European Medical Physics News

Winter 2009

Contents:

Inger-Lena Lamm: Exclusive EMPNews interview!

Editorial

Dear Reader,

Time is flying by - 2009 is fading with 2010 closing in. Financial crisis has finally arrived at the door steps of Medical Physics Departments with a monetary impact range from mildly like in Germany to quite severe for our colleagues in Ireland. But there were also good news in 2009 from a Medical Physics point-of-view. The climax was certainly the World Congress in Munich that proved to be a success, despite the high registration fees. EFOMP was one of the organizers hosting various events at the conference, such as the symposium on Education and Training in Medical Physics. A summary of it is given in this issue.

The last issue announced: You will read about the situation of Medical Physics in this and the coming issues. Now the reports from different parts of Europe start to float in: An interesting insight in the development of Medical Physics in Ireland is given in this issue by Wil van der Putten who describes the Irish road from the beginning to the here and now. Thank you Wil for this profound piece of work.

Well, that will be it, for today and for this year. The editorial team wishes all of you a Merry Christmas and a Happy New Year - if possible without being on call or even duty in your Clinics.

A special

Happy birthday DGMP

from all your European partner organizations!

The German NMO, the Deutsche Gesellschaft für Medizinische Physik (DGMP) could celebrate its 40-th anniversary in November. In a symposium held on the very same day the DGMP was born 40 years ago, our German colleagues looked back at a road that was often bumpy but in the end led to a strong organization of Medical Physics and Physicists. For the long standing members it was a moment of proud seeing what has become the result of their efforts, for the youngsters it was (again) interesting to learn, that problems are seemingly different now but at a second look often the same as they have always been. It is now up to the next generation to tackle the upcoming challenges - from the solid foundation their founding fathers and mothers left them.

A one-time-chance to get a next to complete gathering of active and former DGMP board members, many of them have significantly formed the organization as it is today.

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Inger-Lena Lamm (Sweden): From jet-fighter to fighting cancer

Inger-Lena Lamm and Markus Buchgeister during the interview at the WC2009 at Munich.

Núria Jornet and Markus Buchgeister:
When and why did you decide to go for a physics degree?

Inger-Lena Lamm: When I was at school, studying for my baccalaureate, my first priority was not physics in general but aeronautics. In fact, I was so interested in all aspects of flying - and especially flying myself! -, that I did an extra project work in aeronautics – and another one in mathematics. That was during my last year at school. My plan was to get a university education in engineering, specialising in aeronautical engineering at KTH, the Royal Institute of Technology, in Stockholm.

So you did your university studies in Stockholm?

No, I talked to some people with insight in education and possibilities of future careers, and they all advised me to go for a more general education such as engineering physics, mathematical physics, theoretical physics, instead of aeronautics. With that broad background, I could always later go for aviation type studies, or whatever I wanted. However, back to school again, when I tried to get closer to aeronautics and flying. I soon found, that this was more difficult for me, as a girl, than for the boys! The Swedish air force, for instance, subsidized sailplane training for boys - not for girls. I thought that was very unfair, and I think that this was actually my first gender discrimination experience. Then, I tried to get some practical knowledge of airplanes, and that wasn't easy either being a girl. But thanks to some rather devious connections, I got the possibility to work as trainee technician at an air force base during the school summer holidays. Well, I was not flying myself, of course, it was all about preventive maintenance of jet fighters. As introduction, the first morning I was given a valve and told to replace it! I did so without fuzz and became one of the team directly. The mechanics realized that I was truly interested in engineering, they became very keen on showing me how to do things, and they always called me whenever something interesting came up. I had a great time there, and learned a lot.

This sounds like you were something special, being an interested girl at that air force station or not?

Yes, perhaps, sort of… When I talked with the chief engineer after some weeks he told me, that they had been quite sceptical when they were told that a girl was coming to work there. They had anticipated lots of trouble, a female "technician" amongst all the male soldiers! But, when I had started working, they realized that they were wrong. I had come for the engineering, and not for the engineers (I am not saying that I

did not like boys, though!) Maybe, that I even broke the ice for other girls following me.

During the Christmas school holidays I spent another week at the workshop, and at the Christmas coffee, I was placed next to colonel, as I was the only female around. He got interested in my aeronautical struggle, and helped organise so that I could go to Stockholm and participate in the tests for selecting "flying flight engineers". It was quite an experience those two days! There were a variety of practical tests and psychological tests, and they asked things like how I would react in a war situation flying, if I had a family on the ground. I couldn't understand the difference being a girl or a boy in this type of situation. However, I was very relaxed during the tests, as I knew that I wouldn't be accepted as a flying engineer whatever my results were. And, consequently, I did very well!

Later, during my studies at Lund Institute of Technology, I was the only girl in my study group. During the summer holidays we had to acquire some months of practical engineering experience, as part of our study. I had the advantage of working as a "non-flying engineer" trainee in the air force, again together with a number of boys, all of them "non-flying" engineer students from Institutes of Technology all over Sweden.

But how do you end up in Medical Physics?

Well, my studies included a lot of subjects and exams, among others quantum mechanics. I was the one who got the best results in that subject, and I was offered a *research assistant* position in the department of mathematical physics. Of course I accepted, and that started me off into the mysteries of quantum mechanics. My future as "flying engineer" was quite sort of doubtful, but I had learned a lot of practical engineering (and of people) and had lots of fun. I decided to switch over to mathematical physics, and I did my doctoral thesis on that subject (about stably deformed nuclei in the rare earth and actinide regions, clearly a very narrow subject!). I loved it, as I enjoyed mathematics and computing. In fact, whatever you study actively in depth becomes interesting, I think. We were quite early in our group in Lund, using computers in quantum mechanics. My professor, Sven Gösta Nilsson, was working together with Aage Bohr and Ben Mottelson, the Nobel Prize winners. It was a quite fascinating experience.

I have always been interested in all aspects of natural sciences, such as biology and medical applications, and I decided to devote some time

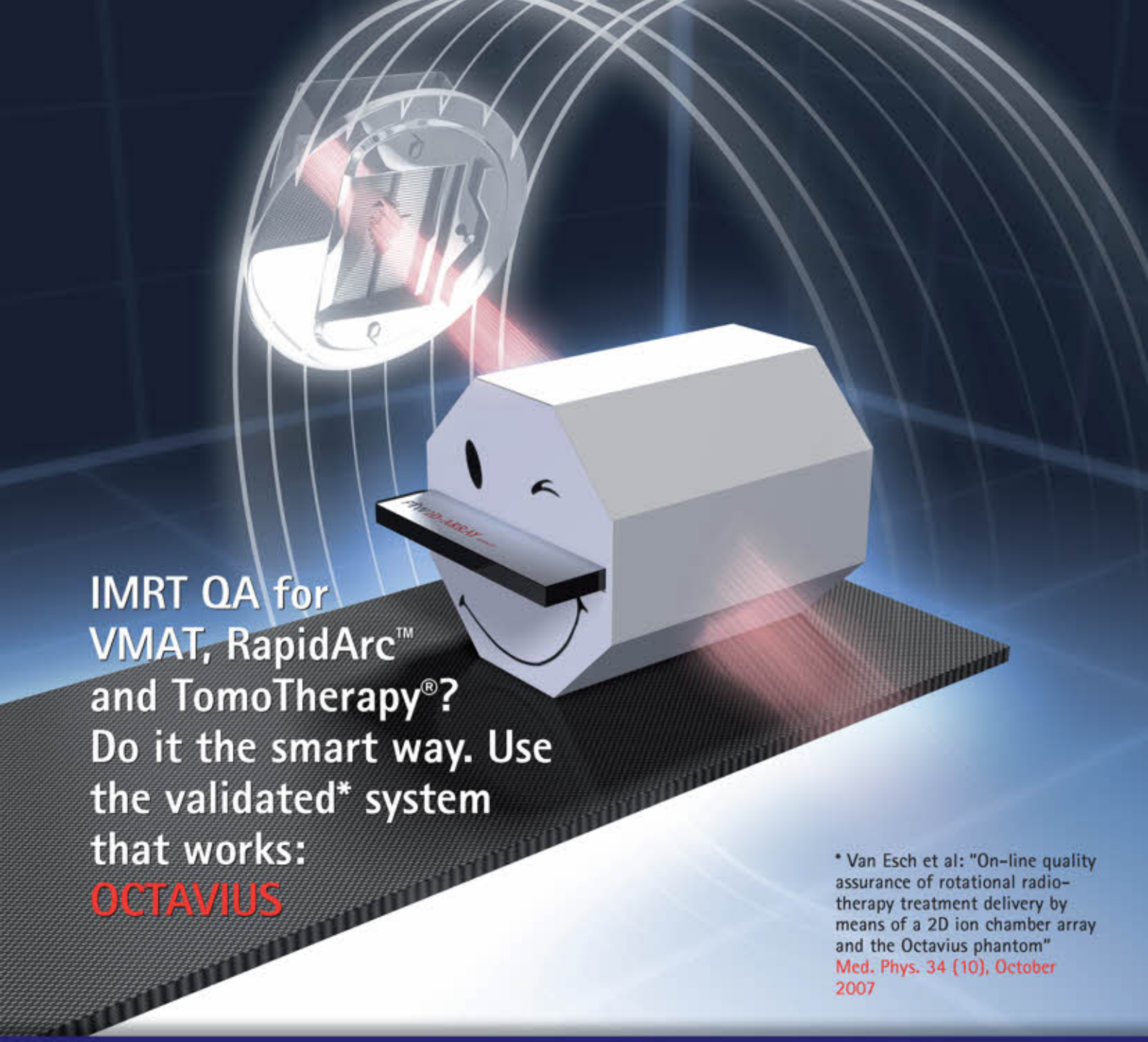
Inger-Lena Lamm - always recognizable by one of her hats or flowers ot both.

to a course on brain behaviour, organised by a famous Swedish brain researcher in Lund. I had a presentation about computers and brains, and he said that he'd loved to have me on his team but that he regrettably had no money. At that time we already had a small family and I did need a salary – together with the fun. It was then, that I discovered "something called radiation physics", something where you get medical applications as well as physics. I didn't know anything about radiation physics before this, I must say. All of this happened while I was doing research work and writing my thesis in theoretical physics.

