our chief examiner to keep our core business working. During his term as chief examiner, Boyd has made significant changes to the exam process, including an electronic database for exam questions, and a major review of question banks. Renée Larouche will be moving into the chief examiner role. I am certain there will be a few calls/emails between Renée and Boyd for some time!

Both Glenn Wells and Horacio Patrocinio are finishing their terms as secretary/treasurer and registrar

respectively. They will remain on the Board as directors-at-large. Moving into these roles are Wendy Smith as secretary/treasurer, and Raxa Sankrecha as Registrar. Thank you, Wendy and Raxa, for taking on these duties.

The Board is also welcoming two new directors, Cheryl Duzenli and Alasdair Syme. Cheryl will be taking on the role of vice-president of the College. Alasdair is replacing Renée as deputy chief examiner. Welcome to both Cheryl and Alasdair, and thank you for accepting these positions on the Board.

I write this column as I return home from this year's World Congress Meeting in Toronto. The meeting was a huge success. Our thanks and congratulations to David Jaffray and Tony Eastey, co-chairs of the meeting, and to everyone on the Organizing Committee.

During the Annual General Meeting of the College, we welcomed 25 new members who successfully passed the membership written and oral exams. Four new fellows were also announced at the AGM. Congratulations to all of you! This brings our total number of members to 430, of which 150 have received the fellowship distinction.

A few words on the projects the Board is currently working on. As many of you know, the new CAMPEP eligibility requirements for the radiation oncology membership exams come into effect for next year's exam. This means that all candidates must be graduates from a CAMPEP-accredited graduate program OR a CAMPEP-accredited residency program. The Board has discussed introducing a mechanism which would allow foreign physicists, coming to Canada, to become eligible for the membership exam. The details of this



Clément Arsenault

“bridging” program are being finalized and should be approved by the Board at the mid-year meeting. Although developed with foreign physicists in mind, this program would also be available to Canadian physicists who do not meet the CAMPEP requirement.

As was announced at last year's AGM, the Board undertook a review of the fellowship distinction. Some comments were received via the e-mail address, FellowshipReview@ccpm.ca. In order to generate more feedback, a survey was sent to all members of the College. Many thanks to the 249 who participated! As expected, we received comments both for and against the fellowship distinction. Many comments were provided which will help us improve the FCCPM exam process. These will be taken into account by the Board as we continue our review of the fellowship exam process. The full results of the survey will be published in the next issue of *InterACTIONS*, following a more detailed analysis of the results.

In anticipation of the results of the survey, Wendy (our secretary/treasurer)

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Executive Director Report

I am back in the office after an exciting week at the World Congress on Medical Physics and Biomedical Engineering in Toronto. The World Congress was the result of a partnership between five organizations: COMP, the Canadian Medical and Biological Engineering Society, the International Organization of Medical Physics, the International Federation of Medical and Biological Engineering, and the International Union for Physical and Engineering Sciences in Medicine. It was an interesting experience learning more about the various partners, in particular the international organizations. Bringing five organizations together is no easy feat and is a testament to the commitment of the representatives of each of the organizations. There were many members of the Canadian medical physics community who put a considerable amount of time and energy into the World Congress under the visionary leadership of David Jaffray. I would like to thank David as well as the following COMP members who sat on the various committees that provided support to the Congress:

Jean-Pierre Bissonnette, Crystal Plume Angers, Horacio Patrocinio, Jake Van Dyk, Michael Balderson, Amanda Cherpak, Sarah Cuddy-Walsh, Olga Dona Lemus, Dave Rogers, Parminder Basran, Marc MacKenzie, Doug Moseley, Nadia Octave, Conrad Yuen, Mike Sharpe, Luc Beaulieu, John Rowlands, Christopher Yip, Jerry Battista, and Ervin Podgorsak.

I would also like to thank Marco Carlone, COMP President, for his tireless support for the Congress and his work to recruit and engage many of the volunteers. I would also like to thank the sponsors of the Congress: Elekta, Raysearch Laboratories, Varian, Accuray and IBA Dosimetry. Without their support, the Congress would not have been

possible. After three years of planning and preparation, it is hard to believe the Congress is now over. Based on what I observed throughout the week, many seeds were planted and connections were made which will ensure that the impact of the Congress will continue for some time to come.

As you know, support for students is an important value of COMP, and we were pleased to be able to provide travel grants to students and include the student lunch and student night out during the Congress, as these have been important elements of the ASM over the past few years. As well, a group of 12 imaging medical physicists gathered to learn more about what the Imaging Committee has been up to and to discuss issues of mutual concern. This meeting was initiated by Imaging Committee Chair, Daniel Rickey.

The participation at both the CCPM and COMP Annual General Meetings was outstanding and provided the Canadian medical physics community with an opportunity to gather within the larger context of Congress.

Following the AGM, it was great to acknowledge and celebrate the contribution of this year's Fellow of COMP award winners (profiled later in this issue) as well as the Sylvia Fedoruk award winner, Mathieu Goulet. COMP's highest award, the Gold Medal, was given to Michael Patterson. Joe Hayward's tribute to Mike touched on both the impact he has had as both a scientist and a family man. More information about Mike can be found in this issue.

I would like to take this opportunity to thank our outgoing Board members: Matt Schmid and Parminder Basran. Matt represented the CCPM at the COMP Board table and was instrumental in



Ms Nancy Barrett

helping to navigate the new Canada Not-for-Profit Act and clarify the contractual arrangements between COMP and CCPM. Parminder initiated COMP's foray into social media and coordinated our efforts to celebrate the International Day of Medical Physics. It was a pleasure working with both Matt and Parminder. I am also pleased to welcome Clément Arsenault, from Moncton, who will be the new CCPM representative on the Board and Atiyah Yahya from the Cross Cancer Institute in Edmonton.

Our focus over the next few months will be launching the new COMP and CCPM websites and planning and preparing for our upcoming meetings. The 2016 Winter School will be taking place at the Fairmont Le Chateau Montebello from February 7th to 11th. The content for this inter-professional program is refreshed each year, so consider participating for both the professional development and the opportunity to network with your colleagues in the world's largest log cabin. The 2016 Annual Scientific Meeting will be taking place in July in St. John's,

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CNSC Feedback Forum

Correcting Inaccurate Submissions

Alexandre Colligan

Senior Project Officer, Accelerators and Class II Facilities Division, CNSC

Radiation safety officers (RSOs) are usually the primary contact with CNSC project officers and bear the brunt of the responsibility for ensuring that the licensee's organization as a whole is compliant with the regulations and standards of operations for which a CNSC licence has been granted. In this role, the RSO is occasionally required to make submissions to the CNSC. Submissions may vary from licence applications to annual compliance reports to the occasional incident reports and ensuing investigation reports. The RSO is also responsible for ensuring the accuracy of such reports at the time of submission. However, there may be times when a report, while submitted in good faith, is discovered by the RSO to be inaccurate or contain errors after it has been submitted to CNSC. This realization may even come after CNSC has accepted or responded to the report. This may cause an RSO to legitimately question as to what would be the best of course of action.

Depending on the type of submission, a report may be rendered inaccurate due to new information that has come to light afterwards; such may be the case when conducting an investigation into a dose report or a reportable incident. Other times, it may be the result of a simple human error in the original submission. Whether the realization comes soon after submission, or in the weeks or months following, it is important to understand what is expected in such instances.

In instances where the CNSC has assessed and accepted the original submission, there remains a marked ethical responsibility to communicate and correct the original submission. This is especially true if the report was used as a basis for some regulatory approval – such as a licence application, or for corrective actions – as may be the case in an investigation report. Still the situation invokes more than just an ethical question, as there are observable regulatory obligations that apply as well.

The fear of alerting the CNSC to the fact that a previous submission was partially false or inaccurate can conjure up

frightful images of a regulator uncompromisingly unloading its arsenal of enforcement tools in response. Understandably, though it may be initially tempting to simply let sleeping watchdogs lie, it is precisely such a behavior that would undoubtedly carry the greater consequence. From a regulatory standpoint, withholding new information that is known to be truthful or knowingly leaving false information in the hands of the CNSC that was submitted as truth, are both likely to be considered an offense under section 48(d) of the Act.

Obviously, this is not a desirable outcome nor is it necessary, as the likely CNSC response to a responsible disclosure of error will be far more restrained.

