ESTRO

NEWSLETTER MAY - JUNE

ESTRO | EUROPEAN SOCIETY FOR RADIOTHERAPY & ONCOLOGY

BRACHYTHERAPY

Introducing the new GEC-ESTRO committee chair-elect

PHYSICS

2nd ESTRO Physics workshop: Science in development

RTT

RTT education: Where do we stand?

N° 118 | BIMONTHLY | MAY - JUNE 2018

ESTRO MEETS ASIA 2018

7-9 December 2018
Singapore

DEADLINES

Abstract submission:
11 June 2018

Early registration:
31 July 2018

Late registration:
5 November 2018

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ESTRO
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NEWSLETTER N° 118
MAY - JUNE 2018

View of Singapore, where ESTRO Meets Asia will take place, 7-9 December 2018

ESTRO | EUROPEAN SOCIETY FOR RADIOTHERAPY & ONCOLOGY

EDITORIAL

"I take on ESTRO's presidency with eagerness and pride"

Dear friends and colleagues,

In my first editorial as ESTRO President, I would like to dedicate my opening words to Yolande Lievens, who recently passed on to me the huge honour and responsibility of being at our Society's helm for the next two years. Yolande gave ESTRO the best of herself, including many hours and much dedication, and we have all profited from her devotion to the Society. I am certain that I speak for all ESTRO members when I express my deepest gratitude to our now Past-President.

I take on ESTRO's presidency with eagerness and pride. The next two years will be vital for our Society, in developing and affirming the new ESTRO Vision and taking on the challenges that the changes in healthcare landscape will put before us. The preparatory work for the new Vision statement has already started, with ESTRO members from all specialties and ages coming together in February this year to brainstorm on the future of our discipline. ▼

Umberto Ricardi

Many good ideas came out of these discussions, and I will do my best to implement them – so stay tuned, we will need the contribution and enthusiasm of all to achieve this.

Work on the programme for ESTRO 38 has already begun, and I am very excited to share with you the conference's theme: 'Targeting optimal care, together'. I hope that this statement reflects ESTRO's conviction in the importance of multi-professional and multidisciplinary collaboration in cancer care. We are working on a very interesting programme, which should, once again, be the core of a successful conference in the beautiful city of Milan, Italy, in April next year.

The most challenging aspect of running a successful scientific society is to understand the different needs and priorities of the generations who constitute the membership; to do that, we need fresh blood to bring new ideas and suggestions for projects that are specifically designed to achieve this. In this way, the active involvement of young members is of strategic importance.

I could not finish this editorial without a special mention of the ever-increasing importance of the role of national societies in ESTRO. For five years, I was chair of the national societies committee, and through this position I learnt a lot about the specific challenges faced by our members in each of their countries. There is still a lot of work to be done to ensure the appropriate recognition of our discipline in many European countries, and I am certain that ESTRO has a fundamental role to play in increasing awareness of radiation oncology at the national level, so count on me to help drive this collaboration.

I look forward to meeting you all again soon.

Umberto Ricardi
ESTRO President

ESTRO 37 report

6,211 of you joined us for the successful ESTRO 37 in Barcelona, Spain, last April. Do not miss the July-August issue of the newsletter in which all the corners will report on relevant tracks and fields of interest.

SOCIETY LIFE

“It is now time to start looking ahead to future events and projects”

Welcome to the first newsletter after ESTRO 37 in sunny Barcelona, Spain.

I think we can all agree that it was a very successful and enjoyable meeting, and a privilege to meet and network with colleagues and friends. It is now time to start looking ahead to future events and projects.

ESTRO is a partner in the Global Impact of Radiotherapy in Oncology (GIRO) group, which aims to improve access to radiotherapy around the world. In this Corner, we include a description of a GIRO survey, which is designed to give us a better understanding of patterns of care in radiation oncology. We encourage all our members to complete the survey.

I would also like to invite you to read more on OligoCare, a joint ESTRO-EORTC collaboration designed to collect evidence for best practice in the treatment of oligometastases.