Was then getting a paid salary made you decide to get into Medical Physics?

Not, not quite like that, but the no salary situation channelled me into medical applications of physics and on towards the fascinating world of Medical Physics. I met Professor Kurt Lidén, one of the pioneers of Medical Physics in Lund and also in Sweden. That was in the mid seventies, when I finished my thesis in quantum mechanics, and started my formal Medical Physics education, necessary to get the formal qualifications to work as a Medical Physicists.

Is there any fact in your life that has had a special impact in your career?



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KNOWING WHAT RESPONSIBILITY MEANS

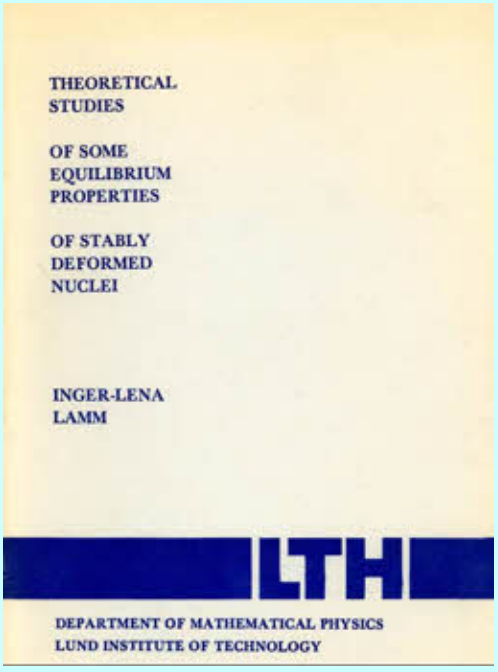
Well, we have to switch far back in time, as my interest in natural sciences and technology was quite a lot influenced by my uncles and aunts, who were biologists, botanists and engineers. (At home, it was mostly music and literature.) When I was a small girl, having a younger sister and no brother, they provided me also with cars and *meccano* (a building system). Since then I have also been very interested in all types of 3D constructions.

If you could change something in your career, in your past, what it would be?

Actually, I don't think that way. Of course, it would be interesting to speculate about what would have happened if I (or my husband) had taken some other decisions. For instance, when neither of us had permanent positions in Lund, I was offered a position in Umea, a young university town in the very north of Sweden. When I visited Umeå and Hans Svensson, I was taken out skiing directly when I got there (a kind of physics test), borrowing his daughter's skis. She was taller than me, but I could manage quite well, as I done quite a lot of skiing as little. Our kids were promised skis, and there was a mathematical statistics department for my husband, everything looked bright, but after a year of administrative delay circumstances had changed, and we decided to stay in Lund.

Is there any day that you remember in particular from your career?

There are so many nice days to remember, and it is difficult to pick a specific one. Of course, receiving the insignia of my doctor's degree, the hat, the ring and the diploma, in the Lund Cathedral, that's a special day. But that didn't change anything, it is just nice a memory. Otherwise I have lots of good memories in connection to music, my alternative career. I was very good at piano and my whole family was and is very interested in music. Music has always been part of my life. My father and I used to listen to music on the radio while following the printed orchestra score. My husband and I used to sing in the Lund cathedral choir, where I also functioned as the "orchestra" during rehearsals, playing the condensed orchestra score on the piano. It was slightly frustrating for me, though, when the proper orchestra did not follow the conductor as well as I used to! All our children have been singing in choirs, performing in Lund and all over the world, sometimes also with me accompanying the choirs on the piano, the harpsichord or the organ.



Is there a link between sciences and music?

Yes, there is, according to many authorities. And, there were quite a number of my old school mates being both good at mathematics and physics and being good musicians.

Deep in discussion at an EFOMP officers' meeting 2003 at Barcelona. From left to right: Suzanne Naudy, Alberto Del Guerra, Inger-Lena Lamm. Front only from the back: Jose Hernandez-Armas.

How did you get involved with EFOMP?

I was contacted by some people from the Swedish Hospital Physicists Association when the chairman of the society, Per-Erik Åsard, was retiring. He was actually one of the people who participated in the creation of EFOMP. I was asked to accept the nomination to be his successor, and at the same time become a member of the board of the Swedish Association of Scientists. I said yes and was duly elected as President of the SHPA and board member of "Naturvetareförbundet". As President of SHPA I

was also the Swedish delegate of EFOMP. I became involved in education and training at the European level from the beginning. As a delegate of EFOMP, I was invited to participate in an EU meeting on education and training in Luxembourg, even if Sweden was not an EU member at that time. That was an experience with all those European languages, and the simultaneous translations! EU matters were becoming more and more important in all areas, and one way forward for Medical Physics in Europe had to go hand in hand with EU regulations, with EFOMP being involved at as early a stage as possible. As an EFOMP delegate, I was a member of the PET (Professional, Education, and Training) committee, which by the way is a very nice committee name, later changed to the ETP committee. Don't you think that is better to be a PET than an ETP (just joking!)? After some years in the committee I became secretary, while Philip Dendy was its chairman. Later, I was elected chairman of the ETP committee, and in 2000 I was elected president of EFOMP. EFOMP has meant many interesting meetings, lots of involvement, many new friends, and I have discovered new aspects of both Medical Physics and life!

What is your vision of the Medical Physics education in Europe in ten years time? Do you think we'll be able to have a homogeneous education that will facilitate the free-movement of Medical Physicists around Europe?

Free movements will be made easier, but I don't think it will be possible to have the same education and training across Europe in ten years. I don't want to be pessimistic, rather realistic. If we just look at the Nordic countries, we have very different education systems for Medical Physics in Sweden and Denmark, for example. In Sweden there are professor chairs in Medical Physics and departments of Medical Physics at several universities, not so in Denmark. Educational systems in universities are not easily changed, are they, irrespective of Bologna declarations and all that?

What about something like CAMPEP in America: getting an European certificate which would be recognised by different countries?

While I was active in EFOMP, I was working quite hard together with many colleagues, to achieve this type of structure, which by the way has been presented in a number of EFOMP Policy Documents. Theoretically, on paper, that should be easy to accomplish, but reality is different. For example, in Sweden Medical Physics is a regulated profession since more than 10 years, and we have a Master degree programme leading to a "Hospital Physics Exam", in Swedish: sjukhusfysikerexamen, which is also the requirement to get the license to practice as a clinical Medical Physicist. The programme contains some clinical training, but not very much. In principle it follows the EFOMP recommendations for the first five years, and the quality of the education is very high. Following EFOMP recommendations, we would need about two years of clinical training after the Master programme to reach the level of a Qualified Medical Physics, the level where the Medical Physicist is competent to work without supervision. The Swedish Ministry of Health could not accept a requirement of two years clinical training in top of the Master to get the li-

In the middle of clinical colleagues for a brachytherapy treatment planning.

cence to practice – for economical reasons. I was very much involved in these discussions being the President of our society. When looking at surveys on education and training in Europe, Sweden always falls far down due to the lack of this formal period training. This is rather unfair to the Swedish system, as our five years of education in the Master programme is very good. I can speak personally for Lund, where we have highly qualified clinical physicists and medical doctors participating as teachers. Further, we also have strong links between the departments of Medical Physics at the university and at the university hospital, of great importance to the development of the profession

At Archamps close to Génève, Inger-Lena Lamm lectures each year at the EFOMP-ESI ESMP brachytherapy week in front of young students.

How do you see the future of Medical Physicists? Will they gain more reputation in the clinic? Will there be more science?

Medical Physics is a very interesting area, subject or whatever you might call it. And, the future of Medical Physics and Medical Physicists is bright, just look at the developments of imaging and the applications of imaging both for diagnostic and therapeutic purposes! I would like to see more science getting into Medical Physics, i.e. university and hospital should work even closer. Ten years ago, clinical physicists had more time to devote to clinical research projects and/or clinical developments. As funding has become tighter, this span of time has become smaller and smaller. Clinical Medical Physicists have to "stand with both feet on the floor at the clinic" and they also have to be aware of all new developments. And of course we will need clinically based research and also pure research! Physics in medicine is a growing multidisciplinary area, partly overlapping engineering in medicine, requiring expert knowledge and experience from all disciplines involved in the collaborative efforts!

There has been a talk during the World Congress 2009 on Medical Physics Assistant with a Bachelor degree compared to the (Qualified) Medical Physicist with a Masters degree. What do you think of this?

I did not listen to that specific presentation, just some thoughts. The "Master with experience" would be the Qualified Medical Physicists, and as you gain experience and knowledge you may qualify as a Specialist Medical Physicist. A nice mixture of people with different interests and backgrounds is required in the clinic. We need both types of people, both the more scientifically interested clinical Medical Physicists and those who are not working primarily towards scientific achievements at university hospitals. It is also of importance whether the departments at the universities are linked to Medical Physics departments in hospitals. A close connection can make a huge difference in the development of the profession. This is crucial to keep the standards high and promote the adoption of methods developed by those more theoretical guys into clinical practice.

Can you give three advices to a young physicist who is just starting in the field?

To start with, this person must be interested in Medical Physics specifically. This means that he/she is interested in physics, medicine, biology in general, and also in interacting with people from different disciplines. He/she must be able to communicate with other Medical Physicists, medical doctors, engineers, nurses, technicians and others. This also means that he/she must be able to work in a team. You cannot be a loner, if you want to work as a clinical Medical Physicist in a hospital. I would advice him/her to get a solid

education in mathematics and general physics (as a background to Medical Physics), to develop "social skills" and enjoy working a multidisciplinary team! The first advice comes from my own experience with my theoretical background, of course! But you can't cram everything into a five years Master degree of Medical Physics!

In which kind of field should they be now involved?

What is definitely coming today is imaging! Different kinds of images are being used everywhere for more and more tasks. Not just ionising radiation imaging such as CT and PET, but also MRI, ultrasound, fluorescent microscopy etc. New technologies based on nanoparticles are developing rapidly, and it is a bit premature to give specific advice on this, as on many developing areas. But, if you have a solid knowledge background, if you are alert, if you follow what's happening in the international literature, if you don't sit back and do nothing, you will be aware of the interesting developments and prepared to participate, to get involved. You have to communicate with your fellow Medical Physicists, radiologists, oncologists, technicians of course to get input from their different aspects – and do not forget to interact also with other scientists. You should also be prepared to start new things and work in new fields - and do not forget flexibility.