The first step consists of contacting your project officer to inform them that you've identified an inaccuracy in a past submission. Explain the inaccuracies and submit an updated version of the report if necessary. Your project officer might ask for few a clarifications, though this would likely be treated no differently than submitting an updated operating procedure. However, let's examine a more complex case: What if the submission was an incident report that resulted in corrective actions being issued by the CNSC, but the inaccuracies would change how the CNSC would have responded to the incident? In other words, the inaccuracies of the report have a ripple-effect on the resulting corrective actions. Again, the same principle applies. At the risk of inconveniencing a project officer with such a disclosure, the role of the project officer is to ensure the correct root cause is identified, and ultimately that deficiencies are correctly addressed. Given that the CNSC regulates from a distance and is not on-site on a day-to-day basis to ensure a facility is operating safely, it relies heavily on the accuracy of written and oral communications with the radiation safety officer as a basis for its regulatory actions and authorizations. For this reason, correcting mistakes or inaccuracies in submissions is a duty RSOs should always consider a priority.

Dates to Remember

***InterACTIONS Summer issue
deadline:
September 1st, 2015***

7th Annual Winter School,
Fairmont Le Chateau Montebello,
Montebello, Quebec :
February 7th – 11th, 2016

Int'l Conference on Medical Physics –
UK, Birmingham, UK :
August 3rd – 5th, 2015

ASTRO 2015, San Antonio, USA :
October 18th – 21st, 2015

COMP ASM, St. John's, NL :
July 2016



Summary of Student Council Events at the 2015 IUPESM World Congress in Toronto

Olga Maria Dona Lemus

Co-Chair, COMP Student Council, McMaster University, Hamilton, ON

Student Luncheon

This year's student luncheon, attended by nearly 40 students, offered a complimentary boxed lunch and started with a brief summary of the student council activities over the last year, additional information about the student exchange program, and the election of the new vice-chair of the student council. Following this, we held a panel discussion with four CAMPEP-accredited medical physics residency program coordinators, which included Dr. Cheryl Duzenli, BC Cancer Agency; Dr. Jean-Pierre Bissonnette, University of Toronto; Dr. Alana Hudson, University of Calgary & Tom Baker Cancer Centre; and Dr. Andrew Kerr, Cancer Centre of Southeastern Ontario. The floor was open to the students who asked questions to the panel about their respective residency programs, how to best prepare for applying for a residency position, the importance of completing a CAMPEP-accredited graduate program, what qualities are looked for when hiring residents, as well as

other items of interest. Thank you again to our panelists for their participation.

Student Night Out

After the last survey, the Student Council took your opinions to heart and that's why the Student Night Out was held at a different place from previous years. This year, students gathered at SPiN Galactic to play ping pong, have some refreshments, drinks, and fun. This event was also attended by residency program coordinators including Marco Carlone, COMP president.

Now it's time for a few congratulations and appreciations. First, congratulations to the winner of the 2015 Jack Cunningham Young Investigator Award: Kurtis Dekker from Western University with his presentation "Towards Optical CT scanning of radiochromic 3D dosimeters in mismatched refractive index solutions." Congratulations to our new vice-chair Hali Morrison who was elected at the Student Luncheon. Welcome to Patricia Oliver, Victor Malkov, and Sahar Darvish-Molla



Student Luncheon panel discussion, Toronto, 2015.

who have joined the Student Council. Last but not least, special thanks to Gisele Kite for her excellent work and help during the WC2015.

Next year's COMP ASM will be in St. John's Newfoundland. To stay informed for this next event, join our Facebook group (COMP Student Council) or follow COMP on Twitter (@MedphysCA). We'll keep you posted on all of the upcoming deadlines and activities.

Your Student Council.



The Student Night Out at SPiN Galactic, Toronto 2015



COMP Gold Medal Introduction Speech – June 11, 2015

Joe Hayward
Juravinski Cancer Centre, Hamilton, ON

It gives me great pleasure to introduce Michael Stuart Patterson as the 2015 COMP Gold Medal winner.

Like most medical physicists, Mike is a multi-faceted individual. As such, I would like to introduce you to the many faces of Mike Patterson.

The Scientist:

Mike is indeed a curious individual who is constantly looking for answers to the seemingly simple, everyday problems, for example, “Based on radar, will I make it home on my bike before getting wet?” or “Why do veins look blue?” The answer to the second question actually appears as a peer-reviewed paper in *Applied Optics* [35, 1151-1160 (1996)]. Selected scientific accomplishments include eight manuscripts resulting from work leading to his PhD, the 2005 Institute of Physics and Engineering in Medicine Roberts Prize for best paper published in *Physics in Medicine and Biology* [50, 2597-2616 (2005)], and the prize for best medical physics article from *The Journal of Applied Clinical Medical Physics* in 2012 [13, 93-110 (2012)]. Mike’s specific citation report as generated in The Web of Science is shown in Figure 1. In addition, he has been elected Fellow of The Optical Society of America, the Institute of Physics, and the Canadian Organization of Medical Physicists.

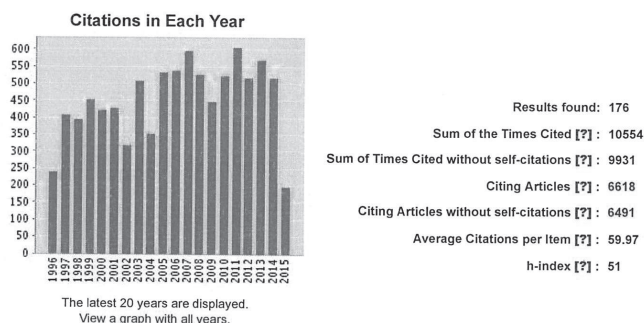


Figure 1: Citation Report for Michael Stuart Patterson.

Note from Figure 1 that Mike’s papers have been cited almost 11,000 times. According to Science Watch [Thomson Reuters, May 1, 2010] a physicist has to receive 2,073 citations to be among the most cited 1% of physicists in the world. Also,

Mike’s h-index is approximately 51 which is remarkable. Recall that an h-index of 20 means there are 20 papers that have 20 citations or more.

One of Mike’s most cited papers [Med Phys 19, 879-888, 1992, cited approximately 800 times] discussed the use of diffusion theory to describe the diffuse reflectance from tissue and was subsequently used by folks in the motion picture industry to make computer-generated images (such as Dobby in Figure 2) more lifelike [Hamilton Spectator, April 22, 2004]. Henrik Jensen, a scientist at Stanford was awarded a Technical Oscar for being one of the first to use the results of the paper in the creation of animated characters.



Figure 2: Dobby, the House Elf from Harry Potter.

The Educator:

Dr. Patterson is a full professor in Radiology at McMaster University, cross-appointed to Medical Physics and Applied Radiation Sciences. During his tenure as an academic, Mike has mentored five post-doctoral fellows, 11 PhD students and 16 MSc students. Mike’s students have advanced their careers to become practicing Canadian medical physicists (seven), professors at various universities in North America (five), an executive vice-president of an American biophotonic company, and even a radiologist.

Mike continues mentoring the young with extracurricular activities including coaching basketball, hockey, and baseball.



Figure 3: Mike participating in one of his favourite summer activities: coaching women's fastball. Although seemingly bored, Mike is actually flashing a complicated, yet subtle, series of signs to the baserunners.

The Leader:

Mike has been involved in many leadership positions locally, provincially, and nationally. Many of these positions had a large impact on the status and public image of medical physicists in Canada including, for instance, chair of both COMP and Ontario's Professional Advisory Committee. On a local note, as the head of medical physics at the Juravinski Cancer Centre [JCC] for the last 21 years, Mike quietly leads and mentors by example. He has the respect of all his staff physicists and has created a culture in Hamilton such that the JCC has an attrition rate due only to retirement. Or perhaps it is the use of novel administrative tools, such as that shown in Figure 4, that "whips" his staff into shape.



Figure 4: Mike showing off his latest implement for guaranteeing total managerial prowess.

The Future:

So what does the future hold for the 2015 COMP Gold Medal Winner upon his retirement in February 2016? Well, I am willing to predict that there will be travel involved. He will likely be seen biking around wine country with his wife Kathy, looking at

the current crop of Pinot Noir grapes. And whenever birthdays are to be celebrated, he will be honing his cake making skills [Figure 5].



Figure 5: Delicious selections from the Patterson cake making catalogue.

Whatever he does, you can bet that his family will be in close proximity. Mike has always balanced his love of science with his love of family [Figure 6]. Whether coaching or just cheering at highland dancing or choir concerts, Mike has continually placed the love and support of his family above all.



Figure 6: The Patterson Family, from left to right: Kevin, Laurel, Kathy, Mike, Mark, and Erin.

I would like to conclude with a quote from "Prayers from the Plymouth Pulpit" by Henry Ward Beecher:

"It is not the going out of port, but the coming in, that determines the success of a voyage."

Congratulations, Mike, on one hell of a voyage.