Finally, I am also delighted to announce that ESTRO has recently signed a memorandum of understanding (MoU) with the Chilean Radiation Oncology Society. This is another demonstration of how ESTRO is seeking to forge strategic links with radiation societies outside Europe. More information is available in this Corner.

Umberto Ricardi
ESTRO President

UMBERTO RICARDI

Help us improve world-wide access to radiotherapy

Take part in the ESTRO Global Impact of Radiotherapy in Oncology (GIRO) survey!

We want to understand better how external beam radiotherapy is used in practice by radiation oncologists in the treatment of breast, prostate and cervical cancers and bone metastases. Help us by completing the GIRO survey today.

The ESTRO Global Impact of Radiotherapy in Oncology (GIRO) partnership was launched in May 2017 at ESTRO 36 in Vienna, Austria, to pursue a data-driven approach to improving access to radiotherapy around the world. The GIRO partnership aims to unite leaders in radiation oncology to tackle current problems, develop solutions, and, ultimately, improve cancer outcomes and save lives.

With this vision in mind, GIRO is initiating the first international study of patterns of care in radiation oncology. It aims to evaluate the use of hypofractionated external beam radiotherapy in the treatment of breast cancer, prostate cancer, cervical cancer and bone metastases.

As a practising radiation oncologist, you are invited to participate in this survey. This information will help us to understand how evidence is shared within our community and what the drivers and / or barriers are to adopting specific treatment strategies and to support the development of new models for radiotherapy delivery.

Please complete the survey at:
www.surveymonkey.com/r/58XMCKS

The survey must be completed in a single session, which should take about ten minutes. Your participation is completely voluntary and all responses will be kept confidential and anonymised.

Thank you for participating and for your commitment to improving access to radiotherapy.

On behalf of the GIRO partnership,

Yolande Lievens, Eduardo Zubizarreta and Danielle Rodin

For more information about GIRO, please visit us at http://giro-rt.org

For further information, please email Gabriella Axelsson: gaxelsson@estro.org

GIRO GLOBAL IMPACT RADIOTHERAPY IN ONCOLOGY
saving one million lives by 2035

OligoCare

A prospective registry trial to evaluate radical radiotherapy for oligometastatic cancer patients

Collaborate in a new joint ESTRO and European Organisation for Research and Treatment of Cancer (EORTC) Study

Purpose

Despite its almost universal use, the level of evidence supporting radical local treatment in general for oligometastatic patients, and stereotactic radiotherapy in particular is low. Uncertainties and variability in practice are therefore huge and it seems highly unlikely or even impossible that these issues will be solved within the traditional framework of prospective randomized trials.

The initiative therefore aims at setting up a registry trial to evaluate patterns-of-care and patterns-of-outcome after radical treatment for oligometastatic disease, as well as patient, tumor, diagnostic and treatment factors influencing outcome.

Patients

- We are studying patients with non-small cell lung cancer, breast cancer, prostate cancer and colorectal cancer.
- This includes all active cancer lesions (loco-regional primary and all oligometastases) treated with radical intent.
- Radical radiotherapy (defined as minimum 50 Gy EQD2/10 biological dose threshold delivered in a maximum of 12 fractions) must be a component of treatment of oligometastases.
- There is no upper limit of metastases treated and no restrictions regarding imaging used.

Study design

The study is a prospective registry trial evaluation. Patient, tumour, treatment and outcome characteristics will be collected in a pragmatic way after the delivery of treatment, at six and 12 months and annually thereafter.

Interested in collaborating?

Please provide us with your details at:
eortc.wufoo.eu/forms/samy6re10j7jz0

Agreement signed with the Chilean Radiation Oncology Society

ESTRO-SOCHIRA

DR ANDRÉS CÓRDOVA B

Changes in radiation oncology are rapidly improving the outcomes for our patients. At the same time, we are facing new and challenging health problems that can only be addressed by staying up to date with the latest advances. Modern technology not only provides our patients with better treatments, it also offers professionals the ability to share knowledge more quickly.