What do you like to do in your free time?

Singing and playing the piano. I used to do a lot. Currently I love knitting sweaters for my grand children, of which I have eight. At the moment I am working on a "pirate sweater". Knitting, and designing clothes, is a kind of 3D modelling I love to practise at home! I like spending time with our grandchildren and family, music plays a big role, reading, too, our summer house on the west cost – and long hot baths with a good book, non-Medical-Physics!

Do you think that it is possible to balance professional, family and personal life? Is it more difficult for a woman than for a man?

It is of course possible to have it all, a professional, a family and a personal life. We are quite a lot of people, who have succeeded in "having all that". To keep the different areas balanced may be the problem. Your priorities vary with time, and there are different periods during your professional life and your personal life. When you have small children, for instance, you cannot live in the same way as when you have no children at home. It must be recognised, that this is the way life is! And, this must be recognised everywhere, at work and at home. If this is not taken into account, people will be doubly frustrated because they can not satisfy the work and family requirements at the same time. Professional life must be organised in such a way, that also people like Medical Physicists can raise families. If not, where we will get the next generation Medical Physicists from??

Do you think that the collaboration between men and women at home has changed?

Yes, things are happening. My father never changed nappies when I and my sister were small, but he did with great success for my kids. Biologically speaking, there are differences between men and women, that's nature, and we can't and don't want to change that. I noticed with interest, that the average age of women having their first child is past 30 years of age in Sweden now. I had three kids at that age! And my doctor's thesis almost finished! Looking back, I must have had quite a busy period of my life, having a lively family at home and my thesis in my head, at the same time. But, I had a wonderful life! (And my husband successfully presented his thesis one year after me!)

One of my particular joys as a Medical Physicist is the interaction with colleagues from other disciplines. Medical Physics as a profession should not be afraid to incorporate people with different professional backgrounds – like me. As a well structured natural scientist, I know what I know and also what I don't know. That's one of the keys of structured work: to know your limits. When you find yourself at one of your limits, another key is to know enough to look for help by the proper expert –and not necessarily try to do it by yourself. It is like the principles I learned in quantum mechanics: you have to watch the limits otherwise you will get nonsense!

So you think it is not necessary to pass by a Swedish air force base to get into Medical Physics?

No, it is definitely not a necessity, even if besides theoretical knowledge the practical engineering experience was very helpful for me, too.

Many thanks for this interview!

Medical Physics in Europe - Ireland

Fisic Leighis na h'Eireann
Wil van der Putten
Chief Physicist, Galway University Hospitals, Galway, Ireland

This paper will give a brief introduction and overview of Medical Physics in the Republic of Ireland. It will concentrate on hospital based Medical Physics and will only deal with Medical Physics in the Republic of Ireland. It will not discuss Medical Physics in Northern Ireland and it will also not consider bio-engineering except where it has an overlap with hospital based Medical Physics.

History

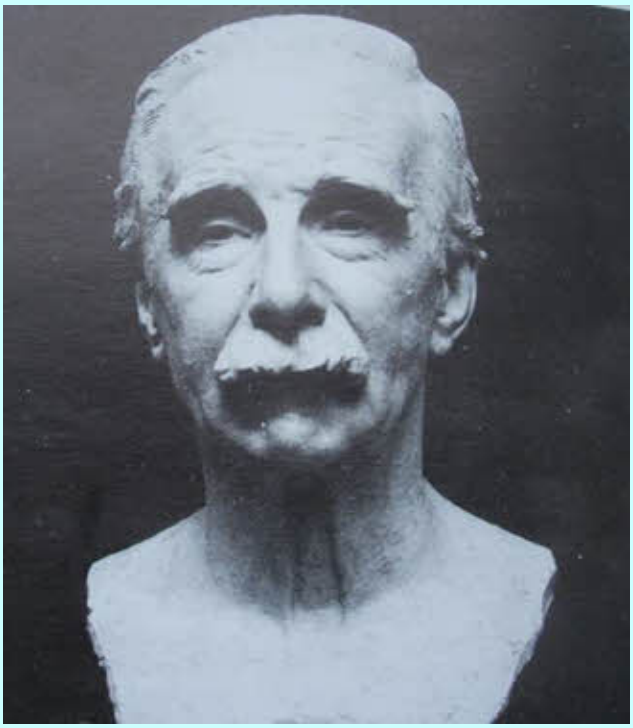
Pioneers, academic 1896 - 1945

Similar to other countries, the application of physics in medicine in Ireland up to the end of the 19th century was a rather incidental and ad-hoc affair performed by individuals in private laboratories and in universities. Like in other countries, the discovery of X-rays and radioactivity prompted the first determined research on applications of physics in medicine. One of the foremost pioneers of this was Prof. John Joly (1857-1933). Joly graduated as an engineer, became notable for research in geology and subsequently became professor in geology and minerals in Trinity College, Dublin in 1897. He was a pioneer in the use of radium and radon in radiotherapy and established the Irish Radium Institute in 1914. Although an engineer and geologist, a lot of the work associated with his Radium work would now be called Medical Physics. In collaboration with a surgeon Walter Stevenson, he developed the "Dublin method" for delivering radiotherapy to deep seated tumours using a system of thin needles.

Once the Irish Republic gained independence, investment in radiotherapy services and hence Medical Physics was low. It was only after the Second World War, in the early 1950s, that the first full-time hospital physicist was appointed. This coincided with the first major investment in teletherapy systems in a new and purpose-build radiotherapy hospital: St. Luke's Hospital in Dublin, which opened in 1954.

Hospital Physics, the start 1950 – 1970

Dr John O'Connor was appointed in 1953 as the first hospital physicist in Ireland to St. Luke's



Bust of John Joly FTCD by Oliver Sheppard
(Source : Wikipedia)

Hospital. This era of Medical Physics in Ireland became an extremely productive one. Dr. O'Connor assembled a small team to work with him in what was now a fully functioning Medical Physics department. It was also a very productive period with respect to research and he developed the well known "density scaling theorem" which now carries his name. The increased use of radiation led to a need for dose monitoring and this period saw then the development of the first national personal dosimetry facility ("Radiation Monitoring Service") which was based in the hospital until the late 1970s. By 1970 a total of nine hospital physicists were employed in the country, with eight employed in St.Luke's Hospital and it's various ancillary departments in Cork and Dublin. One other sole physicist was employed in a Nuclear Medicine Department in St. Vincent's Hospital, one of the academic teaching hospitals in Dublin. Medical Physicists were finally

recognised as a distinct profession by the Irish Department of Health in the late 1960s.

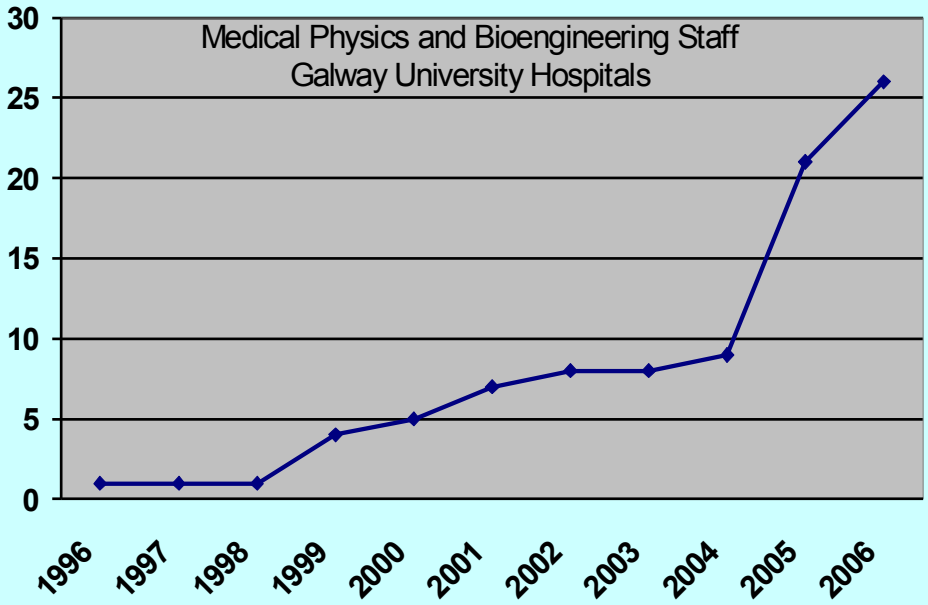
Expansion 1970 -1985

The rapid advance in imaging technology following on from the invention of the CT scanner as well as similar advances in isotope imaging led to physicists being appointed to other hospitals in Dublin. Appointments in James's Hospital, Vincent's Hospital, the Meath Hospital and Mater Hospital were all made in the early to mid 1970s and led to the development of small (1-3 staff) departments in those hospitals. Ireland joined the EEC (now EU) in 1972 and this led to the introduction of the first formal regulations regarding radiation protection. The establishment of the Nuclear Energy Board (NEB) by the Irish government as the organisation with responsibility for radiation protection took place in 1977. The NEB took over the personel dosimetry service which had previously been run from St. Luke's Hospital. In radiotherapy, this was also the period when the first high energy teletherapy units were installed in St. Luke's Hospital in Dublin and at what is now Cork University Hospital. The profession of Hospital Physicist developed further with a grading structure coming into place (Basic, Senior, Principal and Chief grades). The profession also managed to obtain parity with other scientific grades in the Irish civil service. This proved to be not an easy process and took over 5 years to resolve. Since then however, Medical Physicists in Ireland have enjoyed relatively good salaries and terms and conditions of employment compared to peer groups elsewhere in Europe.

Consolidation and diversification 1985 – 2005

From the mid 1980s onwards, Ireland began to invest substantially in its health care services. The wide-spread introduction of high technology in health care led to the establishment of departments of Medical Physics in most of the larger hospitals in the country. Medical Physics began to be applied to areas outside of ionizing radiation and the first departments of Medical Physics and bioengineering appeared, modelled to some degree on similar departments in the UK. These years also saw a rapid role out of Radiotherapy in the private health care system in Ireland. This also led to considerable increases in overall physics staffing. This growth in the profession is best illustrated by taking one department as an example : Galway University Hospitals in Galway City on the west coast of Ireland (Figure 1). This large teaching hospital did not employ any physicist or clinical engineer until late 1995. Figure 3 shows the staffing levels in this hospital between 1995 and 2005. Similar increases were also found in other departments, although perhaps not quite on the same scale.