COMP Gold Medal Acceptance Speech – June 11, 2015

Mike Patterson
Juravinski Cancer Centre, Hamilton, ON

Mr. President, members of the Board, Dr. Hayward, ladies, gentlemen ... and Hamiltonians. Joe, thank you for that kind introduction – I guess you did receive my email about scheduling your performance review next week. I want to thank the members of COMP for honouring me tonight – as scientists we are constantly reviewed by our peers but this usually reminds us of our personal shortcomings – who among us has not read a sentence like “While the concept is somewhat interesting, the author has failed to yada, yada, yada”? I much prefer the unconditional endorsement you have given me through this award. It is also a privilege to join the list of distinguished winners – unlike Groucho Marx who famously refused to join any club that would accept him as a member, I am happy to belong.

My receipt of the Gold Medal at the World Congress is particularly appropriate because the first scientific conference I ever attended was the World Congress in Ottawa in 1976. I don't remember much about that meeting except for a couple of talks presenting very fuzzy images made with a new technique called magnetic resonance. Despite their poor quality, I distinctly remember thinking, “Man, this will never go anywhere!” Well, as the eminent physicist Yogi Berra once remarked, “It's tough to make predictions – especially about the future.” With my track record I will not be making any predictions tonight – instead I would like to look backward rather than forward and acknowledge the people who have played key roles in my career.

We will start at a very specific moment: May 25, 1961 when President John Kennedy told the US Congress, “I believe that this nation should commit itself to achieving the goal, before this decade is out, of landing a man on the moon and returning him safely to the earth.” This speech is remarkable for several reasons:

1. Kennedy had to spell out that not only would the man be landed on the moon, but that he would be brought back – this tells you where the technology was in 1961!
2. The goal was actually achieved with five months to spare – it is hard to imagine such a thing happening in the current fractious US political environment.
3. The ensuing space race raised the public profile of science and engineering in a way that can hardly be overstated. Instead of aspiring to be a doctor or a lawyer or a fire fighter, a nine year old kid growing up in Kingston, Ontario could dream about being a scientist. Note that I did not aspire to be an astronaut – I guess I was still worried about the getting back part.

The question remained: what kind of scientist? Well, biology in 1961 was boring, chemistry was messy – that left physics. I also knew some real physicists because my dad was an avid sailor and on any nice summer evening about half the faculty of the Queen's physics department could be found at the Kingston Yacht Club. If these guys were not completely normal, at least they were sailors. So, in 1969 I enrolled in Honours Physics at Queen's. Before long I realized that physics itself did not enthrall me and that I was not smart enough to invent new physics. What did interest me was the application of physics to real life problems. The one and only time I ever impressed my professor of classical mechanics was when my labmate and I showed him a device we had constructed for long range voice communication using a new commercial product – the semiconductor laser. My labmate went on to do that for a living whereas I graduated, bummed around Europe the next year, and then enrolled in an MSc program at McMaster called Applied Nuclear Physics. This was the brainchild of two defrocked nuclear physicists, Terry Kennett and Bill Prestwich, who were interested in any problem that might be solved using radiation. My own project was to perform nondestructive elemental analysis using prompt gamma rays generated when the sample was placed in the McMaster nuclear reactor. Some of these samples were moon rocks so, in a way, I did fulfill my dream! I was actually more interested in my office mate's attempts to perform neutron activation of calcium *in vivo* for the measurement of bone mineral content – this was my first encounter with the idea that physical methods could solve biomedical problems. Eventually I counted enough gamma rays to write a thesis, but I knew that I was done with school – I wanted a real job.

Although I had an offer from Ontario Hydro, the prospect of working for a faceless behemoth was daunting, so when I happened to be in Kingston I dropped in on one of my old physics profs to ask his advice. He mentioned that he had just met a young guy who had been hired to run the physics group at the Cancer Centre – maybe I should go talk to him. So I made a cold call on Peter Shragge who just happened to be looking for a physicist to be responsible for the computer-controlled linac the centre would soon receive from AECL. Fortunately, I had taken a course from Terry Kennett called Digital Logic and Circuits, so I knew a little about bremsstrahlung and a little about bootstrap loaders – the next thing I knew I was a medical physicist! Geologists now refer to this era as the Pre-Campeian.

Life in Kingston was great – I got married, had an office



overlooking the lake, worked hard learning clinical physics, but had time to sail in the summer and ski in the winter - then I met Harold Johns – you may have heard of him. Harold made it his personal project to uproot me from this bucolic life in Kingston and send me back to school (and by school he meant Medical Biophysics at U of T) so I could get my PhD. I still remember all of Harold's arguments: a PhD is your union card, a PhD is a license to change fields, with a PhD you could be the president of U of T. "Who", I responded, "would want to be the president of U of T?", but Harold did not lose many arguments and after four years he finally convinced me to move to Toronto in 1980 and join John Hunt's group working on ultrasound imaging.

Despite its location on the Isabella Street hookers' stroll, the old OCI was a fantastic place to work. You had the sense that there were no boundaries or limits on what you could do – and you could find an expert on almost anything by simply walking down the hall. John Hunt encouraged this "blue sky" approach – his greatest compliment was to tell you that your idea was crazy. I also had the privilege of working with Stuart Foster – in fact I was his first grad student. Stuart is probably the most creative scientist I have ever worked with – he didn't just think outside the box, Stuart didn't even know there was a box! Much was expected of you as a student at OCI, but we also had a lot of fun plotting elaborate practical jokes, windsurfing at Cherry Beach, and playing hotly contested touch football games pitting the "photons," quarterbacked by John Wong, against the "phonons," quarterbacked by yours truly. Despite these distractions, I earned my PhD and had to leave this idyllic existence behind. Kathy and I had also had our first child and a second was on the way – the prospect of a postdoc was economically unappealing. Could I find a job that would pay me a clinical (i.e. secure) salary, but still allow me the opportunity to do some research?

I explored several options (the job market was a lot different in 1984!), but the most intriguing was in Hamilton with a guy named Brian Wilson. Brian, originally from Glasgow, had been recruited from Australia to be the head of physics and to build a research program *ex nihilo* in photodynamic therapy. The physical facilities at the cancer centre were bad (I would have to share an office with three others and the lab was a converted bathroom), but a new building was on the books and I felt I could learn a lot from Brian – it turned out that I was right. The stereotypical Scot is dour and, shall we say, parsimonious but Brian fails to fit this mold. He was (and is) unstintingly generous with his time, energy, and friendship.

When I started in Hamilton, I had to decide what research I would do in addition to my clinical duties. My PhD work had focused on breast imaging and there was an idea floating around at the time that high resolution optical breast imaging could

be accomplished by using a pulsed laser source and time-gated detection to reject scattered light on the basis of its longer pathlength. In fact, a lot of venture capital had been invested without a thorough analysis. The critical question was "what is the scattering coefficient of tissue at 1 eV" and, amazingly, nobody knew the answer! So I did what any radiation physicist would do – I measured the narrow beam attenuation coefficient using a highly collimated detector and thin tissue slices of different thickness. It turned out that the scattering coefficient was very high – one could make sharp images only if the breast could be compressed to a thickness of 5 mm – a feat even the most sadistic mammographer has been unable to accomplish. This launched me into the area of biomedical optics where I have been ever since, although I have recently been able to reconcile this with my clinical responsibilities in radiotherapy. My old football opponent from OCI, John Wong, and I have been collaborating on the development of a small animal irradiator that uses bioluminescence and fluorescence imaging for targeted radiation delivery.

As you know, I never left Hamilton and, for the last 21 years, I have been the head of the medical physics group at the cancer centre. Obviously, I must like what I do and the main reason for this is the people I work with. Somehow, Hamilton seems to attract those who get things done without a lot of drama and fanfare, who ask for help if they need it, and provide help if they are asked. Most days, I feel as superfluous as Dilbert's pointy-haired boss – and that's not a bad thing! I also want to acknowledge the students I have worked with closely – they are the first authors of almost half of my papers. This reflects their hard work and the important part it has played in my own success.

Finally, I want to thank my family – my wife Kathryn is here tonight, along with our four children Erin (and her fiancé Rob), Mark, Kevin, and Laurel, and my sister, Pat. They remind me every day that some things in life are even more important than medical physics.

Speaking of life, in putting together these reminiscences, I was struck by the role of chance in the evolution of my career. What if Kennedy's political advisors had convinced him there were more votes to be gained by paving highways than by going to the moon? What if Peter Shragge had not been in his office that day I dropped by? What if Brian Wilson had stayed on the beach in Australia? As human beings we are hardwired to try and make sense of events by imposing a structure on our experience, but, as physicists, we know that nature is inherently stochastic and chaotic. Were it not so, life would indeed be more predictable, but the question I leave you with tonight is: would it be as interesting?