The Chilean Radiation Oncology Society has almost 100 active members, including physicians, medical physicists and medical technologists. We really appreciate the opportunity ESTRO has given our members of joining ESTRO and taking advantage of its broad learning opportunities, including accessing *Radiotherapy & Oncology*, the ESTRO guidelines and taking advantage of the range of excellent ESTRO School courses. This agreement is a big step forward for our members. We are especially thankful for the radiation therapists (RTTs) agreement that provides very convenient access for our dosimetrists and technicians. We are sure that these agreements will be the cornerstone for a long-lasting collaboration between our societies.

Dr Andrés Córdova B
President
Sociedad Chilena de Radioterapia Oncológica
(Chilean Radiation Oncology Society)
(SOCHIRA)

READ IT BEFORE YOUR PATIENTS

READ IT BEFORE YOUR PATIENTS

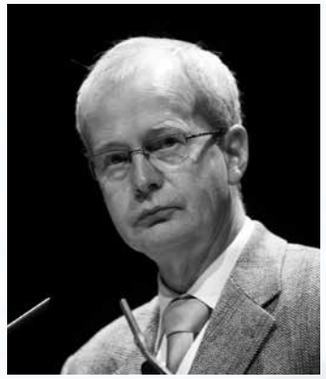
Too important to miss...

A digest of essential reading for all radiation oncologists

BY PHILIPPE LAMBIN, DIRK DE RUYSSCHER AND HANS KAANDERS

PHILIPPE LAMBIN

DIRK DE RUYSSCHER



HANS KAANDERS

READ IT BEFORE YOUR PATIENTS

BREAST

Partial-breast radiotherapy after breast conservation surgery for patients with early breast cancer (UK IMPORT LOW trial): five-year results from a multicentre, randomised, controlled, phase 3, non-inferiority trial

Coles CE, Griffin CL, Kirby AM, Titley J, Agrawal RK, Alhasso A, Bhattacharya IS, Brunt AM, Ciurlionis L, Chan C, Donovan EM, Emson MA, Harnett AN, Haviland JS, Hopwood P, Jefford ML, Kaggwa R, Sawyer EJ, Syndikus I, Tsang YM, Wheatley DA, Wilcox M, Yarnold JR, Bliss JM; IMPORT Trialists.

The Lancet Volume 390, No. 10099, p1048–1060, 9 September 2017. DOI: https://doi.org/10.1016/S0140-6736(17)31145-5

Background

Local cancer relapse risk after breast conservation surgery followed by radiotherapy has fallen sharply in many countries, and is influenced by patient age and clinicopathological factors. We hypothesise that partial-breast radiotherapy restricted to the vicinity of the original tumour in women at lower than average risk of local relapse will improve the balance of beneficial versus adverse effects compared with whole-breast radiotherapy.

Methods

IMPORT LOW is a multicentre, randomised, controlled, phase 3, non-inferiority trial done in 30 radiotherapy centres in the UK. Women aged 50 years or older who had undergone breast-conserving surgery for unifocal invasive ductal adenocarcinoma of grade 1-3, with a tumour size of 3cm or less (pT1-2), none to three positive axillary nodes (pN0-1), and minimum microscopic margins of non-cancerous tissue of 2mm or more, were recruited. Patients were randomly assigned (1:1:1) to receive 40 Gy whole-breast radiotherapy (control), 36 Gy whole-breast radiotherapy and 40 Gy to the partial breast (reduced-dose group), or 40 Gy to the partial breast only (partial-breast group) in 15 daily treatment fractions. Computer-generated random permuted blocks (mixed sizes of six and nine) were used to assign patients to groups, stratifying patients by radiotherapy treatment centre. Patients and clinicians were not masked to treatment allocation. Field-in-field intensity-modulated radiotherapy was delivered using standard tangential beams that were simply reduced in length for the partial-breast group. The primary endpoint was ipsilateral local relapse (80% power to exclude a 2.5% increase [non-inferiority margin] at five years for each experimental group; non-inferiority was shown if the upper limit of the two-sided 95% CI for the local relapse hazard ratio [HR] was less than 2.03), analysed by intention to treat. Safety analyses were done in all patients for whom data was available (i.e. a modified intention-to-treat population). This study is registered in the ISRCTN registry, number ISRCTN12852634.

