Announcing FARO, the Federation of Asian organisations for Radiation Oncology

PHYSICS
Recommendations adopted by the IAEA regional meeting on medical physics in Europe

NATIONAL SOCIETIES
Announcing FARO, the Federation of Asian organisations for Radiation Oncology

CONFERENCES
ECC2015: Highlights and awards
CONTENTS

Editorial 3
Society Life 6
Clinical 15
Read it before your patients 20
Brachytherapy 36
Physics 46
RTT 58
Radiobiology 69
ESTRO School 75
Young ESTRO 101
Health Economics 112
Institutional Membership 116
National Societies 121
Conferences 126
Calendar of events 155
Dear colleagues and friends,

After the highly successful European Cancer Congress in Vienna (ECC2015), we’re all back to work, ready to face the autumn chill with renewed energy. Those of you who could not attend this very important congress should be sure to follow the webcasts online to catch up on some of the presentations. As you may know, ECC2015 was the last congress in this format, and from 2017 on, the congress will become annual and focus mainly on oncopolicy, patients and education. ESTRO is involved in defining the structure of this new conference and its programme, and we are sure it will quickly become an unmissable event on your calendar.

We have an announcement to make in this issue, which is the recent appointment of the new School Director. Following a careful selection procedure, we are very pleased to announce that Jesper Eriksen will take on this position at ESTRO 35 in Turin. Jesper has been involved...
in education for a long time now, and is highly enthusiastic and committed to ESTRO’s project of delivering the highest quality education to our members. Good luck Jesper!

In line with our tradition of building partnerships with our colleagues from outside Europe, ESTRO has just signed a Memorandum of Understanding with SEAROG, the South East Asia Radiation Oncology Group. Read more about this in the Society Life Corner of this newsletter. This partnership will no doubt lead to a fruitful relationship with FARO, the newly created Federation of Asian organisations for Radiation Oncology, with whom we hope to collaborate in future. ESTRO’s dedication to establishing close connections with other Societies and professionals in the radiation oncology field is as strong as ever, and we are working on the opening of a permanent ESTRO hub in the Asia-Pacific region. We’ll have more details to share soon.

2015 is nearly over now (how time flies!) and we are going to reach the end of the year with more than 6,500 members. Membership renewal for 2016 is already open, so don’t forget to log in and renew yours!

However, before the year ends, we have something else to do as ESTRO members: vote for our new President-elect and Board members. Keep an eye out for more details on the elections; we will be sending you information soon. This is your chance to take part in choosing the leaders of our Society, so don’t miss out!

I’d like to finish by wishing you all a very happy holiday season and a wonderful start to 2016.

Philip Poortmans
ESTRO President
SOCIETY LIFE
By the time you read this, autumn will be in full swing. It was a pleasure to meet some of you at the European Cancer Congress (ECC2015), the multidisciplinary platform for oncology. ESTRO’s general assembly was held at ECC2015, and the Society’s activities and matters of governance were discussed. A summary is given in this Corner.

In our efforts to increase collaboration with other radiation oncology societies, we have signed Memoranda of Understanding (MoU) with a young society in Europe, as well as another society in Asia. You will find more details here.

I had the privilege of attending the 2nd Spanish Congress on the breast (October, Madrid). At this meeting I was interviewed on advances in breast cancer research. I am pleased to share a report of the interview, which you will find at the bottom of this Corner.

Last but not least, we have outlined some activities on the upcoming 4th International Day of Radiology on 8 November.

I hope you enjoy reading the newsletter.

*Philip Poortmans*
*ESTRO President*
The Second Spanish congress on the breast took place in Madrid on 22-24 October 2015. It was an opportunity for Dr Jose Guinot Rodriguez, radiation oncologist at the Instituto Valenciano de Oncología (IVO), Valencia, Spain, and members of the scientific organising committee of the Congress, to ask Professor Philip Poortmans a few questions. As President of ESTRO, Prof Poortmans shared his thoughts on advances in the treatment of breast cancer, initiatives undertaken by ESTRO, and also on the joint efforts by oncology societies.

**INTERVIEW WITH PHILIP POORTMANS**

**Second Spanish congress on the breast**
22 - 24 October 2015
Madrid, Spain

You have been President of ESTRO since 2014. What role has ESTRO played in the fight against breast cancer?

ESTRO has as its mission, “Every cancer patient in Europe will have access to state of the art radiation therapy, as part of a multidisciplinary approach where treatment is individualised for the specific patient’s cancer, taking account of the patient’s personal circumstances”. This means that we are working to improve the outcome of every cancer patient in all European countries by helping to improve the accessibility and the quality of radiation oncology. In most radiation oncology departments in industrialised countries, treatment of breast cancer amounts to about 20-25% of the workload and is thereby the largest proportion of the overall workload by tumour type. This of course translates into the attention that ESTRO pays to this topic in its educational and scientific programme: on alternate years we organise 1) the multidisciplinary course on breast cancer and 2) the course on accelerated partial breast irradiation for all those who are active in the field of radiation oncology. At each of the ESTRO congresses, we dedicate several sessions to an update of multidisciplinary as well as specifically radiation oncology-linked aspects of breast cancer. In addition to this, ESTRO has developed broadly endorsed guidelines for contouring the diverse target volumes of breast cancer. ESTRO has worked with the European Society for Medical Oncology (ESMO) to develop guidelines and has also contributed to the European Society of Breast Cancer Specialists (EUSOMA)’s multidisciplinary guidelines.

Breast cancer incidence continues to rise globally. You are an expert in the treatment of breast cancer using radiation therapy. What do you believe will be the role of the different techniques of radiotherapy treatment in the coming years?

I have often found it surprising that a highly curable tumour like breast cancer continues to be treated in most departments with rather conventional technical approaches, while for cancers with a poor prognosis including lung cancer and high grade brain tumours, a lot of attention has been paid to improving the technical aspects of radiation therapy, in large part in vain. Following the reports that ▼
radiation therapy for breast cancer using conventional techniques increases long-term morbidity and mortality, especially related to the radiation dose to the heart, more attention has gradually been paid to the technical aspects of radiation therapy in breast cancer.

Without proper target volume delineation, even the most advanced techniques will not lead to a satisfactory result. When using the new ESTRO guidelines, the total treatment volume for comprehensive locoregional irradiation is greatly reduced, in many patients to or even below the volume that used to be included with simulator-based treatment fields for the breast without the regional lymph nodes. Current developments focus on improving dose homogeneity and coverage of the target volumes, using forward-planned field-in-field techniques as various solutions using (volumetric) IMRT. Furthermore, improvement in patient positioning and the use of respiratory control are now recognised as standard tools to lower the dose to the organs at risk. Given all this, it is most important that each radiation oncology department develops its own approach which typically will apply to about 80% of their breast cancer patients. For the remaining 20%, a higher level of individualisation using another technical approach is required. I foresee that in the coming years these developments will continue in the form of fine tuning current techniques as well as in an increased exchange of experience among radiation oncology departments. Another possible development is that for the most challenging cases, a completely new approach like particle therapy, probably with protons, might also be developed.

As well as the technical innovations in radiation oncology, we are investigating novel approaches for high-risk patients such as combining radiation therapy with existing and investigational treatments including targeted drugs and immunotherapy. For low-risk patients, we are exploring ways to decrease the burden of treatment either by decreasing the extent of loco-regional treatments and/or of adjuvant systemic treatments.

This year, the Spanish Society for Radiotherapy (SEOR) has made you an honorary member. Do you think there are good relationships between scientific societies or are we still lacking in the cooperation which would benefit patients, and is it the aim of the Spanish congress on the breast? While healthcare systems in European countries developed autonomously for a long time, we can see a gradual alignment not only in Europe but, of course to a lesser extent, worldwide. In domains like oncology in general or radiation oncology in particular, internationalisation clearly leads to accelerated alignment of guidelines in working procedures. ESTRO facilitates this through its courses, congresses and more recently the installation of a national societies committee in which all European countries take an active part in the exchange of information via meetings and ESTRO newsletters. Also ACROP (Advisory Committee on Radiation Oncology Practice), the guidelines committee, plays an important role in the exchange of knowledge via the endorsement of common guidelines and working procedures.

Multidisciplinarity is the best way to achieve the best results in the prevention, diagnosis and treatment of all cancers. The atmosphere in which the oncological specialties collaborate varies highly from one country to another – I feel very happy with the excellent way that this works in The Netherlands. Currently, a very challenging issue in the European multidisciplinary collaboration for which ECCO and the biannual ECC meeting has played an important role, is the unilateral decision of ESMO to terminate its collaboration with other partners in the multidisciplinary field of oncology in the setting up of the ECC congresses. This puts a lot of pressure on several oncological societies which are, in contrast to ESMO, not easily supported by pharmaceutical and other companies. I sincerely hope that we can clear up this highly unwarranted situation, for which no reasonable explanation can be found, apart from economic considerations.
The most recent ESTRO general assembly was held during ECC2015 in Vienna, on 28 September. The assembly was attended by 35 members, and 18 others were represented by proxy. The items on the agenda were the upcoming elections, the approval of the budget for 2016, and an update on ESTRO’s activities: the ECF (ESTRO Cancer Foundation), membership, education and congresses.

ESTRO President, Prof Philip Poortmans, reminded attendees that in 2016 his term will come to an end. At ESTRO 35, President-elect Professor Yolande Lievens will take over the presidency. Elections for a new President-elect now need to be held, and also for new Board members, as one current member is coming to the end of her second term, and three other places are up for renewal.

ESTRO Treasurer Professor Dirk Verellen presented the budget for 2016, detailing the Society’s expected revenue and costs. The assembly was asked to vote on the proposed budget, and it was unanimously approved.

Past-president Professor Vincenzo Valentini presented an update on the activities of the ESTRO Cancer Foundation (ECF). A grant from Varian will fund patient outreach activities and applications of health economics data, in order to promote radiation oncology at both national and international levels.

Prof Poortmans informed the assembly of the latest figures for membership, the ESTRO School and conferences.

There were no further questions or items on the agenda. The next general assembly will take place during ESTRO 35 in Turin. See you there!
MoU WITH YOUNG MEMBERS IN ISCORT AND SEOR

ESTRO aims to facilitate the access and inclusion of young radiation oncology trainees within the Society. In order to extend and reinforce collaboration across Europe, ESTRO has recently concluded a joint membership Memorandum of Understanding with the young members of the Israeli Society for Clinical Oncology and Radiotherapy (ISCORT) and those in the Spanish Society for Radiotherapy and Oncology (SEOR) in their third or fourth year of residential training in radiation oncology. These joint membership agreements will be effective as of January 2016 and can be renewed every three years. Members will enjoy the same benefits as members in training.

MoU WITH SEAROG

“In Vienna, on behalf of ESTRO, it was a pleasure to sign a Memorandum of Understanding with the South East Asia Radiation Oncology Group (SEAROG), on membership and the continuation of joint efforts in education. Good agreements mean we can work together to better position radiation oncology and improve the future for cancer patients. We are very much looking forward to this collaboration. It fits nicely into ESTRO’s vision that every cancer patient, not only in Europe but on a global scale, has the right to access state of the art radiation therapy, as part of a multidisciplinary approach in which treatment is individualised for the specific patient’s cancer, taking account of the patient’s personal circumstances.”

Philip Poortmans
ESTRO President

“SEAROG is pleased to announce the signing of a MoU with ESTRO on 27 September 2015 to further promote scientific collaboration and exchange. It marks a strong partnership between the two societies that will expand and enhance ESTRO teaching courses in South East Asian countries and will prompt more radiation oncologists in Asian countries to become members of ESTRO. We would like to thank the ESTRO Board, and give special thanks to Prof. Philip Poortmans, ESTRO President, for his support and enthusiasm for the collaboration. We look forward to inviting experts from ESTRO to share their knowledge and experience with us in the teaching programmes that we have agreed up to 2018 and perhaps beyond.”

Ibrahim Wahid
SEAROG Past-president

From left to right: SEAROG past President Ibrahim Wahid, ESTRO President Philip Poortmans, and SEAROG President Somjai Dangprasert, at the signing of the MoU in Vienna, at the ECC.
November 8 is the International Day of Radiology (IDoR) and this year, marking the 120th anniversary of Wilhelm Conrad Röntgen’s discovery of x-rays, children will take centre stage as celebrations unfold all around the world to highlight the role of radiologists in the detection and treatment of paediatric diseases.

For the fourth year in a row, more than 120 radiological and medical societies from all around the world have joined the initiative, including ESTRO.

IDoR is organised each year by the European Society of Radiology, the American College of Radiology and the Radiological Society of North America. The participating societies contribute in various IDoR activities to help stress the importance of radiology in the management of paediatric diseases.

“Imaging in children has many unique and specific features; it is adjusted to the needs of children. IDoR will highlight the efforts of paediatric radiologists throughout the world, whose work benefits children’s health immensely,” said Boris Brkljačić, Chair of ESR’s communication and external affairs committee.

The involvement of the radiation protection campaigns, EuroSafe Imaging and Image Gently, reflects another key objective of the organisers, which is to raise awareness of the necessity of reducing radiation exposure in young patients. “Radioprotection is gaining much interest among both the population and legislators; the importance of optimising our techniques to minimise the risk associated with radiation is more evident in paediatric patients than ever before.”
anywhere else,” said ESR President Lluis Donoso Bach.

Radiologists will celebrate their discipline through a wide range of activities, from press conferences and public lectures to open days at hospitals and social events. The WFPI (World Federation of Pediatric Imaging) is also holding a video and photography contest via YouTube, Instagram and Twitter, to promote pediatric radiology. Winners will be awarded a prize and will be featured in the International Day of Radiology celebrations.

The European Society of Radiology (ESR), the European Society of Paediatric Radiology (ESPR), the Society for Pediatric Radiology (SPR) and the World Federation of Pediatric Imaging (WFPI) have produced a book on paediatric imaging, comprised of articles written by international experts, including from ESTRO (see text box).
2016 ESTRO MEMBERSHIP

Discover the opportunities that only the ESTRO membership can bring to you, your career, your practice, your profession, and ultimately, your patients.

ESTRO is devoted to advancing the goals of radiation oncology. This includes providing its members with outstanding science and education in order to support them in their career advancement.

Join ESTRO and gain access to exclusive member benefits such as:
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- Eligibility for grants, awards, faculties and governance positions.

ESTRO offers several categories of membership to fit your professional needs.
Check them online on www.estro.org/members
INTRODUCTION

PROSTATE CANCER – CHANCES AND CHALLENGES

CLINICAL
In line with ESTRO’s vision of further development of a patient-centred approach in radiation oncology, the Clinical committee has set up a number of activities during the past year, including a workshop with patient group representatives. As a result of these activities, a collaboration with Europa UOMO has been established. Please find a report by Clinical committee member, Dr. Joanna Kazmierska, from the European Patient Coalition Europa Uomo Congress, ”Prostate cancer – chances and challenges”, in Warsaw in June this year.

Daniel Zips
Chair of the Clinical committee
HEARING THE PATIENT’S VOICE

Patient-centredness is one of the most important pillars of the ESTRO mission. The Vision for 2020 states, “Every cancer patient in Europe will have access to state of the art radiation therapy, as part of a multidisciplinary approach where treatment is individualised for the specific patient’s cancer, taking account of the patient’s personal circumstances”. To this end, the ESTRO Board and Clinical Committee have started to work more closely with patient organisations across Europe.

The first joint meeting between representatives from ESTRO and patient organisations took place in December 2014. It fostered understanding of mutual expectations and development of a framework for future cooperation. As a result, ESTRO representatives were invited to shape the congress programme for the patient organisation, the European Prostate Cancer Coalition, Europa Uomo.

“Prostate cancer – chances and challenges” was co-hosted by Europa Uomo, the Polish Society of Urology, Gladiator (Association of Men with Prostate Diseases), European School of Oncology, the European Association of Urology and last but not least, ESTRO.

The second day of a three-day congress was dedicated to topics which are important to prostate cancer patients and survivors. The aim of the symposium was to provide education and information but also to allow discussion and interaction between patients and invited experts. The need for such events was confirmed by the
full audience at all sessions and a very lively discussion.

The workshop was chaired by two honoured founders of Gladiator, Mr Tadeusz Rudzinski and Mr Marcin Włodarczyk, with help of Dr Roman Sosnowski, urologist and a good friend of this association.

The programme included talks on epidemiology and risk factors for prostate cancer as well as issues directly related to treatment. The talk about the role of physical activity and diet in prostate cancer presented by Dr Sosnowski attracted great attention. It was also a pleasure to see many women in the audience. Lively discussion was evoked by facts on nutrition and practical tips e.g. the role of tomato sauce as the best way to deliver lycopene, or how to fight obesity by motivating partners to increase their physical activity.

Many questions raised during the lecture referred to the prostate cancer diagnostic process. Audience concerns focused on interpretation of PSA levels and its significance in treatment decisions and follow up.

Modern methods of prostate cancer treatment including surgery, radiotherapy and ways to manage side effects were discussed by experts in the respective fields. It should be emphasised that the symposium was multidisciplinary, not just due to the presence of different specialists involved in prostate cancer treatment. More importantly, the event provided balanced opinions from both urologists and radiation oncologists, and positioned multidisciplinary cooperation as the way to maximise patient benefits.

The final session of the seminar was dedicated to quality of life and the psychological and emotional realm of patients, survivors and their caregivers. The lecture was given by Dr Villa, a psychologist from Fondazione IRCCS Istituto Nazionale dei Tumori in Milan.

Special guests of the symposium were representatives of the Europa Uomo Board: the President, Mr Ken Mastris and Professor Louis Denis. Prof Denis, in his closing remarks, stressed that he was impressed not only by the large number of participants, including women, but also by the enthusiasm and involvement of all: patients, organisers and invited experts.

Meetings like the Warsaw symposium help all of us to think again how important it is to listen to the voice of the most important player, the patient. Ensuring appropriate involvement of patients in the treatment decision process is clearly an emerging future trend and the right way forward. Patients have the right to be informed and educated and patient-doctor communication must be individualised and tailored to take into account the variety of patients’ backgrounds. Patients’ organisations nowadays have become an equal partner with medical societies. They want to, and will shape the future of modern oncology, both locally and globally. I believe that our Society will recognise the importance of these trends and take the necessary steps to ensure our voice is firm in the creation of true multidisciplinary oncology.

Joanna Kazmierska
Department of Radiation Oncology
Greater Poland Cancer Center
Poznan, Poland

For further information, see:
Europa Uomo: www.europa-uomo.org
Gladiator: www.gladiator-prostata.pl
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READ IT BEFORE YOUR PATIENTS
Too important to miss…
A digest of essential reading for all radiation oncologists

BY PHILIPPE LAMBIN, DIRK DE RUYSCHER AND HANS KAANDERS
BREAST

Regional nodal irradiation in early-stage breast cancer.


BACKGROUND
Most women with breast cancer who undergo breast-conserving surgery receive whole-breast irradiation. We examined whether the addition of regional nodal irradiation to whole-breast irradiation improved outcomes.

METHODS
We randomly assigned women with node-positive or high-risk node-negative breast cancer who were treated with breast-conserving surgery and adjuvant systemic therapy to either the nodal-irradiation group (whole-breast irradiation plus regional nodal irradiation including internal mammary, supraclavicular, and axillary lymph nodes) or the control group (whole-breast irradiation alone). The primary outcome was overall survival. Secondary outcomes were disease-free survival, isolated locoregional disease-free survival, and distant disease-free survival.

RESULTS
Between March 2000 and February 2007, a total of 1,832 women were assigned to the nodal-irradiation group or the control group (916 women in each group). The median follow-up was 9.5 years. At the 10-year follow-up, there was no significant between-group difference in survival, with a rate of 82.8% in the nodal-irradiation group and 81.8% in the control group (hazard ratio, 0.91; 95% confidence interval [CI], 0.72 - 1.13; p = 0.38). The rates of disease-free survival were 82.0% in the nodal-irradiation group and 77.0% in the control group (hazard ratio, 0.76; 95% CI, 0.61 - 0.94; p = 0.01). Patients in the nodal-irradiation group had higher rates of grade ≥2 acute pneumonitis (1.2% vs. 0.2%, p = 0.01) and lymphoedema (8.4% vs. 4.5%, p = 0.001).

CONCLUSIONS
Among women with node-positive or high-risk node-negative breast cancer, the addition of regional nodal irradiation to whole-breast irradiation did not improve overall survival but reduced the rate of breast-cancer recurrence.

Funded by the Canadian Cancer Society Research Institute and others; MA.20 ClinicalTrials.gov number, NCT00005957.
BACKGROUND
The effect on survival of internal mammary and medial supraclavicular lymph-node irradiation (regional nodal irradiation) added to whole-breast or thoracic-wall irradiation after surgery among women with early-stage breast cancer is unknown.

METHODS
Our study included women who had a centrally or medially located primary tumour, irrespective of axillary involvement, or an externally located tumour with axillary involvement. They were randomly assigned to undergo either whole-breast or thoracic-wall irradiation in addition to regional nodal irradiation (nodal-irradiation group) or whole-breast or thoracic-wall irradiation alone (control group). The primary end point was overall survival. Secondary end points were the rates of disease-free survival, survival free from distant disease, and death from breast cancer.

RESULTS
Between 1996 and 2004, a total of 4,004 patients underwent randomisation. The majority of patients (76.1%) underwent breast-conserving surgery. After mastectomy, 73.4% of the patients in both groups underwent chest-wall irradiation. Nearly all patients with node-positive disease (99.0%) and 66.3% of patients with node-negative disease received adjuvant systemic treatment. At a median follow-up of 10.9 years, 811 patients had died. At 10 years, overall survival was 82.3% in the nodal-irradiation group and 80.7% in the control group (hazard ratio for death with nodal irradiation, 0.87; 95% confidence interval [CI], 0.76 - 1.00; p = 0.06). The rate of disease-free survival was 72.1% in the nodal-irradiation group and 69.1% in the control group (hazard ratio for disease progression or death, 0.89; 95% CI, 0.80 - 1.00; p = 0.04), the rate of distant disease-free survival was 78.0% versus 75.0% (hazard ratio, 0.86; 95% CI, 0.76 - 0.98; p = 0.02), and breast-cancer mortality was 12.5% vs.14.4% (hazard ratio, 0.82; 95% CI, 0.70 - 0.97; p = 0.02). Acute side effects of regional nodal irradiation were modest.

CONCLUSIONS
In patients with early-stage breast cancer, irradiation of the regional nodes had a marginal effect on overall survival. Disease-free survival and distant disease-free survival were improved, and breast-cancer mortality was reduced.

Funded by Fonds Cancer; ClinicalTrials.gov number, NCT00002851.
COMMENT BY LISE BECH JELLESMARK THORSEN AND BIRGITTE VROU OFFERSEN

Two large randomised clinical trials, the EORTC 22922/10925 and the NCIC CTG MA.20, recently published ten year results in *The New England Journal of Medicine* (Poortmans et al; Whelan et al, 2015). Both trials concerned the effect of regional nodal irradiation after surgery for early-stage breast cancer. The results are likely to have a profound impact on the adjuvant radio-therapeutic management of early-stage breast cancer.

The EORTC 22922/10925 trial, conducted 1996 - 2004, randomised 4,004 patients with node-positive breast cancer or node-negative disease and a central/medial tumour to receive adjuvant whole breast (WBI)/chest wall irradiation +/- regional nodal irradiation of the medial supraclavicular and internal mammary lymph nodes. Most patients (76%) were treated with breast conserving surgery (BCS). The majority had node-negative disease (44%) or 1-3 nodes involved (43%). Adjuvant systemic treatment was widely used, with 85% of patients receiving chemotherapy and/or endocrine therapy. The medial supraclavicular and internal mammary nodes were treated using anterior mixed photon and electron beams matched to the treatment fields for the residual breast or chest wall in patients treated with regional irradiation.