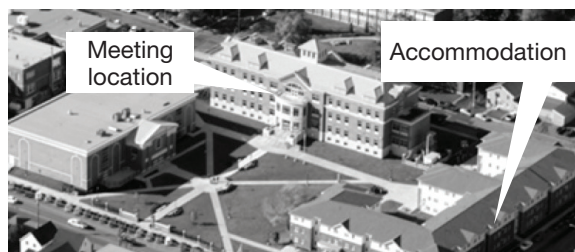
Atlantic Medical Physics Meeting, Charlottetown, PEI, July 31 – Aug 2, 2015

AMP History: For a decade beginning in 1999, the Atlantic medical physicists, dosimetrists and equipment service technologists held annual meetings to discuss topics of common interest. The meetings were called AMP (Atlantic Medical Physics) meetings, were held on a Friday and Saturday in the fall of the year, and were hosted by one of the five Atlantic cancer clinics on a rotational basis. There was a strong consensus that these meetings fostered better communication between the physicists, dosimetrists, and equipment service technologists of the Atlantic Province's clinics and helped to create efficiencies and improved patient care.

AMP 2015: The PEI Cancer Treatment Centre physics, Dosimetry, and bio-medical staff believe that it is time to continue the tradition and are organizing an AMP meeting from noon on Friday July 31st to noon Sunday August 2nd, 2015 in Charlottetown. We are planning a guest speaker and are encouraging proffered papers, which can either be of a research nature (planned, underway, or completed), an update on treatment approaches, or physics, Dosimetry, or equipment maintenance topics that would be of interest to staff from other clinics. Relevant posters, even ones from other meetings, are welcome. Students are encouraged to participate as well in a dedicated session on Friday afternoon.

The midsummer timing will allow participants to take their families to the meeting and to add a PEI vacation. During the meeting we are planning organized recreational activities that will help attendees and their families to get to know each other and to enjoy PEI in the summer. There will be a Friday evening lobster (or other option) dinner, the chance to attend the musical *Anne of Green Gables* or *Anne & Gilbert, the Musical*, on Saturday evening, and a wind-up BBQ Sunday at noon. Attendees from outside the Atlantic Provinces or in related disciplines are welcome and encouraged to participate.

Meeting Location and Accommodation: The meeting will be held at Holland College, Prince of Wales Campus, in Charlottetown, which is four blocks from historic Province House and the Confederation Centre of the Arts. There are many hotels within walking distance. However, a block of 25 apartments in the new Holland College residence have been reserved for the meeting. The apartments have a kitchen, living room, bathroom, and two or three bedrooms with double beds. The 21 two bedroom units are each \$99 per night and the four reserved triple bedroom units are \$119 per night, plus taxes. All rooms include continental breakfast. The apartments are also available before or after the meeting but book early. Please see http://www.hollandcollege.com/summer_accommodations/index.php.



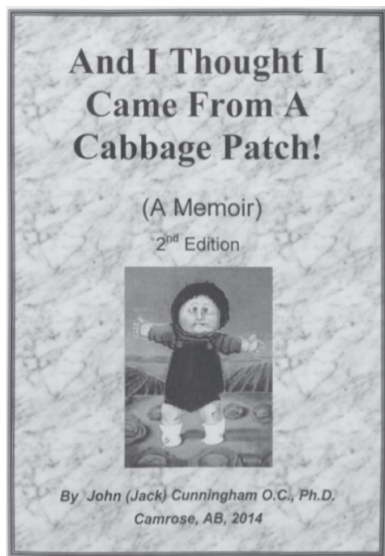
More Information: Please go to our website at www.atlanticmedphys.ca for meeting information. Go to www.tourismpei.com for information about summer on PEI. Come play (and do professional development) on our island!

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A book review, prepared by Crystal Plume Angers, was published in the October 2014 edition of Interactions.



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I like the way it works and flows. The software and analysis have already impacted the way we plan, so it is making a clinical difference.

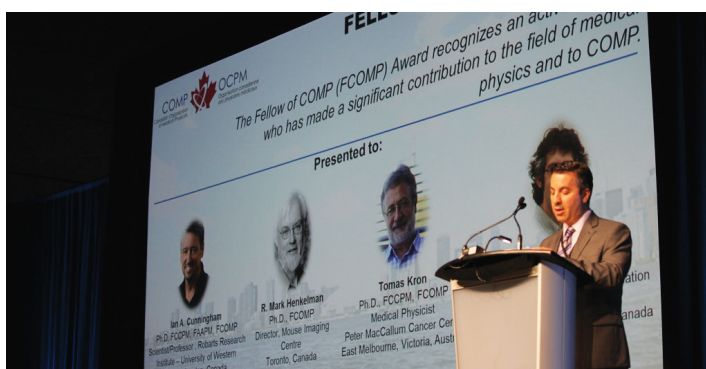
Lou Nardella
Medical Physicist
Pocono Medical Center

¹ "Variation in external treatment plan quality: An inter-institutional study of planners and planning systems," B.Nelms, et al., Practical Radiation Oncology 2012 Oct;2(4):296-305



World Congress 2015 Photo Overview

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Full Breast Tangent Treatment with DIBH Using FFF Beam

Fred Cao

Fraser Valley Centre - BC Cancer Agency, Surrey, BC

On April 10, 2015, the BC Cancer Agency Fraser Valley Centre (FVC) treated a patient using a flattening filter free (FFF) beam with the deep inspiration breath hold (DIBH) technique for left side full breast treatment. This combination of technologies applied to breast cancer treatment has not been reported in the literature to date.

As we know, DIBH can reduce radiation dose to the heart. The challenge of DIBH technique with the conventional flat (FF) beam is that the patients have to hold their breath for a length of time that can be quite challenging for some patients, especially older patients or those with compromised lung function. The FFF beam can be delivered with a dose rate of 1400 MU/min for 6 MV or 2400 MU/min for 10 MV using the VARIAN TrueBeam machine and this has the potential to reduce breath hold times for DIBH.

With DIBH using FFF beams, the total breath hold time for the patient can be reduced to about 13 seconds, compared to about 28 seconds for delivery with flattened beams. The shorter breath hold time is easier on the patient, as well as decreasing the likelihood of motion during treatment, which means that more patients will be eligible to benefit from this technique. In an FFF treatment, the total beam-on time is very often longer than the time calculated by the total MU and dose rate. This is because the beam on time is mostly determined by the maximum MLC leaf speed which is 2.5 cm/sec. Although the usage of 6 MV FFF beam for breast IMRT will strongly reduce the beam-on time, to replace

6 MV FFF beams (1400 MU/min) with 10 MV FFF beams (2400 MU/min) will not further reduce the beam-on time.

In general, the MUs for the FFF beams will be higher than the flattened beams. Even with slightly higher MUs, the usage of the FFF beams for DIBH will reduce the head scatter dose compared with using the flattened beams. This is because the absence of the flattening filter strongly reduces the head scatter dose.

It is almost not possible to do forward planning with the FFF beam because the beam profile is not flat. People often use FFF beams for SBRT treatment with forward planning, because the FFF beam profile is very similar to a flattened beam for small fields. For large field IMRT planning, such as breast, with the help of inverse fluence optimization, successful treatments can be relatively simply produced.

Starting in 2010, IMRT became the standard technique implemented at the Fraser Valley Centre for full breast treatment. FVC developed template-based, inverse optimization breast IMRT technique (TB-IMRT) (ref.1) to achieve the advantages of breast IMRT without being resource intensive. The TB-IMRT provided reduction of planning time (14.0 min. for TB-IMRT vs 39.0 min. for 3D-CRT) and equal or better plans compared with the conventional forward plans.

With the conventional technique, the planning time and quality is strongly planner dependent, however, the TB-IMRT is independent of the planner with a minimal learning curve.

The reason that normal free breathing breast treatment does not use an FFF beam is because of the unknown averaging effects from the fast delivered dose to a relatively slow moving target with a regular phase. The uniformity of the delivered dose is also in question.

It is therefore very important for a patient to hold her breath steady during the FFF beam DIBH treatment. Unlike the Varian iX machine, the Varian TrueBeam machine can be set so the beam will turn on automatically when the breath monitoring tracker is at the pre-determined "beam-on" position. Some patients exhibit chest fall at the beginning of the breath hold. This may be because when the patient hears instructions to "hold," she may relax slightly. This problem may be avoided by talking to the patient to let her know that she may have to adjust inspiration at the beginning of her breath hold. After some practice, the patient should be able to inhale reproducibly from day to day. Fig 1. shows one of the patient breath plots.