Findings

Between 3 May 2007, and 5 October 2010, 2018 women were recruited. Two women withdrew consent for use of their data in the analysis. In total, 674 patients were analysed in the whole-breast radiotherapy (control) group, 673 in the reduced-dose group, and 669 in the partial-breast group. Median follow-up was 72.2 months (IQR 61.7-83.2), and five-year estimates of local relapse cumulative incidence were 1.1% (95% CI 0.5-2.3) of patients in the control group, 0.2% (0.02-1.2) in the reduced-dose group, and 0.5% (0.2-1.4) in the partial-breast group. Estimated five-year absolute differences in local relapse compared with the control group were -0.73% (-0.99 to 0.22) for the reduced-dose and -0.38% (-0.84 to 0.90) for the partial-breast groups. Non-inferiority ▼

can be claimed for both reduced-dose and partial-breast radiotherapy, and was confirmed by the test against the critical HR being more than 2.03 (p=0.003 for the reduced-dose group and p=0.016 for the partial-breast group, compared with the whole-breast radiotherapy group). Photographic, patient, and clinical assessments recorded similar adverse effects after reduced-dose or partial-breast radiotherapy, including two patient domains achieving statistically significantly lower adverse effects (change in breast appearance [p=0.007 for partial-breast] and breast harder or firmer [p=0.002 for reduced-dose and p<0.0001 for partial-breast]) compared with whole-breast radiotherapy.

Interpretation

We showed non-inferiority of partial-breast and reduced-dose radiotherapy compared with the standard whole-breast radiotherapy in terms of local relapse in a cohort of patients with early breast cancer, and equivalent or fewer late normal-tissue adverse effects were seen. This simple radiotherapy technique is implementable in radiotherapy centres worldwide.

ctRO
Clinical and Translational Radiation Oncology

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To submit your paper to *ctRO* and take advantage of the discounted publication charge that is offered to all ESTRO members, please visit: www.ctro.science

Editors-in-chief:
Pierre Blanchard (France) and Daniel Zips (Germany)

ELSEVIER
ESTRO European Society for RADIOTHERAPY & ONCOLOGY

READ IT BEFORE YOUR PATIENTS

BREAST CANCER AND YOGA

The effect of yoga exercise on improving depression, anxiety, and fatigue in women with breast cancer: a randomised controlled trial

Taso CJ1, Lin HS, Lin WL, Chen SM, Huang WT, Chen SW.

J Nurs Res. 2014 Sep; 22(3):155-64. doi: 10.1097/jnr.0000000000000044.

Background

Depression, anxiety, and fatigue are among the most significant problems that influence the quality of life of patients with breast cancer who receive adjuvant chemotherapy. Although evidence has shown yoga to decrease anxiety, depression, and fatigue in patients with cancer, few studies on the effects of yoga have targeted patients with breast cancer. Yoga interventions should be tested to promote the psychological and physical health of women with breast cancer.

Purpose

This study examines the effectiveness of an eight-week yoga exercise programme in promoting the psychological and physical health of women with breast cancer undergoing adjuvant chemotherapy in terms of depression, anxiety and fatigue.

Methods

A sample of 60 women with non-metastatic breast cancer was recruited. Participants were randomly assigned into either the experimental group (n = 30) or the control group (n = 30). A 60-minute, twice-per-week yoga exercise was implemented for eight weeks as the intervention for the participants in the experimental group. The control group received standard care only.