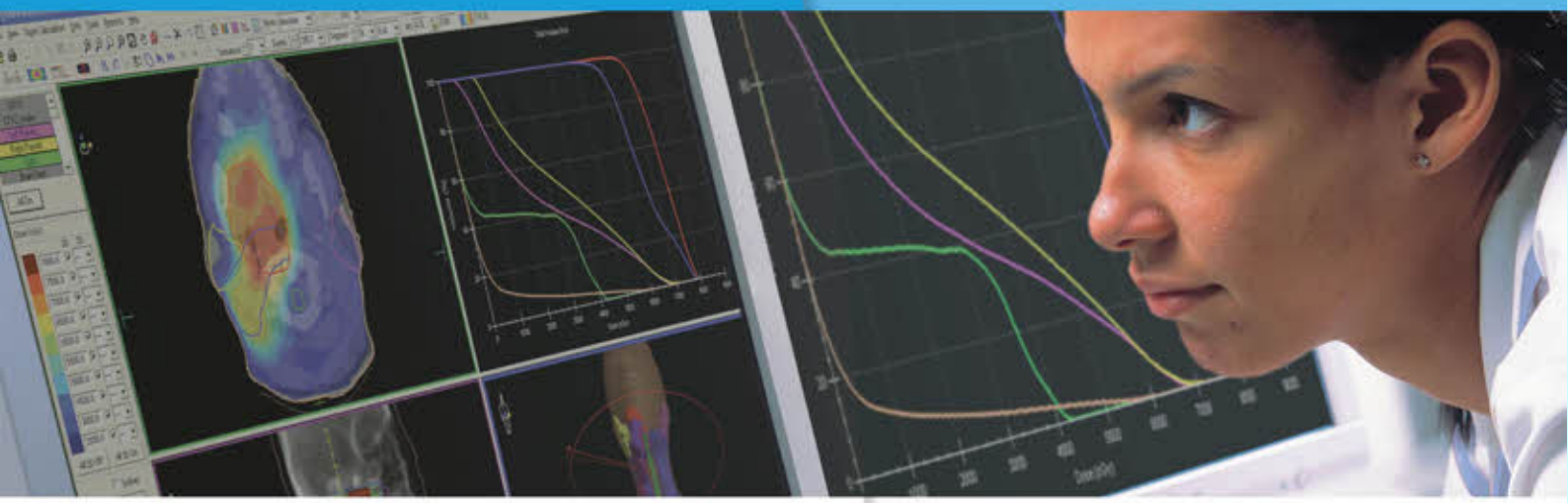
Current Status



Organisation

If we consider a department with more than 20 employees as a large department, then Ireland has four such departments. These are all based in publicly funded hospitals : St. James' Hospital and St. Luke's Hospital in Dublin, Galway University Hospitals in Galway and Cork University Hospital in Cork. The latter is the only department which has no role in Clinical Engineering. These larger hospitals are also ones where the departments of Medical Physics report directly to senior hospital management. Apart from the provision of Medical Physics services which extend considerably beyond traditional radiation physics, these departments

Beyond doubt there's certainty



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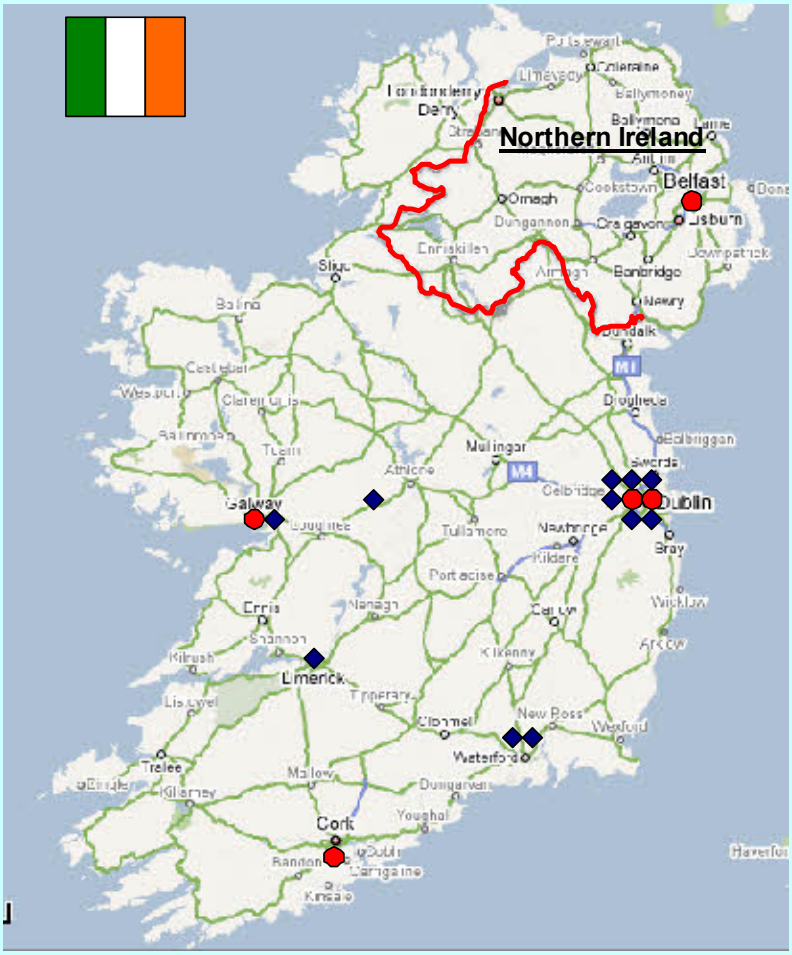
are also characterised by having close academic links with their respective local universities. In addition to these larger departments, there are a considerable number of smaller departments, typically with between 4 and 5 members of staff : Galway Clinic (Galway), Mater Private Hospital and Limerick Radiotherapy Clinic (Dublin and Limerick), St.Vincent's and Hermitage Hospitals (Dublin), Beacon Clinic and Whitfield Hospital (Dublin and Waterford), Mater Public Hospital (Dublin), St.Vincent's Hospital (Dublin), Beaumont Hospital (Dublin), Waterford Regional Hospital (Waterford) and Portiuncula Hospital (Ballinasloe). The national breastscreening service (Breastcheck) also employs approx. 5 physicists. Finally, several physicists with Medical Physics training are employed by the Radiological Protection Institute of Ireland (RPII., agency responsible for monitoring ionizing radiation regulations). Small Medical Physics departments are typically part of clinical departments and report to medical directors of radiotherapy and/or radiology. Excluding individuals who are mainly involved in physiological measurements or clinical instrumentation, about 100 individuals are employed in traditional Medical Physics. Practically all of these individuals are employed as physicists. It is somewhat surprising that little or no use is made of physics technicians. The paucity of departments and staffing outside of Dublin (see figure 1) resulted in a number of the larger departments providing a remote service. This service concentrates mainly on radiation safety inspections of x-ray equipment with respect to the local ionizing radiation regulations.

... about 100 individuals are employed in traditional medical physics. Practically all of these individuals are employed as physicists.

Under Irish regulations, each user of ionizing radiation (often the owner of x-ray equipment) is obliged to appoint a Radiation Protection Advisor (RPA). This is the Qualified Expert as mentioned in the Basic Safety Directive EU 96/29/Euratom. Recently, the title RPA has become a protected title which means that only individuals who have been approved by the RPII can work as Radiation Protection Advisors. One of the criteria is that individuals are required to have a degree in physics and generally also a post-graduate qualification in Medical Physics (for those individuals who wish to be RPA to medical installations) with in addition seven year experience. Currently approximately 23 individuals are registered in Ireland as RPAs. The RPII has now commenced to strictly enforce the requirement to appoint RPAs. As this also now applies to a very large number of dentists, this has led to the establishment of several private providers of radiation protection services as well as the entry of radiation protection advisors from abroad. With a significant retrenchment of government expediture over the next few years in Ireland expected due to the current economic crisis, this private provision of Medical Physics is likely to grow. Finally, one RPA is a member of the Committee on Medical Exposures in Radiology which was established to advice the national Health Service on the safe use of ionising radiation. This committee has been established as part of the Irish implementation of EU Directive 97/43/Euratom.

Education, Research and Training

The education and training of Medical Physicists in Ireland follows a fairly traditional path. Up to recently, new entrants would typicaly have an honours degree in physics or an engineering subject with a strong physics component. This entry requirement has lately changed to a minimum of an MSc in Medical Physics. This requirement to have an MSc in Medical Physics is not official but has become practically essential due to the numbers of individuals who graduate with these degrees. The first MSc in Physical Sciences in Medicine was established in Trinity College Dublin in 1984. It was initially a three year part-time program. This changed to a two year program in 1992 and finally into a one year program in 2007. The program was also the first to have external accreditation with the Institute of Physics and Engineering in Medicine (UK). It has been always been characterised by a broad curriculum which would cover all areas of Medical Physics. The increased need for physicists in radiotherapy led to the establishment of the MSc in Medical Physics in the National University of Ireland, Galway in 2002. This is a one year degree, also accredited by the Institute of Physics and



Medical Physics departments in Ireland.
Red Circles : Large departments (> 20 FTE)
Blue Diamonds : smaller departments.

Medical Physics was for a considerable time a Cinderella of Physics in Irish academia. It was only in the middle of the 1990s that the first Professor of Medical Physics was appointed in Trinity College Dublin ...

Engineering in Medicine (UK). Currently, well over 60 students have graduated from this program.

Until several years ago, clinical training took the form of the usual master-apprentice method. In the early 1990s this was increasingly seen as an inefficient method which lacked validation. Hence, in common with other countries, formal training programs were developed. These were initially based on models such as the IPEM training scheme and funded through ad-hoc and "soft" monies without official funding. This changed in 2007 when the National Cancer Control Program (part of the national health service) recognized the need for an adequate supply of Medical Physicists to staff planned new radiotherapy centres. NCCP is now funding a training program for radiotherapy physicists. This program is based on the training syllabus of the American Association of Physicists in Medicine (AAPM Report 90) The sponsor insisted on external validation of the program and in the absence of a European standard, it was decided to utilise the CAMPEP accreditation mechanism (*www.campep.org*).