The MA.20 trial, conducted 2000 - 2007, randomised 1,832 patients to WBI or WBI plus regional nodal irradiation of internal mammary, supraclavicular and axillary lymph nodes after BCS and adjuvant systemic therapy. Of these patients, 10% had node-negative disease with an additional high-risk criterion, 85% had 1 - 3 positive nodes, and 5% had four or more nodes involved. Combination chemotherapy was used in 91% of patients; endocrine therapy in 76%. Regional irradiation was given using an anterior photon field for supraclavicular and level III axillary nodes. In patients with more than three nodes involved or fewer than ten nodes removed, fields were extended to include axillary levels I and II. The internal mammary nodes were treated using either mixed beam fields or by inclusion in tangential photon fields. Nodal fields were matched to the tangential fields used for WBI.

At ten years, neither trial found improvement in its primary end-point of overall survival with regional irradiation, although the EORTC results approached significance (HR=0.87; 95% CI, 0.76 - 1.00; p = 0.06). However, both trials found significant improvements in loco-regional, disease-free and distant disease-free survival. Furthermore, the EORTC trial found a statistically significant 3% decrease in 10 year breast cancer mortality. These results were achieved at the cost of a slightly increased risk of pulmonary fibrosis (EORTC), lymphoedema and cutaneous adverse events (MA.20), while no increase in cardiac disease or second cancer was observed. Overall, toxicity rates were low in both trials.

These two trials have obvious strengths: study populations were large and well-described, radiotherapy was conducted with systematic quality assurance and high adherence to randomisation, follow-up was long with few patients lost. However, certain limitations must also be acknowledged. As regional irradiation was directed at all undissected regional nodal areas, no conclusions can be drawn about the benefits derived from treatment of the individual nodal areas. Although adjuvant systemic treatment was reasonably contemporary, taxanes were not widely used, and trastuzumab use was not reported. ▼
Neither study was designed to identify whether some subsets of patients benefited more from treatment than others, and limited information on, e.g., HER2 status precludes any investigation of the effect within molecular subgroups. Results may not apply to patients with laterally located node-negative disease nor to those with more than three nodes involved. A Danish Breast Cancer Cooperative Group study on internal mammary node irradiation, including more than 3,000 patients with node-positive early-stage breast cancer, will in the near future publish more comprehensive results in favour of regional irradiation in patients with advanced nodal disease (Thorsen et al, OC-0148, ESTRO 33, 2014).

Whether the results from these trials apply to the breast cancer patient of today is debatable. Since the studies were carried out, advances in systemic treatment of early-stage disease have reduced recurrence rates. This is likely to reduce the absolute gains achievable with regional radiotherapy, but could also increase relative gains, as more patients with distant microscopic disease at diagnosis are cured with adjuvant systemic treatment. With developments in organ-sparing delivery of radiotherapy, treatment may be less toxic and more efficient, increasing long-term benefits. The question of what part regional irradiation plays in the treatment of patients with screen-detected, perhaps less aggressive, cancer, or in patients with micro-metastatic disease only, remains unanswered. This is also the case for patients receiving only sentinel node sampling, and for patients treated with neoadjuvant systemic therapy.

In spite of these uncertainties, the results from the EORTC 22922/10925 and the MA.20 clearly show that regional irradiation does benefit patients with early-stage breast cancer by reducing not only the risk of loco-regional relapse but also the risk of developing distant and incurable disease. Although treatment after relapse is evolving rapidly, it seems reasonable to assume that this benefit will in time translate into improved survival.

Lise Bech Jellesmark Thorsen (MD, PhD),
Department of Oncology,
Aarhus University Hospital,
Denmark

Birgitte Vrou Offersen (MD, PhD),
Department of Oncology,
Aarhus University Hospital,
Denmark
**SUMMARY**

Each year, 500,000 patients are treated with radiotherapy for head and neck cancer, resulting in relatively high survival rates. However, in 40% of patients, quality of life is severely compromised because of radiation-induced impairment of salivary gland function and consequent xerostomia (dry mouth). New radiation treatment technologies enable sparing of parts of the salivary glands. We have determined the parts of the major salivary gland, the parotid gland, that need to be spared to ensure that the gland continues to produce saliva after irradiation treatment. In mice, rats, and humans, we showed that stem and progenitor cells reside in the region of the parotid gland containing the major ducts. We demonstrated in rats that inclusion of the ducts in the radiation field led to loss of regenerative capacity, resulting in long-term gland dysfunction with reduced saliva production. Then we showed in a cohort of patients with head and neck cancer that the radiation dose to the region of the salivary gland containing the stem/progenitor cells predicted the function of the salivary glands one year after radiotherapy. Finally, we showed that this region of the salivary gland could be spared during radiotherapy, thus reducing the risk of post-radiotherapy xerostomia.

Peter van Luijk, Sarah Pringle, Joseph O. Deasy, Vitali V. Moiseenko, Hette Faber, Allan Hovan, Mirjam Baanstra, Hans P. van der Laan, Roel G. J. Kierkels, Arjen van der Schaaf, Max J. Witjes, Jacobus M. Schippers, Sytze Brandenburg, Johannes A. Langendijk, Jonn Wu, Robert P. Coppes

*Science Translational Medicine* 16 Sep 2015; Vol. 7, Issue 305, pp. 305ra147. DOI: 10.1126/scitranslmed.aac4441
Oxaliplatin added to fluorouracil-based preoperative chemoradiotherapy and postoperative chemotherapy of locally advanced rectal cancer (the German CAO/ARO/AIO-04 study): final results of the multicentre, open-label, randomised, phase III trial.


BACKGROUND

Preoperative chemoradiotherapy with infusional fluorouracil, total mesorectal excision surgery, and postoperative chemotherapy with fluorouracil was established by the German CAO/ARO/AIO-94 trial as a standard combined modality treatment for locally advanced rectal cancer. Here we compare this previously established regimen with an investigational regimen in which oxaliplatin was added to both preoperative chemoradiotherapy and postoperative chemotherapy.

METHODS

In this multicentre, open-label, randomised, phase III study, we randomly assigned patients with rectal adenocarcinoma, clinically staged as cT3-4 or any node-positive disease, to two groups. The control group received standard fluorouracil-based combined modality treatment, consisting of preoperative radiotherapy of 50.4 Gy in 28 fractions plus infusional fluorouracil (1,000 mg/m² on days 1-5 and 29-33), followed by surgery and four cycles of bolus fluorouracil (500 mg/m² on days 1-5 and 29). The investigational group received preoperative radiotherapy of 50.4 Gy in 28 fractions plus infusional fluorouracil (250 mg/m² on days 1-14 and 22-35) and oxaliplatin (50 mg/m² on days 1, 8, 22, and 29), followed by surgery and eight cycles of oxaliplatin (100 mg/m² on days 1 and 15), leucovorin (400 mg/m² on days 1 and 15), and infusional fluorouracil (2,400 mg/m² on days 1-2 and 15-16). Randomisation was carried out using computer-generated block-randomisation codes stratified by centre, clinical T category (cT1-3 vs cT4), and clinical N category (cN0 vs cN1-2) without masking. The primary endpoint was disease-free survival, defined as the time between randomisation and non-radical surgery of the primary tumour (R2 resection), locoregional recurrence after R0/1 resection, metastatic disease or progression, or death from any cause, whichever occurred first. Survival and cumulative incidence of recurrence analyses followed the intention-to-treat principle; toxicity analyses included all patients treated. Enrolment of patients in this trial is completed and follow-up is ongoing.

FINDINGS

Of the 1,265 patients initially enrolled, 1,236 could be assessed (613 in the investigational group and 623 in the control group). With a median follow-up of 50 months (IQR 38-61), disease-free survival at 3 years was 75.9% (95% CI 72.4-79.5) in the investigational group and 71.2% (95% CI 67.6-74.9) in the control group (hazard ratio [HR] 0.79, 95% CI 0.64-0.98; p=0.03). Preoperative grade 3-4 toxic effects occurred in 144 (24%) of 607 patients who actually received fluorouracil and oxaliplatin during chemoradiotherapy and in 128 (20%) of 625 patients who actually received fluorouracil chemoradiotherapy. Of 445 patients who actually received adjuvant fluorouracil and leucovorin...
and oxaliplatin, 158 (36%) had grade 3-4 toxic
effects, as did 170 (36%) of 470 patients who
actually received adjuvant fluorouracil. Late
grade 3-4 adverse events in patients who received
protocol-specified preoperative and postoperative
treatment occurred in 112 (25%) of 445 patients
in the investigational group, and in 100 (21%) of
470 patients in the control group.

**INTERPRETATION**
Adding oxaliplatin to fluorouracil-based
neoadjuvant chemoradiotherapy and adjuvant
chemotherapy (at the doses and intensities used
in this trial) significantly improved disease-free
survival of patients with clinically staged cT3-4
or cN1-2 rectal cancer compared with our former
fluorouracil-based combined modality regimen
(based on CAO/ARO/AIO-94). The regimen
established by CAO/ARO/AIO-04 can be deemed
a new treatment option for patients with locally
advanced rectal cancer.

Funded by German Cancer Aid (Deutsche
Krebshilfe). ClinicalTrials.gov, number
NCT00349076.
Patients with locally advanced rectal cancer who achieve a pathological complete response to neoadjuvant chemoradiation have an improved prognosis. The need for surgery in these patients has been questioned, but the proportion of patients achieving a pathological complete response is small. We aimed to assess whether adding cycles of mFOLFOX6 between chemoradiation and surgery increased the proportion of patients achieving a pathological complete response.

**METHODS**

Our phase II, non-randomised trial included four sequential study groups of patients with stage II-III locally advanced rectal cancer at 17 institutions in the USA and Canada. All patients received chemoradiation (fluorouracil 225 mg/m² per day by continuous infusion throughout radiotherapy, and 45.0 Gy in 25 fractions, five days per week for five weeks, followed by a minimum boost of 5.4 Gy). Patients in group 1 had total mesorectal excision 6 - 8 weeks after chemoradiation. Patients in groups 2 - 4 received two, four, or six cycles of mFOLFOX6, respectively, between chemoradiation and total mesorectal excision. Each cycle of mFOLFOX6 consisted of racemic leucovorin 200 mg/m² or 400 mg/m², according to the discretion of the treating investigator, oxaliplatin 85 mg/m² in a 2-h infusion, bolus fluorouracil 400 mg/m² on day 1, and a 46-h infusion of fluorouracil 2400 mg/m². The primary endpoint was the proportion of patients who achieved a pathological complete response, analysed by intention to treat.

**FINDINGS**

Between 24 March 2004 and 16 November 2012, 292 patients were registered, 259 of whom (60 in group 1, 67 in group 2, 67 in group 3, and 65 in group 4) met criteria for analysis. 11 (18%, 95% CI 10 - 30) of 60 patients in group 1, 17 (25%, 16 - 37) of 67 in group 2, 20 (30%, 19 - 42) of 67 in group 3, and 25 (38%, 27 - 51) of 65 in group 4 achieved a pathological complete response (p = 0.0036). Study group was independently associated with pathological complete response (group 4 compared with group 1 odds ratio 3.49, 95% CI 1.39 - 8.75; p = 0.011). In group 2, two (3%) of 67 patients had grade 3 adverse events associated with the neoadjuvant administration of mFOLFOX6 and one (1%) had a grade 4 adverse event; in group 3, 12 (18%) of 67 patients had grade 3 adverse events; in group 4, 18 (28%) of 65 patients had grade 3 adverse events and five (8%) had grade 4 adverse events. The most common grade 3 or higher adverse events associated with the neoadjuvant administration of mFOLFOX6 across groups 2-4 were neutropenia (five in group 3 and six in group 4) and lymphopenia (three in group 3 and four in group 4). Across all study groups, 25 grade ≥ 3 surgery-related complications occurred (ten in group 1, five in group 2, three in group 3, and seven in group 4); the most common were ▼

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pelvic abscesses (seven patients) and anastomotic leaks (seven patients).

**INTERPRETATION**
Deliver of mFOLFOX6 after chemoradiation and before total mesorectal excision has the potential to increase the proportion of patients eligible for less invasive treatment strategies; this strategy is being tested in phase III clinical trials.

Funded by National Institutes of Health National Cancer Institute. ClinicalTrials.gov, number NCT00335816.
BACKGROUND
Abdominoperineal resection is the standard treatment for patients with distal T2 or T3 rectal cancers; however, the procedure is extensive and mutilating, and alternative treatment strategies are being investigated. We carried out a prospective observational trial to assess whether high-dose radiotherapy with concomitant chemotherapy followed by observation (watchful waiting) was successful for non-surgical management of low rectal cancer.

METHODS
Patients with primary, resectable, T2 or T3, N0-N1 adenocarcinoma in the lower 6 cm of the rectum were given chemoradiotherapy (60 Gy in 30 fractions to tumour, 50 Gy in 30 fractions to elective lymph node volumes, 5 Gy endorectal brachytherapy boost, and oral tegafur-uracil 300 mg/m²) every weekday for six weeks. Endoscopies and biopsies of the tumour were performed at baseline, throughout the course of treatment (weeks two, four and six), and six weeks after the end of treatment. We allocated patients with complete clinical tumour regression, negative tumour site biopsies, and no nodal or distant metastases on CT and MRI six weeks after treatment, to the observation group (watchful waiting). We referred all other patients to standard surgery. Patients under observation were followed up closely with endoscopies and selected-site biopsies, with surgical resection given for local recurrence. The primary endpoint was local tumour recurrence one year after allocation to the observation group. Enrolment for this study is closed, but follow-up continues for secondary endpoints.

FINDINGS
Between 20 October 2009 and 23 December 2013, we enrolled 55 patients. Patients were recruited from three surgical units throughout Denmark and treated in one tertiary cancer centre (Vejle Hospital, Vejle, Denmark). Of 51 eligible patients, 40 had clinical complete response and were allocated to observation. Median follow-up for local recurrence in the observation group was 23.9 months (IQR 15.3 - 31.0). Local recurrence in the observation group at one year was 15.5% (95% CI 3.3 - 26.3). The most common acute grade 3 adverse event during treatment was diarrhoea, which affected four (8%) of 51 patients. Sphincter function in the observation group was excellent, with 18 (72%) of 25 patients at one year and 11 (69%) of 16 patients at two years reporting no faecal incontinence at all and a median Jorge-Wexner score of 0 (IQR 0-0) at all timepoints. The most common late toxicity was bleeding from the rectal mucosa; grade 3 bleeding was reported in two (7%) of 30 patients at one year and one (6%) of 17 patients at two years. There were no unexpected serious adverse reactions or treatment-related deaths. ▼
INTERPRETATION

High-dose chemoradiotherapy and watchful waiting might be a safe alternative to abdominoperineal resection for patients with distal rectal cancer.

Funded by CIRRO-The Lundbeck Foundation Center for Interventional Research in Radiation Oncology and The Danish Council for Strategic Research. ClinicalTrials.gov, number NCT00952926.
PURPOSE
Citrus products are widely consumed foods that are rich in psoralens and furocoumarins, a group of naturally occurring chemicals with potential photocarcinogenic properties. We prospectively evaluated the risk of cutaneous malignant melanoma associated with citrus consumption.

METHODS
A total of 63,810 women in the Nurses’ Health Study (1984 to 2010) and 41,622 men in the Health Professionals Follow-Up Study (1986 to 2010) were included. Dietary information was repeatedly assessed every two to four years during follow-up. Incident melanoma cases were identified through self-report and confirmed by pathologic records.

RESULTS
Over 24 - 26 years of follow-up, we documented 1,840 incident melanomas. After adjustment for other risk factors, the pooled multivariable hazard ratios for melanoma were 1.00 for overall citrus consumption < twice per week (reference); 1.10 (95% CI, 0.94 - 1.30) for two to four times per week; 1.26 (95% CI, 1.08 - 1.47) for five to six times per week; 1.27 (95% CI, 1.09 to 1.49) for once to 1.5 times per day, and 1.36 (95% CI, 1.14 - 1.63) for ≥ 1.6 times per day (ptrend < .001). Among individual citrus products, grapefruit showed the most apparent association with risk of melanoma, which was independent of other lifestyle and dietary factors. The pooled multivariable hazard ratio for melanoma comparing the extreme consumption categories of grapefruit (≥ three times per week vs. never) was 1.41 (95% CI, 1.10 - 1.82; p_trend < .001).

CONCLUSION
Citrus consumption was associated with an increased risk of malignant melanoma in two cohorts of women and men. Nevertheless, further investigation is needed to confirm our findings and explore related health implications.

Citrus consumption and risk of cutaneous malignant melanoma.

Shaowei Wu, Jiali Han, Diane Feskanich, Eunyoung Cho, Meir J. Stampfer, Walter C. Willett and Abrar A. Qureshi

J Clinical Oncology 2015 June 29; doi: 10.1200/JCO.2014.57.4111
INTRODUCTION

BREAST

HEAD AND NECK

RECTAL

MELANOMA

**BACKGROUND**

Adjuvant radiotherapy is recommended for patients with melanoma after lymphadenectomy. We previously showed this treatment reduced risk of repeat lymph-node field cancer in patients with a high risk of recurrence but had no effect on overall survival. Here, we aim to update the relapse and survival data from that trial and assess quality of life and toxic effects.

**METHODS**

In the ANZMTG 01.02/TROG 02.01 randomised controlled trial, we enrolled patients who had undergone lymphadenectomy for a palpable lymph-node field relapse and were at high risk of recurrence at 16 hospitals (11 in Australia, three in New Zealand, one in Netherlands, and one in Brazil). We randomly assigned patients (1:1) to adjuvant radiotherapy (48 Gy in 20 fractions, given over a maximum of 30 days) or observation, stratified by institution, areas of lymph-node field (parotid and cervical, axilla, or groin), number of involved nodes (≤3 vs >3), maximum involved node diameter (≤4 cm vs >4 cm), and extent of extracapsular extension (none, limited, or extensive). Participants, those giving treatment, and those assessing outcomes were not masked to treatment allocation, but participants were unaware of each other’s treatment allocation. In this follow-up, we assessed outcomes every three months from randomisation for the first two years, then every six months up to five years, then annually. The primary endpoint was lymph-node field relapse as a first relapse, assessed in patients without major eligibility infringements (determined by an independent data monitoring committee). We assessed late adverse effects (occurring >90 days after surgery or start of radiotherapy) with standard criteria in the as-treated population.

**FINDINGS**

Between March 21, 2003, and Nov 15, 2007, we randomly assigned 123 patients to adjuvant radiotherapy (109 eligible for efficacy assessments) and 127 to observation (108 eligible). The final follow-up date was Nov 15, 2011. Median follow-up was 73 months (IQR 61-91). 23 (21%) relapses occurred in the adjuvant radiotherapy group compared with 39 (36%) in the observation group (adjusted hazard ratio [HR] 0.52 [95% CI 0.31 - 0.88], p = 0.023). Overall survival (HR 1.27 [95% CI 0.89 - 1.79], p = 0.21) and relapse-free survival (0.89 [0.65 -1.22], p = 0.51) did not differ between groups. Minor, long-term toxic effects from radiotherapy (predominantly pain, and fibrosis of the skin or subcutaneous tissue) were common, and 20 (22%) of 90 patients receiving adjuvant radiotherapy developed grade 3 - 4 toxic effects. Eighteen (20%) of 90 patients had grade 3 toxic effects, mainly affecting skin (nine [10%] patients) and subcutaneous tissue (six [7%] patients). Over five years, a significant increase in lower limb volumes was noted after adjuvant radiotherapy.


(mean volume ratio 15.0%) compared with observation (7.7%; difference 7.3% [95% CI 1.5 - 13.1], p = 0.014). No significant differences in upper limb volume were noted between groups.

**INTERPRETATION**

Long-term follow-up supports our previous findings. Adjuvant radiotherapy could be useful for patients for whom lymph-node field control is a major issue, but entry to an adjuvant systemic therapy trial might be a preferable first option. Alternatively, observation, reserving surgery and radiotherapy for a further recurrence, might be an acceptable strategy.

Funded by National Health and Medical Research Council of Australia, Cancer Council Australia, Melanoma Institute Australia, and the Cancer Council South Australia. ClinicalTrials.gov, number NCT00287196.
BRACHYTHERAPY
Welcome to the Brachytherapy Corner,

It was good news that the recommendations for target definition for accelerated or boost partial breast brachytherapy were published in June in the Green Journal by the GEC-ESTRO breast working group. It is a great step forward for the harmonisation of target definition in breast brachytherapy. In this newsletter, you can find an introduction to the recommendations by Vratislav Strnad. Furthermore, you can find two papers from Editors’ Picks on breast and prostate brachytherapy.

Remember to sign up for the third GEC-ESTRO Workshop, ‘Tips and tricks for expanding the role of brachytherapy’. The programme is made up of a series of parallel sessions organised by each GEC-ESTRO working group, with the aim of presenting practical daily clinical tips and tricks for improving your brachytherapy practice. The workshop takes place on 19 November. The number of participants is limited and the sooner you sign up the better!

Peter Hoskin, Bradley Pieters and Kari Tanderup

GEC-ESTRO WORKSHOP

To register for the GEC-ESTRO Workshop on 19 November 2015, visit the ESTRO website: www.estro.org/congresses-meetings/articles/3rd-gec-estro-ws-registration >
In a recent issue of the *Green Journal*, the Breast Cancer Working Group of GEC-ESTRO released an important manuscript titled “Recommendations from GEC-ESTRO Breast Cancer Working Group (I): Target definition and target delineation for accelerated or boost Partial Breast Irradiation using multicatheter interstitial brachytherapy after breast conserving closed cavity surgery.” [1]

There is currently no doubt that for breast cancer patients, after breast conserving surgery due to the increased use of APBI and also utilisation of new modern whole breast radiation techniques (WBRT), it is crucial to propose consensual and consistent CTV delineation rules for APBI and Boost. Reviewing the issue of target delineation for Boost or APBI after breast conserving surgery, it has to be noted that after open cavity surgery a number of publications exist with local rules and guidelines. But until now no recommendations were defined for the target definition after closed cavity surgery or oncoplastic surgery.

The recommendation of the GEC-ESTRO Breast Cancer Working Group is focused on reproducible target definition and target delineation for APBI or boost after closed cavity or oncoplastic breast conserving surgery, preferably for use of interstitial multicatheter brachytherapy, but applicable also for use of external beam techniques, irrespective of whether the target definition is intended for sole APBI or for a boost after external beam WBRT.

According to the GEC-ESTRO Breast Cancer Working Group the following crucial information and procedures are principally needed prior to appropriate delineation of CTV (PTV) for boost or sole APBI:

1. **DETAILED KNOWLEDGE** of the primary surgical procedure, of all details of the pathology report including size of the resection margins in at least six directions, as well as of preoperative imaging (mammograms and/or MRI and/or ultrasound)
2. Identification of the **TUMOUR LOCALISATION** before breast conserving surgery inside the breast and translation of this information into current CT imaging data set
3. Calculation of the size of the **TOTAL SAFETY MARGINS** needed to cover the CTV in all six directions that should be at least 2 cm from the tumour.