With both the implementation of DIBH and TB-IMRT, the FVC is able to use FFF beams for breast treatment. Although FVC is



Fig.2 Some of the FVC team members for the first FFF beam DIBH treatment at the radiation therapy unit with the patient. From left to right: Peter, Sarah, Winkle, Robert, Adrian, Barbara, Charlotte, Laura, Kelly and Fred.



Breath-hold Gating

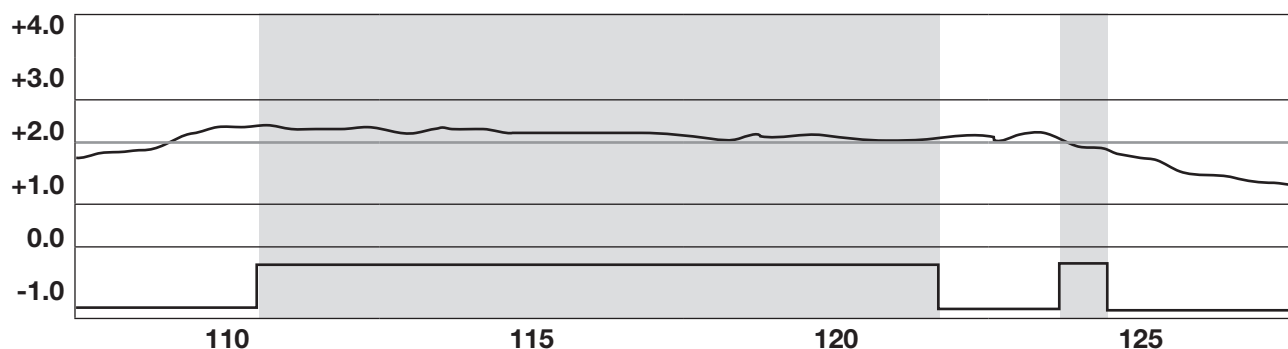


Fig.1 one of the patient breath hold plots. The stable breath hold plateau can be achieved after a few practices.

still in the early stages of implementation of DIBH using FFF beams, the patient acceptance has been very positive. At the time that this article was written, the second patient treated with DIBH using FFF beams has started her treatment.

References

1. Sonia K. Nguyen, Fred Cao, Ramani Ramaseshan et al. "Template-based breast IMRT planning for increased workload efficiency". Radiation Oncology (London, England), 2013. 8: p. 67-67.

New COMP Members

Please welcome the following new members who have joined COMP since our last issue:

Last Name	First Name	Institute/Employer	Membership Type
Al Amri	Iqbal	McGill University Health Centre	Full
Darvish Molla	Sahar	McMaster University	Student
Fang	Yuan	US Food and Drug Administration	Associate
Fillion	Olivier	Université Laval	Student
Girard	Frédéric	Centre intégré de cancérologie de Laval	Full
Goulet	Mathieu	CHU de Québec	Full
Hila	Mukhraj (Monica)	Central Alberta Cancer Centre	Full
Laliberté-Houdeville	Cédric	Université Laval	Student
Létourneau	Étienne	Centre intégré de cancérologie de Laval	Full
Nusrat	Humza	Ryerson University	Student

Congratulations to our past student COMP members who are now full members:

Last Name	First Name	Institute/Employer
Gaul	Joshua	Windsor Regional Cancer Centre

Message from the COMP President

continued from page 65

meeting. As physicists who think about improving healthcare, we develop skills that lend naturally to thinking about issues from different points of view. I believe this is because we know that we have to set up the machines that we work with (whether that machine is a linac, scanner, computer, or something used in an OR)

for someone else to use, since we don't interact directly with patients. Hopefully, this medical device will be integrated into the clinic in such a way so that our clinical colleagues will have an easier job, and not a harder one. In doing this, we add great value to the entire clinical environment, not just the machine we are working on.

These are great skills for any professional, and though most physicists tend to view ourselves through the technical work we do, I think we should not forget how valuable the work we do is for the greater healthcare setting.



Is Routine Hospital-Based Proton Therapy Coming to Canada: Are We Proton-Ready?

Patrick V. Granton, Glenn Bauman, and Jerry Battista
London Regional Cancer Program, London, ON

You might have missed it, but earlier this year Health Canada issued a decision to approve and issue a class III licence to Mevion Medical Systems for the Mevion S250 Proton Beam Radiation Therapy System. This paves the way for the first Health Canada approved medical device to allow routine hospital-based proton therapy in Canada. Mevion Medical Systems federal application took just under three years to complete, but now with this hurdle removed, proton therapy may be coming to Canada and quickly. According to the publically available 2018-strategy document of Princess Margaret Cancer Centre in Toronto, one of their strategic initiatives is to “Secure resources, partnerships, and infrastructure to implement the first comprehensive and hospital-based proton therapy program in Canada.” Notwithstanding, the challenges in establishing a routine proton facility in Canada are great; there are geographical issues with deploying a new treatment option to a country as large as Canada, and cost issues that are potentially difficult to address within our public health system, to name a couple of these practical challenges.

Of course Canada is not new to proton therapy, and most readers will be familiar with TRIUMF, the world’s largest cyclotron, in Vancouver, which has been treating patients with ocular melanoma from across this nation since 1995. TRIUMF has received more than one billion dollars in federal funding since its

inception and is generally regarded as a Canadian success story, supporting local economies, integrating with the private sector, and providing opportunities for fundamental particle physics research. TRIUMF has treated nearly 200 patients with proton therapy, but treatment has remained limited to the eye. Worldwide, the Heidelberg Ion Therapy (HIT) centre is widely viewed as a model of integrated research and clinical care providing both proton and carbon therapy.

The TRIUMF proton therapy program is now 20 years old and its infrastructure is built upon 1960’s design and engineering considerations, which are in contrast to today’s proton therapy facilities that no longer resemble physical laboratories but are polished hospital-based bunkers that include on-boarding imaging. According to the PTcog.ch website - a fantastic resource for material on ion treatment - there were 11 clinically operating proton therapy facilities in 1995, which has now ballooned to 49 operating facilities with an additional 28 under construction. In that time period, the cost and design of these systems has also evolved from a switched beam line feeding multi-room system to a single room system that retails for around \$30M CDN, excluding peripheral costs (building, equipment, personnel etc...). The technology has also evolved to the point where range shifting while scanning a pencil beam resembles the clinical workflow and dose conformity of IMRT, often referred to as intensity

modulated proton therapy (IMPT). Based on these new technologies and the physical arguments of proton treatment to generally spare healthy tissue, why has Canada been so reticent in adopting this technology for routine cancer treatment? Particularly when proton therapy patient advocacy groups and case-specific controversies have been appearing in the news as of late.

The likely explanation is that Canada is quite conservative in adopting new medical procedures, much like other healthcare systems worldwide (e.g. National Health Service of the UK). Our decision makers control the diffusion of technology by demanding evidence-based medical care decisions, and, until now, the evidence that protons outperform photons has been truly lacking; one clinical trial even showed a greater GI toxicity for prostate therapy when compared to photon-only IMRT treatment. Also due to our public health care system, additional costs over the standard of care must demonstrate a sufficient gain to the patient, often referred to as quality of life years gained or avoidance of longer term costs of re-treatment. Unfortunately, data from clinical trials and late effects, such as secondary cancers, take decades to acquire and Canada, perhaps too often, has taken a “wait-and-see” attitude. There are, however, a few more recently initiated clinical trials comparing protons versus photons, such as RTOG 1308 trial for locally advanced NSCLC and RTOG



trial 1326 for Glioblastoma, that will report outcome data earlier than other trials, and could alter clinical decision trees inferred from “old protons”. That said, there does appear to be an emerging consensus in Canada and abroad that for some sites, like the base of the skull and for pediatric patients, proton therapy would be the preferred treatment modality despite the scarcity of clinical “proof”, based on the principle of equipoise and theoretical arguments of less normal tissue damage. There is also precedent for the introduction of new technologies into clinical practice through clinical trials. For example, Ontario moved from a situation of very limited availability of PET scanning to the current state where there are well-defined funded indications for PET scanning based on clinical trials conducted in Ontario. In addition, a PET registry and special access program provide PET availability for clinically justified situations outside of evidence-based indications. Such a process could be applied to the introduction of proton beam therapy.

Alberta physicians have recently outlined recommendations on how clinical decisions should be made towards proton therapy and have even put forward their ideas as a model for the rest of Canada (see recommended reading below). It may surprise the reader that even though proton therapy for disease sites other than the eye are not available in Canada yet, some provinces and multidisciplinary clinical boards do provide avenues for patients to seek treatment in the United States based on a case-by-case basis. Such reviews are conducted using processes established at the provincial level to review and approve out-of-country treatment requests.