Medical Physics was for a considerable time a Cinderella of Physics in Irish academia. It was only in the middle of the 1990s that the first Professor of Medical Physics was appointed in Trinity College Dublin (Prof. J.F. Malone). This has now become the Robert Boyle chair in Medical Physics. This is in honour of Robert Boyle (1627-1691) who can be seen as a pioneer of the application of physical methods to medical problems. Other universities followed suit and honorary professorships in Medical Physics are now present in Dublin City University, University College Dublin and National University of Ireland, Galway. Permanent full-time academic positions in Medical Physics are now present in Dublin Institute of Technology and in NUI Galway.

The busy clinical workload of Medical Physicists has made large scale participation in research difficult. Nevertheless efforts are under way in most of the larger departments. The most succesful department has been the Department of Medical Physics and Bioengineering in St. James' Hospital which has for a period of close to twenty years been participating in a multitude of large European projects such as DIMOND and SENTINEL. Research efforts in other universities and clinical departments are now increasing. The large throughput of MSc students has resulted in a considerable number of small scale research projects. The presence of a permanent member of staff in Galway has led to the establishment of a Medical Research cluster there between the hospital department of Medical Physics and the university. This allows for easy exchanges and also gives PhD researchers the opportunity to acquire clinical skills. One difficulty with Medical Physics research in Ireland has been that grant funding agencies often have difficulty with

Medical Physics proposals as these are often ruled out of both “physics” competitions (not enough physics) and “biological and medical” competitions (not enough biology).

Finally mention should be made of the Dublin Institute of Technology. This Institute has for over 20 years been running courses in Medical Physics aimed at physiological and cardiac measurement technicians, etc. Under the guidance of Dr. Jacinta Browne, this department has now become a thriving focus of research in ultrasound imaging.

Professional Organisations

Like many professional organisations in Ireland, Medical Physics is represented by a number of professional bodies. Radiotherapy physics is represented by the Irish Radiotherapy Physics Group (IRPG) with a total of approx. 40 active members. The bulk of Medical Physicists in Ireland however belong to the Association of Physical Scientists in Medicine. The APSM is the organisation represented on the Council of EFOMP and represents Medical Physics on the Board of the Radiological Protection Institute of Ireland. Both IRPG and APSM are active in the support of its members. Both organisations organise highly succesful annual scientific meetings which are now increasingly organised as a joint effort. In addition, the IRPG organises a very succesful inter-departmental audit of radiation dosimetry. Here members of one hospital department audit radiation dosimetry in another one. Similarly, the APSM is effective in providing a forum for discussions on radiation protection as well as non-ionizing radiation. The APSM also has an useful list server for its members as well as a website (*www.apsm.org*)

Future

Although the current economic crisis will have an impact, it can be expected that there will still be expansion of Medical Physics in Ireland albeit at a slower pace. New radiotherapy facilities will come on stream in the next few years and these will require a considerable number of staff. In addition, there is still a deficit of physicists associated with medical imaging and radiation protection. Also, physics and more generally, clinical technology, will become more pervasive in health care. This poses a challenge for the traditional Medical Physics training and education which needs to change to take account of this. All this makes it probable that there will be a consolidation of departments. Small departments are increasingly less likely to be able to provide the range of skills and expertise required to support clinical services. Reluctance by central government to employ staff will result in private Medical Physics services becoming more widespread. The pressure to reduce costs and become more effective will result in an increasing likelihood that more and more use of physics technicians will be made. Another major change which can be expected in the future is statutory recognition of the Medical Physics profession. Recently, the Irish government introduced the Social and Health Care Professions Act. This provides for the statutory recognition of a range of professions and it can be expected that Medical Physics will be one of these professions in the near future. This will then regularize the present voluntary register of Medical Physicists. One step towards this process is recognition by the government of the Medical Physics Expert as defined in EU Directive 97/43/Euratom. This is expected shortly and the definition appears to follow closely the EFOMP definition.

Finally, members of the IRPG and APSM have recognised that two organisations of Medical Physics in a small country such as Ireland is not a very effective use of resources and have recently started discussions on a possible merger. This follows on from the highly succesful joint scientific meetings as well as from a succesful bid for the EFOMP Scientific conference in 2011.

In summary, although there are many future challenges for Medical Physics in Ireland, the profession is well established in hospitals and academia and is expected to grow further.

Acknowledgements

Helpful discussions with Edwina Jones and Jim Malone are acknowledged. Any remaining errors as well as expressed opinions are entirely those of the author.

Prof. Wil van der Putten

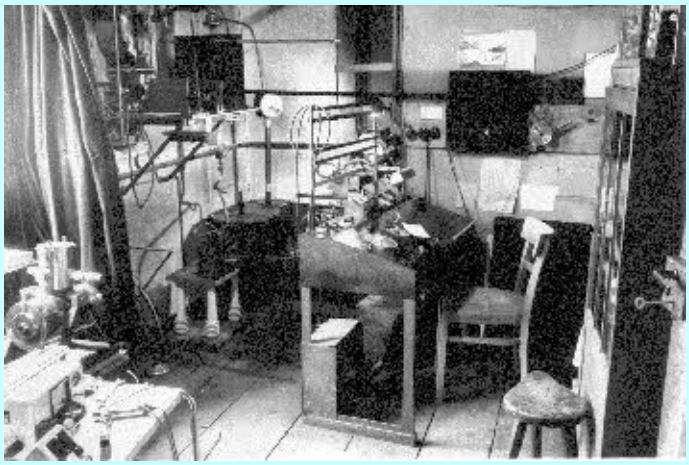
The PTW Calibration Laboratory: 88 years of history

Introduction

As the oldest and largest manufacturer of medical dosimetry equipment PTW-Freiburg has always maintained a calibration laboratory for dosimetric measuring quantities. While being an integral part of the company and its comprehensive quality assurance system, the calibration laboratory is also proud of ist own traditions and achievements. The "Eichraum" employees sometimes have their very own language and special procedures include but are not limited to great birthday breakfasts.

Origin and tradition

PTW-Freiburg was founded as an early example of a university spin-off on May 9, 1922 for the purpose of manufacturing radiation therapy dosimeters based on the electrostatic relay invented by one of the founders, Prof. Hammer. Garages being rare in Germany at the time the companies production was first housed in a garden shed and later moved to a carpenters backyard buildings. Early photographs of the calibration laboratory show Hammer dosimeters and their ionization chambers facing x-ray tubes supplied by open high-voltage leads. Calibration traceability to the National Laboratory (first PTR, now PTB) always was of prime importance. Original and improved versions of the Küstner Transfer Standard instrument in the PTW museum bear witness of that tradition. Internal traceability is proudly extended to the point of preserving the original measurement notes to every calibration performed since 1937.



Detail of the calibration laboratory approx. 1957

Keeping Animals

Calibration work means concentration. Long hours of looking at instrument displays, noting data, calculating corrections, checking and rechecking the results. A certain tension can build up during a working day. Good therapy for this is to stand up occasionally and shout a loud "Urschrei" groan. But this can lead to misunderstandings. A surprised customer to the laboratory office on hearing such a groan from behind the lab door asked: "Do you keep animals here?"

Calibration facilities and instrumentation

Today the PTW calibration laboratory operates eleven separate calibration benches for radiological and radiotherapy measurements:

- 2 mammography units, one of these with multitrack anode
- 1 100 kV soft X-ray (a rather historic piece from Philips when they were called Röntgen-Müller)
- 1 150 kv constant potential unit
- 1 160 kV modern GE X-ray unit
- 1 300 kV older Siemens X-ray unit
- 1 300 kV newer Siemens X-ray unit
- 1 320 kV modern GE X-ray unit
- 1 9 TBq (250 Ci) Cs-137 unit
- 1 74 TBq (2000 Ci) older Co-60 radiotherapy unit
- 1 220 TBq (6000 Ci) new Co-60 dedicated calibration unit

Work at all these single calibration places is coordinated using a custom-made laboratory software for data acquisition and calibration factor calculation from the calibration monitors (UNIDOS instruments) and thermometers and a barometer. Data are then transferred to the department office writing the calibration certificates. As far as possible (for connector compatibility) the reference class UNIDOS electrometers are also used for the measurement of all customer chambers. The calibration in electrical measuring quantities of all electrometers used is also traceable to PTB.

Fast Breeding Reactor

Imagine an ionization chamber showing a higher response each time it is inserted into its check source. Obviously something really strange is happening here. Since the check source activity increases with every measurement we must be looking at a breeding reactor! It took some time to notice that the customer had treated the source with oil to "improve" the rather tight fit of a chamber adaptor. Now with every check measurement the chamber became more contaminated with oil…..

Besides the dose and dose rate benches the laboratory maintains facilities for the calibration of non-invasive kV-meters and radiotherapy and nuclear medicine nuclide calibrators.

Scope of work

Dosimetric calibrations are performed in the following measuring quantities and radiation quality ranges:

- Absorbed dose to water for radiation therapy
  10 kV-70 kV, 100 kV-280 kV, Cs-137, Co-60
- Air Kerma for radiation therapy
  10 kV-70 kV, 70 kV-280 kV, Cs-137, Co-60
  (altern. Exposure) for diagnostic radiology
  25 kV-45 kV, 40 kV-150 kV
- Ambient Dose Equivalent for radiation protection 20 kV-60 kV, 60 kV-250 kV, Cs-137, Co-60 (altern. Photon Equiv. Dose)

For these calibrations every instrument from every manufacturer is accepted (as long as it works and physically fits within the beam). In consequence the PTW laboratory is one of the busiest calibration laboratories worldwide; the number of calibrations performed every year is over 10,000.

Check your Connections

Being nervous does not help. Being new in the calibration lab I tried to be even more careful than everybody else and doing the comparison measurements for the quarterly report to PTB helped to increase the tension. So after working at the Cesium I moved my dosimeter to the Cobalt unit. Only to feel a slight tug and then to hear a loud bang. Forgot to unplug the chamber which still was in the check source for the control values. The source didn't mind the drop. But breaking a chamber with a PTB calibration comes expensive…..