For the final target delineation after closed cavity surgery the Breast Cancer Working Group of GEC-ESTRO recommend the following steps in order as follow:

1. Perform a CT with marks on the scar
2. Delineation of clips.
4. Delineation of ImTV (Imaging correlated Target Volume).
5. Delineation of ETB (Estimated Tumour Bed).
6. Delineation of CTV (Clinical Target Volume).
7. Delineation of PTV (Planning Target Volume). For detailed information and descriptions see please the corresponding paper [1].

In the case of oncoplastic surgery no generally applicable recommendations have been made, but for selected cases of limited rotational flaps the authors recommend that CTV should be defined as the sum of the clipped area (CA) and the distance of 20 mm minus the smallest surgical free margin (SFM) defined by the pathologist (CTV = CA + (20 - SFM)). In that case the PTV is defined as the CTV + 10 mm.

It is to be hoped that this recent published guideline based on the consensus of a group of experts will make it possible for every radiation oncologist to define for the majority of breast cancer patients a reproducible and consistent CTV/PTV for Accelerated Partial Breast Irradiation (APBI) as well as for boost irradiation after breast conserving closed cavity surgery and oncoplastic surgery.

Vratislav Strnad
Chair, GEC-ESTRO Breast Cancer Working Group

REFERENCES

Multi-axis dose accumulation of noninvasive image-guided breast brachytherapy through biomechanical modeling of tissue deformation using the finite element method

Mark Rivard
J Contemp Brachytherapy. 2015; 7, 1:55-71 doi: 10.5114/jcb.2015.49355

Influence of zonal dosimetry on prostate brachytherapy outcomes

Jay P. Ciezki
J Contemp Brachytherapy. 2015;7:17-22
What was your motivation for initiating this study?
Noninvasive image-guided breast brachytherapy (NIBB) delivers conformal HDR 192Ir brachytherapy treatments with the breast compressed and then treated sequentially in the cranial-caudal and medial-lateral directions. This technique subjects breast tissue to extreme deformations not observed in other disease sites. Given that commercially-available software for deformable image registration cannot accurately co-register image sets obtained in these two states, a finite element analysis (FEA) model based on biomechanical properties was developed. The model deforms dose distributions for each compression direction for dose summation. The ability to treat an immobilised breast provides dosimetric advantages such as skin dose sparing, dose to adjacent non-target structures, and the like, but compression along orthogonal axes makes visualisation and characterisation of the dose from a 4-field treatment difficult to assess. Using information from recent work in breast elastography on the mechanical properties of the breast, the FEA model was developed to provide better insight into composite dose distributions. As this publication shows, assessing target coverage and DVHs for the composite simulated breast provides additional information to aid clinicians making treatment decisions.

What were the main challenges during the work?
Striking a balance between the computational complexity of the breast model and obtaining verifiably accurate results from it was one of the main challenges. Extreme deformations of the breast tissue occur during clinical NIBB procedures. This means that a rather complex FEA model capable of dealing with various biomechanical properties and existing in homogeneity within the breast is required. It must account for larger deformations than are typically dealt with in finite elasticity theory. Emphasis was given to minimising computational runtime and simplifying the scenario setup. Key physical responses of breast tissue during actual treatments were observed and published results for biomechanical tissue properties were taken into account. A model was then developed that implements the fundamental behaviour of tissue deformity while simplifying the details that would have otherwise required more demanding computational tools and more complex assumptions.
What are the most important findings of your study?
This study elucidated the change in target size based on compression thickness and target location, where the dimensions increased by several millimeters as compression thickness decreased. This trend increased with increasing offset distances of the target from the breast centre. Based on volumetric evaluations, a key finding was that applicator size minimally affected target coverage. It became important only when applicator size was less than the compressed target size. In most cases, more than 95% of the target was covered by more than 95% of the prescription dose. In all cases, more than 90% of the target was covered by more than 90% of the prescription dose when using an applicator size greater than or equal to the compressed target size. This is expected in NIBB dosimetry, and these results are reassuring. In all cases, dose coverage became less uniform as offset distance of the target from the breast centre increased and the average dose increased. This effect was more pronounced for smaller target applicator combinations.

What are the implications of this research?
The NIBB technique is a novel treatment that targets the lumpectomy cavity following breast conserving surgery for early stage breast cancer. This technique holds potential advantages over other techniques in that it is highly conformal yet non-invasive. Conformality is achieved by employing breast immobilisation, displacement of non-target tissue, and image-guidance. However, breast compression and tissue displacement creates a monumental challenge: obtaining patient specific composite 3D dosimetry between the two axes of treatment. This study lays the ground work for addressing this limitation. By analysing a model of the compression characteristics of breast tissue, we were able to generate composite 3D dose distributions. This analysis shows that the NIBB technique results in expected and adequate target coverage in all clinical scenarios, confirming earlier dosimetric analysis. More importantly, this study serves as a stepping stone to create patient specific 3D dosimetry for in-clinic decision making.
Influence of zonal dosimetry on prostate brachytherapy outcomes

Hong CW, Reddy CA, Wilkinson DA, Klein EA, Ciezki JP

*J Contemp Brachytherapy. 2015;7:17-22*

Corresponding author:
Jay P. Ciezki
Desk T-28
9500 Euclid Avenue
Cleveland, Ohio, USA
email: ciezki@ccf.org

**What was your motivation for initiating this study?**
A few years ago I was discussing the relatively high toxicity rate in RTOG 00-19 with one of its investigators [1]. It was his opinion that the toxicity rate was high (i.e. 15% grade 3 toxicity for genitourinary and gastrointestinal systems) because of the use of the Quimby System in which uniform loading of a 3D implant results in non-uniform dose delivery. I was surprised that such a system would be used in an organ with a relatively radio-intolerant structure like the urethra in the known hot spot of the implant. While I do not use the Quimby System, others must, and I thought it would be interesting to measure the degree of difference in dose to the transitional and peripheral zones of the prostate when a peripheral loading technique is used.

**What were the main challenges during the work?**
There were two. The first was to define the transition and peripheral zones on a post-implant CT scan. This is difficult even without the artifact caused by metallic sources in the prostate. I was very fortunate to work with Cheng William Hong. He is a medical student who has a great deal of experience in identifying the zonal anatomy of the prostate using MRI images. Together, we developed an algorithm for reproducibly defining what is likely to be the transition zone and the peripheral zone of the prostate. The second challenge was that we have no patients treated with the Quimby system at our institution and so we could not make an intra-institutional comparison of efficacy or toxicity. We were only able to report on our efficacy and toxicity and compare them to antecedent publications. Since our paper was published, another more comprehensive analysis of our efficacy and toxicity has been published that makes further comparisons [2].

**What is the most important finding of your study?**
A peripheral loading technique for low-dose rate prostate brachytherapy results in good efficacy, despite a lower central prostate dose. Toxicity is acceptable.

**What are the implications of this research?**
Clinicians need not deliver excessive doses of radiation with brachytherapy to achieve good outcomes. Performing a non-uniform, peripherally-biased implantation may be more...
difficult than a uniform loading but it is helpful in reducing toxicity. In the USA, our training programmes do not adequately stress the development of procedural skills. A resident only has to perform five interstitial brachytherapy cases to sit for a board exam. This seems inappropriate.

REFERENCES


THIRD GEC-ESTRO WORKSHOP
“Tips and tricks for expanding the role of brachytherapy”

Provisional programme
19 November 2015
Brussels, Belgium

Register online:
www.estro.org/congresses-meetings/articles/3rd-gec-estro-ws-registration>

GEC-ESTRO would like to thank our sponsors, Eckert & Ziegler BEBIG, Elekta and Varian Medical Systems for their support in the organisation of this workshop and in the activities of this Committee.

08.00-08.45 | Registration and welcome coffee

08.45-09.00 | WELCOME AND RULES OF ENGAGEMENT
Jacob C. Lindegaard (DK), Chair GEC-ESTRO Committee

09.00-15.50 | GEC-ESTRO WORKING GROUPS:
UroGEC, Braphyqs, Head and Neck, Breast, Gynae and Ano-rectal will run a practical session that will be repeated four times. This will give a chance for delegates to take part in four different topical practical sessions.

09.00-10.00 | PARALLEL PRACTICAL SESSIONS 1:
UroGEC, Braphyqs, Head and Neck, Breast, Gynae, Ano-rectal

10.00-10.30 | Coffee break

10.30-11.30 | PARALLEL PRACTICAL SESSIONS 2:
UroGEC, Braphyqs, Head and Neck, Breast, Gynae, Ano-rectal

11.30-12.30 | PARALLEL PRACTICAL SESSIONS 3:
UroGEC, Braphyqs, Head and Neck, Breast, Gynae, Ano-rectal

12.30-14.00 | Lunch

13.15-14.00 | ELEKTA SATELLITE SYMPOSIUM

14.00-15.00 | PARALLEL PRACTICAL SESSIONS 4:
UroGEC, Braphyqs, Head and Neck, Breast, Gynae, Ano-rectal

15.00-15.30 | Coffee break

15.30-17.15 | SYMPOSIUM: EXPANDING THE ROLE OF BRACHYTHERAPY IN RADIATION ONCOLOGY
Moderators: Bradley Pieters (NL) and José Luis Guinot (ES)

• 15.30 Is BT in danger of being obsolete? Christian Kirisits (AT)
• 15.50 How to revitalize BT in the radiation oncology community? Kari Tanderup (DK)
• 16.10 Is there a business case for BT? Eric van ’t Hooft (BE)
• 16.30 How to investigate the health economics of BT? Cai Grau (DK)
• 16.50 Where is BT on the oncopolicy agenda? Philip Poortmans (BE)

17.15-17.30 | WRAPPING UP AND END OF MEETING
Christian Kirisits (AT), Chair-elect GEC-ESTRO Committee
PHYSICS
Dear colleagues,

In September the first research masterclass in radiotherapy physics took place. Based on the feedback received from the participants and teachers, it can be concluded that the course was a great success. More information can be found in this Corner and that of the ESTRO school.

In line with the research masterclass, this Corner edition also features two editor’s picks highlighting recent research papers in the field of radiotherapy physics. Eduard Gershkevitsh has written a comprehensive report on the IAEA regional meeting on medical physics in Europe. The aim of the meeting was to discuss and raise awareness of the medical physicist’s role in radiation medicine.

Finally, you will find an announcement of the celebration of the International Day of Medical Physics (IDMP). The celebration will take place on 7 November, the day on which Marie Curie was born in 1867.

Mischa Hoogeman (m.hoogeman@erasmusmc.nl) and Ludvig Muren (ludvmure@rm.dk)
**RESEARCH MASTERCLASS IN RADIOTHERAPY PHYSICS**

3 - 7 September 2015
Prague, Czech Republic

COURSE DIRECTOR:
Ben Heijmen
Physicist
Erasmus Medical Centre
Rotterdam (NL)

**A unique opportunity for new researchers in radiotherapy physics and related fields**

In September 2015, the first Research Masterclass in Radiotherapy Physics took place in Prague. Participation was upon application, i.e. by submitting a research proposal, and a limited number of places was available. The Masterclass brought together 23 participants from all over Europe and was highly interactive. Participants’ proposals were reviewed, discussed, and improved in small groups under the guidance of the teachers. The programme also left ample time for one-to-one discussions between participants and teachers. A common theme in most proposals was to clearly define the hypothesis of the study, to improve its novelty, and to obtain high-value scientific messages for the radiotherapy community. Discussions were lively, in an open and friendly atmosphere, and were focused on helping each other to improve. Each teacher presented current trends and future research opportunities within his or her field of expertise. In addition, participants could benefit from tips and tricks for writing a successful grant proposal and a scientific paper. The participants went home with much-improved proposals, ready to start their research.

Read the full report from a participant in the ESTRO School Corner in this newsletter on p 92 >
Representatives of more than 30 European countries met at the International Atomic Energy Agency (IAEA) headquarters in Vienna to discuss the current status and future perspectives of medical physics in Europe. They came from the World Health Organization, ESTRO, the European Federation of Organisations in Medical Physics (EFOMP), the International Organisation for Medical Physics (IOMP), national Ministries of Health and other governmental agencies. They met to discuss and raise awareness of the medical physicist’s role in radiation medicine.

Prior to the meeting, a survey was conducted jointly by the IAEA and members of the EFOMP. It revealed a number of issues related to education, clinical training, accreditation, certification and recognition of medical physicists in Europe. Specifically, a shortage of Clinically Qualified Medical Physicists (CQMP) as well as a lack of recognition of medical physicists as health professionals were identified in many European countries.

These issues were discussed extensively at the meeting and a number of recommendations were adopted. We expect that these recommendations will help to strengthen medical physics in Europe. They include action at various levels to ensure that international and European standards are implemented. They also suggest steps that could lead to the harmonisation of education in medical physics, training, accreditation, certification and registration, and eventually, to full recognition of the medical physicist as a health professional in Europe. We expect that this will improve safety and quality in medical radiation.

The adopted recommendations follow.

Eduard Gershkevitsh
North Estonia Medical Centre,
Tallinn, Estonia
On behalf of the IAEA core committee responsible for drafting the recommendations
The “Regional Meeting on Medical Physics in Europe: Current Status and Future Perspectives” held at IAEA headquarters, Vienna, from 7 - 8 May 2015, noted:

1. The important contribution of ionising radiation in diagnostic and therapeutic applications in healthcare;

2. The key role of clinically qualified medical physicists (CQMPs) [1] in the safe and effective use of ionising radiation in medicine (diagnostic and interventional radiology, radiation oncology and nuclear medicine);

3. The continuous innovation of medical radiation technologies and techniques for imaging and therapy that require comprehensive quality assurance (QA) programmes conducted by CQMPs in order to ensure the quality of diagnostic imaging and radiation treatment of patients;

4. The importance of the role of CQMPs in optimising radiation protection and safety (of patients, staff and the general public) in medical uses of radiation;

5. The shortage of CQMPs in the majority of Member States of Europe;

6. Insufficient harmonisation of medical physics education and training in Member States of Europe;

7. A lack of accredited clinical training programmes and corresponding continuing professional development (CPD) schemes in the majority of Member States in Europe;

8. Efforts by the IAEA, the European Commission, and professional organisations to harmonise the core curriculum for medical physics education and clinical training.

The Meeting also observed that in Europe:

1. National mechanisms for the implementation of international basic safety standards are needed, along with guidelines on what comprises the medical physics profession [2]. Where appropriate, European directives should be implemented in national legislation;

2. Sufficient levels of CQMP staffing, in line with international recommendations, are important to ensure high quality radiation health care services, and to reduce the risk of radiological incidents and accidents;

3. A high level educational and clinical training framework is needed for the certification of CQMPs in the different fields of specialisation (diagnostic and interventional radiology, radiation oncology and nuclear medicine);

4. Competent national bodies should be designated for registration of CQMPs;

5. Adequate mechanisms should be established to deal with the transition period for recognition and certification of senior professionals who are already employed in the field of medical physics;

6. The recognition of medical physics as a health profession is crucial and should be reflected at the national level (with a list of recognised professions, legal and fiscal environment, etc.) as well as at the local level within clinical teams and through close involvement with hospital governance boards.

RECOMMENDATIONS ADOPTED BY THE REGIONAL MEETING ON MEDICAL PHYSICS IN EUROPE
The “Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards (General Safety Requirements Part 3, IAEA 2014)” cover the role of medical physicists in ensuring safety in diagnostic and therapeutic procedures involving application of ionising radiation. The Meeting recommended that European Member States should fully recognise Clinically Qualified Medical Physicists (CQMP) as health professionals with specialist education and training in the concepts and techniques of applying physics in medicine and competence to practice independently in one or more of the subfields (specialties) of medical physics.

The Meeting also recommended that European Member States should, in particular:

1. Recognise medical physics as an independent healthcare profession with radiation protection responsibilities, as outlined in the joint position statement by the IAEA and WHO, “Bonn call for action”;

2. Ensure that the medical physics aspects of therapeutic and diagnostic procedures, including patient and equipment related tasks and activities, are performed by CQMPs or under their supervision;

3. Establish an appropriate qualification framework for CQMPs including education, specialised clinical training, certification, registration and continuing professional development in the specialisation of medical physics, i.e. diagnostic and interventional radiology, radiation therapy and nuclear medicine;

4. Follow and fulfil international recommendations on staffing levels in the field of medical physics;

5. Establish mechanisms for the integration of medical physics services in all centres practising radiation medicine and establish where appropriate independent Medical Physics Departments in which accredited clinical training can take place;

6. Promote involvement of CQMPs in hospital governance boards and relevant national health committees;

7. Establish and enforce legislative and regulatory requirements relating to radiation safety in medical imaging and therapy involving medical physics, in accordance with international and, where applicable, European basic safety standards.

More information can be found here: https://rpop.iaea.org/RPOP/RPoP/Content/News/regional-meeting-on-medical-physics-europe.htm

REFERENCES


Potential for enhancing external beam radiotherapy for lung cancer using high-Z nanoparticles administered via inhalation

Yao Hao and Wilfred Ngwa

Technology for innovation in radiation oncology

Indrin J. Chetty and Mary K. Martel
*Int J Radiat Oncol Biol Phys* (2015) Published online: July 10, 2015, doi: http://dx.doi.org/10.1016/j.ijrobp.2015.07.007
Potential for enhancing external beam radiotherapy for lung cancer using high-Z nanoparticles administered via inhalation

Yao Hao, Yucel Altundal, Michele Moreau, Erno Sajo, Rajiv Kumar, Wilfred Ngwa.


CORRESPONDING AUTHORS:
Yao Hao
University of Massachusetts, Lowell, Massachusetts, USA

Wilfred Ngwa
Department of Radiation Oncology, Brigham and Women’s Hospital, Dana-Farber Cancer Institute & Harvard Medical School, Boston, Massachusetts, USA

What was your motivation for initiating this study?
Nanoparticle-aided radiotherapy is emerging as a promising modality for highly localised radiation boosting to tumours. It is based on the photoelectric interaction of radiotherapy photons with high atomic number (Z) nanoparticles such as gold nanoparticles (GNPs). Such an approach could enable radiation boosting or dose-painting with minimal increase in toxicities to normal tissue. However, for external beam radiotherapy (EBRT) e.g. at 6 MV, the probability of photoelectric interactions with the much higher energy photons is smaller, so a higher concentration of nanoparticles is needed to enable clinically significant radiation boosting. Some studies have therefore indicated that nanoparticle-aided EBRT may not be clinically feasible due to the limitations in delivering a sufficiently potent concentration of the nanoparticles to tumours. In the meantime, experimental studies have shown that a significantly higher (3.5 to 14.6 times) number of nanoparticles can reach lung tumours when administrated via the inhalation route (IR) compared to more typical intravenous (IV) administration. These experimental studies prompted this study. We hypothesised that IR administration will circumvent limitations in delivery and lead to a major dose enhancement to lung tumours during EBRT.

What were the main challenges during the work?
Determining the dose enhancement to each tumour voxel due to the presence of the nanoparticles is complicated by the fact that the distribution of administered nanoparticles may not be uniform. It is therefore expected that certain tumour sub-volumes will be likely to have higher dose enhancement than others. More experimental studies are needed to further investigate the distribution of nanoparticles and find ways to optimise it for greater therapeutic efficacy.

What is the most important finding of your study?
The most important finding is that major (clinically significant) dose enhancement can be achieved in tumours during EBRT using high-Z nanoparticles administered via IR compared to more typical IV administration. The high-Z nanoparticles investigated include cisplatin nanoparticles (CNPs), carboplatin nanoparticles (CBNPs) and GNPs.
What are the implications of this research?
These findings provide major impetus for the development of nanoparticle-aided radiotherapy with IR delivery. This could enable the effective use of high-Z nanoparticles such as GNPs, CNPs or CBNPs and substantially boost the therapeutic efficacy of EBRT for lung cancer patients. The new approach would be particularly beneficial for centrally localised tumours for which stereotactic body radiotherapy use is limited, and for concomitant chemoradiotherapy, as it would allow highly localised radiation boosting via photoelectric mechanism, with minimal toxicity to healthy tissue.
Technology for innovation in radiation oncology


Int J Radiat Oncol Biol Phys (2015) Published online: July 10, 2015, doi: http://dx.doi.org/10.1016/j.ijrobp.2015.07.007

CORRESPONDING AUTHORS:
Indrin J. Chetty
Department of Radiation Oncology,
Henry Ford Hospital,
Detroit, USA

Mary K. Martel
Department of Radiation Physics,
University of Texas MD Anderson Cancer Center,
Houston, Texas, USA

What was your motivation for initiating this study?
Technology has played a pivotal role in curing cancer using radiation oncology. In light of this, ASTRO, AAPM and the National Cancer Institute (NCI) convened a workshop entitled ‘Technology for innovation in radiation oncology.’ The workshop focused on the challenges posed by new technologies, addressed the state of science for several disease sites, discussed clinical trials for advanced technology, and reviewed the future promise and potential pitfalls of emerging, innovative technologies.

What were the main challenges during the work?
In reviewing expert views on the various innovative technologies, a few consistent trends emerged, which are likely to be challenging. These include consistency and uniformity of data collection, whether the data is related to quantification of image data or collection of outcomes for “big data” management. Institutional treatment practices vary, sometimes significantly. Therefore the data generated for “collective” analyses must be validated to ensure some level of consistency. Models built from this data might otherwise be too noisy to be of value to individual patient situations. The development of infrastructure to establish uniformity among different institutions might mitigate this problem.

Another challenge is the assessment of efficacy and effectiveness of new technologies. Sensible approaches need to be developed to understand the benefit of new technologies to the patient. The tradeoff between cost and value will need to be carefully considered along with the endpoint used to assess the new technology.

What is the most important finding of your study?
We must continue to innovate and build new technologies for the benefit of our cancer patients. We must broaden our efforts in technological development and innovation, and embrace the powerful field of informatics so that these innovations can be placed in the broader context of personalised cancer medicine and evidence building.

What are the implications of this research?
This workshop highlighted the critical role of innovative technologies in radiation oncology.
Areas such as automation, infrastructure for “big-data” collection, informatics and evidence building, among others, are likely to gain significant traction in the coming years, as our field and the world in general embraces newer technologies.
Message from the Chairman of the IOMP Education and Training Committee, Prof. John Damilakis

Dear colleagues,

Could radiation therapy exist without medical physics? The obvious answer is No. The impressive progress in radiation oncology over the past decades has been largely due to our ability to more effectively deliver radiation to the tumour while minimising the dose to surrounding normal tissue.

Nevertheless, the general public is not aware of the critical role medical physicists play in providing services in RO departments. It is important to inform the public on the responsibilities of medical physicists and draw attention of the media to the important role that medical physics play in the health care system.

To raise awareness of our profession, the International Organisation for Medical Physics celebrates annually the International Day of Medical Physics (IDMP) on 7 November, an important date in the history of medical physics. On that day in 1867, Marie Curie, known for her pioneering research on radioactivity, was born in Poland.

We will celebrate the 3rd IDMP on 7 November 2015. The theme will be ‘Better MP = Better Cancer Care in RO’. IOMP is drawing attention to the many ways in which medical physics has revolutionised medicine through contributions in RO.

I look forward to your active participation in the IDMP events in November!

Prof. John Damilakis
INTRODUCTION PAPER REVIEWS
REPORT ON THE 3RD ESTRO FORUM
THE GLOBAL VILLAGE OF RADIATION THERAPISTS
RTT
Welcome to the November-December edition of the RTT Corner. We have three very interesting articles for you in this issue.

First, a piece of great importance by Martijn Kamphuis draws our attention to promising research from a group in Heidelberg, which has been published and was presented at the 3rd ESTRO forum, April 2015. They have developed a new way of producing individual immobilisation devices for the head based on tomographic image data and using 3D printing technologies. This is an emerging topic in the field of patient immobilisation.