Based on Health Canada’s decision to approve the sale and use of a proton therapy device, the explicitly stated desires of some Canadian institutions to acquire proton therapy, and the growing adoption

of proton therapy worldwide, it should be incumbent upon the Canadian medical physics community to remain prepared for the potential introduction of routine proton therapy. Certainly, feasibility studies must include questions like: what patient cohort could benefit most in Canada from proton therapy? Would funding be better invested in multiple single-room centres across Canada or a large multi-room facility, with several beam lines that could include isotope generation and medical physics research in an expert central location? What are the standards of practice and training that would have to be in place for routine quality assurance before treatment commences?

Some of these questions are being addressed at select Canadian institutions, and of particular note are groups at the University of Toronto, Carleton, and McGill. However, the number of proton therapy researchers in Canada appears diminished when compared to similar GDP-level countries. For example, the publication output from the Netherlands, Belgium, and Denmark, representing a similar population to that of Canada’s, reveals a total of 126 publications, whereas there are only 46 papers associated with Canada in a web of knowledge literature search using the search terms “proton therapy”. Upon closer inspection, only 34 of these publications have a strong Canadian affiliation, defined as either the first or last author present at a Canadian institution. None of these three countries have a proton facility currently in clinical operation, but there are plans in all three countries to acquire a proton centre (in fact the Dutch have started building two facilities as we speak). Are they getting ready for routine proton therapy while Canada appears lagging?

The point is, that despite not having a modern clinical proton therapy facility, there is ample research that could be



performed to prepare this nation to determine if a proton facility would be appropriate for our population, and where research could progress to evaluate the potential benefits of heavy ion treatment, such as carbon ions. This establishment of expertise almost occurred in Alberta in the 1980’s with the MARIA project that folded because of dropping oil revenues – déjà vu! In particular, *in-silico* trials of simulated treatment could be revisited using state-of-the-art delivery systems, refreshed by today’s optimization algorithms for plan robustness and radiobiology-based planning. On the experimental physics side, TRIUMF could guide new avenues of research, including prompt gamma imaging or in-vivo PET dosimetry. In addition, this is a great opportunity to build collaborations with international partners around comparative dosimetry on common data sets planned by expert teams of proton and photon planners. Such collaborative experience could also build confidence among Canadian physicists and radiation oncologists in reviewing and evaluating proton plans and better understanding of the unique characteristics of proton-based delivery in real life clinical scenarios.



In conclusion, we believe that it is critically timely and important that the medical physics community engage in an urgent national dialogue that could explore the cost/benefits of routine proton therapy coming to Canada. Certainly there are opportunities for proton therapy research to be performed in Canada, and with international partners, to demonstrate to the world that Canada can regain its leadership role in radiation therapy. In addition, there is a timely opportunity for Canadian investigators to connect with their counterparts in the UK and Netherlands and learn about how they are developing their proton facilities. This is a unique chance to learn from others as they start their journey so we can learn from their experience. Harold Johns would state it so!

We hope you have found this article informative in order to help spur discussion within our community. We hope that we have not misrepresented any material presented, but if we have, we apologize in advance, and welcome any corrections or rebuttals. As they say in the proton world, the buck (particle) stops here!

For further recommended reading on proton therapy

- "The physics of proton therapy" PMB Vol. 60. N. 8, pp. R155 by W. Newhauser & R. Zhang
- "Recommendations for the referral of patients for proton-beam therapy, an Alberta Health Services report: a mode for Canada?" Curr Oncol, Vol. 21, pp. 251-262 by S. Patel et al.

- Patient advocacy group - Protonbob.com
- "Proton Versus Intensity-Modulated Radiotherapy for Prostate Cancer: Patterns of Care and Early Toxicity" JNCI Vol. 105. Issue 1, pp. 25-32 by. Yu et al.
- "In Search of the Economic Sustainability of Hadron Therapy: The Real Cost of Setting Up and Operating a Hadron Facility" Red Journal, Vol. 89, Issue 1, pp. 152-160 by Vanderstraeten et al.
- "Emerging technologies in proton therapy" Acta Oncologica, 2011, Vol. 50, pp. 838-850 by Schippers and Lomax
- "Current Clinical Evidence for Proton Therapy," The Cancer Journal, Vol. 15. Issue 4, pp. 319-324 by Brada M., Pijls-Johannesma M., De Ruyscher D.
- Heidelberg proton facility: <https://www.klinikum.uni-heidelberg.de>

AutoSeg 2015 at the World Congress

Stephen Breen
Princess Margaret Cancer Centre, Toronto, ON

AutoSeg 2015 lecturers

Grigorios Karangelis, PhD
Oncology Systems Ltd, United Kingdom

Stina Svensson, PhD
RaySearch Laboratories, Sweden

Jinzhong Yang, PhD
MD Anderson Cancer Center, USA

Thomas Langerak, PhD
Erasmus Medical Center, The Netherlands

Chris MacIntosh, PhD
Princess Margaret Cancer Centre, Canada

Harini Veeraragavan, PhD
Memorial Sloan Kettering Cancer Center, USA

Yuri Boykov, PhD
Western University, Canada

Prabhjot Juneja, PhD
University of Sydney, Australia

Satish Viswanath, PhD
Case Western University, USA

John Kim, MD
Princess Margaret Cancer Centre, Canada

AutoSeg 2015 was a pre-conference educational event held immediately prior to the World Congress on Medical Physics and Biomedical Engineering in Toronto in June. The half-day event was organized by Dr. Stephen Breen (Princess Margaret Cancer Centre / University of Toronto), Dr Vladimir Pekar (Philips Healthcare), and Dr. Gregory Sharp (Massachusetts General Hospital, Harvard Medical School), and featured ten presentations on the autosegmentation of medical images. This event follows a successful AutoSeg 2013 held in Boston.

Presentations focused on algorithm development, validation, and applications. Speakers were invited from around the world, bringing

their perspectives from industry, academia, and hospitals. There were some interesting clinical results using deformable registration applied to adaptive radiation therapy and improving conventional radiation therapy processes as well. One of the common themes was atlas selection for automated segmentation.

The sessions were attended by about forty delegates, who rated the event very highly. Even though the event started early on Sunday morning, prior to the World Congress, the attendees from around the world were very engaged in many discussions.

The event was supported by COMP through a Continuing Education Grant.



What is QARSAC?

Kyle Malkoske

Simcoe Muskoka Regional Cancer Program, Barrie, ON

The Quality Assurance and Radiation Safety Advisory Committee has been a standing committee that reports to the COMP board on issues related to quality assurance and radiation safety in Canadian radiation treatment programs. Our main responsibilities include: developing and maintaining technical quality control guidelines for use by the Canadian medical physics community, reviewing and commenting on existing and proposed regulations in the area of radiation safety on behalf of COMP, and advising COMP on matters relating to quality assurance, radiation safety, and associated training.

In the last few years, we have been spending a great deal of energy working with the Canadian Partnership for Quality Radiotherapy (CPQR) to develop a suite of Technical Quality Control (TQC) guidelines for radiotherapy equipment. This need was expressed by COMP membership and explicitly recognized in COMP's 2012-2015 strategic plan. We wanted to take this opportunity to describe some of this exciting work.

The CPQR was envisioned in 2010 at the first COMP Winter School. It is a cooperation among the three key national professional organizations involved in the delivery of radiation treatment in Canada: the Canadian Association of Radiation Oncology (CARO), the Canadian Organization of Medical Physicists (COMP), and the Canadian Association of Medical Radiation Technologists (CAMRT). The mandate of the CPQR is to support the universal availability of high quality and safe radiotherapy for all Canadians through system performance improvement and the development of consensus-based guidelines and indicators to aid in radiation treatment program development and evaluation. The Canadian Partnership Against Cancer

(CPAC) currently provides fiscal and strategic sponsorship.

As part of this mandate, TQC guidelines were earmarked as an area in need of work (essentially a continuation of the work that was founded by CAPCA). At QARSAC, we are leveraging the backing by CPQR to support as many guideline documents as possible. As a result, you have seen many email blasts and review opportunities over the last few years.