Comparison measurements

Comparisons both with primary laboratories and with other secondary standard dosimetry laboratories are done on a regular basis. Traceability to PTB is maintained by calibration of seven sets of dosimetry equipment every two years with comparative measurements and reports every three months. Comparison with IAEA is done by exchange of mailed TLD every year and occasional comparative measurements with ionization chambers. Deviations are always minimal.

Participation in European Ring Comparisons (mostly also supplied with PTW equipment) was also very successful.

Setting up a chamber for calibration

TLD Comparison measurements between IAEA and PTW both using the IAEA system and the newly developed PTW TLD audit probes have shown only minimal differences.

Secondary Standard Laboratory / Cooperation with IAEA and PTB

Having successfully participated in the regular comparisons for some years, since the year 2000 the PTW calibration laboratory is formally recognized as a **S**econdary **S**tandard **D**osimetry **L**aboratory in the IAEA/WHO SSDL network[1].
This so far is the latest expression of the extremely good and fruitful cooperation PTW has enjoyed with the IAEA Dosimetry Laboratory. (Since 1996 PTW has qualified, then four times requalified, and later on continuously been awarded as preferred supplier of clinical dosimetry equipment to IAEA.) Another positive aspect of this cooperation is in the mutual discussion of procedures and equipment which has lead to the design or continued development of several dosimetry components as for example the PTW Farmer chambers.
A similar close cooperation is traditionally maintained with the German National Laboratory,

PTB. Joint development has lead to such successful results as the Kühn neutron chamber, the Böhm extrapolation chamber and the Roos electron chamber. In the German DKD service of secondary standard laboratories PTW is the first laboratory for dosimetric quantities[2]. PTW is also one of the oldest members of this service at all (since 1980).

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[2] Physikalisch-Technische Bundesanstalt DKD Deutscher Kalibrierdienst, Verzeichnis der Kalibrierlaboratorien, Ausgabe 3/2001: DKD-K-01501 (http://www.dkd.ptb.de)

Cooperation agreement between EAN and EFOMP

Stelios Christofides on behalf of EFOMP and Annemarie Schmitt-Hannig on behalf of the European ALARA Network signed a cooperation agreement between their respective organizations to promote radiation protection with a particular focus on its implementation in medicine. Find the text of the agreement below.

The European ALARA Network (hereafter called EAN), aims to maintain, enhance and develop competence in radiation protection with special emphasis on the implementation of the ALARA principle for occupational, public and patients exposures represented by Annemarie Schmitt-Hannig, Chairperson of the EAN Administrative Board.

The European Federation of Organisations for Medical Physics (hereafter called EFOMP), aims to develop competence in radiation protection with special emphasis on the implementation of the ALARA principle in the Medical sector, and, in particular with regard to the ALARA principle, represents the interests of the EFOMP National Member Organisations in the area of radiation protection represented by Stelios Christofides, President of EFOMP.

The above mentioned parties have noticed that they are following common objectives in terms of improving the radiological protection of workers and patients in the medical field within the European countries, and they have agreed to establish a partnership in order to:

- exchange information of interest both on their activities and on the situation dealing with optimisation of protection issues with regard to worker and patient exposures in Europe,
- cooperate in a European Medical ALARA Network dealing with workers and patient exposure management, harmonising national radiation protection requirement guidelines for the promotion of good ALARA practices in the medical sector.
- Work together in particular in the following areas of activity:
  - formulation of the ALARA approach to radation protection culture
  - collection and distribution of examples for good ALARA practice in medicine
  - organisation of the 13th ALARA Workshop in Oslo in June 2011 which will be devoted to ALARA in medicine.

Both parties agree that they shall find resources for reaching their common objectives.
The parties agree that all common results or recommendations from common actions will be free for use by each of the parties.
The parties agree to inform their members about the projects/actions when needed.
The parties agree to envisage setting up any other common action of interest for both, taking care of any opportunity that should occur.

Both parties agree to review this agreement two years following signature.

Signed in December 2009

EFOMP Medal and Honorary Awards 2009

One of the underlying principles of EFOMP's Constitution is to strengthen Medical Physics in Europe by fostering and coordinating the activities of NMO's, and EFOMP recognizes that individual members of NMO's contribute to this aim by their outstanding work in various areas. To encourage individuals to participate in the development of Medical Physics in Europe, EFOMP has created two awards:

- **The EFOMP Medal** recognizing an individual's outstanding and internationally acknowledged contribution to the advancement of Medical Physics.
- **EFOMP Honorary Membership** recognizing an individual who through his/her career has contributed to advancement in Research, education and training or organizational affairs and professional activities in Medical Physics in Europe.

Nominations for these awards are requested every two years, with the intention of making a single award in each category.

Prof. Dr. Dietrich Harder, Univ. of Göttingen, Germany

Prof. Dr. Alberto Del Guerra, Univ. of Pisa, Italy

The 2009 Awards

During the World Congress on Medical Physics and Biomedical Engineering (WC2009) that was held in Munich, Germany between the 7th and 12th of September 2009, the two awards were presented in two separate ceremonies.

Professor Wolfgang Schlegel introduced this year's winner of the EFOMP Medal, who was Professor Dietrich Harder, from Germany. After the presentation of the medal by the EFOMP President, Dr. Stelios Christofides, Prof. Harder gave a lecture with the title "**Biological Dosimetry**".

Dr Renato Padovani introduced this year's winner of the EFOMP Honorary Membership, who is Professor Alberto Del Guerra, from Italy. After the presentation of the award by the EFOMP President, Dr. Stelios Christofides, Prof. Del Guerra gave a lecture with the title "**Molecular Imaging - the European perspective**".

The EFOMP Symposium at WC2009: Education & Training in Medical Physics

This symposium was organised in collaboration with the International Organisation of Medical Physics (IOMP) and took place in the afternoon of Friday 11th of September as a component of the 3rd European Conference on Medical Physics that EFOMP organises every year and this year it was incorporated into the WC2009. The Symposium was organised and chaired by Stelios Christofides (Nicosia General Hospital, Cyprus), as the representative of EFOMP and Anchali Krisanachinda (Chulalongkorn University, Thailand), as the representative of IOMP.

The symposium consisted of seven presentations, a short discussion after each presentation and a general discussion at the end of the session. It appeared from the beginning that this symposium was important to many of the participants since the small room that was allocated to it was packed with participants from the beginning to the end of the symposium. More than 70 persons were present. Some of them were sitting on the floor and window ledge and also standing by the door outside the room.

Education, clinical training and professional recognition of Medical Physicists

Ahmed Meghzifene (Internatinal Atomic Energy Agency, Austria), presented by Joanna Izewska

She described the work of the IAEA and in particular the work of the Human Health division in relation to the role and responsibilities of the Medical Physicist who fulfils an essential role in the safe and effective use of radiation in medicine, most commonly in cancer treatment or diagnostic imaging. She emphasised that cancer rates are raising worldwide. This rate of increase is significantly higher in developing counties, thus requiring additional Medical Physics support. She also pointed out that the qualifications of an entry level Medical Physicist should consist of an appropriate academic degree at the postgraduate level followed by clinical training and professional accreditation, recognition or registration. While there are examples of countries with functioning academic, clinical and accreditation processes in place, many countries, in Africa and Asia for example, have limited or no programmes at all.

As part of its technology transfer scheme in the field of human health, the IAEA provides support for education, on the job training and for attendance of specialized courses. Currently, the IAEA supports the training of around 200 Medical Physicists per year through short courses. The long term strategy of the IAEA is to contribute to the establishment and harmonization of educational programmes in Medical Physics, including clinical training and professional accreditation/ registration, in Member States. She finished by saying that the IAEA works in close collaboration with professional bodies and other international organizations to further strengthen Medical Physics education and professional recognition.

As of 2009, the IAEA has launched a new initiative to strengthen Medical Physics in radiation medicine through an interregional technical cooperation project. It is important to say here that EFOMP has a long standing collaboration with the IAEA and is also one of the main partners in this new interregional technical cooperation project.

Education and Training of the Medical Physicist in Europe

Stelios Christofides (Nicosia General Hospital, Cyprus); Wolfgang Schlegel (Deutsches Krebsforschungszentrum, Germany); Renato Padovani (SO di Fisica Sanitaria, Italy); Peter Sharp (University of Aberdeen & Grampian Hospitals NHS Trust, United Kingdom); Alberto Torresin (Azienda Ospedale Niguarda, Italy); Marta Wasilewska-Radwanska (AGH University of Science and Technology, Poland); Wil van der Putten (University Hospital Galway, Ireland); Eduardo Guibelalde (Universidad Complutense, Spain); Kay-Uwe Kasch (University of Applied Sciences - Beuth Hochschule für Technik Berlin), Germany)

This paper was presented by me in my capacity as President of EFOMP. It is a standard presentation on the work of EFOMP in the field of education and training of the Medical Physicist. I have pointed out that one of the main aims of the European Federation of Organisations for Medical Physics is to propose guidelines for education, training and accreditation programmes. This is achieved through the publication of Policy Statements and the organisation of education

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and training courses, seminars and conferences. It represents a long-term work-programme aimed at harmonising the education and training of the Medical Physicist across Europe (see www.efomp.org for details of all the EFOMP activities).

I have concluded the presentation by emphasising that EFOMP's activities can only materialise through the collaboration of all the Medical Physicists of the EFOMP's National Member Organisations (NMOs). The NMOs must actively adopt and implement the guidelines of the policy statements as well as participate in the various events organised by EFOMP in collaboration with its NMOs. The contributions of all interested parties are more than welcome in order to further develop the harmonisation of the education, training and professional status of the Medical Physicist in Europe.

Medical Physics Education and Training in South East Asia

Anchali Krisanachinda (Chulalongkorn University, Thailand); James Lee (National Cancer Centre, Singapore); Nguyen Hoa (Cho Ray Hospital, Vietnam); Djarwani Soejoko (University of Indonesia, Indonesia); Kwan Ng (University of Malaya, Malaysia); Toh Wong (National Cancer Centre, Singapore)

This paper was presented by Anchali Krisanachinda in her capacity as the President of the South East Asian Federation of Organizations in Medical Physics (SEAFOMP). She said that the Association of South-East Asian Nations (ASEAN) established in 1967 comprises 10 countries located in South East Asia. Eight countries with Medical Physicists are Brunei, Indonesia, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam. Cambodia and Laos have no Medical Physicists. The SEAFOMP was setup in 2000 with 5 ASEAN members and 2 members joined in 2002 and 2005. Due to the limited number of Medical Physicists, Myanmar, Laos and Cambodia are not members of SEAFOMP.