Every year, the RTT Committee welcomes colleagues who are interested in the Committee’s activities and want to contribute to the ESTRO community. The second article is a self-introduction by Bartosz Bąk, our Polish colleague who joined the RTT Committee this year as an observer.

A not-to-be missed section is the “Paper review” by Aileen Duffton. She highlights two important current papers. Both investigate the use of Cone Beam CT (CBCT) for verification and for target identification and the increased role of RTTs in these procedures.

Finally, I would like to conclude by thanking our contributors for sharing ideas and spending time writing for the RTT Corner. If you would like to contribute to the RTT Corner, please send an email to pscherer@salk.at or danilopasini@yahoo.it.

Philipp Scherer and Danilo Pasini
At the 3rd ESTRO Forum meeting in April 2015, interesting data on the use of 3D printing to create immobilisation devices were considered to be one of the highlights of the RTT meeting (see below). For other highlights, please refer to the congress report (available on www.estro.org).

**BACKGROUND**
In radiation therapy, accurate patient immobilisation is crucial to guarantee that the tumour is precisely targeted, and healthy tissue is not unduly affected. For multiple fractions, patient position must be reproducible. Usually immobilisation devices are made manually using a cast (ScotchCast) or thermoplastic material, which is costly and time-consuming. Furthermore, the casting causes significant discomfort to the patient, especially if the head is to be immobilised. We developed a new approach for producing individual immobilisation devices for the head based on tomographic image data and using 3D printing technologies.

**OVERVIEW OF ABSTRACT**
The purpose of this study was to determine the positioning accuracy of our 3D-printed head masks, using eight healthy volunteers. The masks were based on 3D MRI data using in-house developed software. The software generated a complete surface mesh model of the fixation mask including apertures for eyes, nose, mouth and ears, as well as an interface for fixation to the intervention table. A commercial 3D printer was used to produce the model. Repeated MRI datasets were acquired for all volunteers wearing their masks. As a measure of positioning accuracy, displacements of the head relative to the first dataset were calculated using image-to-image registration.

**INTERVIEW WITH THE AUTHORS**
What were the three main findings of your research?
The process of producing masks from image data proved to be simple and practical. Mask model computation was performed automatically with very little manual intervention. All masks fitted the volunteers’ faces well and were subjectively assessed as being comfortable. Displacement calculations resulted in a mean overall displacement vector length of 1.20mm (0.53mm SD).

What impact could your research have?
We propose a completely new approach to the production of individual immobilisation devices: integrating radiological imaging and 3D printing techniques with dedicated algorithmic data processing. The main advantage is that mask production is completely free of contact and uses radiological image data which has already

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**REPORT ON THE 3RD ESTRO FORUM**

3D printing of individual immobilisation devices based on imaging: analysis of positioning accuracy

**Unterhinninghofen R** 1, **Giesel F** 2, **Wade M** 3, **Kuypers J** 3, **Preuss A** 1, **Debus J** 3, **Sterzing F** 3

1 Karlsruhe Institute of Technology - Informatics Karlsruhe, Germany
2 University Hospital Heidelberg - Nuclear Medicine Heidelberg, Germany
3 University Hospital Heidelberg - Radiation Oncology Heidelberg, Germany
been acquired for planning. Hence, it saves time, improves patient comfort, and reduces psychological stress considerably. Our analysis of positioning accuracy revealed very good values that are equal to or even better than those published for conventional fixation devices. In the near future, our approach may replace the last manual segment in modern radiotherapy workflow with an almost fully automated production line.

*Is this research indicative of a wider trend in oncology?*

3D printing is about to revolutionise many subject areas. In radiation therapy, it will allow for even more personalised therapy than is possible with present-day standardised thermoplastic fixation systems. Using image data (MRI, CT or optical surface scanning are suitable), fixation devices for any part of the body may be produced automatically and individually, thereby saving time and cost. In addition, our approach has the potential to satisfy the pervasive demand for reduced costs in the clinical environment. In future, producing personalised fixation devices from image data may be outsourced by the clinic, thus reflecting a trend seen in other medical disciplines.
Early in 2015, I had the honour of acting as an observer to the Radiation Therapists (RTT) Committee and thus began my adventure as a member of the Scientific Advisory Group for RTTs. As an RTT myself, I am proud to be able to participate in creating the “global village” of RTTs on behalf of my colleagues. I am amazed at the organisational abilities of the Committee as it successfully handles the enormous task of arranging a meeting of people from all over Europe. These people discuss vital aspects of education, scientific programmes and organisational issues such as the ESTRO conference. A number of people are committed to the development of our professional group and their activity represents a considerable challenge both in terms of economy and politics. At this point I would like to invite your collaboration.

First, members of the RTT Committee take an active part in many programmes and courses in which RTTs can participate. The support of members and their deep commitment are priceless. Annual ESTRO conferences require an extensive study of new developments and an analysis of trends in Radiation Therapy (RT). Every year we witness the increasing use of RT both in research and in clinical practice. Selecting the most interesting and the most vital projects is a real challenge.

Due to the insufficient number of physicians and the considerable development in technology, members of other professional groups have had to take over many of their responsibilities. These professionals are very well prepared both in terms of theory as well as scientifically. However, proper standards must be established in order to keep patients safe. Therefore, both the education and the professional qualification programme in Europe needs to be unified. The RTT Core Curriculum is a superb tool which could help achieve this, and we should analyse the possibility of implementing this Curriculum to make the best use of the ESTRO guidelines in everyday clinical practice.

Being a member of ESTRO, I have observed that many young RTTs feel an increased need to express their views on RT as a professional group and they are also willing to introduce changes. This is a very positive phenomenon and I have had discussions with many people who are in favour of increased professional responsibility and unified academic education systems across Europe.

At this point I would like to ask you – ESTRO members, RTTs from all over Europe – to be bold in expressing your views and to actively participate in all relevant discussions. Every voice may inspire the enrichment of the Core Curriculum or the introduction of new standards in your country. I encourage you to correspond but, let us not forget the value of direct discussion at the many conferences and workshops organised by ESTRO.
Please bear in mind that changes can be introduced through our commitment. Therefore, I also ask you to answer the questionnaire sent out by ESTRO which aims to shape the best model possible for the development of RT. The information you provide makes it possible to develop projects like ROSIS or “Train the trainers” and to produce Guidelines for RTTs.

Due to the pace of development in medical diagnostics and therapy, it is imperative that we take over some of the responsibilities of physicians. If patients are to receive the best specialist help, well-trained personnel are needed. Therefore, dear colleagues, I encourage you to strive relentlessly to this ambitious end, to upgrade your qualifications and professional competence so that we can serve those in need of treatment. Make every endeavour to use your knowledge and experience to the highest level and make RT an essential element of multidisciplinary treatment.

Bartosz Bąk
RTT
Greater Poland Cancer Center
University of Medical Sciences
Poznań, Poland
Anatomical landmarks accurately determine interfractional lymph node shifts during radiotherapy of lung cancer patients

Hoffmann, Lone; Holt, Marianne Ingerslev; Knap, Marianne Marquard; Khalil, Azza Ahmed; Møller, Ditte Sloth. - *Radiotherapy and Oncology* 2015 116 (1): 64-69

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Modeling Pancreatic Tumor Motion Using 4-Dimensional Computed Tomography and Surrogate Markers

Huguet, Florence; Yorke, Ellen D.; Davidson, Margaret; Zhang, Zhigang; Jackson, Andrew; Mageras, Gig S; Wu, Abraham J; Goodman, Karyn A. - *International Journal of Radiation Oncology • Biology • Physics* 2015, 91 (3), 579-587

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I chose the first paper because of the increasing use of Cone Beam CT (CBCT) for verification, and because it details how additional information can be gained from these valuable datasets for adaptive radiotherapy. The authors recognise that although previous work indicates that the carina is a reliable structure for verifying lymph node position, there has been no previously published data to confirm this is the case for individual nodes.

The second paper highlights the many issues RTTs have in identifying pancreatic target volumes using CBCT. Pancreas treatment protocols have developed to include highly conformal techniques such as intensity modulated RT (IMRT) and volumetric modulated arc therapy (VMAT) and on-treatment verification solutions need to be found. A summary of this comprehensive study is discussed below.

Aileen Duffton

Institute of Cancer Sciences
University of Glasgow
Glasgow, UK
PURPOSE AND METHODS
The aim of the study was to determine a strategy which could be used to verify lymph node position using CBCT imaging. The patient group included 40 lung cancer patients, treated with radical chemo-RT. The group included 26 non-small cell lung cancer (NSCLC) patients treated to 60-66Gy in 30-33 fractions, and 14 small cell lung cancer (SCLC) patients treated to 45Gy in 30 fractions, 10 fractions per week.

Where visible on CBCT, surrogate structures were identified within 2cm of each lymph node station. In total, 1,233 CBCT scans were analysed using a number of matches evaluating lymph nodes in relation to its surrogate with 3D displacements being calculated. The authors describe clearly and in detail the delineation and matching methodology used in this study. Each CBCT registered to CT was analysed, and there was further evaluation of CT registered to CT at around fraction 10 and 20. A comparison of CBCT-CT and CT-CT data was used to validate CBCT results.

FINDINGS
The comparison of CT-CT and CT-CBCT match showed acceptable deviations 0.5mm + 0.3mm, thus confirming the validity of using CBCT for analysis.

The group identified smaller deviations in lymph node displacements when using surrogate structures (1.0 - 2.7mm), than when using the carina (1.4mm - 3.0mm), except in nodal disease where the carina was the obvious surrogate. Statistically significant differences were identified between surrogate and carina match in LN station 1 where thoracic vertebrae was the best surrogate ($p=0.03$), as was aortic arc for LN station 6 ($p=0.03$) and hilum for LN stations 10 and 11 ($p=0.02/0.01$ respectively). The carina was significantly better than thoracic vertebrae for LN station 7 ($p=0.003$).

One important aspect to consider is the shrinkage of the primary volume and lymph nodes throughout treatment delivery. This has the potential to alter the match and may introduce inter-observer variability when registering the images. It was surprising that similar shrinkage was seen for primary and nodal volumes at fraction 20 for both NSCLC and SCLC given the different diagnosis and the difference in RT and chemotherapy delivered. Where gross tumour volume (GTV) had reduced, the authors had to perform a best match using either centre ▼
of mass or guidance from surrounding soft tissue. This presents challenges where the regression of tumour volume is not uniform.

Uncertainties remain when using surrogates for matching so it is important for departments to include sufficient margin to compensate.

**RELEVANCE TO RADIATION THERAPISTS (RTTS)**

This paper is of interest to RTTs who are considering the use of on-treatment imaging to further verify dose delivered to regions of lymph node disease. As departments continue to implement CBCT imaging for positional verification, there is a need to develop strategies which evaluate soft tissue surrogates, especially where it would be otherwise difficult to define. This paper helps to identify deviations in individual lymph nodes. By identifying these deviations and their consequences in your own department, appropriate margins can be applied and adaptive strategies implemented.

Utilising on-treatment imaging to verify the geographical position of nodal disease, RTTs can ensure that the prescribed dose is delivered to all areas of PTV. Using lower contrast imaging such as CBCT can be challenging when looking at areas outside of the primary target volumes, highlighting the importance of this work.
Modeling Pancreatic Tumor Motion Using 4-Dimensional Computed Tomography and Surrogate Markers

Huguet, Florence; Yorke, Ellen D.; Davidson, Margaret; Zhang, Zhigang; Jackson, Andrew; Mageras, Gig S; Wu, Abraham J; Goodman, Karyn A.

*International Journal of Radiation Oncology • Biology • Physics* 2015, 91 (3), 579-587

**PURPOSE AND METHODS**

This study evaluated intrafractional motion of pancreatic tumours using 4DCT imaging and how this motion impacts on target volume coverage. It also investigated the use of tumour surrogates including biliary stent, fiducially and the real-time position management (RPM) marker block.

Data for 36 consecutive patients treated with chemo-RT were analysed, mainly including tumours within the pancreatic head. Twenty patients had biliary stent, 16 patients had 2-4 fiducial markers and all patients had the RPM marker block. Patients had a 4DCT scan acquired in free breathing (FB) as well as an end exhalation (EE) breath hold (BH) 3DCT for treatment planning. Tumour surrogates were delineated as well as gross tumour volume (GTV).

Analysis of surrogate position was done retrospectively by registering the 3DCT to EE phase of the 4DCT. Planning CT contours were applied to different phases of the 4DCT and displacements of GTV and surrogate structures were recorded. Using a linear mixed model, the correlation of surrogates and GTV was explored.

**FINDINGS**

Tumour motion was measured on the three axes i.e. left-right (LR), anterior-posterior (AP) and superior-inferior (SI) on 4DCT (all phases): 0.35cm +0.2cm, 0.57cm + 0.35cm, 1.34 + 0.7cm and in EE gated phase (30%-70%): 0.29cm + 0.1cm, 0.21+ 0.2cm and 0.54cm + 0.4cm respectively. By respiratory gating in EE, this group used a PTV margin of 0.4cm, 0.5cm and 1.15cm in the LR AP and SI directions. A FB delivery would have required 0.7cm, 1.1cm and 2.25cm respectively. The reduction may be partly due to this group having identified greater motion on 4DCT than other previously published studies. The authors suggest that this may be due to the use of audio coaching.

The RPM marker block has limitations in that it detects AP motion, however a predictive model could be used to predict motion in the other directions as explained in the paper. As for biliary stent and fiducials, both were seen to have a strong correlation to GTV displacement with p = <0.0001. The use of biliary stent is controversial since previous work has identified issues with motion and migration.
RELEVANCE TO RADIATION THERAPISTS (RTTS)

Dose escalation protocols need to be explored to improve clinical outcomes for this group of patients. In order to dose escalate to pancreatic tumours and limit dose to nearby structures, it is important that RTTs understand what can be used as reliable surrogates for registration, and more importantly, when caution should be applied. There may not be sufficient numbers of pancreas patients being treated in all centres to conduct their own investigation. In view of the comparatively low number of pancreas patients, the authors have successfully recruited patients into a robust prospective study. This gives an insight into the challenging aspects of verification and treatment delivery for this patient group.
INTRODUCTION FROM BED TO BENCH TO BED: PATIENCE AND SERENDIPITY

RADIOBIOLOGY
Dear Radiobiology Corner reader,

Recently, two papers [1,2] were published by the Department of Radiation Oncology, University Medical Centre, Groningen, on a clinical application derived from biological observations. Here the major contributors are interviewed. They describe the lengthy process from the clinical question to the biology experiments and eventually back to the clinical application. Given the potential of new radiation treatment technologies to spare part of an organ, the clinically relevant question is: Are there regional differences in the radiosensitivity of organs?

Rob Coppes  
Departments of Radiation Oncology and Cell Biology  
Cancer Research Centre Groningen  
University Medical Centre Groningen  
University of Groningen  
Groningen, The Netherlands

As usual we encourage you to contact Anne Kiltie, Martin Pruschy and Conchita Vens, with comments (good or bad) at info@estro.org
The first paper [1] describes a sensitive method for detection of lung damage using CT-scans.

In 2002 a young doctor, Erwin Wiegman (MD), came to the lab to start his PhD. Driven by the first observation of loco-regional differences in mouse lung sensitivity by the Travis group at MD Anderson, Houston [2,3], it was decided that these studies needed follow up in a somewhat larger animal model with better-controlled and more varied irradiated volumes.

Erwin Wiegman: We did not only want to study the regional differences in loss of lung function but we also wanted to investigate whether these could be explained by regional changes in lung density. Therefore, we started with a simple technique. We took CT scans of rat lungs to determine changes in density after different regions and volumes of lung tissue were irradiated. Next, I drew a region of interest (ROI) by hand in both the irradiated and non-irradiated parts. In these ROIs, clear changes were visible. However, when we tried to quantify this, the results were noisy. We observed some regional differences though, which were published in Radiotherapy and Oncology in 2003 [4]. The question remained, how was it possible for us to see these changes without being able to quantify them accurately, although they were clearly visible? Looking more closely at the data, we observed great differences within the investigated ROIs. Areas of high density were surrounded by areas of low density. We then hypothesised that these might be averaging out the effects. At this point, I started training to become a radiation oncologist and the problem was adopted by Peter van Luijk, who was then a post-doc on a Dutch Cancer Society research project, “Prediction of radiation damage to parallel organised organs”.

Peter van Luijk: I started to look at histograms of the densities observed in this study and noticed that the low-density peak in the histogram actually broadened. It suggested that we should not only look at the average density but also at the width of these peaks. However, this gives you two different values when you only want a single number to represent how healthy your animal is with respect to lung function. We then found a way to combine the density with the standard deviation of the measurement, which led to a single parameter (delta S). Delta S correlated strongly with histological changes and lung function of the animals in a region-dependent manner. This was first published for the whole lung [5] and was later optimised to assess local effects in the lung [6,7]. The latter studies showed effects so sensitive that even out-of-field changes could be detected on a CT-scan. This suggested a clinical application, as this highly sensitive method could potentially be used to objectively score radiation effects in patients’ lungs. This would be really useful and could be used to develop predictive models. The development of the clinical application was dependent on ▼
radiation oncologists who were interested in the topic. Luckily at that moment Erwin Wiegman had just finished his training and was appointed as radiation oncologist at the department.

**Erwin:** First we scanned a group of lung cancer patients in whom clinical toxicities were expected to be dose-dependent. The method used for patients actually remained exactly the same as for rats. However, the variation in anatomy between patients is of course much greater than between rats. Patients have lung cancer so the lung contains tumour tissue. After radiation, this leads to tumour shrinkage which on its own results in anatomical changes. Thus post-treatment scans cannot just be compared with the baseline situation. So to adapt, we made the CT scan as uniform as possible, using deep inspiration CTs. To account for anatomical changes, deformable image registration was needed, which had already proven to be beneficial in the pre-clinical study.

**Peter:** Furthermore, in contrast to the animal experiments, we wanted to use the patient as his/her own control, since the anatomical differences between patients are bigger. Therefore, we had to adapt our method. We performed an extra scan prior to treatment to see what the differences were from scan to scan. However, some patients refused further CT-scans and this caused delays. The technique can now be used accurately and more sensitively to assess density changes in the lung, which results in a measurement for damage of the lung.

**Peter:** To facilitate broader use of this method, it should be implemented in clinical image processing tools.

**Erwin (currently working in Isala, Zwolle, The Netherlands):** We can now obtain a single parameter that is much more sensitive and corresponds much better to physician-rated toxicities such as SWOG grade 2 pneumonitis and CTCAE grade 2 toxicity. The methods should be tested in a study with a larger group of patients, in which the relation between delta S and pulmonary function will be established.

**Peter and Erwin:** These results could be used to develop better multivariate models for toxicity, as the data obtained will be much better than we have had to date. This could lead to a multiparameter model with improved insight into radiation-damage that could also include other factors such as the dose to the heart, pre-existing lung disease and smoking.

**Erwin:** The big advantage of the method is that it can be performed on a CT-scanner available in any hospital. It really feels great to have been part of this study, involved in the first laboratory experiments and eventually in the clinical application.

**The second paper [2] shows that parotid gland stem cell sparing radiotherapy may preserve salivary flow in head and neck cancer patients.**

**Peter van Luijk:** In 1999, we started to study the dose-volume dependence of parotid gland damage using a simple set up of photon irradiation. It was based on the same idea as described above, that the radiosensitivity of regions within organs may not be homogeneous. Indeed, we observed regional differences in radiosensitivity [8,9] which were much more pronounced than in the lungs. Later, in the previously mentioned project, funded by the Dutch Cancer Society, we used very accurate proton irradiation to irradiate as many volumes and doses as possible. We saw strange and not always consistent differences in regional sensitivity and did not know why. First, we thought that the upper part of the gland was more radiosensitive, but this was not always the case. Radiation-induced ductal or blood vessel obstructions were proposed, but no evidence for this was found. So we were stuck for a mechanism. In parallel with the dose volume studies, stem cell research was initiated in the lab. Isabelle Lombaert discovered the stem cells of the mouse salivary glands and showed that these cells could rescue the salivary gland from radiation damage [10]. To see if we could find similar differences in human parotid glands, I visited Professor J.O. Deasy, who was at that time.
INTRODUCTION

(2010) at Washington University, St Louis. In Prof Deasy’s lab, I worked on patient data collected by Professor Hovan’s group at the British Columbia Cancer Agency - Vancouver Centre. I tried to relate the local dose given to sub-structures of the parotid gland to its saliva production after radiotherapy. I found that the dose given to the exact same anatomical area as in rats best correlated with reduction in parotid gland flow. This area encompassed the major ducts of the parotid glands. Back in the rats, irradiation of this area indeed induced enhanced degeneration. Since Isabelle Lombaert’s study had delivered a stem cell marker (c-Kit) we started to study the localisation of the stem cells in the rat gland with antibodies. We found that the larger ducts contain most of these cells, and verified this in both mice and humans. Subsequently, proof of the existence of stem cells in these ducts came from an assay: its ability to form spheres in this specific radiosensitive area confirmed that it contained most stem cells. This was also verified in human parotid glands. Once this became clear, I developed a model to show that sparing of this area in the patient’s parotid gland would reduce considerably the numbers of those developing xerostomia. Finally, the paper [2] ends with an IMRT treatment plan to spare this area.

The paper has already been followed up. With Roel Steenbakkers, a double-blind randomised controlled clinical trial was set up. Patients (n = 102) were randomised to receive either a stem cell area sparing radiotherapy technique or standard radiotherapy, based on mean dose sparing of the whole salivary gland.

Roel Steenbakkers: We did encounter some difficulties. In animals, it is relatively easy to collect saliva. In patients, and especially older patients, however, we noticed that they have decreased saliva flow rates at baseline and they were therefore excluded from the trial. We then changed the collection method so that higher numbers of patients became eligible. Furthermore, in planning the pilot study, sparing of the stem cell area was quite straightforward. However, when the trial started, this had become much less clear because changes in standard planning meant that the parotid gland was being spared to a greater extent than before. Even so, we hope to find significant improvements in saliva flow in stem cell-spared patients. We are now halfway through the trial, having included more than half of the patients. So, in 1.5 years’ time, we hope to have finished this study. Patients are keen to participate as xerostomia is an important side effect and the method is not a big burden to patients (only one extra saliva sample is taken).

Peter: Now we know the mechanism, we have to continue to study the interaction with other mechanisms of damage such as acinar cell dysfunction soon after irradiation. Furthermore, the observation that even a low dose of irradiation in the stem cell area may reduce regeneration potential [11].

Roel: Yes, but this might be avoided with proton therapy, which we will try to do in two years’ time when our facility is up and running.

Peter: This will require a different approach to proton planning and possibly also different proton irradiation technology. However when these issues are resolved, I foresee an important role for proton therapy in sparing the parotid gland.

Erwin Wiegman
Department of Radiation Oncology
Isala
Zwolle, The Netherlands
e.wiegman@isala.nl

Peter van Luijk
Department of Radiation Oncology
University Medical Centre Groningen, The Netherlands

Roel Steenbakkers
Department of Radiation Oncology
University Medical Centre Groningen, The Netherlands
r.steenbakkers@umcg.nl

The studies were funded by several research grants from the Dutch Cancer Society, the Netherlands Organisation for Scientific Research (NWO) and the Netherlands Organisation for Health Research and Development (ZonMW)▼
REFERENCES


ESTRO has just appointed a new School director. Jesper Eriksen will take over from Richard Pötter at the ESTRO meeting in Turin, April 2016. There was an open application procedure and candidates were interviewed in September. From now until April, Jesper will work closely with Richard to ensure a smooth transition. We will have a full interview with Jesper in the March-April issue of the newsletter in which he will discuss his vision for the school, following a tremendously successful period under Richard’s leadership.