The TQC guidelines have been established as a cohesive suite of documents with similar template and language throughout. The common template allows for ease of production and review. These documents are designed to be used as a reference for minimum performance objectives and safety criteria that equipment or technology should meet in order to assure safe operation. A formalized review process was developed to ensure these documents are relevant, field tested, and adaptable to changes in technology, thereby increasing their applicability. Here's how the process works in a nutshell:

- (1) Expert Review. QARSAC identifies one or more *expert reviewers* to lead the development of a particular TQC. Initial quality control testing and frequencies are drafted from a review of available literature, existing guidelines, and clinical evidence related to the selected technology.
- (2) Community Review. Once an initial draft is prepared, the guideline is shepherded through a community review phase that consists of an online review and comment period of at least 30 days. Comments are accepted from the community at large to promote concise feedback and review of suggested testing methods and frequencies by a variety of experts

in variety of clinical settings. The community comments are organized and sent back to the expert reviewers for incorporation into the draft version.

- (3) External Validation. Three to five institutions are recruited to perform in-depth field testing of the document. Centres are selected to include a range of sizes, types of equipment, and regions of the country. The field testing reports assess the practicality of the tests, including a measurement of the required resources.
- (4) Ratification by COMP. The validated document is edited, translated, and posted for use.
- (5) Review and update. After 2–3 years, the documents will undergo a formal review, which will include community review and field implementation reporting. Stay tuned as some of the first guidelines are reaching this point soon!
- (6) Recently we have consolidated the TQCs to the CPQR website, with clear separation of the documents according to their stage in the development process. Check out the latest versions at www.cpqr.ca/programs/technical-quality-control/.

This process endeavors to provide rapid and relevant guidance for quality control of radiotherapy equipment and systems. Let's use a current example to demonstrate the strengths of the process. The TQC guideline for *Medical Linear Accelerators and Multileaf Collimators* (MLA) was ratified in 2014 and published online on February 28, 2015. This first version did not include any tests related to Volumetric Modulated Arc Therapy (VMAT), which has exploded in use in the last two years. QARSAC recognized the need to



incorporate VMAT tests and initiated an independent TQC development process for VMAT quality control. The VMAT TQC is currently undergoing field testing at four centres in Canada, and is available at www.cpqr.ca. Once the external validation reports are completed, the finalized test list will be incorporated into the existing MLA TQC. This will likely occur later this year. Compare this to the length of time between AAPM Task Group report updates, and I think you'll agree that the process is quite nimble; not to mention the fact that the amendments have been thoroughly tested in the field prior to finalization.

These are documents created by the community—for the community. Each province has now contributed to at least one aspect of the development process for a TQC guideline. Your feedback and involvement directly affects the quality of the guidelines. They will evolve with time, so if you disagree with some aspect of the guidelines, please let us know! As an example, based on your feedback we are in the process of reformatting the document suite to be more user friendly. The general overview of technical quality control, which was a large preamble in each TQC guideline, is being moved into a separate overarching document. This will allow

each *equipment specific* TQC guideline to shorten to a brief system overview and the tables of tests.

At the recent World Congress meeting in Toronto in June, QARSAC hosted a special session titled “*QC in Radiotherapy: Defining the Next Steps*”, where our work was presented to colleagues from Canada, USA, Europe, Central, and South America. The attendees were very impressed with the work to date, and many expressed interest in collaborating, so don't be surprised to see upcoming TQC guidelines tested outside of Canada!

On another front, we are in the process of creating a Radiation Safety Sub-Committee of QARSAC to connect and facilitate discussion amongst Radiation Safety Officers (RSOs) from across the country. The goal is to increase COMP's voice in radiation safety issues with our regulators and partner organizations through improved internal communication and consolidation of expert opinions. We will provide more information on this initiative in future InterACTIONS articles as this project progresses.

For more information on QARSAC, or to get involved in one of these initiatives, please contact Kyle Malkoske (malkoskek@rvh.on.ca).

QARSAC Committee:

Kyle Malkoske (Simcoe Muskoka Regional Cancer Program, Barrie, ON)

Michelle Nielsen (Mississauga-Halton Regional Cancer Program, Mississauga, ON)

Jean-Pierre Bissonnette (Princess Margaret Cancer Centre, Toronto, ON)

Laurent Tantôt (CIUSSS de l'Est-de-l'Île-de-Montréal, Montréal, QC)

Kevin Diamond (Juravinski Cancer Centre, Hamilton, ON)

John Grant (Cape Breton Cancer Centre, Sydney, NS)

Eduardo Villarreal-Barajas (University of Calgary, Calgary, AB)

Natalie Pomerleau-Dalcourt (Centre d'oncologie Dr Léon-Richard, Moncton, NB)

L. John Schreiner (Cancer Centre of Southeastern Ontario, Kingston, ON)

Marie-Joëlle Bertrand (CIUSSS du Saguenay-Lac-Saint-Jean, Chicoutimi, QC)

Normand Frenière (Centre de santé et de services sociaux de Trois-Rivières - Centre hospitalier régional, Trois-Rivières, QC)

Message from the CCPM President

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proposed certain changes to this year's FCCPM exam, while still respecting our current regulations. Candidates were required to provide examiners with additional documentation (up-to-date CV, brief summaries for up to two projects, and letters of reference) which illustrate their leadership qualities. This additional information was very much appreciated by the examiners. Also new this year were a shorter presentation (15 minutes) and more questioning on the

project and submitted documentation (30 minutes).

As many of you may already know, the College offers a special certification in the physics of mammography. These certified physicists oversee the quality assurance program of mammography facilities. This is a requirement for the facility's mammography accreditation by the Canadian Association of Radiologists. Recently, there have

been some preliminary discussions on potentially adding certification in a new area, the physics of bone densitometry. These discussions are in very early stages. The CCPM Board will collaborate with COMP and the physicists spearheading this project as the need for this certification become clearer.

Well, that's it for now! One down ... 11 more to go!



Congratulations to the 2015 Fellow of COMP Award Recipients

	Dr. Ian Cunningham obtained a PhD in medical biophysics from the University of Toronto. Dr. Cunningham is a research scientist at the Robarts Research Institute and a Professor in the Schulich School of Medicine and Dentistry at Western University in London Ontario. He is a Fellow of the Canadian College of Physicists in Medicine and the American Association of Physicists in Medicine. Ian's research interests include the development of design principles and concepts for new high-performance x-ray detectors, and he has published 120 research papers on the physics of diagnostic imaging. He is the founder and president of DQE Instruments, a startup company created with Western University that manufactures and sells instruments that determine the defective quantum efficiency of x-ray detectors to major manufacturers and leading hospitals worldwide.
	Dr. R. Mark Henkelman is a professor in the Departments of Medical Biophysics and Medical Imaging at the University of Toronto. He is a senior scientist and director of the Mouse Imaging Centre (MICE) at the Hospital for Sick Children. The Mouse Imaging Centre is staffed by a team of 40 investigators with expertise in imaging techniques, computer science, engineering, imaging processing, developmental biology, and mouse pathology. Dr. Henkelman is a co-author on 10 patents, over 350 publications, 600 abstracts, and numerous presentations worldwide. He holds a Tier 1 Canada Research Chair in Imaging, and, in 1998, he was awarded a Gold Medal from the International Society of Magnetic Resonance in Medicine. In 2005, he was appointed a Fellow of the Royal Society of Canada. In 2010, he was awarded the Killam Prize in Health Sciences by the Canada Council for the Arts.
	Dr. Tomas Kron was born and educated in Germany. After his PhD, he migrated to Australia in 1989 where he worked in a number of radiotherapy departments, and from 2001 to 2005 he worked in Canada at the London Regional Cancer Centre. Since 2005, Dr. Kron has been the principal research physicist at Peter MacCallum Cancer Centre in Melbourne, Australia. Dr. Kron has co-authored a radiotherapy textbook and published more than 200 papers in refereed journals. He was president of the Australasian College of Physical Scientists and Engineers in Medicine (ACPSEM) from 2008 to 2009. Over the years, Dr. Kron has maintained an interest in education, reflected in 70 invited conference presentations, consultancies for the International Atomic Energy Agency (IAEA), and involvement in workshops and training in Australasia. Dr. Kron was convenor of the 17th International Conference on the Use of Computers in Radiation Therapy (ICCR) in Melbourne. In 2014, he was awarded an Order of Australia Medal (OAM) for services to medicine, research, and education.
	Dr. Malcolm McEwen received his MSc in medical physics from University College, London in 1993, and his PhD in radiation physics from the University of Surrey in 2002. From 1989 to 2002, he worked at the National Physical Laboratory in the UK before moving to the Ionizing Radiation Standards group at the National Research Council, Canada. Dr. McEwen is currently the scientific lead for the IRS group, which develops primary air kerma and absorbed dose standards for x-rays, gamma rays, electron, photon, and neutron beams. His research interests focus on absorbed dose calorimetry and the performance of secondary reference dosimeters. He serves on a number of national and international organizations, including as director of the Ottawa Medical Physics Institute, chair of the AAPM's Calibration Laboratory Accreditation Sub-Committee, chair of the BIPM's Comité consultatif des rayonnements ionisants, and in 2010 he was chair of the LAC for the COMP meeting in Ottawa.