Results

Analysis using the Johnson-Neyman procedure found that the yoga exercise reduced overall fatigue and the interference of fatigue in everyday life for the experimental group participants. Significant reductions were obtained after four weeks of intervention participation for those experimental group patients with relatively low starting baseline values (baseline item mean value < 3.31 and 3.22, respectively) and after eight weeks for most patients (approximately 75%) with moderate starting baseline values (baseline item mean value < 7.30 and 5.34, respectively). The eight-week intervention did not significantly improve the levels of depression ($F = 1.29$, $p > .05$) or anxiety ($F = 2.7$, $p > .05$).

Conclusions / implications for practice

The eight-week yoga exercise programme developed in this study effectively reduced fatigue in patients with breast cancer but did not reduce depression or anxiety. Oncology nurses should strengthen their clinical health education and apply yoga to reduce the fatigue experienced by patients with breast cancer who undergo adjuvant chemotherapy.

READ IT BEFORE YOUR PATIENTS

PROSTATE

Comparison between adjuvant and early-salvage post-prostatectomy radiotherapy for prostate cancer with adverse pathological features

Hwang WL, Tendulkar RD, Niemierko A, Agrawal S, Stephans KL, Spratt DE, Hearn JW, Koontz BF, Lee WR, Michalski JM, Pisansky TM, Liauw SL, Abramowitz MC, Pollack A, Moghanaki D, Anscher MS, Den RB, Zietman AL, Stephenson AJ, Efstathiou JA.

JAMA Oncol. 2018 Jan 25:e175230

Importance
Prostate cancer with adverse pathological features (i.e. pT3 and/or positive margins) after prostatectomy may be managed with adjuvant radiotherapy (ART) or surveillance followed by early-salvage radiotherapy (ESRT) for biochemical recurrence. The optimal timing of postoperative radiotherapy is unclear.

Objective
To compare the clinical outcomes of postoperative ART and ESRT administered to patients with prostate cancer with adverse pathological features.

Design, setting, and participants
This multi-institutional, propensity score-matched cohort study involved 1566 consecutive patients who underwent post-prostatectomy ART or ESRT at 10 US academic medical centres between January 1, 1987, and December 31, 2013. Propensity score 1-to-1 matching was used to account for covariates potentially associated with treatment selection. Data were collected from 1 January 1 to 30 September 2016. Data analysis was conducted from 1 October 2016 to 21 October 2017.

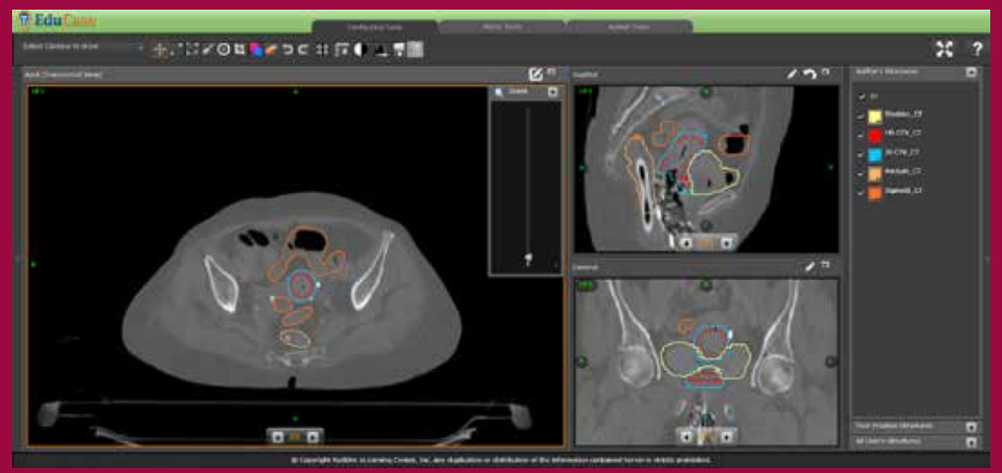
Main outcomes and measures
Freedom from post-irradiation biochemical failure, freedom from distant metastases, and overall survival. All outcomes were measured from date of surgery to address lead-time bias.