The next deadline for applications for mobility grants is 31 October 2015, so there are only a few days left. Full details of the scope of these grants and how to apply can be found on the website. There are reports from previous awardees describing their experiences at: www.estro.org/school/other-pages/mobility-grants-past-reports-articles

Registration for all 2016 courses is now open, including the pre-meeting courses which will be held before the Turin meeting in April. All the information for these courses is on the website, but if you would like a paper copy, just contact the ESTRO office.

A new initiative from the ESTRO School is to develop multidisciplinary summer schools for undergraduates interested in pursuing a career in radiation oncology. The Medical science summer school, ”Oncology for medical students” will take place in Groningen, The Netherlands, in early July. The ESO-ESSO-ESTRO course, also for medical students, will take place in Poznan at the end of August - early September. We need your help in advertising this new initiative and helping to identify potential candidates.

Fiona Stewart, Christine Verfaillie and Richard Pötter
ONLINE WORKSHOP

Gynaecological cancer - external beam RT
Mohamed Shelan

FALCON* DEMOS AT THE 3RD ESTRO FORUM

At the ESTRO booth four daily demonstrations were held for FALCON
Vassiliou Vassilios

Sometimes studying the guidelines is not enough
Andre Branquinho

*Fellowship in Anatomic delineation and CONtouring
While checking the ESTRO School programme for 2015, I noticed that ESTRO was offering a variety of online delineation workshops this year, covering very interesting topics. Such courses were set up to help us as junior clinical or radiation oncologists who want to improve our contouring skills, or for more senior specialists who want to refresh and validate their knowledge and skills in this field.

The course registration process was very simple. A few days before the course began, all attendees received via email their log-in data to access the web conference session and the online educational system (FALCON Educase*). We were notified about the timing of the three workshop sessions in different countries.

During the first session, there was a short introduction which was really informative about what each session would entail. We were told how to access the training case and how to deal with the online system. During the first session, a case of advanced cervical cancer was presented with a detailed history, a diagram of the tumour’s location and different radiological scans. At the end of the session, we were asked to contour the case as we would in our daily routine.

The second session was held a week later. The presenters informed us about the newest and the standard guidelines for contouring such a case. One of the interesting parts of this session was comparing attendees’ contours and experts’ contours. There was time to answer participants’ questions and we were then asked to re-contour the case based on what we had learnt in session two.

The last session was another attempt to contour the case after being shown how to do it professionally. At the end of this session, I could see how my own contouring skills had improved and what was still needed to get better results.

I strongly believe that all trainee and even practising radiation oncologists would benefit from attending a workshop like this, which touched on many of the daily scenarios we face when treating cervical cancer patients with radiation therapy. The discussions and exchanges that took place during this workshop were very instructive. I recommend the online workshops to my colleagues and I hope to attend many more such interactive workshops in the future to increase my knowledge of target volume contouring and to demonstrate my improvement.

Finally, I would like to thank all the presenters,
the course coordinator and also the tutors for their help and support during and between sessions.

Mohamed Shelan
Third year resident
Department of Radiation Oncology
St. Vincentius Klinik
Karlsruhe, Germany
Mohamed.shelan@googlemail.com

* Educase:
software program used by the FALCON project
FALCON DEMOS AT THE 3RD ESTRO FORUM

It is already a few months since the 3rd ESTRO Forum, which was a great success in terms of participation, organisation and scientific content.

During the event, as a new FALCON tutor I had the chance to meet the entire FALCON team who are really enthusiastic about their work. We agreed on an action plan in order to set even higher goals and standards for the future.

At the ESTRO booth four daily demonstrations were held for FALCON Educase. It was a great pleasure to take part in these as there was considerable participation and interest. Participants had the chance to see how the delineation program works and learn about the applications and benefits of the program.

This is an essential requirement for improving and increasing the efficacy and accuracy of radiotherapy while simultaneously minimising potential toxicity.

The main benefit of FALCON Educase is the improvement of delineating skills, both for organs at risk and for target volumes during routine clinical practice. This is an essential requirement for improving and increasing the efficacy and accuracy of radiotherapy while simultaneously minimising potential toxicity. Moreover, students can learn conveniently from home without any travelling or accommodation expenses, at their own pace and time.

Teaching is provided by expert clinicians who have an interest in the topic they teach. Their aim is to provide and present established delineation and treatment guidelines. Both the teachers and tutors are more than willing to help with the use of the program and to answer any questions.

Now is the time to improve your own skills in delineation. By joining a FALCON workshop you may learn from the experts and enhance your contouring skills in daily practice. We can help you to make a difference.

Vassiliou Vassilios
Senior FALCON tutor
Consultant Radiation Oncologist,
Bank of Cyprus Oncology Centre,
Nicosia, Cyprus
As a resident in radiation oncology, but also as a recent tutor for FALCON, I empathise with all colleagues who wish to improve their knowledge and skills for the benefit of all patients. There is a need to improve and to learn about certain aspects, namely how to excel and to create the best and the most appropriate treatment plan for each patient according to the guidelines. Sometimes, however, studying guidelines is not enough and we need a different mindset and need to work on real cases to learn how to manage contouring uncertainties.

Learning is also an interactive process, and that is the key advantage of FALCON. You can choose an online workshop and train with the help of expert teachers from other countries, during your workdays, without the need to travel abroad. As a tutor, with previous experience as a participant, I was fully aware of the FALCON Educase platform's potential, with the online workshops which are appealing for many reasons. Nowadays, there is a need to acquire experience and skills, be up to date as fast as possible and to attend meetings to share experience and knowledge. These workshops eliminate the geographical obstacle which was an obstacle not so many years ago. The participants can perform contours for a particular case on a standard browser-based platform which is similar to the consoles in a radiotherapy department. The contours can be compared with an expert contour with extreme details (qualitative and quantitative features) and there is always time during the online session (videoconference, chatroom) and offline (exchanging e-mails) to address particular questions and doubts. As tutors we facilitate the communication channels during and between the online courses.

The FALCON team gave their first free live demonstration at the 3rd ESTRO Forum in Barcelona in order to show how easy it is to work with the contouring platform, to show its advantages, and to receive feedback from congress attendees. We believe that everyone should be aware of the possible tools for self-improvement in order to reduce variation in the precision of conformal radiation therapy planning and to reduce one of the major source of errors. It was also very interesting to hear and learn from replies from physicians, radiation therapists (RTTs) and physicists. FALCON Educase is integrated into the ESTRO system and we want to interact with all professionals.
related to radiation oncology to adapt to their needs. We noticed that there is a need to supply education for a wider variety of diseases and for this reason the FALCON team has expanded their online workshop offering in 2015. FALCON Educase also intends to improve even more in the coming years.

This news was well received by the members that attended the 3rd ESTRO Forum in 2015 and we hope it will be also by you.

Andre Branquinho
Junior FALCON tutor

Radiation Oncologist Resident
Centro Hospitalar Lisboa Norte,
Lisbon, Portugal
COURSE REPORTS

Brachytherapy for prostate cancer  ➤
28 - 30 June 2015 | Vienna, Austria

Advanced skills in modern radiotherapy  ➤
28 June - 2 July 2015 | Copenhagen, Denmark

Clinical practice and implementation of image guided stereotactic body radiotherapy  ➤
30 August - 3 September 2015 | Dublin, Ireland

Haematological malignancies  ➤
3 - 5 September 2015 | London, UK

Research masterclass in radiotherapy physics  ➤
3 - 7 September 2015 | Prague, Czech Republic

Imaging for physicists  ➤
13 - 17 September 2015 | Leiden, The Netherlands
Three indispensable ingredients for a good brachytherapy procedure are the right patient selection, the right equipment, the right training. We don’t know what specific equipment is available in your department, but after this course, you should know that it is technically possible to cure prostate cancer with minimal side effects.

Three ingredients for a good brachytherapy teaching course are the right location, the right teachers, the right amount of information to absorb. We were surprised by the excellent balance that ESTRO managed to achieve on this 2.5 day teaching course.

Even before the course started, it was a success for us. It unexpectedly turned out to be an unplanned reunion of three former residents trained by Dr Bradley Pieters, member of the Groupe Européen de Curiethérapie (GEC)-ESTRO. We already had thorough training in prostate brachytherapy to compare this training course with.

As a first comment, this course offered something unique: an overview of prostate brachytherapy that is so complete, it is as solid as a rock. This was gently illustrated by Gabriella Axelsson, always ready to assist with a wonderful smile.
So, in short, what did we learn? With tongue in cheek, Jean Marc Cosset convinced us that almost all prostate brachytherapy patients should be considered normal. Stefan Machtens pointed out the exception. They shouldn’t have a post-implant rectal biopsy without consulting their radiation oncologist.

Bashar Al-Qaisieh and Frank-André Siebert showed that even with different approaches, you can deliver a good implant with good coverage. And they disclosed completely different ideas about hygiene in the operating theatre. Peter Hoskin and Carl Salembier demonstrated the ins and outs of the outstanding clinical results with low dose rate (LDR) and high dose rate (HDR) brachytherapy, if patients are selected correctly. Last but not least, the importance of the dose to the bladder neck was pointed out.

The interaction between teaching staff was like a wonderful, well-oiled machine. The multidisciplinary composition of the training staff gave a balanced view of prostate brachytherapy. Pre- and post-course, we used the ESTRO platform for contouring and delineation, FALCON (fellowship in anatomic delineation and contouring) to see the progress we had made.

Vienna was the host city for this course. We were honoured by a short visit from Richard Pötter. At the wonderful social event, we were treated to local wines and local food. The local organiser, Gregor-Moritz Goldner, talked to us about Viennese wines and prostate brachytherapy in Austria. During the other evenings, we were impressed by the wonderful culture but even more so by the U-bahn signs reminding us of the sausage-shaped way you should properly implant a prostate.

In summary, this course is of inestimable value for radiation oncologists, physicists, radiation technicians and especially urologists working or starting to work in prostate brachytherapy.

For those of you who have reached the end of this report, we hope you enjoyed it and found it useful.

Joost Verhoeff, Marianne de Jong and Dorien Haverkort

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Joost Verhoeff
Radiation Oncologist
Medical Spectrum Twente
Enschede, The Netherlands
J.Verhoeff@mst.nl

Marianne de Jong
Radiation Oncologist
Radiotherapy Institute Friesland
Leeuwarden, The Netherlands
M.A.A.Jong@skf-rif.nl

Dorien Haverkort
Radiation Oncologist
Radiotherapy group
Arnhem, The Netherlands
D.Haverkort@radiotherapiegroep.nl
The ESTRO advanced skills in modern radiotherapy course in Copenhagen was interesting, comprehensive and enjoyable. The faculty delivered a well-structured programme that included a good range of advanced skills for radiation therapists (RTT). The team were welcoming and very happy to answer any questions.

The course included interactive lectures on contouring, immobilisation, motion management, image guidance and margin recipes delivered by oncologists, physicists and RTTs. Challenging discussions were welcomed, giving the delegates the opportunity to discuss and debate a variety of advanced skills in clinical practice. The uniqueness of the course was the

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**Simon Goldsworthy**
hands-on workshops that enabled us to practice contouring, image guidance and margin recipe calculation each day.

As a research RTT, advanced skills are a requirement of my everyday work and the course offered an opportunity to learn from others and consolidate existing knowledge. A visit to a local hospital gave us an insight into how other radiotherapy departments implement and use their advanced skills in clinical practice. There were plenty of opportunities to ask questions during interactive sessions and demonstrations. We visited Rigshospitalet, Copenhagen University Hospital, where a physicist gave us a tour of the radiotherapy department with demonstrations of specialised imaging equipment and breath hold techniques.

This was my second ESTRO teaching course and so far I have not been disappointed. The course was very well organised and it catered for a wide demographic of RTTs. The interactive nature of the teaching materials and the workshops made this course beneficial and specific to clinical practice. The skills honed on this course have been invaluable, and for this reason I recommend that my colleagues locally and internationally attend. The social dinner, including a cruise on the famous canals of Copenhagen, gave us an opportunity to socialise with colleagues from across Europe and beyond. I would like to thank the faculty for delivering such a great programme.

Simon Goldsworthy  
Research radiation therapist  
Radiotherapy, Beacon centre  
Taunton & Somerset NHS Foundation Trust  
Taunton, UK  
Simon.goldsworthy@tst.nhs.uk
With a long tradition of educational excellence, Ireland is known as the country of “Saints and Scholars”. Thanks to the ESTRO School, that tradition continues today. In August this year, Trinity College Dublin was host to the ever popular course in “Clinical Practice and Implementation of Image Guided Stereotactic Body Radiotherapy”. As always, this course was fully booked with over 150 delegates. Educating, inspiring and engaging with such a large group is no easy task and the faculty did not disappoint us.

Over the course of five days the faculty led us through the complete clinical rationale of stereotactic body radiotherapy (SBRT).
with a perfect balance of evidence from large international trials and also anecdotal scenarios from their own clinical experience. The first day whet our appetite by covering the historical developments and also outlined the current landscape of SBRT based on recent technological advances. The day ended with a focus on radiobiological consequences and a discussion of different dose fractionation schemes. We were also all reminded of the need for quality safety measures, across all aspects of the treatment chain, with a very sobering presentation by Mischa Hoogeman. Day 2 continued with didactic lectures, but this time covering more practical considerations, such as respiratory motion and treatment plan evaluation. The content of each of the lectures was pitched to include all of the radiation oncology disciplines, which was reflected in the mix of clinicians, therapists and physicists amongst the participants.

Sitting in lecture theatres is often a far cry from our busy clinical environments and the practical split up sessions and workshops on days 3 and 4 were a welcome addition to the intense programme. These smaller sessions allowed participants to choose a topic most relevant to their clinical practice for more informal engagement with the faculty and peers. Some of these sessions were site specific where we examined the management options of clinical case scenarios. Here we were able to discuss specific challenges and uncertainties, such as gold fiducial placement for liver SBRT or MRI/CT registration for spine SBRT. We also had the opportunity to split up into sessions covering lung SBRT for Varian, Elekta or general tracking which made clinical implementation strategies more specific to our work environments. There were also sessions dedicated to either physicists or therapists. I was pleased to see the mix of disciplines attending these sessions, which confirms the dedication to a multidisciplinary team environment in clinical practice.

The last day brought all the information together and put forward recommendations for starting up an SBRT programme from either a clinicians or physicist’s perspective. Regardless of where we are in our clinical programmes, these lectures were valuable to ensure we are practicing in line with the best evidence available.

It must be said Ireland is also known for Guinness and good times, which locals refer to as “the craic”. This tradition was also upheld all week. The first social evening included whiskey tasting and hot lunches were served throughout the week in the university’s 18th century dining hall. As is common to ESTRO courses a course dinner took place on the second night in which the dance floor was packed. Again the faculty did not let us down!

Overall this inspirational (and intense!) course provided multiple opportunities to learn from the experts and collaborate with peers near and far. Whilst I could say my personal highlight was catching up with old friends, I must be honest and admit it was the sneak preview of the much anticipated ICRU report that was the cherry on the cake for me!

Elizabeth Forde
Assistant Professor
RTT
Discipline of Radiation Therapy
Trinity College Dublin, the University of Dublin
Dublin, Ireland
eforde@tcd.ie
Having previously attended several ESTRO courses, I signed up for the latest one on haematology-oncology malignancies with high expectations. I know I speak on behalf of the other delegates in saying that we were not disappointed. The reputation and calibre of speakers was an instant draw, as was the programme which ambitiously aimed to cover almost the entire breadth of malignant lymphomas and plasmacytoma/myeloma. The course was held in the Royal Society of Medicine, London. The venue, administration and catering services were excellent and, of course, being in London it was relatively easy for people to access. As a consequence, there were clinicians (dominated by consultant radiation and ▼)
The course predominantly revolved around the disease entities and situations in which radiotherapy is important but it was refreshing to have the contribution from the invited medical oncologist, Andy Davies, UK. It was organised by Lena Specht and Joachim Yahalom – both internationally well known within this field but supported by an extremely strong faculty all of whom were similarly great speakers and teachers. All of the talks were succinct, clear and informative and there was ample opportunity for discussion and debate. In addition there were sessions focused on advanced technologies such as IMRT and DIBH – techniques aimed at minimising late toxicity as well as lengthy discussion on where molecular imaging now lies within the diagnostic and follow up pathways of lymphoma.

It was a challenge to deliver such a comprehensive course over three days (0800 - 1700) and arguably an additional half day would have lessened the intensity. In addition to the talks, delegates were given a contouring exercise to complete in advance and a session to go through these (with additional exercises) was scheduled on the second day. This was perhaps the weaker component. Some felt that it might have been helpful if more time had been allocated for this. That said, it was useful to have the opportunity to work alongside other clinicians and see the fairly considerable inter-observer variability! A course such as this will no doubt go some way to helping to standardise the target volume delineation in lymphoma – one of the many variables in managing this complex group of conditions. Similarly it might also have been helpful for there to be a session dedicated to selected cases sent in advance by the delegates. These are relatively minor areas in which the course could have been improved and aren’t necessarily views held by all.

Judging by the speed with which places filled, this is clearly a course that is likely to remain popular for many years to come. The data presented was current and relevant and I came away feeling I’d learnt a huge amount. I certainly intend to go again in a few years’ time. Well done ESTRO and thank you to the faculty.

Charles Gillham
Consultant radiation oncologist
St Luke’s Hospital,
Dublin, Ireland
The beginning of September found me in Prague, attending a new ESTRO course, “Research masterclass in radiotherapy physics”. I singled it out from the School calendar for 2015 as a course I had to attend this year. It was the perfect combination of a city I had never visited and a course with an attractive name. The main aim caught my attention: how to turn an initial idea into a successful project with scientific output. All attendees had to submit an idea for a research project or scientific paper and attendance was limited. I was not certain that my idea would be accepted but decided to take a chance and submitted my proposal right on deadline. It turned out that my proposal was accepted and I got to visit Prague for the first time.

We were welcomed by course director Ben Heijmen and introduced to all the faculty members. The course flowed smoothly through project presentations, research and discussions. During the presentations, participants and teachers were divided into three groups. Each project was discussed within the group, questions were raised and suggestions for further improvements given. The teachers assisted and supervised us individually giving advice as we tried to include the new ideas from the feedback into our projects.

A second presentation of the upgraded projects and proposed changes took place before the groups were shuffled so they could be discussed and maybe improved further. Some of the projects were given a boost, while others had their research agenda reshaped and methodology improved. The outcome was fantastic and promising. The interactive sessions were engaging and dynamic and the teachers were very supportive and encouraging. They evaluated the quality of the research, ensuring that it was meaningful, timely and useful.

Another source of motivation were the lessons. Current trends in research were pointed out in radiotherapy, brachytherapy, imaging, dosimetry, biophysics and also particle radiotherapy. Important unresolved issues and future research opportunities were discussed. Everyone could find something in one of the inspiring topics. We were also introduced to valuable tips and tricks on writing successful grant proposals and scientific papers. Both were appealing presentations and shared the need for novelty, impact, feasibility and risk. In other words, have good ideas and work hard.

The coffee breaks allowed us as individuals and professionals to exchange information and...
The course took place at Hotel Century Old Town, in a unique atmosphere that gave a nod to the heritage of Franz Kafka. Over dinner, there were a few beers, a few laughs, a more serious debate and some transfer of information here and there. The social dinner was carefully organised by Laura La Porta, ESTRO Project manager, at Villa Richter, a pleasant restaurant with a perfect view over the “city of a hundred spires”. The chats, the wine, the view, some pictures and giggles all contributed to a lovely and relaxed September night in Prague.

The course took place at Hotel Century Old Town, in a unique atmosphere that gave a nod to the heritage of Franz Kafka. His influence was to be found at every corner and the three meeting rooms were named after his fiancée and muses: Milena, Dora and Julie.

He said, “From a certain point onward there is no longer any turning back. That is the point that must be reached”. I am sure that this educational event will grow very significantly in two years, that the process is irreversible and that we will see its impact in the form of published papers and successful research outcomes.

Lulzime Daçi
Medical Physicist
Nordlandssykehuset
Bodø, Norway
lulzime.daci@nordlandssykehuset.no
This September, against the wonderful backdrop of Leiden, surrounded by a myriad of bikes and beautiful windmills, I spent five great days participating in the ESTRO course, “Imaging for physicists”.

The first day I woke up at dawn and I remember feeling quite anxious, because my English is not really Oxfordian! I arrived in front of the ROC building (a giant blue skyscraper like those you only see in Grey’s Anatomy). I went up to the first floor and found Gabriella Axelsson, who welcomed me and who proved to be an excellent course organiser.

At 9 o’clock, course director Uulke van der Heide, a distinguished and friendly professor, welcomed us and outlined the course. The first two days would be focused on MRI and PET, the other days would be dedicated to the physical principles of CT and new imaging techniques (Dinamyc Pet and CT, cone-beam CT, MRI in Radiotherapy).

Professors Malinen, Nyholm and Liney explained to us the physical principles of MRI image creation, while Professor van der Heide taught us how, from the analysis of artifacts in an MRI image, it is possible to understand what went wrong during their acquisition.
The following days we listened to inspiring lectures by Professor Thorwarth, who guided us through the world of PET physics, and to enthusiastic lectures by Professor Geleijns, who explained to us the physical principles related to 3D and 4D CT imaging.

Finally, we were given an overview of all possible clinical applications of imaging techniques in lectures by two excellent doctors, Professors Dirix and Ménard.

The lessons were clear and understandable even to me with my “non-Oxfordian” English. They were made interactive with quizzes for the audience, and enriched by real-time statistics of the results (fortunately anonymous!).

During the days, we had pleasant coffee breaks and delicious lunches, during which I had the pleasure to meet people who shared my passions and the possibility to debate with other colleagues what it means to be a medical physicist in countries other than my own.

I have honestly never experienced such a high quality course. It wasn’t only the professors, who were accurate and precise in the presentation of arguments, but also the students, young people from everywhere in the world, brought together by the desire to learn new things and by a passion for physics.

In Leiden there were two hours of sunshine in five days but I would do this course again 1000 times. Not only because I learned a lot of new things, but also because I experienced an indescribable atmosphere, full of passion and multiculturalism, such as I have never found in other courses.

Davide Cusumano  
*Medical physicist in training*  
IRCCS – Istituto Neurologico Carlo Besta  
Milano, Italy  
davide.cusumano@unimi.it
Why did you agree to become director of this course?
Since 2008, I have been a teacher on the “Modern brachytherapy techniques” course. I have participated with great pleasure with Erik Van Limbergen as course director. Erik decided to step down as course director after 13 years, and I was asked to take over. In fact, I was a student on the same course in 1994 when Alain Gerbaulet was course director. When I returned as a teacher, I noticed that the course had been modified substantially. New elements included image guided brachytherapy, GEC-ESTRO concepts of intraluminal brachytherapy, MRI-guided cervical brachytherapy, and more. However, brachytherapy keeps evolving and it is time to make further modifications. This is the main reason why I have accepted the directorship. I would like to contribute to the further development of the course.

What will be challenging in this position?
The ESTRO School is very successful and has introduced many high quality courses in recent years. This has increased competition between courses. In addition, new radiation techniques are competing with brachytherapy in certain ways. IMRT/IGRT and proton therapy, for example, are developing rapidly and several courses on these topics exist. One challenge is to explain the importance of brachytherapy to potential students, and to keep the course attractive, so that many more keep participating.