She mentioned that the Medical Physics education and training as Master of Science program in Medical Physics was started at Thailand in 1972, followed by Philippines in 1981, Malaysia in 1994, and Indonesia in 1998. Vietnam established an M.Sc. in Bio-Medical Engineering in 2003. Currently, thirteen universities in South-East Asia provide Medical Physics education and training at different levels. This was evident from a survey on the status of Medical Physicist in South East Asia that was performed in 6 countries that determined the level and the period of education and training, the clinical training, the total number of Medical Physicists, the Certification and the Accreditation levels.

Status of Education and Training in Africa: Focus on South Africa

William Rae (University of the Free State, South Africa)

William Rae reported that Medical Physics training and education in Africa continues to be limited in many ways. Information gathering is difficult in the region due to limited communication channels and relatively few formal contact people within the field. It appears only five countries in Africa have formal courses offered toward recognized Medical Physics qualifications. Much of the training is achieved via International Atomic Energy Agency (IAEA) sponsored training courses. These focus on specific training needs and are presented around the continent in member countries.

He also reported that many qualified individuals currently in Africa obtained their qualifications in other countries. Formal recognition of the profession is well established in South Africa (SA) where professional registration with the Health Professions Council of SA is required after formal, structured and approved training. An active education and training program has been in place there since the 1960s. Functional academic and practical training programs are available at six accredited SA universities and most offer postgraduate training programs up to PhD level. Postgraduate students from at least seven other African states are currently studying at SA institutions.

He also mentioned that active efforts have been made since the 2006 IOMP World Congress in Seoul to form a regional federation of African Medical Physics organizations in order to attempt to address some of the urgent needs in the field. This process is well supported by the IAEA and the IOMP, and is aimed at comprehensive support of the profession on the continent. Many challenges exist in providing Medical Physics services within Africa. To overcome these coordinated education and training is vital.

AFOMP's Draft Policy #2: "Recommended Clinical Radiation Oncology Medical Physicist Staffing Levels in AFOMP Countries"

Kwan Hoong Ng (University of Malaya, Malaysia); William Round (University of Waikato, New Zealand); Yak Tay (Gleneagles Hospital, Singapore)

This paper was presented by Kwan Hoong Ng. He concentrated on the efforts of the Profes-

sional Development Committee (PDC) of the Asia-Oceania Federation of Organizations for Medical Physics (AFOMP) that had been drafting a set of policy statements which give recommendations and guidelines on issues such as the definitions on the roles and responsibility of Medical Physicists, their professional and quality standards, and the standard and structure of education and training of Medical Physicists.

One of these policy statements, which is the second of a series of documents, outlines the official views of AFOMP on recommended clinical Medical Physicist staffing levels in radiation oncology departments. It aims to serve as a guideline or reference document for AFOMP organizations. This policy statement also explains the philosophy and rationale in defining suitable radiation oncology Medical Physicist staffing levels.

Medical Physics Degree: A mature choice for Greece

Constantinos Koutsojannis (Technological Educational Institute of Patras, Greece)

Constantinos Koutsojannis reported on the efforts of his Institute to develop a Medical Physics Degree course. This course is for people that want to work in Medical Physics but at the level of a technologist.

He started his presentation by saying that almost all major engineering university schools now have a department of biomedical engineering. Biomedical engineering is now an equal to electrical, mechanical, civil and chemical engineering. Additionally the industrial sector in Medical Physics on ionizing and non-ionizing radiation as well as on biomedical engineering is also advancing and evolving quickly. Physicists as engineers can find numerous and lucrative opportunities with companies. Consequently Medical Physics is currently the most rapidly growing field of physics. Numerous academic, clinical and industrial opportunities are open to physicists in the medical world.

He stressed the point that according to the latest EU directives for education and professions, undergraduate education is of major importance. This paper is the first report of a higher degree level course on medical physics developed and introduced at Technological Educational Institute of Patras in Greece partly due to student interest, and partly due to the faculty's desire to provide interesting courses, as a result from the tight cooperation of the Health Science and Engineering Schools.

He finished his presentation by saying that while this is certainly good news, the curriculum have been designed with extreme care. If too much of the core physics material is removed to free up time for the discipline-specific material, there's a serious risk that graduating students will not have a sufficiently strong foundation on which to build a career as professional Medical Physicists. More discussion under national and international organizations will also improve this choice of the Technological Educational Institute of Patras in Greece.

The Future of Medical Physics. The Role of Medical Physics in Research and Development. An Opinion

Stelios Christofides (Nicosia General Hospital, Cyprus)

This paper expresses my personal view of the future of the Medical Physics Profession and especially the role of the Medical Physicist in research.

The convergence of technology in recent years within different fields of research has broadened the horizon for Medical Physics involvement both in basic research and in the clinical setting. These include and are not limited to the mapping of the entire human genome, tools to genetically manipulate cells or organisms, new treatment strategies, including molecular and cell based therapies, nanotechnology, and State-of-the-art imaging modalities with increased spatial and temporal resolutions. This convergence brings with it opportunities as well as threats to the traditional role of the Medical Physicist, both in the hospital environment and the research settings.

I believe that there is no future if the profession of Medical Physics is not refocused. The tasks of a Medical Physicists are to design processes, implement and monitor them. Medical Physicists should spend more time on development, assessment and implementation of new technologies. Medical physicists should do the work of a physicist and not that of a technologist.

In my opinion, in order for the Medical Physics profession to have a future, two directions should be aimed for:

- The introduction of the Medical Physics Technologist
- The introduction of the Medical Physics Researcher.

The education and training of the Medical Physics Technologist must be equivalent to level 3 or higher of the European Qualifications

Framework (http://ec.europa.eu/education/lifelong-learning-policy/doc44_en.htm). Apart from the traditional subjects, the curriculum required should include new subjects such as biology, genetics, molecular engineering, nanotechnology, etc.

A researcher should have an education and training equivalent to level 8 of the European Qualifications Framework. Universities are encouraged to developed taught or semi taught PhD level programmes in Medical Physics so as to encourage the development of the Medical Physics Researcher to meet today's and the future's challenges.

Furthermore, employers are encouraged to set up the necessary mechanisms to allow the continuous professional development of their employees in line with the European recommendations for lifelong learning. Through these mechanisms a Medical Physics Technologists can have the opportunity to become a Qualified Medical Physics or even a Medical Physics Researcher after gaining the necessary education and training qualifications prescribed at the different levels of the European Qualifications Framework.

Conclusions

The discussion that followed after all the presentations were delivered, proved that there is a different perception around the world about the roles, responsibilities and competencies of the clinical Medical Physicist.

It is concluded that the regional organisations of Medical Physics, such as EFOMP, SEAFOMP, AFOMP, ALFIM, etc, should work hard to harmonise the education and training of the Medical Physicists in their regions based on competences. Furthermore they should collaborate on the international level to harmonise the education and training of the Medical Physicists based on competences internationally. In this collaboration the involvement of international organisations such as the International Atomic Energy Agency, World Health Organisation and the International Organisation of Medical Physics are of paramount importance.

Report by:

Stelios Christofides,
EFOMP President

ESMRMB-EFOMP Session on MR Treatment Planning

ESMRMB European Conference 2009, Antalya, Turkey

The JOINT ESMRMB-EFOMP Session in Antalya provided deep insight into various areas of MRI applications for planning, navigation and monitoring of several minimally interventional treatment strategies. Interest in MR is increasing both in clinical and research areas, particularly in radiotherapy for planning and dose calculation. The session focused on the problems of MRI applications in radiotherapy, for different anatomic areas, using basic and advances MRI techniques for data reception and post processing. Speakers and topics were organized by EFOMP representative Prof. Alberto Torresin in close collaboration with ESMRMB officer Prof. Fritz Schick.

During the session P. M. Evans provided an overview of the use of MR in radiotherapy, particularly treatment planning, where MRI has become an important imaging modality complementary to the use of CT. C. Cavedon pointed out that especially Neurosurgery is a field where spatial accuracy is a key feature. MRI is widely used in neuronavigation systems and its validity has been largely demonstrated. Intra-operative MR scanners have been proposed and clinically used. In addition to low-field scanners, new high-field systems have recently become available for this task. P. Degreze and T. Andreae reported on the current state and future prospective of focused ultrasound for treatment of different pathology.

The next joint Session of ESMRMB and EFOMP is planned for the European Conference in Medical Physics at Udine, Italy in September 2010 (www.efomp.org). This conference is dedicated to "Advances in high field Magnetic Resonance Imaging".

Alberto Torresin, Chair of EFOMP Scientific Committee

Fritz Schick, former Secretary of ESMRMB

RADIOBIOLOGY AND RADIOBIOLOGICAL MODELLING IN RADIOTHERAPY

CHESTER, UNITED KINGDOM, 28 April - 1 May 2009

The fourth "Radiobiology and Radiobiological modelling in Radiotherapy" course organised by the Clatterbridge Centre for Oncology (CCO) was held from 28th April to 1st May in the premises of the CHESTER GROSVENOR and SPA Hotel located in the heart of the Roman town of Chester in the North West of the UK. Chester is a beautiful place, small enough to be explored easily on foot, famous for its magnificent racecourse, the zoo, the fascinating 900 years old cathedral and the heritage of the roman amphitheatre. It was a splendid experience, walking on the bank of river Dee and in the city centre in the evenings.

This international course, which is run every year for four days during spring, attracts delegates from all across the world, and it has been designed for all categories of professionals working in radiation oncology, ranging from medical doctors to medical physicists and university researchers. Being medical physics researchers of the host institution, we had the opportunity to attend it with 45 other participants from Europe and as far as USA, Canada, South Korea and Australia. This year's programme included sessions which were carefully prepared in order to cover all topics extensively, and it was divided into two parts, each of two days. The first part provided a thorough insight on the basis of radiobiology applied to radiotherapy while the second focused mainly on the use of radiobiological models for both tumour control probability (TCP) and normal tissue complication probability (NTCP).