Horacio Patrocinio completed his MSc in medical physics at McGill University, and worked at Hôpital Hotel-Dieu de Montreal until 1997, at which time he joined the staff of the McGill University Health Centre. He has taught hundreds of graduate students and residents at McGill University and Dawson College, and has supervised six graduate students and mentored 42 medical physics residents.

Horacio has worked on developing training modules for the CAMRT, and also participated in the preparation of CAPCA and CPQR documents. He has worked with the IAEA as a technical cooperation expert on several missions and has conducted program reviews in South America, Europe, and the Middle-East.

Horacio has been a Fellow of CCPM since 2002. He also served as CCPM registrar and on the Finance Committee of the 2015 World Congress. He served as both treasurer and president of the Association Québécoise des Physiciens Médicaux Cliniques and has worked to improve the conditions and recognition of medical physicists in Quebec. He served on the Board of COMP as treasurer from 2002-2005, and has been a member of the Professional Affairs Committee since 2009.



Dr. Jan Seuntjens was trained as a radiation physicist and measurement dosimetry expert and contributed to the development of water calorimetry techniques for calibration standards. During his PhD in Belgium, and continuing into his post-doc at the NRC, he also developed expertise Monte Carlo techniques with applications in radiation dosimetry and clinical physics.

In 2000, Dr. Seuntjens joined the Medical Physics Unit at McGill University and became Director in 2009, where he now holds a James McGill Professorship. The CAMPEP accreditation of teaching and training programs has been maintained, and, in 2013, the medical physics certificate program was launched. In collaboration with Dr. Luc Beaulieu, he launched an NSERC-funded new training program called "Medical Physics Research Training Network". He has been very involved with committees related to radiation dosimetry with the International Atomic Energy Agency (IAEA), the International Commission for Radiation Units and Measurements (ICRU), the AAPM, COMP, and a variety of grant panels.

Dr. Seuntjens' publication record contains 150 peer-reviewed publications, editorship on three books, a book co-authorship, 10 book chapters, 28 proceedings papers, three patents, and numerous abstracts and presentations.



Dr. Dave Wilkins was born in Ottawa and then went on to study physics at Queen's University. He obtained his MSc in medical physics at McGill University, and his PhD at Carleton University, followed by a post-doctoral fellowship and residency in Ottawa.

Dr. Wilkins' working career has been spent at The Ottawa Hospital Cancer Centre, where he is currently a senior medical physicist and radiation safety officer, with academic appointments at Carleton University and University of Ottawa.

Dr. Wilkins served on the COMP Board as councillor for Professional Affairs from 1999-2003, and on the CCPM Board as vice-president and president from 2006-2012. He currently lives in Ottawa with his wife Ruth, who is also a COMP member, and two teenage children who are not (yet).

Executive Director Report

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Newfoundland. More details will be shared as they become available.

We will also be launching a partnership with Sosido, an online knowledge sharing platform for professional healthcare associations and their members. Sosido bridges silos of specialty, discipline,

and centre to speed knowledge transfer, promote collaboration, and broadcast contributions of each group to the broader healthcare community. More information will be shared with you about this partnership over the next few months and you will be provided with an opportunity to opt out should you not wish to

participate. More information is available at www.sosido.com.

It was great to see so many of you in Toronto. Thank you for all of your support and participation. Please contact me anytime with ideas and feedback.



Thank You to Our Outgoing Board Members



Matt Schmid FCCPM is a senior physicist at the BC Cancer Agency-Southern Interior.

Matt has served on the COMP Board for the past three years as a director-at-large representing the Canadian College of Physicists in Medicine (CCPM). Matt was instrumental in helping COMP transition to the new Not-for-Profit Corporations Act. As well, Matt helped clarify the relationship between COMP and CCPM through the creation of a formal contract between the two organizations. Matt also just recently completed his term on the CCPM Board where he served for six years; three years as president preceded by three years as vice-president.

COMP was well-served by Matt's leadership and his thoughtful and practical approach to resolving issues



Parminder Basran FCCPM is a senior medical physicist with the BC Cancer Agency-Vancouver Island Centre.

Parminder served on the COMP Board for the past three years and was chair of the Communications Committee. Under Parminder's leadership, COMP ventured into the foray of social media. Parminder encouraged members to communicate in new ways; for example, by submitting videos or "velfies" to celebrate the International Day of Medical Physicists. Parminder also played a key role on the Publicity Committee for the 2015 World Congress.

The COMP Board and the organization as a whole were well-served by Parminder's knowledge of technology and his creative and innovative approach to problem-solving.

Welcome New Board Members



Clément Arsenault FCCPM FCOMP completed his PhD at l'École Polytechnique in Montréal and retrained in medical physics at the Montreal General Hospital. Clément joined the Dr Leon-Richard Oncology Centre in Moncton, NB in 1992 and has been chief physicist there since 1994. He has been a Fellow of the Canadian College of Physicists in Medicine since 2005. Clément also became a Fellow of the Canadian Organization of Medical Physicists in 2012, the inaugural year for the award.

Clément has been involved throughout his career with many associations and organizations. Since 1997, he has participated on many committees of COMP. From 2000 to 2006, he was part of the COMP Executive, serving as chair-elect, chair and past-chair. In 2012, Clément joined the CCPM Board as vice-president and in June 2015 took over the duties of president.

Clément will be serving on the COMP Board as a director-at-large representing the Canadian College of Physicists in Medicine (CCPM).



Atiyah Yahya MCCPM has been a medical physicist at the Cross Cancer Institute and an assistant professor in the Department of Oncology at the University of Alberta since 2010.

She obtained a PhD in medical sciences-biomedical engineering and electrical and computer engineering from the University of Alberta in 2006. In 2008, she obtained her CCPM certification in Magnetic Resonance Imaging Physics and in 2015 and obtained a second CCPM certification in Diagnostic Radiology. She is also certified in the physics of Mammography. Atiyah served as treasurer for the Association of Medical Physicists in Alberta (AMPA) from 2011-2014.

Atiyah will be serving on the Board as a director-at-large and will also be working with the Communications Committee.



Message from the Editor



Christopher Thomas
Nova Scotia Cancer Centre

Hello again! We're a little late (ok, a lot late) getting this issue out to you all as we wanted to wait until after the World Congress and include content from that great conference. This issue is brimming with articles. We have some relating to the World Congress, plus a new technique development article, and an article discussing the status of proton therapy in Canada.

A special thanks to all the organizers (too numerous to mention) on putting together a truly fantastic conference in Toronto. If you were there, then you know there were a lot of talks and sessions requiring extra effort to manage. There were medical physics session and biomedical engineering sessions, as well as joint sessions. It was a great opportunity to mingle with colleagues we might not normally see.

Although I didn't make the gala dinner on Wednesday night, it looks to have been a smash and now I wish I had been there. In addition, the COMP student council also organized their annual night out and luncheon. At the CCPM AGM Thursday night, new members and fellows were accepted, and at the COMP AGM, immediately following, the Gold Medal was awarded to Mick Patterson from the Juravinski Cancer Centre (see this issue for Joe Hayword's introduction speech and Mike's acceptance speech). Both AGMs helped the stretch the conference day until 9 pm! This was a great ending to a great conference.

Next year's COMP ASM is in St. John's, Nfld. If you've never been that far east in Canada, you owe it to yourself to go. I was there a couple years ago for vacation and had a great time. Not only is there the legendary Newfoundlander hospitality, but there are also some of the best restaurants in Canada (seriously, Raymond's has been voted the best restaurant in Canada for at least two years now). I could go on for hours about Newfoundland, so I'll stop here. But seriously, it's going to be a lot of fun, plus there will be medical physics!

Just as a reminder, YOU help make InterACTIONS work, so please submit articles. Take care and see you soon.

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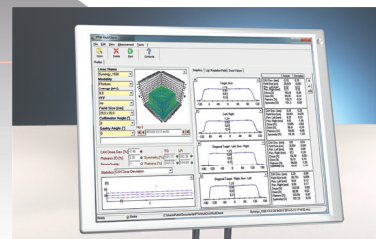
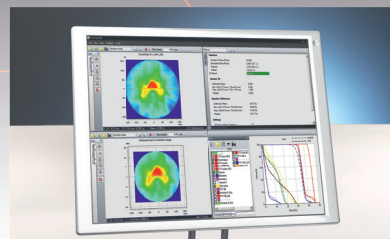
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