Has the content of this course changed from previous courses?
Changes will be gradual. My intention is to introduce more practical lectures and exercises into the course. A basic knowledge is essential for the practice of brachytherapy. However, in the end someone needs to use his/her hands to perform brachytherapy, either with an applicator or with a computer for planning. These modifications take time to implement completely.

There are two directors for this course (Erik Van Limbergen and yourself). In terms of preparation, who is doing what?
Erik Van Limbergen is responsible for the course as it is nowadays. He will also coach me and help me to make the transition as smooth as possible. I will be responsible for making the necessary modifications to the course as I have explained.

Is there a specific message you will try to communicate to your audience during the few days of the course?
Fortunately, there are now many techniques in radiation oncology practice. Brachytherapy is one of these techniques. For best results in brachytherapy, we need to select our patients.
carefully. Brachytherapy can be the solution to many of the problems and dilemmas we encounter when deciding on appropriate treatment for our patients. It is something to appreciate when making treatment choices.

What previous involvement have you had within ESTRO?
I am member of the GEC-ESTRO advisory board and the UroGEC group. I am the local investigator for the EMBRACE study at my hospital (AMC), and I am involved in the scientific advisory groups for several GEC-ESTRO meetings. I participate in the EIBIR (European Institute for Biomedical Imaging Research) working group for ESTRO. Last but not least I am one of the editors of the Brachytherapy Corner for the ESTRO newsletter.

Bradley Pieters
Radiation Oncologist
Academic Medical Center
Amsterdam, The Netherlands
Effective cancer treatment necessitates both high efficacy of local treatment and combating sub-clinical systemic disease. Consequently, cancer therapy today involves various combinations of local and systemic treatment modalities. Of those, combining drugs and radiation has been attracting particular attention both in terms of its biological rationale and its potential of increasing the therapeutic outcome. The course will update participants about established and emerging knowledge in this field. It will provide the key-messages that biological and clinical research is bringing to the oncology community nowadays.

**COURSE AIMS**
- Updating participants about biological effects of combining drugs and radiation in normal and tumour tissue
- Presenting evidence-based clinical applications of combined modality treatment using drugs and radiation in major human malignancies
- Stimulating case-based discussion on the inter-disciplinary treatment of cancer
- Presenting future perspectives for combining drugs and radiation.

**LEARNING OUTCOMES**
By the end of this course participants should be able to:
- Describe the rationale and mechanisms of action of combined drug radiation treatment in cancer
- Discuss the evidence for combined drug radiation treatment in different tumour sites
- Select patients for combined drug radiation treatment
- Decide on the optimum treatment strategy, sequencing and duration, for different patients.

More information: [www.estro.org/school >](http://www.estro.org/school)
### POSTGRADUATE COURSES IN EUROPE

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Dates</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BASIC CLINICAL RADIOBIOLOGY</strong></td>
<td>27 February - 2 March 2016</td>
<td>Budapest, Hungary</td>
</tr>
<tr>
<td><strong>DOSE MODELLING AND VERIFICATION FOR EXTERNAL BEAM RADIOTHERAPY</strong></td>
<td>6 - 10 March 2016</td>
<td>Utrecht, The Netherlands</td>
</tr>
<tr>
<td><strong>MODERN BRACHYTHERAPY TECHNIQUES</strong></td>
<td>13 - 16 March 2016</td>
<td>Florence, Italy</td>
</tr>
<tr>
<td><strong>PARTICLE THERAPY</strong></td>
<td>14 - 18 March 2016</td>
<td>Krakow, Poland</td>
</tr>
<tr>
<td><strong>IMRT AND OTHER CONFORMAL TECHNIQUES IN PRACTICE</strong></td>
<td>3 - 7 April 2016</td>
<td>London, UK</td>
</tr>
<tr>
<td><strong>TARGET VOLUME DETERMINATION - FROM IMAGING TO MARGINS</strong></td>
<td>10 - 13 April 2016</td>
<td>Barcelona, Spain</td>
</tr>
<tr>
<td><strong>ESTRO 35 PRE-MEETING COURSES</strong></td>
<td>29 April 2016</td>
<td>Turin, Italy</td>
</tr>
<tr>
<td><strong>ESNM/ESTRO COURSE ON MOLECULAR IMAGING AND RADIATION ONCOLOGY</strong></td>
<td>19 - 22 May 2016</td>
<td>Lisbon, Portugal</td>
</tr>
<tr>
<td><strong>MULTIDISCIPLINARY MANAGEMENT OF PROSTATE CANCER</strong></td>
<td>22 - 26 May 2016</td>
<td>Istanbul, Turkey</td>
</tr>
<tr>
<td><strong>LOWER GI: TECHNICAL AND CLINICAL CHALLENGES FOR RADIATION ONCOLOGISTS</strong></td>
<td>25 - 27 May 2016</td>
<td>Brussels, Belgium</td>
</tr>
<tr>
<td><strong>UPPER GI: TECHNICAL AND CLINICAL CHALLENGES FOR RADIATION ONCOLOGISTS</strong></td>
<td>9 - 13 September 2016</td>
<td>Cambridge, UK</td>
</tr>
<tr>
<td><strong>ADVANCED BRACHYTHERAPY PHYSICS</strong></td>
<td>14 - 18 September 2016</td>
<td>Cambridge, UK</td>
</tr>
<tr>
<td><strong>IMAGING FOR PHYSICISTS</strong></td>
<td>20 - 25 November 2016</td>
<td>Sydney, Australia</td>
</tr>
<tr>
<td><strong>BIOPHYSICAL BASIS OF PERSONALISED RADIATION ONCOLOGY</strong></td>
<td>20 - 25 November 2016</td>
<td>Sydney, Australia</td>
</tr>
<tr>
<td><strong>IMAGE-GUIDED AND ADAPTIVE RADIOTHERAPY IN CLINICAL PRACTICE</strong></td>
<td>23 - 27 October 2016</td>
<td>Madrid, Spain</td>
</tr>
<tr>
<td><strong>BEST PRACTICE IN RADIATION ONCOLOGY – A WORKSHOP TO TRAIN RTT TRAIEERS</strong></td>
<td>20 - 25 November 2016</td>
<td>Sydney, Australia</td>
</tr>
<tr>
<td><strong>ESOR/ESTRO MULTIDISCIPLINARY APPROACH OF CANCER IMAGING</strong></td>
<td>10 - 12 November 2016</td>
<td>Amsterdam, The Netherlands</td>
</tr>
<tr>
<td><strong>ACCELERATED PARTIAL BREAST IRRADIATION</strong></td>
<td>13 - 16 November 2016</td>
<td>Paris, France</td>
</tr>
<tr>
<td><strong>4TH ESO-ESTRO MASTERCLASS IN RADIATION ONCOLOGY</strong></td>
<td>19 - 23 November 2016</td>
<td>Prague, Czech Republic</td>
</tr>
<tr>
<td><strong>MEDICAL SCIENCE SUMMER SCHOOL ONCOLOGY FOR MEDICAL STUDENTS</strong></td>
<td>4 - 15 July 2016</td>
<td>Groningen, The Netherlands</td>
</tr>
<tr>
<td><strong>ESO-ESSO-ESTRO MULTIDISCIPLINARY COURSE IN ONCOLOGY FOR MEDICAL STUDENTS</strong></td>
<td>29 August - 9 September 2016</td>
<td>Poznan, Poland</td>
</tr>
</tbody>
</table>
15TH ESO-ESMO MASTERCLASS IN CLINICAL ONCOLOGY

12-17 March 2016
Ermatingen (Lake Constance)
Switzerland

Chairs: N. Pavlidis, GR - R.A. Stahel, CH
Scientific Co-ordinators: W. Gatzemeier, IT - R. Popescu, CH

ATTENDANCE TO THE MASTERCLASS IS BY APPLICATION ONLY
SUCCESSFUL APPLICANTS ARE GRANTED FREE REGISTRATION AND ACCOMMODATION

APPLICATION DEADLINE: 1 DECEMBER 2015
YOUNG ESTRO
Welcome to the November-December issue of the Young Corner.

In this issue, we are continuing our series of reports from young national society meetings. This time, we are delighted to bring you a report from the Spanish Young Radiation Oncology Group (SYROG), written by the Chair, José L. Lopez.

Further, we present a proposal for an unusual but very interesting trial, namely a randomised, multi-institutional humour trial. The proposal is written by Gerben Borst from the Netherlands Cancer Institute, who is seeking trial participants. However, a number of challenges might need to be discussed in the trial design phase, for instance various cultural differences as well as chocolate intake!

Our Corner also features two mobility reports. Wojciech Burchardt from Poznan, Poland, visited Otto von Guericke University, Magdeburg, Germany, to learn about CT-guided interstitial brachytherapy of liver tumours. Ellen Marie Høye from Aarhus, Denmark, visited the Cyclon Centre Bronowice at the Polish Academy of Sciences, Krakow, Poland, in order to develop a 3D dosimeter for proton therapy.

We hope you enjoy this issue and we wish you a good and productive year-end. And do not forget to renew your 2016 membership and to register for ESTRO 35 in Turin. It will be the main event for young radiation oncology professionals next year.

Best regards,

Pierfrancesco Franco and Kathrine Røe Redalen

"We present a proposal for an unusual but very interesting trial, namely a randomised, multi-institutional humour trial"
The Spanish Young Radiation Oncology Group (SYROG), which has approximately 200 members, mostly radiation oncologists, was founded in 2010. Its aim is to promote research and education for young professionals involved in the field of radiation oncology in Spain. Achievements so far include the creation and management of a dedicated website (www.seor.es/area-joven/quienes-somos), the design of clinical studies and the organisation of educational and teaching courses.

The XVIII Spanish Society for Radiation Oncology (SEOR) congress was held in Valencia (4 – 6 June 2015). Since 2011, the national meeting has included a Young track, usually comprising educational talks and selected oral communications given by SYROG members. This is an important opportunity for young Spanish radiation oncology professionals to discuss and share their results, perspectives and challenges.

This year the first contribution was given by Professor Philip Poortmans, President of ESTRO, who gave an overview of the role of young members within ESTRO. Thereafter, Dr Arturo Navarro, the first SYROG chair, showed the audience the multifunctional ESTRO platform FALCON (1), a helpful tool for learning radiotherapy contouring. The free cases available online were demonstrated and discussed, and practical suggestions for proper use were given.
Historically, few Spanish radiation oncologists have actively participated in ESTRO activities. However, the trend is changing, which may be attributed in part to Professor Vincenzo Valentini, past President of ESTRO, who showed a strong commitment towards the involvement of southern European countries within the society. At the SYROG meeting, young members of ESTRO were represented by Dr Sofia Rivera, who reported from the Agorá meeting (2), which took place in Taormina, Sicily, in October 2012. This meeting was an occasion for fruitful discussion between young radiation oncology professionals (physicists, radiation oncologists, radiobiologists and radiation therapists) from all over Europe.

The former SYROG chair, Dr Raul Herranz, ended the programme with a very interesting Quo Vadis presentation on the future vision for SYROG. SYROG is a relatively new group within SEOR, which, however, has experienced fast and proactive development and is able to provide valuable benefits to all young SEOR members in Spain. The new President of SEOR, Dr Carlos Ferrer, closed the congress with a show of support from the whole SEOR society for SYROG. For SYROG to develop further, a firm connection between the board directors of SEOR and the young group is essential.

(1) Falcon: Fellowship in Anatomic delineation and CONtouring
www.estro.org/school/articles/online-workshops/2015-online-workshops

(2) Agorá meeting: ESTRO Agorá 2012: Future Leaders' Retreat, 12-14 October 2012, Taormina. The strategy meeting involved young RO professionals (physicists, radiation oncologists, radiobiologists and RTTs) coming together to discuss key challenges in the Radiation Oncology field, pulling together the Vision of ESTRO and the involvement required from younger ESTRO members.
Burnout, depressive symptoms, and recent suicidal ideation are phenomena more commonly seen among trainees and young physicians than among their peers in the USA population [1]. Referring to a study from Queensland, Poulsen et al showed that managing complex patient cases, carrying the workloads and responsibilities of other staff, and the presence of rigid hierarchies in hospital administration are the most frequently reported work-related stressors in the field of radiation oncology [2]. This brings forth the question of how we deal with the consequences of our (changing) medical landscape.

As can be expected from evidence-based professionals, a literature search is the logical way to begin tackling this clinically-relevant question. A PubMed search on work-related stress for radiation oncologists may offer some insight. However, it may be more important to look for proactive means to prevent potential, serious causal conditions such as emotional exhaustion, depersonalisation, feelings of inadequacy, personal failure and poor professional self-esteem.

Drinking 800 different beers and eating 22 kg of chocolate per person [3] may ensure that Belgian professionals in the field of radiotherapy are within normal limits for avoiding health problems and experiencing emotional demands [4] (although the results were not stratified for intake of chocolate and beer). Leaving Belgium and going a little further southwards to the country of highly-skilled flattery, passionate cursing and red sports cars, a survey of radiation oncologists revealed that burnout is limited to a small percentage of professionals, and most people were satisfied with their profession [5]. It seems that Italian radiation oncologists are doing better (and/or are better off) compared to the high level of burnout and emotional exhaustion seen at radiation oncology departments in New Zealand [6].

In other words, geographical variations seem significant, but no significant data is available to normalise workload and cultural influences. Important advice on how to deal with stress and burnout comes from Canada, where Oczkowski expands on the role humour plays in reducing stress, addressing fears, and creating effective health care teams [7].

Although large variations are observed in studies evaluating stress, burnout and job satisfaction among radiation oncologists in these three different countries, the answer on how to deal with it is strikingly clear. In order to maximise the benefits of humour, we need to teach and model the effective and virtuous use of humour. I opt for, and am looking forward to, an ESTRO-supported international multi-institutional randomised study in the field of radiation oncology on dealing with stress and burnout [8].
using humour. However, issues to be discussed first include how to stratify for culture-related humour and selection bias.

Gerben Borst
Radiation Oncologist,
Netherlands Cancer Institute,
Amsterdam, The Netherlands

REFERENCES


CT-guided interstitial brachytherapy of liver tumours

Wojciech Burchardt

Development of a 3D dosimeter for proton therapy

Ellen Marie Høye
The main aim of my visit was to increase my knowledge and practical skills in CT-guided interstitial brachytherapy of liver tumours. I focused especially on patients’ eligibility, as well as management of patients before, during and after the procedure.

Liver metastases occur frequently in patients with solid tumors (e.g. colorectal and breast cancer) and are a major cause of disease progression. Besides systemic treatment, which is increasingly tailored to the molecular features of tumours, local treatment is needed for most individuals. It is essential to have a feasible procedure. Surgery is one of the best methods for treating solitary metastases, but most cases are inoperable because of technical, functional and comorbidity reasons or because of the patient’s views.

At the Department of Radiology and Nuclear Medicine, patients with inoperable primary and secondary tumours in the liver can be treated using loco-regional approaches like transarterial chemoembolisation (TACE) and transarterial radioembolisation (TARE), with local approaches using thermal devices (radio-frequency ablation and microwave ablation) and interstitial brachytherapy. The optimal approach for each patient is decided by the tumour board, which includes a surgeon, a radiologist, a radiation oncologist and a medical oncologist as well as a specialist in nuclear medicine. Afterwards, all treatments are scheduled and planned at a department meeting.

Professor Jens Ricke and his team had a very dynamic and busy schedule, from which my project benefited. During my stay, I was able to actively participate in all steps of the patients’ treatment and care. I was also able to discuss the follow-up treatment of the patients. I attended ▼
procedures of interstitial brachytherapy with fluoroscopy-CT (Toshiba, Japan) and open 1.0 T MRI (Panorama HFO™, Philips Healthcare) guidance of primary liver tumours, secondary liver tumours, metastatic lymph nodes in the retroperitoneal cavity, lung tumours and metastatic tumours in the abdominal wall. MRI was usually used to visualise small lesions (around 1 cm) or isodense lesions.

When the procedure was completed, the patient was transferred to the Department of Radiation Oncology. I was able to see contouring of clinical target volumes (CTVs), organs at risk (OARs) and planning processes in system planning (Oncentra™ Brachy, Nucletron). I also discussed the cases and dose volume histograms (DVHs) with a radiation oncologist and physicist. The Department of Radiation Oncology was equipped with a high dose rate (HDR) 192-Ir radiation source after-loading system (Nucletron).

Additionally, I was able to see other treatment modalities, like transarterial chemoembolisation, radioembolisation with Yttrium 90, interstitial CT-guided radio-frequency and microwave ablations of liver tumours.

Moreover, I had an opportunity to attend great lectures at the Deutsche Akademie für Microtherapie conducted by Prof Ricke and Dr Konrad Mohnike. The topics of the lectures were congruent with my interest in; local treatment of liver tumours. Additionally, I had the opportunity to train on MRI-guided applications using a gel-phantom.

My two week visit was immensely rewarding. I found Magdeburg a friendly and relaxed city, with interesting architecture, a beautiful river and city parks. I felt welcome and the colleagues at the Otto von Guericke University Magdeburg were very helpful and generous. I look forward to continuing our collaboration.

I would like to convey my sincere thanks to Prof Jens Ricke, Dr Konrad Mohnike, Dr Brojon Friebe, Dr Maciej Powerski, Professor Maciej Pech and Madeleine Beneke from the Department of Radiology and Nuclear Medicine. Also to Professor Gunther Gademann, Mathias Walke and especially Dr Peter Hass at the Department of Radiation Oncology.

Wojciech Burchardt
Specialist in Radiation Oncology
Brachytherapy Department
Greater Poland Cancer Centre
Poznan, Poland
wojciech.burchardt@wco.pl
MOBILITY REPORT
Development of a 3D dosimeter for proton therapy

Ellen Marie Høye

HOST INSTITUTE:
Cyclotron Center Bronowice,
Institute of Nuclear Physics,
Polish Academy of Sciences,
Kraków, Poland

DATE OF VISIT:
22 June - 5 July 2015

During my visit to the Cyclotron Center Bronowice in Kraków, I investigated the performance of a new 3D dosimeter for proton therapy. In proton therapy, highly modulated dose delivery is possible, and this increases the sensitivity of the treatment plan to different patients and to accelerator uncertainties. The increased complexity of the dose distribution, as well as the highly localised Bragg peak, places substantial demands on the dosimetry systems that are used for e.g. patient-specific measurements, in terms of the spatial resolution and capability to measure doses in a volume.

At Aarhus University Hospital and Aarhus University in Denmark, we have developed a radiochromic 3D dosimeter for photon beams. In this dosimeter, the dose response is measured as an increase in the optical density with higher dose, which is caused by increasing absorption in a dye. It can therefore be measured with a laser-based read-out system with the correct wavelength. Due to the different nature of the dose deposition with photon and proton beams, the dose response with protons had to be investigated.

The irradiation setup used in the experimental work at the Cyclotron Center Bronowice

The scattering material used during proton irradiation surrounded the dosimeter, which was placed where the hole is
A 1D optical laser scanner was sent to Kraków, in order to allow read-out of the dosimeters a few hours after irradiation. The scanner can read out small dosimeters of 1cm thickness in steps of 0.20 mm along the length. Thus, optical density profiles can be recorded along the penetration depth of the proton beam, and the full-depth dose curve can be analysed.

Before traveling to Kraków, dosimeters of different chemical compositions were produced in Aarhus. A few dosimeters from each batch were left in Aarhus to be irradiated with photons. Based on preliminary results from our measurements, decisions were made as to which chemical compositions to investigate further. These dosimeters were produced for us in Aarhus, and sent to Kraków to be irradiated the following week. Dosimetry of the proton beam with an ionisation chamber was performed every day before irradiation.

We were pleased to get the measurements we needed and to see some very interesting preliminary results. Quenching was observed in all dosimeters, while the peak to plateau ratio seemed to depend on at least one constituent of the dosimeter. Further data analysis is required to determine the final results. This will give us detailed information on how the dosimeter can be further optimised for proton therapy.

I would like to thank ESTRO for allowing me this opportunity, my supervisor Peter Skyt, who participated in the first part of the visit, everyone in Aarhus who helped me carry out this project, as well as all the nice people at the Institute of Nuclear Physics in Kraków, especially Professor Jan Swakon, Gabriela Mierzwińska and Marzena Rydygier.

Ellen Marie Høye
PhD student in Medical Physics
Department of Oncology
Aarhus University Hospital,
Aarhus, Denmark
elhoey@rm.dk
HEALTH ECONOMICS
In health care, value is defined as the patient health outcomes achieved per dollar spent [1]. So the value of any new therapeutic strategy or treatment is determined by the magnitude of its clinical benefit balanced against its cost. If value increases, patients, payers, providers and suppliers can all benefit while the economic sustainability of the health care system improves.

To date, no standard tool for grading the magnitude of the clinical benefit of cancer therapies has been available.

Yolande Lievens, Peter Dunscombe and Madelon Johannesma
Recently, the European Society for Medical Oncology Magnitude of Clinical Benefit Scale (ESMO-MCBS) has been developed [2]. This tool uses a rational, structured and consistent approach to derive a relative ranking of the magnitude of clinically meaningful benefit that can be expected from a new anti-cancer treatment. The ESMO-MCBS can be seen as an important first step towards the critical public policy issue of value in cancer care, helping to frame the appropriate use of limited public and personal resources to deliver cost effective and affordable cancer care.

The ESMO-MCBS is a dynamic tool and its criteria will have to be revised on a regular basis. Clinical benefit in this context refers to the added benefit compared to a control which, in most cases, is the best current standard care. Evidence for clinical benefit from new treatment options is derived from clinical research, in particular phase III randomised trials, which generate unbiased data on the efficacy, benefit and safety of new therapeutic approaches. The potential benefits of a new treatment can be summarised as either living longer and/or living better, evaluated in clinical studies through the effect of treatment on overall survival (OS) and/or quality of life (QoL), and their surrogates.

The scale has been developed only for solid cancers and consists of two parts, one for curative and one for palliative settings. Medicines and therapies that fall into the two highest scorings levels of the ESMO-MCBS should be highlighted for accelerated assessment of value and cost effectiveness. While a high score does not automatically imply high value (that depends on the price), the scale can be utilised to frame such considerations and can help public policy-makers advance “accountability for reasonableness” in resource allocation deliberations.

The ESMO-MCBS can only be applied to comparative research outcomes; it is therefore not applicable when evidence of benefit derives from single arm studies. This limits its utility in the uncommon situation in which registration is granted on the basis of outcomes reported from single arm studies.

The rising financial burden of cancer on health-care systems worldwide has led to increased demand for evidence-based research on which to base reimbursement decisions. Despite some limitations, the ESMO-MCBS is an important first step in the major ongoing task of evaluating value in cancer care which is essential for appropriate use of limited public and personal resources.
resources. In addition, advances in informatics are needed such as those recently used in the United Kingdom to ascertain reliable health-care cost and QoL data and hence to determine the value of health [3].

**Madelon Johannesma**  
Epidemiologist  
MAASTRO clinic  
Maastricht, The Netherlands  
Health insurance company CZ  
Tilburg, The Netherlands

**REFERENCES**


INSTITUTIONAL ESTRO MEMBERSHIP

The institutional membership category has been specially designed for European hospitals, clinics or other institutions that seek continuously to develop and support their radiotherapy and oncology professionals. In this Corner, we invite our institutional members to provide us and you with some feedback on their experience and institute.