Results
Of 1,566 patients, 1,195 with prostate-specific antigen levels lower than 0.1 ng/mL received ESRT and 371 patients with prostate-specific antigen levels of 0.1 to 0.5 ng/mL received ART. The median age (interquartile range) was 60 (55-65) years. After propensity score matching, the median (interquartile range) follow-up after surgery was similar between the ESRT and ART groups (73.3 [44.9-106.6] months vs 65.8 [40-107] months; P = .22). Adjuvant RT, compared with ESRT, was associated with higher freedom from biochemical failure (12-year actuarial rates: 69% [95% CI, 60%-76%] vs 43% [95% CI, 35%-51%]; effect size, 26%), freedom from distant metastases (95% [95% CI, 90%-97%] vs 85% [95% CI, 76%-90%]; effect size, 10%), and overall survival (91% [95% CI, 84%-95%] vs 79% [95% CI, 69%-86%]; effect size, 12%). Adjuvant RT, lower Gleason score and T stage, nodal irradiation, and post-operative androgen deprivation therapy were favourable prognostic features on multivariate analysis for biochemical failure. Sensitivity analysis demonstrated that the decreased risk of biochemical failure associated with ART remained significant unless more than 56% of patients in the ART group were cured by surgery alone. This threshold is greater than the estimated 12-year freedom from biochemical failure rate of 33% to 52% after radical prostatectomy alone, as determined by a contemporary dynamic nomogram. ▼

Conclusions and relevance

Adjuvant RT, compared with ESRT, was associated with reduced biochemical recurrence, distant metastases, and death for high-risk patients, pending prospective validation. These findings suggest that a greater proportion of patients with prostate cancer who have adverse pathological features may benefit from post-prostatectomy ART rather than surveillance followed by ESRT.

FALCON ONLINE CONTOURING WORKSHOP



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6 June and 13 June 2018

www.estro.org/school

READ IT BEFORE YOUR PATIENTS

OESOPHAGEAL

Effect of neoadjuvant chemoradiotherapy on health-related quality of life in oesophageal or junctional cancer: results from the randomised CROSS trial

Noordman BJ, Verdam MGE, Lagarde SM, Hulshof MCCM, van Hagen P, van Berge Henegouwen MI, Wijnhoven BPL, van Laarhoven HWM, Nieuwenhuijzen GAP, Hospers GAP, Bonenkamp JJ, Cuesta MA, Blaisse RJB, Busch OR, Ten Kate FJW, Creemers GM, Punt CJA, Plukker JTM, Verheul HMW, Spillenaar Bilgen EJ, van Dekken H, van der Sangen MJC, Rozema T, Biermann K, Beukema JC, Piet AHM, van Rij CM, Reinders JG, Tilanus HW, Steyerberg EW, van der Gaast A, Sprangers MAG, van Lanschot JJB.

J Clin Oncol. 2018 Jan 20;36(3):268-275.

Purpose

To compare pre-agreed health-related quality of life (HRQOL) domains in patients with oesophageal or junctional cancer who received neoadjuvant chemoradiotherapy (nCRT) followed by surgery or surgery alone. Secondary aims were to examine the effect of nCRT on HRQOL before surgery and the effect of surgery on HRQOL.

Patients and methods

Patients were randomly assigned to nCRT (carboplatin plus paclitaxel with concurrent 41.4-Gy radiotherapy) followed by surgery or surgery alone. HRQOL was measured using the European Organisation for Research and Treatment of Cancer (EORTC) Quality of Life Questionnaire-Core 30 (QLQ-C30) and -Oesophageal Cancer Module (QLQ-OES24) questionnaires pre-treatment and at three, six, nine, and 12 months postoperatively. The nCRT group also received preoperative questionnaires. Physical functioning (PF; QLQ-C30) and eating problems (EA; QLQ-OES24) were chosen as predefined primary end points. Predefined secondary end points were global QOL (GQOL; QLQ-C30), fatigue (FA; QLQ-C30), and emotional problems (EM; QLQ-OES24).