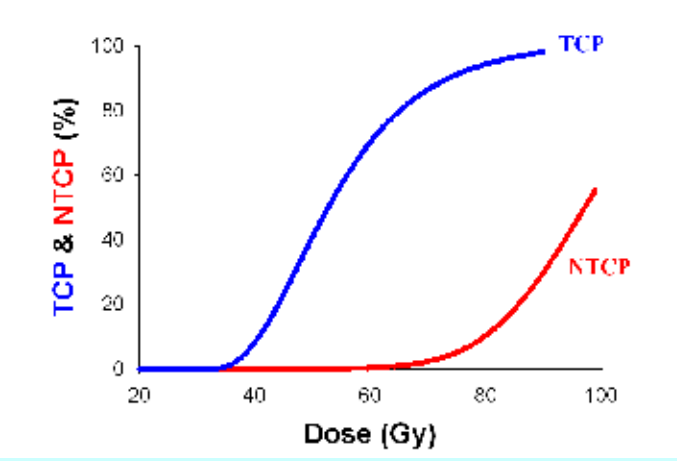

Fig.1: TCP & NTCP for a given fraction size

The teaching faculty included distinguished radiobiologists, oncologists and physicists who are internationally known for their research, such as Dr Don Chapman, the former head of radiobiology at world-renowned Fox Chaser cancer centre in Philadelphia, Professor Roger Dale, from the Imperial College of London, Dr Ellen Yorke from the Memorial Sloan Kettering Cancer Centre of New York and many more world's leading experts in the field.

The course started on the morning of 28th of April when we were warmly welcomed by the organiser of the course, Professor Alan Nahum. The first two days were dedicated to lectures on more general concepts such as an overview on quantitative radiobiology, radiobiology of brachytherapy, radiobiological aspects of heavy-particle therapy, track-structures studies, DNA damage and bystander effects, and a very comprehensive summary of works dedicated to the induction of secondary cancers in radiotherapy. On a different note, some of the lectures were on the implications of radiotherapy at a cellular level, such as the innovative lecture from Dr Catherine West on the genomic revolution and radiotherapy which closed the first part of the course.

The second part, which began on the 30th of April, was instead primarily meant to cover radiobiological modelling, and the presentations included a detailed summary of the most commonly used TCP and NTCP models, the statistical methods employed in dose volume analysis, and the use of radiobiological parameters in treatment plan optimisation. The prospects of the use of molecular imaging for target

definition and treatment assessment were also discussed.

In our opinion, the lectures, each of which lasted about 45 minutes, were adequate to cover proposed topics in depth. We had the occasion to ask questions and hear diverse perspectives from the lecturers as well as fellow participants, on various issues. This resulted in very interesting discussions that, in some cases further continued during the coffee breaks and delicious lunches.

During the entire course a computer lab was made available to run through three different radiobiological modelling softwares created by our colleagues at the CCO Physics department (BIOPLAN, BIO-Suite and LQ-modeller) and at Raysearch in Stockholm (ORBIT). We believe that this facility was extremely useful since it allowed us to put into practice the concepts learnt during the theoretical sessions.

As tradition, the night of the second day we all attended the social dinner, which was organised at the wonderful Aqua-Vitus restaurant in the centre of town. During this time we had an additional opportunity to meet and know better new colleagues and to catch-up with others that we had not met for a while.

Overall the course has been a very good experience and we highly recommend it for all the people that are interested in widening their knowledge in radiotherapy beyond the concept of physical dose.

Full details of the 2010 course can be found at: http://www.ccotrust.nhs.uk/document_uploads/Radiobiology%20Course/CCORBLGYCOURSEFLYER(2)May2010.pdf

Mekala Chandrasekaran

Vanessa Panettieri

MCTP2009: Second European Workshop on Monte Carlo Treatment Planning

MCTP2009: Second European Workshop on Monte Carlo Treatment Planning which took place at the National Museum Cardiff between 19th and 21st October 2009 was jointly organised by Velindre NHS Trust, Cardiff University and Cancer Research Wales. The event was also supported by the European Workshop on Monte Carlo Treatment Planning (EWG-MCTP, *www.ewg-mctp.ugent.be*) and sponsored by the Institute of Physics (*www.iop.org*).

MCTP2009 (*www.mctp2009.org*) focused on the application of Monte Carlo (MC) technology in cancer diagnosis and treatment with the aim of highlighting recent developments, technical and clinical breakthroughs and emphasizing scientific innovations. The scientific programme, scheduled over 2.5 days, included 13 scientific sessions, 53 oral presentations and 24 posters. One technical session was included in the programme giving manufacturers the opportunity to present to delegates the latest technological developments. The following manufacturers presented their innovative products in radiotherapy treatment planning: BrainLab, DOSIsoft, Elekta/CMS, Nucletron and Varian.

From the left: Indrin Chetty, Emiliano Spezi, Harald Paganetti, Antonio Leal , Iwan Kawrakow

MCTP2009 had 142 participants. This is a remarkable figure, considering the specialist nature of the event. MCTP2009 improved on the success of similar previous initiatives and confirmed an increasing interest from the clinical environment in MC-based Treatment Planning solutions and research. The majority of participants came from the countries of the European Union with a 24% from the UK alone and 46% from the rest of Europe (France 11%, Germany 11%, and The Netherlands 6%). The North America component was 12%. The remaining 18% of participants came from other counties around the World including, among others Brazil, South Africa and South Korea.

The Workshop was opened by a keynote presentation from Dr. Markus Alber (University of Tübingen, Germany) on "Clinical use of MCTP in external photon beam radiotherapy", in which he discussed the importance of source modelling and the advantages of MCTP approach in dynamic deliveries and 4D optimization. Prof. Indrin Chetty (Henry Ford Health System, Detroit, USA) provided a very intriguing review on the "Status of Monte Carlo Treatment Planning (MCTP) for electron and photon beams", while Prof. Harald Paganetti's (Massachusetts General Hospital, Boston, USA) keynote presentation focused on the "Clinical use of proton Monte Carlo", including all aspects of the work, from detector simulation and treatment head design to PET modeling and patient dose calculation. The rationale for using MC in brachytherapy was discussed in Dr. Josè Perez-Calatayud's (Hospital La Fe, Valencia, Spain) keynote talk titled "Use of MC in Brachytherapy HEBD consensus datasets". Novel applications of MC in the field of Nuclear Medicine were discussed in the keynote presentation "Monte-Carlo for Targeted Radionuclide Therapy: quantitative imaging and treatment planning" from Dr. Manuel Bardiès (INSERM, Nantes, France), in which exciting research opportunities in the MC simulation of PET/SPECT detectors and patient dosimetry were outlined. Dr. Hugo Palmans (National Physical Laboratory, Teddington, UK) opened a very interesting scientific session dedicated to MC in dosimetry with a talk on "Monte Carlo simulations for improved reference dosimetry in radiotherapy", in which it was emphasized that MC plays a key role in small field dosimetry, where disequilibrium conditions arise. Dr. Iwan Kawrakow (NRC, Ottawa Canada) talked about "Recent code developments in Monte Carlo treatment planning", with particular attention to speed performance and dose calculation in deforming geometries. The Workshop was closed by a truly inspiring keynote lecture on "Past and Future of Monte Carlo in Medical Physics" from Prof. Dave Rogers (Carleton University, Ottawa, Canada) on the 60th anniversary of the paper by N. Metropolis and S. Ulam "The Monte Carlo method", Journal of the American Statistical Association, Vol. 44 p. 335, 1949.

MCTP2009 was accredited by the EFOMP as a CPD event for Medical Physics with 20 hours. According to the EFOMP recommendations this is equivalent to 20 "CPD credit points".

Dr. Emiliano Spezi

Chairman of MCTP2009 Organising Committee,
Department of Medical Physics,
Velindre Cancer Centre
Cardiff (UK)

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Scientific Meetings

January 17 – 22, 2010

EIBIR Winter School on Interdisciplinary Biomedical Imaging
Info: www.eibir.org

January 24-28 , 2010

COMP Winter School, Banff, Alberta CANADA
Quality and Safety in Radiation Oncology
Info: medphys.ca/

February 2-4, 2010

WORKSHOP "PHYSICS FOR HEALTH IN EUROPE"
"Towards a European roadmap for using physics tools in the development of diagnostics techniques and new cancer therapies"
Info: cern.ch/physics-for-health

March 4-8, 2010:

European Congress of Radiology, ECR 2010
Vienna, Austria
Info: www.myESR.org

March 8-12, 2010

European Conference on Individual Monitoring of Ionizing Radiation
Athens, Greece
Contact: im2010@gaec.gr
Info: www.gaec.gr/im2010

March 18-20, 2010

Molecular Imaging in Radiation Onlcology (MIRO)
Brussels, Belgium
Info: www.estro-events.org

May 1-7, 2010

18th Scientific Meeting and Exhibition,
Joint Annual Meeting ISMRT& ESMRMB,
International Society for Magnetic Resonace in Medicine (ISMRM) and
European Society for Magnetic Resonance in Medicine and Biology (ESMRMB)
Stockholm, Sweden
Info: www.ismrm.org

May 20-22, 2010

4th AISCMP 2010 Meeting
Austrian, Italian, Slovenian and Croatian Medical Physics Meeting
Ljubljana, Slovenia
Info: www.aiscmp2010.com/

June 16-18, 2010

International Workshop on Digital Mammography
Girona, Spain
Info: iwdm2010.org

September 12-16, 2010

ESTRO29
Abstract submission: March 4, 2010
Early registration: February 25, 2010
Late registration: August 6, 2010
Info: www.estro-events.org

October 9-13, 2010

EANM '10
Annual Congress of the European Association of Nuclear Medicine
Vienna, Austria
Info: eanm10.eanm.org/

November 9-12, 2010

International Symposium on Standards, Applications and Quality Assurance in Medical Radiation Dosimetry
Organized by the International Atomic Energy Agency
Vienna, Austria
Info:
www-pub.iaea.org/MTCD/Meetings/Announcements.asp?ConfID=38093

September 1-3, 2011

12th European Federation of Organisations of Medical Physics (EFOMP) Congress, 5th European Conference on Medical Physics
Trinity College,
Dublin, Ireland