BECOME AN INSTITUTIONAL MEMBER

Signing up a group of five or more people is great value for money. You receive all the regular benefits of membership plus a few extra perks just for your institute. We offer various membership packages where a minimum of three disciplines is represented. Detailed information can be found on the website: www.estro.org

Contact: institutional-membership@estro.org
How would you describe the radiation oncology department of your institute?
The department currently has nine treatment units (all equipped with CBCT and capable of VMAT delivery), 16 radiation oncologists, seven clinical physicists and approximately 75 radiation technologists.

What are the main areas of specialisation in your department?
The department has broad expertise in stereotactic treatments and a focus on early implementation of new technologies, for example, SBRT (2003), 4D radiotherapy (2004), VMAT (2008), and in the near future, the ViewRay MRIdian system. The ViewRay system will be used for stereotactic MRI-guided ablative radiotherapy (SMART).
What are the main achievements of your department to date?
We have extensive experience in stereotactic radiosurgery, SABR and VMAT treatments, and our work has influenced recent European guidelines for a number of tumour sites. We contribute to knowledge transfer to other centres through courses on advanced IGRT and SRS/SABR.

Is your department currently undertaking any studies or clinical trials that you would like to share with the ESTRO community?
We are very excited about the installation of our ViewRay MRIdian system. The combination of radiation equipment with MRI offers great opportunities for online soft-tissue imaging and markerless gated treatment. This system will for the first time allow daily adapted radiation for selected indications. We will use it to improve the therapeutic ratio of current hypofractionated stereotactic treatments.

What attracted you to apply for institutional membership and why is it important for your institute that its staff members are part of ESTRO?
Institutional membership allows more people to join and boosts both the department as well as ESTRO. It offers opportunities for promotion and contact with the international radiotherapy community.

In your opinion, what additional benefits would be useful as part of the institutional membership package?
I think the current benefits are very useful, but with time we might have further requests.

Is there anything about your institute that you would like to promote and share with the ESTRO community?
Our fourth symposium on SRS/SBRS will take place on 14-16 January 2016 in Amsterdam. This symposium is always well-attended with 250-300 participants from around the globe. Local and international speakers will for the first time include presentations on SMART. For more details, please see www.sbrt.eu
FACT FILE
VU University Medical Center
Amsterdam, The Netherlands

Description of the institution
Academic department with an enthusiastic and ambitious team of more than 150 people, including 16 radiation oncologists, 7 clinical physicists and approximately 75 radiation technologists. There are 9 treatment units; 6 at the main location in Amsterdam and 3 at the satellite centre in Hoorn (50 km north of Amsterdam).

Areas of specialisation
Stereotactic treatments and a focus on early implementation of new technologies; most recently stereotactic MR-guided ablative radiotherapy.

Ongoing projects/studies/clinical trials
See website.

In-house news
Our next symposium on SRS/SBRS will take place on January 14-16 2016 in Amsterdam: for more details, please visit www.sbtr.eu.

Equipment used in the RO department:
MV-Treatment machines (9):
• 1 x ViewRay MRIdian (under installation)
• 5x Varian TrueBeam
• 1x Varian-Brainlab Novalis Tx, with ExacTrac X-ray and Robotic Couch
• 1x Varian Clinac 2300 C/D
• 1x Varian Trilogy

CT-scanners (2):
• 1x GE Medical Systems Lightspeed 16
• 1x GE Medical Systems Optima 580W
In this edition of the National Societies Corner, we host the public announcement of the establishment of FARO (the Federation of Asian organisations for Radiation Oncology).

We do this with great pleasure. Professor Masahiro Hiraoka, President of FARO, has explained that it is envisioned that FARO will operate as a federation of represented national societies rather than an independent society. It is an organisational model that the National Societies Committee cannot but feel akin to.

During the last strategy retreat in Turin, the subject of ESTRO’s international networking was high on the agenda with particular focus on the Asia-Pacific region. While remaining a European Society in terms of its commitment, ESTRO is increasingly connected worldwide in order to facilitate the rising demand for its established educational activities. Having already signed memoranda of understanding with a number of National Societies in the region, ESTRO welcomes the potential for improved coordination in education and research through FARO towards the common goal of global progress in radiation oncology.

We wish FARO every success and congratulate the involved national societies on this initiative.

Panagiotis Papagiannis  
Member of the ESTRO national societies committee  
Medical School, University of Athens  
Athens, Greece

If your national societies would like to share views on topics of common interest, please contact the National Societies Committee via Chiara Gasparotto: cgasparotto@estro.org
It is our great pleasure to announce publicly the establishment of the Federation of Asian organisations for Radiation Oncology (FARO). This is a new and exciting framework in which collaboration among Asian radiation oncologists can be developed. FARO intends to function as a federation of radiation oncology societies in Asia and aims to improve and promote radiation oncology for the benefit of patients in the Asian region.

Discussions to establish a regional organisation for radiation oncology in Asia started in 2012 when the Japanese Society for Radiation Oncology (JASTRO) hosted the 4th Trilateral Symposium of the Chinese Society of Therapeutic Radiation Oncology (CSTRO), the Korean Society for Radiation Oncology (KOSRO) and JASTRO during JASTRO’s 25th Annual Meeting. The coordinator of the symposium, Dr. Masahiro Hiraoka, invited core members of the South East Asia Radiation Oncology Group (SEAROG) to the Trilateral Symposium. An informal meeting of JASTRO, CSTRO, KOSRO, and SEAROG members was held to discuss the formation of a regional organisation for radiation oncology in Asia. There was unanimous agreement for the foundation of such an organisation and for a preparatory meeting to initiate progress. Professor Takashi Nakano was elected to take on the role of organising the preparatory meetings.

The first preparatory meeting was held on 5 - 6 November 2013 in Bangkok, Thailand. The response to the call for this meeting was positive: 11 oncology and radiation oncology societies sent delegates. During the meeting, delegates expressed their enthusiasm for the establishment of the Asian regional organisation and discussed its preparation. Several important points were agreed by delegates. It was agreed that this organisation would not take the form of an independent society with individual membership, but would be a federation of representative national organisations or societies. The name, the “Federation of Asian organisations for Radiation Oncology” (abbreviated to FARO) was agreed on, and its purpose, to pursue the future development of radiation oncology in Asia. There was intensive discussion about the draft constitution, which was later finalised and approved by delegates of the participating organisations.

The second preparatory meeting was held on 3 November 2014 in Yogyakarta, Indonesia. At this meeting, societies from 11 Asian countries officially agreed to the establishment of FARO. The 11 founding members (societies/organisations) are:

• Bangladesh Society of Radiation Oncologists (BSRO)
• Chinese Society of Therapeutic Radiation Oncology (CSTRO)
• Association of Radiation Oncologists of India (AROI)
• Indonesian Radiation Oncology Society (IROS)
• Japanese Society for Radiation Oncology (JASTRO) ▼
The Federation of Asian Organizations for Radiation Oncology (FARO)

- Korean Society for Radiation Oncology (KOSRO)
- Malaysian Oncological Society (MOS)
- Philippine Radiation Oncology Society (PROS)
- Singapore Radiological Society (SRS)
- Sri Lanka College of Oncologists (SLCO)
- Thai Society of Therapeutic Radiology and Oncology (THASTRO)

The meeting also elected the first Council officers:
- President: Prof Masahiro Hiraoka (JASTRO)
- Vice president: Prof Ramesh Bilimagga (AROI)
- Secretary general: Prof Takashi Nakano (JASTRO)
- Treasurer: Prof Xianshu Gao (CSTRO)
- President-elect: Prof Soehartati Gondhowiardjo (IROS)
- Deputy Secretary general: Dr. Tomoaki Tamaki (JASTRO)

The meeting agreed that FARO should initially focus on education/training, the development of human resources, and academic and scientific exchanges among members. The training and education committee, and the research committee, were decided on. Dr Miriam Joy Calaguas (PPOS) was nominated as chair of the training and education committee.

The first FARO Meeting took place at the Kyoto International Conference Centre in Japan on 29 May 2015, the day after the successful 15th International Congress of Radiation Research. This inaugural meeting was attended by 40 participants including the council members nominated by member organisations, council officers and the observers seen in the photo.

The FARO council members nominated by each member organisation are:
- BSRO: Golam Mohiuddin Faruque, Qazi Mushtaq Hussain
- CSTRO: Yexiong Li, Junlin Yi
- AROI: M.C. Pant, Rajesh Vashistha
- IROS: Gregorius Ben Prajogi, Angela Giselvania
- JASTRO: Yasumasa Nishimura, Katsuyuki Karasawa
- KOSRO: Yong Chan Ahn, Kwan Ho Cho
- MOS: Ibrahim Wahid, Anita Bustam
- PROS: Enrico Tangco, Miriam Joy Calaguas
- SRS: Eu Tiong Chua, Ivan Tham

The first FARO Meeting, in Kyoto International Conference Center, Japan on 29 May 2015
The meeting focused on the status of training and education of radiation oncologists in each country with presentations by council members. The meeting also reviewed the activities of other multinational organisations in the region, namely the SEAROG and JASTRO-CSTRO-KOSRO Trilateral Symposium and international research activities in the region were discussed. The presentations and discussions provided many insights into the situation faced by the radiation oncology field today in Asia. They led to suggestions for the future activities of FARO. The meeting agreed that FARO’s first task should be to engage in the improvement of training and education. Initial activities such as creating a database of experts and training institutions in the Asian region, and reviewing the IAEA syllabus for the training of radiation oncologists for possible endorsement were agreed on. In the field of research, members decided to set up a research committee and Dr. Yong Chan Ahn (KOSRO) was nominated as Chair.

Council members also agreed on FARO’s logo, shown here. The logo represents FARO’s focus on our part of the world and, at the same time, its aspiration to collaborate beyond Asia and contribute globally. FARO faces many challenges: the enormous population undergoing rapid development consequently results in an enormous cancer burden in this region; differences in economic status and development often exist domestically and regionally. However, we also believe that challenges are our opportunities. Members of FARO share their enthusiasm and determination to improve radiation oncology in Asia for the benefit of patients, and we hope that FARO will be able to collaborate with other organisations such as ESTRO and contribute to the development of radiation oncology on a global scale.

Masahiro Hiraoka, MD, PhD
FARO President
Department of Radiation Oncology and Image-applied Therapy
Kyoto University Graduate School of Medicine
Japan
The deadline for abstract submission for ESTRO 35 passed a few days ago. We are pleased to announce that we have received 2,200 abstracts submitted for the various tracks: clinical, physics, brachytherapy, RTT and radiobiology. ESTRO 35 programme will present new scientific knowledge and offer many opportunities for dialogue on the major issues facing cancer treatment.

The programme has been designed to offer a well balanced mix of state of the art sessions tailored to meet the daily practice needs of participants and sessions focusing on the latest advances, highlighting future optimal treatment for cancer patients. Yolande Lievens and Ben Heijmen, Chairs of the scientific programme committee, are exploring the programme in depth for us.

Finally, 19,127 of you joined us for ECC2015, the European Cancer Congress in Vienna in September. The multidisciplinary meeting was a tremendous rendezvous for the oncology world but, as you know, it was the last time the meeting will take place in this format. Professor Philip Poortmans, ESTRO President, gives a brief overview of the new ECC format in the Society Life Corner. In the following pages, you can find a summary of some lectures of the utmost interest to radiation oncologists and others, as well as tributes to the recipients of the ESTRO awards which were presented on site.

Agostino Barrasso and Eralda Azizaj
CONFERENCES

FOCUS ON FORTHCOMING CONGRESSES

EMUC 2015
12 - 15 November 2015
Barcelona, Spain

ESTRO 35
29 April - 3 May 2016
Turin, Italy

European Association of Urology
www.emuc15.org

Optimising opportunities in multidisciplinary care
12-15 November 2015, Barcelona, Spain

7th European Multidisciplinary Meeting on Urological Cancers
In conjunction with
• ESU courses on Medical treatment of metastatic renal cancer and Castrate resistant prostate cancer
• European School of Oncology: Personalised approach to prostate cancer management
• 4th Meeting of the EAU Section of Urological Imaging (ESUI)
• Young Academic Urologists meeting
7th European Multidisciplinary Meeting on Urological Cancers

In conjunction with

- ESU courses on Medical treatment of metastatic renal cancer and Castrate resistant prostate cancer
- European School of Oncology: Personalised approach to prostate cancer management
- 4th Meeting of the EAU Section of Urological Imaging (ESUI)
- Young Academic Urologists meeting

www.emuc15.org
FALCON delineation contouring workshop at EMUC on MRI-based delineation in prostate cancer treatment with focus on focal therapy

Saturday 14 November 2015
14:20-16:00
Barcelona, Spain

Target audience
The delineation workshops are aimed at junior clinical or radiation oncologists wanting to improve their contouring skills or more senior specialists wanting to refresh and validate their knowledge and skills in this field.

Structure of the workshop
- Explanation of the contouring software
- Presentation of the clinical case and the delineation exercise
- 30-40 minutes for delineation on site
- Presentation of the delineation guidelines and discussion between experts and participants

Practical arrangements
Participants should bring their own laptops. Internet connection will be available. Participants will be limited to 60 persons to keep a strong interactivity in the group.

Registration at emuc15.uroweb.org

FALCON (Fellowship in Anatomic deLineation and CONtouring) is the multifunctional ESTRO platform for contouring and delineation.

Attending a FALCON workshop offers the opportunity for individual professionals to:
- Validate their contouring practice during live workshops by comparing them with those from experts and other participants
- Learn the indications proposed by the experts that coordinate the workshops
- Discuss with other participants, experts and panelists
- Communicate and use the delineation guidelines in order to further integrate themselves into daily practice.
What can we expect from the scientific programme of ESTRO 35?
The programme will of course be made up of the usual tracks: clinical, interdisciplinary, physics, brachytherapy, RTT, radiobiology and young, and participants can focus on specific areas. As always, the programme will offer teaching lectures, symposia, proffered papers and of course a few debates, as they always represent a lively way of presenting material.

But apart from the format, we wanted in the clinical track, for instance, to define specific topics that endorse the state of the art of current radiation oncology, giving participants the opportunity to reflect on their own practical way of treating their patients. On top of that, we have tried to find some topics that are more demanding, renewing and specific: the most advanced way of looking at radiation oncology. So we achieved a good balance between the two: the state of the art symposia and the symposia dedicated to the latest and future advances in radiation oncology. In the physics track, there are several symposia that aim to bridge the gap between physics and biology, covering topics such as functional imaging for radiotherapy, imaging markers for response prediction and assessment, and quantitative imaging for personalised treatment.

What’s on the menu of the interdisciplinary track?
Every day, the interdisciplinary track will focus on advances in radiotherapy and its evolution towards more accurate radiotherapy. The aspect we wanted to highlight more specifically in this congress is how to balance the benefits with the potential risks and pitfalls of advanced technology. What is the available clinical evidence addressing this issue? We’ll also look at quality assurance within clinical trials and in daily clinical practice. Radiation oncology is a rapidly evolving field but how do we deal with it from a quality assurance point of view? The interdisciplinary track will strive to give some answers.

What aspects of the scientific programme have been developed?
Over the past few months, we have been working on how to better profile the abstracts that are selected as posters. We decided to implement this year, in the scientific programme, poster viewing sessions. They will be organised around specific topics, participants will walk around in the poster area and will be able to join in discussions on specific posters that will be presented by Yolande Lievens and Ben Heijmen.
their authors. The idea is to better highlight the scientific outreach of the posters in an interactive way, involving both the authors and the participants.

The concept was inspired by the young track, which has been using this concept for some years now, and it has always been very well received by the young audience. So we have planned 12 poster viewing sessions, each for the discussion of 8-10 posters.

Finally, in order to make the posters livelier, we would like to have them displayed in a place where they are highly visible. The poster viewing sessions will replace the poster discussion sessions organised in previous meetings.

**What hot topics are to be discussed on site?**
We put a lot of effort into the careful selection of some hot items in radiotherapy. Topics that we thought deserve to be discussed in symposia are proton and ion beam therapies, from the clinical, physics and implementation points of view. There are also a few sessions on other hot topics: how to integrate MRI in treatment planning and delivery, adaptive therapy, and standardisation in radiotherapy, including automated contouring and planning.

Of course there are some interesting issues in stereotactic body radiation therapy (SBRT) although the focus on SBRT is moving towards more specific topics such as whether SBRT works in oligometastatic disease. Oligometastasis is broadly tackled in several sessions: a teaching lecture, a symposium on SBRT for oligometastatic disease and a multidisciplinary tumour board session.

**What about personalised treatment?**
Naturally, this is a central topic and we’ll discuss how to merge radiotherapy with novel systemic treatment, as the focus has been shifting more and more from targeted therapy towards immunotherapy. We’ll have a session on “Towards personalised radiation oncology” in the interdisciplinary track on Tuesday 3 May 2016.

**What tumours will the programme mainly focus on?**
Obviously the programme will focus on the big tumours we treat (breast, prostate, head and neck, lung, rectal and prostate) but not only these. We will also have sessions on lymphoma, renal cancer and a few other less common tumour types. These sessions include ‘Modern radiotherapy in lymphoma’, ‘Changing paradigm in the management of kidney cancer’, ‘Neuroendocrine tumours – personalised diagnosis and treatment using radiolabelled peptides’, ‘Radiotherapy for paediatric brain tumours’, ‘Whole brain radiation therapy (WBRT) for brain metastases- the end of an era?’, ‘New insights in treating vertebral metastases’.

**Obviously the evolution of radiation oncology will be at the heart of discussions. How will the health economic aspects be implemented in the programme?**
During ESTRO 35, we envisage the evolution of radiation oncology not only through the latest scientific advances but also in exchanges on the whole context of our discipline. How do we deal with continuously evolving technology (MR, protons, and so on) and the demands on the departments and professionals dealing with radiotherapy? For instance, is automation of radiotherapy the key? How can we make it
possible to implement these novel technologies in our daily practice?

We have increasing technical possibilities for treating patients but we are aware that these opportunities demand more effort, and are time and resource consuming. How then can we streamline our increasingly complex process and safeguard the quality of treatment we give our patients at the same time? Training in all new technologies is crucial. We will discuss systemic treatments in the same way. We are aware of their benefits but they are very expensive so here again, there is a need to define the patients for which they are appropriate and what their added value is in each specific case. Last but not least, our health economics symposium will focus on uncovering the gap between optimal and actual utilisation of radiotherapy in Europe. Even in high-income environments, access to radiotherapy remains a problem to tackle. We will first discuss the causes for the apparent underutilisation in a few European countries, before investigating how cancer plans can aid in closing the gap.

**What are the networking opportunities?**

The meeting will offer plenty of opportunities to interact. There’ll be the poster reception, the discipline lounges, the young track, the social event and of course the Super Run on the last day. You’ll need to be patient to find out more!

**In conclusion, why should everyone attend?**

The meeting will offer a mix of state of the art radiotherapy, defining how to treat the big tumours in daily practice, with novelties just round the corner, highlighting what to expect in the future. The talks will boost participants’ confidence that they are treating their patients in the right way, but they will also bring new perspectives on translating research into future daily practice.

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**DEADLINES**

#ESTRO35

Late breaking abstract submission: 31 January 2016
Early registration: 20 January 2016
Late registration: 29 March 2016
Desk registration: from 30 March 2016
FOCUS ON PAST CONGRESS

EUROPEAN CANCER CONGRESS
25 - 29 September 2015
Vienna, Austria

Introduction >
Awards >
Highlight of papers >
The 18th ECCO – 40th ESMO European Cancer Congress (ECC2015) was the largest European multidisciplinary oncology platform for presenting ground-breaking data to a global audience this year. ECC2015 was the last congress in this format, and from 2017 on, the congress will become annual and focus mainly on oncopolicy, patients and education. We invite you to save the date for the next congress, ECCO2017 “The voice of multidisciplinary cancer care in Europe”, that will take place on 27-30 January 2017 in Amsterdam, and for sure, ESTRO will be there!

**ABSTRACTS**

- 2,482 abstracts submitted
- 2,023 abstracts presented
- 52% of late-breaking abstracts accepted
- 10 abstracts published simultaneously as papers in prestigious journals

**ATTENDANCE**

- 19,127 oncology professionals from over 100 countries

**SCIENTIFIC PROGRAMME**

- 634 invited speakers
- 136 oral presentations
- 25 tracks
- 30 posters in the spotlight
- 28 poster discussions
- 1,849 posters
- 46 satellite symposia
FOCUS ON PAST CONGRESS
European Cancer Congress
REGAUD AWARD

Minimal effective treatments in the personalised era: the breast model

Roberto Orecchia
University of Milan
Scientific Director, European Institute of Oncology (IEO), Milan
National Center of Oncological Hadrontherapy (CNAO), Pavia, Italy

The Regaud Medal is awarded to a scientist who has accomplished outstanding work in radiotherapy and strived to communicate his knowledge to colleagues and others interested in the field.

LECTURE SUMMARY

Medical science has gone through an important evolution based on progress in research and advances in technology. In the last few years a lot of effort has been made to improve treatment modalities, in order not only to prolong survival, but also to ensure good quality of life. The advances achieved are in large part attributed to clinical research with randomised trials playing an important role in the progress towards less aggressive treatments. This new objective became important after a change in ▼
The new paradigm has been applied widely and evolution of the treatment of breast cancer is an excellent model. Large randomised trials paved the way to less surgery and breast conservation became not only a viable option but a standard treatment. The role of radiotherapy in loco-regional control also became well established. Radiotherapy is nowadays considered an essential component of breast conservation, at least in women who are younger than 65 years old. For older patients, some multicentre prospective randomised trials have been conducted, in order to assess the necessity of radiotherapy. Breast radiotherapy has followed the same course as breast surgery with the aim of personalising fields and doses. The traditional fractionation schedules changed with the introduction of shorter courses as a new and parallel standard. Recently, the concept of accelerated partial breast irradiation has emerged.

Conservative mastectomy is the last step in breast cancer conservative treatment. It combines total excision of breast parenchyma, sparing the skin and the nipple areola complex, thus offering a very good aesthetic result thanks to the immediate reconstruction of the breast. However, randomised controlled trials on this technique are not yet available.

For the future, predictive and prognostic factors are on their way, and molecular and genomic profiles will become drivers for the selection of patients, allowing us to realise true personalised therapy. The long term beneficial effects are evident, especially with regard to the motivation of women for early detection. Today women know that the early discovery of a small nodule on the breast will not only save their life, but will make it possible to preserve their body image, with more tailored therapies.
INTERVIEW WITH ROBERTO ORECCHIA

What have been the highlights of your career?
The key step in my career, after more than ten years at the University of Turin, came in 1994 when I became Full Professor of Radiation Oncology at the University of Milan. That year, the European Institute of Oncology (EIO) had just been set up in Milan by Professor Umberto Veronesi. Professor Veronesi took me on as Director of the Radiotherapy Department and invited me to translate my accumulated experience to the clinic. Another key step was in 2001, when the Italian Ministry of Health approved and financed the construction of the National Centre for Hadrontherapy in Pavia. I still manage it from a scientific perspective. Finally, this year I have been appointed Scientific Director of EIO, succeeding Professor Veronesi.

What are the forthcoming challenges for radiation oncologists?
Radiotherapy is an extraordinary specialty. It has roots in physics, biology, genetics and bioengineering, and represents an essential modality in the treatment of cancer. Its role is destined to increase over time. Technological advances that enable extreme precision, but also an increased ability to select patients based on molecular and biological criteria, will increase its role in oncology. Earlier diagnosis leading to the discovery of low-burden tumours will escalate the demand for local, precise and non-invasive therapies such as irradiation. Indeed, radiotherapy shows great potential for further improvement. It’s up to us to play our role as cancer clinicians able to manage all aspects of the disease.

What does this award mean to you?
It is very important recognition for those who have dedicated much of their life to the care of cancer patients. It also prompts a moment of reflection to help us focus on developing new ideas for the future.

What has been your involvement within ESTRO?
I am very attached to ESTRO. I have been a member of the Board and still participate in several educational and training activities. I believe that scientific societies such as ESTRO have a very important role in the evolution of disciplines, not only from a professional point of view but also in the basic research and development that is the foundation of radiation therapy.
ESTRO Honorary membership is conferred on individuals from around the world who have made an outstanding scientific contribution in the field of oncology.

**LECTURE SUMMARY**

Scientific publishing has looked the same for well over 300 years with a model based on manuscript submission, peer-review, and a print journal, all led by big publishing houses and fuelled by academic library subscriptions. That old model is about to change forever, driven by the push for open access, by electronic journals, and by a whole new business model that cuts out the libraries and, potentially, the old publishing Leviathans too. At the moment there is chaos with new open access journals emerging like weeds every day. Their provenance is uncertain and there appears to be little peer-review. In time, however, these predatory journals will largely disappear but a few will survive to become the new e-journal giants. In addition, the medical societies and even the publishing houses are starting to fight back and reclaim a large part of the open-access space. Order will be restored but when it is, the days of traditional peer-review are likely to be over. Within five to ten years, it is probable that all methodologically-sound papers will be published and readers will determine the value of the science in a post-publication, dynamic and interactive way. The Facebook and crowdsourcing generation has come of age and its relationship to hierarchy and the published word is very different from those that came before. Prepare for huge changes in the way you receive the evidence that will drive your future practice.
INTERVIEW WITH ANTHONY ZIETMAN

What do you think are the next challenges for radiation oncologists?
Radiation oncology is at a branch point in its evolution. We are using our advanced technologies to move away from the conservative, fractionation-based approaches of yesterday towards image-guided, ablative approaches that ally us closely with our colleagues in interventional radiology. They are keen to get out of their interventional suites and into the multidisciplinary clinic. We are keen to broaden our portfolio. I envisage a future in which some trainees in radiation oncology co-train with interventional radiologists to form the basis of a new specialty, which might be called “image-guided oncology”. The emerging paradigm of aggressive treatment for oligo-metastatic disease is only going to drive this faster and harder. In my remaining ten years as an academic I would like to help facilitate the birth of this new specialty.

What have been the highlights of your career?
One of the great pleasures of my career so far has been editing the Red Journal (International Journal of Radiation Oncology • Biology • Physics). As a European, living in the United States, having received some of my training in Africa and now spending much time in Asia, I truly want to capitalise the first word of the journal’s full title, International. I am soliciting manuscripts from around the globe, and recruiting many international radiation oncologists as working members of the editorial board, and, through an ongoing series of articles, highlighting the unique challenges of radiation oncologists working in every continent. This journal, through its high profile, has a responsibility to promote global integrity in science and in the global fraternity, united by our common experiences and sacred dedication to patient care.

What do you do in your spare time?
In my spare time, I am an enthusiastic salsa dancer and, if my life had taken a different turn, would have made a career out of this. For now, my wife and I always take the many academic opportunities we are lucky to have to travel. We have certainly danced in more capital cities than any other radiation oncologists we know. We have, of course, danced in Vienna!
HONORARY AWARD LECTURE
The evolution of treatment of localised rectal cancer: Multidisciplinarity starts at home

Andrés Cervantes
Biomedical Research Institute INCLIVA, University of Valencia, Valencia, Spain

LECTURE SUMMARY
Everybody agrees that a multidisciplinary team approach is an essential strategy for a successful approach to localised rectal cancer. However, its implementation in every single institution requires a coordinated effort. Working together in an optimal manner takes time and requires personal adjustment. However, this interactive process will impact positively on a series of outcomes, particularly patient outcomes. Among them, I am going to underline the importance of multidisciplinarity as the optimal setting to promote and facilitate clinical research.

Our multidisciplinary group was set up in 1998 and since then, we have published a series of articles on this topic that have contributed to questions of interest. Our first study was on...
macroscopic assessment of resected specimens to classify them as complete, partially complete and incomplete. This study co-incided with Phil Quirke’s definition of the surgical plane of mesorectal specimens, and confirmed that incomplete specimens are related to a higher risk of local relapse. It highlighted the importance of this parameter in the pathology report.

It is our view that some rectal cancer patients are over-treated and that not all patients require neoadjuvant treatment. We explored this issue in a retrospective analysis of our series. Patients with clinical stage N+, who did not get preoperative treatment, had excellent outcomes provided the mesorectal fascia was not involved or threatened by the tumour front. However, those presenting with an involvement of the fascia had a much higher risk of local relapse. An improvement in the definition of nodal involvement was needed and has happened over time. Techniques to increase nodal yield were also developed. It is critical for us to work towards better selection of patients for neoadjuvant therapy through discussion of each patient at the multidisciplinary team meeting.

**INTERVIEW WITH ANDRÉS CERVANTES**

**What does this award mean to you?**

I feel very honoured to receive this award. I did not expect it. I am not even sure if I deserve it, but I respect the decision of a relevant and committed oncology society such as ESTRO, founded almost 35 years ago. I accept this award as a professional privilege and great honour.

Although our education is in general strongly individualistic, our professional work teaches us that working within a team allows everyone to reach better outcomes and to overcome challenges together that we cannot surmount alone. This award will stimulate me to continue team-building. Talking and listening to other professionals involved in cancer research and care is essential to fulfil our commitment as cancer doctors.

**To whom would you like to dedicate your award?**

I would like to dedicate this award first to my family, to my wife Laura and my five children. They are very well aware how hard it is to combine a dedicated professional career with the daily challenges of family life. But I would also like to dedicate it to my colleagues with whom I share the daily task of giving patients all we think is good for them.

Finally, I would also like to dedicate it to my patients. Their confidence and their support stimulates us to go on with our professional activity.
What has been your involvement within ESTRO?
I have cooperated with ESTRO in two ways. First, I participated for several years in the ESTRO course on rectal cancer, organised by Professor Valentini in Madrid, Istanbul and Prague. It was a wonderful opportunity to share with a multidisciplinary faculty team our views on the best treatments, and to teach professionals about current developments in rectal cancer. Second, as Chair of the ESMO Guidelines Committee, which has produced joint guidelines on several diseases in conjunction with relevant professional societies such as ESTRO, ESSO and ESGO. I hope this activity will continue in the future, expressing as it does our commitment to serving our society members and patients.
HIGHLIGHT OF PAPERS

Utilisation of radiotherapy in Norway after the implementation of the national cancer plan – a national, population-based study

Linn M. Åsli, Stein O. Kvaløy, Vidar Jetne, Tor Å. Myklebust, Sverre G. Levernes, Kjell M. Tveit, Tor O. Green, Tom B. Johannesen


CORRESPONDING AUTHOR:
Linn M. Åsli
PhD student, clinical oncologist
Cancer Registry of Norway,
Institute of Population-Based Cancer Research,
Oslo, Norway

ESTRO representatives on ECC2015’s scientific committee have selected some interesting papers from the radiation oncology track that were presented on site. So if you couldn’t attend the meeting, here is a quick catch up.

In any country it is important to document accurate population-based utilisation rates of radiotherapy and compare them with optimal rates to determine the required future capacity of radiotherapy services, thereby ensuring adequate access. Major economic investment in cancer care was recommended in the Norwegian National Cancer Plan (NCP) in 1997, with the aim of doubling the capacity of radiotherapy services. This population-based cohort study used complete, high-quality data from the Cancer Registry of Norway to estimate actual utilisation rates of radiotherapy in Norway, describe time trends (1997-2010), and compare these estimates with the corresponding optimal radiotherapy rates.

We identified all patients diagnosed with cancer and/or treated with radiotherapy for cancer in Norway, from 1997-2010. Radiotherapy utilisation rates (RURs) were calculated as (1) the proportion of incident cancer cases which received radiotherapy at least once within 1 year of diagnosis (RUR1Y); and (2) the proportion who received radiotherapy within 5 years of diagnosis (RUR5Y). The number of radiotherapy treatment courses per incident cancer case (TCI) was also calculated for all cancer sites combined. The actual RURs were compared with corresponding Australian and Canadian epidemiological- and evidence-based model estimates (A- and C-EBESTs) and criterion-based benchmark estimates of optimal RURs. The TCIs were compared with TCI estimates from the 1997 NCP. Joinpoint regression analyses identified changes in time-trends, and annual percentage change in actual radiotherapy rates was estimated.

We found that the actual RUR5Y (all sites) increased significantly to 29% in 2005 but still differed markedly from the Australian EBEST of 48%. With the exception of RURs for breast cancer and RUR1Y for lung cancers, all actual RURs were markedly lower than optimal rates. The actual TCI increased significantly during
the study period, reaching 42.5% in 2010, but was still lower than the 54% recommended in the 1997 NCP. The trend for $R_{1Y}$ (all sites) and TCI changed significantly. The annual percentage change was largest during the first part of the study period, corresponding to the time period when most of the new radiotherapy facilities were implemented.

We concluded that utilisation rates of radiotherapy in Norway rose after the NCP was implemented and radiotherapy capacity was increased, but they still seem to be markedly lower than optimal levels.

**REFERENCE**


Proportion of incident cancer cases treated by radiotherapy within 1 year ($R_{1Y}$) and proportion treated by radiotherapy within 5 years ($R_{5Y}$) of diagnosis in Norway (1997-2009) compared with Australian (A) and Canadian (C) epidemiological- and evidence-based estimates (EBEST) of optimal lifetime proportions. *Abbreviation: MCUT = Multicohort Current Utilization Table-method estimates of lifetime utilization rates based on current medical practice [1]. Short horizontal lines around point-estimates represent 95% confidence intervals. *EBESTs adjusted to exclude carcinoma in situ.*
Adaptive radiotherapy, in which the treated region is modified as treatment progresses, remains the holy grail of personalised radiotherapy. As yet this is out of the reach of daily practice because of the extensive time requirement of repeated manual definition of the clinical target volume (CTV). The purpose of the project was to develop and assess novel machine learning algorithms to automate the creation of CTVs from gross tumour volumes (GTVs).

We selected 30 CT scans of patients with head and neck oropharyngeal cancers to develop machine learning algorithms. Each CT slice was segmented into homogenous regions (superpixels) using the simple linear iterative clustering (SLIC) procedure.

Superpixels belonging to the GTV were found by training a Support Vector Machine (SVM) to distinguish between superpixels whose cancerous status was known. The trained SVM was then able to classify unseen superpixels with an accuracy of 72%.

The probability of each superpixel belonging to the CTV was estimated by solving the Heat equation, a parabolic partial differential equation, on the graph of superpixels, with the GTV held at a constant high temperature and superpixels distant from the GTV at zero. The “thermal conductivity” between superpixels was based on their proximity together with their texture and intensity similarities. Voids and bone, which should be excluded from the CTV, were automatically identified and masked while the Heat equation was solved.

The computer generated CTVs were compared using Dice and precision-recall comparison statistics to the actual CTVs used to treat the patients. Testing was performed using the leave-one-out procedure. Slices from each patient were withheld and the remaining patients used for training the algorithm, which was then evaluated on the held-out slices. This was repeated for each patient in turn and the test results averaged over the held-out slices are reported. An additional ten patients were held out for further testing.

The computer-generated CTVs corresponded closely to the physician’s contours and, importantly, avoided both bone and air spaces. The median Dice score over 460 slices was 83%, with an inter-quartile range of 77-86%.

We conclude that novel machine learning algorithms that utilise learning on graphs of...
superpixels can generate CTVs from GTVs that closely approximate physician contours for head and neck cancer. We predict that this advance in radiotherapy planning may in future allow the automation of CTV definition and make daily automatic adaptive radiotherapy a real possibility.

A CT slice with a Dice score of 83%, showing the GTV (red) and the physician-marked CTV (green) together with the solution to the Heat equation on superpixels and the machine-generated CTV (magenta).
HIGHLIGHT OF PAPERS
Safety assessment of molecular targeted therapies in association with radiotherapy in metastatic renal-cell carcinoma: a real-life report


Paper as yet unpublished

CORRESPONDING AUTHOR:
Romain Rivoirard (MD)
Department of Medical Oncology,
Lucien Neuwirth Cancer Institute,
Saint Priest-En-Jarez, France

Molecular targeted therapies (TT) are the cornerstone of treatment for metastatic renal cell carcinoma (RCC). In addition, radiotherapy (RT) can be given for palliation. There is a paucity of data on the safety of the RT-TT association, in either sequential or concomitant setting.

We assessed the safety of the RT-TT association retrospectively. From 2006 to 2014, data from 84 consecutive patients treated with RT and TT for metastatic RCC were collected. The median follow-up was 9.5 months (range: 1 – 67). RT-TT sequential and concomitant associations were defined respectively by a time interval of >5 TT half-lives and ≤5 TT half-lives between the last TT administration and RT initiation. Toxicities in RT fields were systematically assessed, using the Common Terminology Criteria for Adverse Events v4.0.

Many patients received several TT and RT courses. We analysed 136 RT-TT associations, with 66 sequential and 70 concomitant schemes. RT was mainly delivered to bone (75%), and brain metastases (14.7%). TTs were tyrosine kinase inhibitors (73.5%), mTOR inhibitors (19.8%), and monoclonal antibodies (6.7%). With a median follow up of 9.5 months, whatever the sequence, no grade ≥4 toxicity was reported. Two grade 3 toxicities were reported with sequential (3%) and concomitant (2.9%) RT-TT associations. Although the retrospective nature of the study is a limitation, the safety profile of the RT-TT association was consistent with previous reports in other solid tumours.

The present retrospective analysis is, to our knowledge, the largest study examining the safety of the RT-TT association in metastatic RCC. Neither sequential nor concomitant RT-TT associations appear to cause major toxicity.
HIGHLIGHT OF PAPERS

15O-H2O PET/CT confirms early post-radiotherapy changes of heart perfusion in breast carcinoma patients

Agnieszka Zyromska, Bogdan Małkowski, Tomasz Wiśniewski, Karolina Majewska

Paper as yet unpublished

CORRESPONDING AUTHOR:
Zyromska Agnieszka (MD)
Department of Oncology and Brachytherapy, Nicolaus Copernicus University in Torun, Collegium Medicum in Bydgoszcz
Bydgoszcz, Poland

Background
Although the heart is considered a radiosensitive and radiation dose-limiting organ, whether contemporary techniques of radiotherapy (RT) cause heart toxicity in irradiated breast cancer patients is still being debated. One gold standard for myocardial blood flow assessment is 15O-H2O PET/CT. However, it has never been used for the assessment of post-RT heart damage in irradiated patients.

Aim
1. To assess myocardial blood flow (MBF) in irradiated breast cancer patients prospectively using 15O-H2O PET/CT: before RT and 2 and 8 months after RT
2. To analyse the localisation of MBF disturbances within the heart
3. To analyse a dose-effect correlation.

Material and Methods
15 (6 right-sided and 9 left-sided) breast cancer patients with a mean age of 50.5 years underwent 15O-H2O PET/CT. All patients received tangential photon RT to the breast or chest wall to standard total doses. Each patient underwent rest and stress (after adenosine-induced vasodilation) heart imaging. MBF was quantitatively assessed and analysed on a per-segment basis according to the 17-segment model of the heart myocardium of the American Heart Association.

Results
Two months after RT, MBF decreased in 53% of cases independently on the irradiated side. The stress test appeared more sensitive and demonstrated decreased perfusion in the segments supplied by the left anterior descending artery (LAD) (5.41 +/- 1.74 ml/(g*min) vs. 4.52 +/- 1.82 ml/(g*min); p=0.018) as well as a decrease of a global heart perfusion (5.14 +/-1.49 ml/(g*min) vs. 4.46 +/-1.73 ml/(g*min); p=0.036) as early as two months after RT. In the anterior wall of apical and mid-cavity area of the left ventricle (LAD territory), the perfusion decrease persisted for the next six months (5.41 +/- 1.74 ml/(g*min) vs. 4.40 +/- 1.38 ml/(g*min); p=0.032). The rest test showed MBF changes in only one segment (7) supplied by LAD (1.23 +/-0.3 ml/(g*min) vs. 1.09 +/- 0.24 ml/(g*min); p=0.026). A minimal radiation dose absorbed by LAD appeared to be the only parameter that correlated with MBF changes observed two months after RT (r=-0.57; p=0.032).
Conclusion
In breast cancer patients $^{15}$O-H$_2$O PET/CT confirms early post-RT changes of heart perfusion, independent of the irradiated side. $^{15}$O-H$_2$O PET/CT is a sensitive tool for detecting radiation-induced MBF disturbances.
# EVENTS DIRECTORY

**2015 - 2016**

ECCO - the European CanCer Organisation organises multidisciplinary meetings of excellence on behalf of its Members:

<table>
<thead>
<tr>
<th>EVENTS</th>
<th>SAVE THE DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>9 – 11 March 2016</td>
</tr>
<tr>
<td>EBCC10</td>
<td>Amsterdam, The Netherlands</td>
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<tr>
<td></td>
<td>10th European Breast Cancer Conference</td>
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<tr>
<td></td>
<td>21 – 23 March 2016</td>
</tr>
<tr>
<td>ITOC3</td>
<td>Munich, Germany</td>
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<tr>
<td></td>
<td>3rd Immunotherapy of Cancer Conference</td>
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<tr>
<td></td>
<td>18 – 24 June 2016</td>
</tr>
<tr>
<td>MCCR Workshop</td>
<td>Zeist, Netherlands</td>
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<tr>
<td></td>
<td>Joint ECCO-AACR-EORTC-ESMO Workshop on Methods in Clinical Cancer Research</td>
</tr>
<tr>
<td></td>
<td>9 – 12 July 2016</td>
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<tr>
<td>EACR24</td>
<td>Manchester, United Kingdom</td>
</tr>
<tr>
<td></td>
<td>24th Biennial Congress of the European Association for Cancer Research</td>
</tr>
<tr>
<td></td>
<td>14 – 16 September 2016</td>
</tr>
<tr>
<td>esso36</td>
<td>Krakow, Poland</td>
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<tr>
<td></td>
<td>in partnership with the Polish Society of Surgical Oncology</td>
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<tr>
<td></td>
<td>29 November – 2 December 2016</td>
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<tr>
<td>EORDEC NCI AACR 2016</td>
<td>Munich, Germany</td>
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<td></td>
<td>ENA2016</td>
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<td></td>
<td>28th EORTC-NCI-AACR Symposium on Molecular Targets and Cancer Therapeutics</td>
</tr>
</tbody>
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To discover more about ECCO, visit: [www.ecco-org.eu](http://www.ecco-org.eu)
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REGULAR RATE REGISTRATION DEADLINE: 25 JANUARY 2016

www.ecco-org.eu/EBCC
CALENDAR
OF EVENTS
<table>
<thead>
<tr>
<th>Event Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>**5 - 7 NOVEMBER 2015</td>
</tr>
<tr>
<td><strong>ABC3: Advanced Breast Cancer Third International Consensus Conference</strong></td>
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<td><a href="http://www.abc-lisbon.org">www.abc-lisbon.org</a></td>
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<tr>
<td>**5 - 7 NOVEMBER 2015</td>
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<tr>
<td><strong>ESDE Congress - Congress of the European Society for Diseases of the Esophagus</strong></td>
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<tr>
<td>**7 - 9 NOVEMBER 2015</td>
</tr>
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<td><strong>The International Head and Neck Cancer Conference: An Integrated Prospect</strong></td>
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<tr>
<td>**7 - 10 NOVEMBER 2015</td>
</tr>
<tr>
<td><strong>XXV National Congress AIRO</strong></td>
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<td><a href="http://www.airo2015.com">www.airo2015.com</a></td>
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<tr>
<td>**11 - 13 NOVEMBER 2015</td>
</tr>
<tr>
<td><strong>Anatomy and Radiology Contouring Bootcamp for Radiation Oncology Residents</strong></td>
</tr>
<tr>
<td><a href="http://www.arcbootcamp.com">www.arcbootcamp.com</a></td>
</tr>
<tr>
<td>**12 - 15 NOVEMBER 2015</td>
</tr>
<tr>
<td><strong>EMUC - 7th European Multidisciplinary Meeting on Urological Cancers</strong></td>
</tr>
<tr>
<td><a href="http://emuc15.uroweb.org">emuc15.uroweb.org</a></td>
</tr>
<tr>
<td>**17 NOVEMBER 2015</td>
</tr>
<tr>
<td><strong>3rd GEC-ESTRO workshop</strong></td>
</tr>
<tr>
<td><a href="http://www.estro.org/congresses-meetings/items/3rd-gec-estro-workshop">www.estro.org/congresses-meetings/items/3rd-gec-estro-workshop</a></td>
</tr>
<tr>
<td>**18 NOVEMBER 2015</td>
</tr>
<tr>
<td><strong>State of the Art in Multidisciplinary Approach for Oncological Treatment Event</strong></td>
</tr>
</tbody>
</table>
18 NOVEMBER 2015 | MOSCOW, RUSSIA
Joint ESTRO-RUSSCO Session “Colorectal Cancer: Standards and New Options”
at the Russian National Cancer Congress 2015
www.oncology.ru/events/2015/11/17/program/>

24 - 25 NOVEMBER 2015 | BRUSSELS, BELGIUM
COCIR (European Coordination Committee of the Radiological, Electromedical and
Healthcare IT Industry) eHealth Summit
www.cocir.org>

26 NOVEMBER 2015 | POZNAN, POLAND
Young Scientists’ Forum 2015
www.wco.pl/ysf2015>

FEBRUARY 2016
15 - 19 FEBRUARY 2016 | GENEVA, SWITZERLAND
ICTR-PHE 2016, International Conference on Translational Research
in Radiation Oncology
ictr-phe16.web.cern.ch>

MARCH 2016
9 - 11 MARCH 2016 | AMSTERDAM, THE NETHERLANDS
EBCC 10 - European Breast Cancer Conference
ESTRO Workshop on Accelerated Partial Breast Irradiation: Current Status and Perspectives
www.ecco-org.eu/EBCC>

21 - 23 MARCH 2016 | GHENT, BELGIUM
3rd Symposium on Small Animal Radiotherapy
APRIL 2016

13 - 16 APRIL 2016 | GENEVA, SWITZERLAND
**ELCC - 6th European Lung Cancer Conference**
www.esmo.org/Conferences/ELCC-2016-Lung-Cancer >

29 APRIL - 3 MAY 2016 | TURIN, ITALY
**ESTRO 35**
www.estro.org/congresses-meetings/items/estro-35 >

MAY 2016

6 - 7 MAY 2016 | SANTIAGO DE CHILE, CHILE
**1st International ecancer Symposium on Radiotherapy**

JUNE 2016

27 - 29 JUNE 2016 | SAN FRANCISCO, USA
**6th World Congress of Brachytherapy**
www.americanbrachytherapy.org/meetings >

NOVEMBER 2016

24 - 27 NOVEMBER 2016 | MILAN, ITALY
**EMUC**

DECEMBER 2016

7 - 11 DECEMBER 2016 | OBERGURGL, AUSTRIA
**Cancer Stem Cells (CSCs): Impact on Treatment 2016**
transidee-conference.uibk.ac.at/CSC2016 >
ESTRO
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N° 103 | November - December 2015
European Society for Radiotherapy & Oncology

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cecile.hardon@estro.org

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