Results

A total of 363 patients were analysed.
No statistically significant differences in postoperative HRQOL were found between treatment groups. In the nCRT group, PF, EA, GQOL, FA, and EM scores deteriorated one week after nCRT (Cohen's d: -0.93, P < .001; 0.47, P < .001; -0.84, P < .001; 1.45, P < .001; and 0.32, P = .001, respectively). In both treatment groups, all end points declined three months postoperatively compared with baseline (Cohen's d: -1.00, 0.33, -0.47, -0.34, and 0.33, respectively; all P < .001), followed by a continuous gradual improvement. EA, GQOL, and EM were restored to baseline levels during follow-up, whereas PF and FA remained impaired one year postoperatively (Cohen's d: 0.52 and -0.53, respectively; both P < .001).

Conclusion

Although HRQOL declined during nCRT, no effect of nCRT was apparent on postoperative HRQOL compared with surgery alone. In addition to the improvement in survival, these findings support the view that nCRT according to the chemoradiotherapy for oesophageal cancer followed by surgery study-regimen can be regarded as a standard of care.

READ IT BEFORE YOUR PATIENTS

LUNG

Post-treatment mortality after surgery and stereotactic body radiotherapy for early-stage non-small-cell lung cancer

Stokes WA, Bronsert MR, Meguid RA, Blum MG, Jones BL, Koshy M, Sher DJ, Louie AV, Palma DA, Senan S, Gaspar LE, Kavanagh BD, Rusthoven CG.

Clin Oncol. 2018 in press http://ascopubs.org/doi/10.1200/JCO.2017.75.6536

Purpose

In early-stage non-small cell lung cancer (NSCLC), post-treatment mortality may influence the comparative effectiveness of surgery and stereotactic body radiotherapy (SBRT), with implications for shared decision-making among high-risk surgical candidates. We analysed early mortality after these interventions using the National Cancer Database.

Patients and methods

We abstracted patients with cT1-T2a, N0, M0 NSCLC diagnosed between 2004 and 2013 undergoing either surgery or SBRT. Thirty-day and 90-day post-treatment mortality rates were calculated and compared using Cox regression and propensity score-matched analyses.

Results

We identified 76,623 patients who underwent surgery (78% lobectomy, 20% sublobar resection, 2% pneumonectomy) and 8,216 patients who received SBRT. In the unmatched cohort, mortality rates were moderately increased with surgery versus SBRT (30 days, 2.07% vs 0.73% [absolute difference (Δ), 1.34%]; P < .001; 90 days, 3.59% vs 2.93% [Δ, 0.66%]; P < .001). Among the 27,200 propensity score-matched patients, these differences increased (30 days, 2.41% vs 0.79% [Δ, 1.62%]; P < .001; 90 days, 4.23% vs 2.82% [Δ, 1.41%]; P < .001). Differences in mortality between surgery and SBRT increased with age, with interaction P < .001 at both 30 days and 90 days (71 to 75 years old: 30-day Δ, 1.87%; 90-day Δ, 2.02%; 76 to 80 years old: 30-day Δ, 2.80%; 90-day Δ, 2.59%; > 80 years old: 30-day Δ, 3.03%; 90-day Δ, 3.67%; all P ≤ .001). Compared with SBRT, surgical mortality rates were higher with increased extent of resection (30-day and 90-day multivariate hazard ratio for mortality: sublobar resection, 2.85 and 1.37; lobectomy, 3.65 and 1.60; pneumonectomy, 14.5 and 5.66; all P < 0.001).

Conclusion

Differences in 30- and 90-day post-treatment mortality between surgery and SBRT increased as a function of age, with the largest differences in favour of SBRT observed among patients older than 70 years. These representative mortality data may inform shared decision-making among patients with early-stage NSCLC who are eligible for both interventions.

READ IT BEFORE YOUR PATIENTS

LUNG

Bayesian adaptive randomization trial of passive scattering proton therapy and intensity-modulated photon radiotherapy for locally advanced non-small-cell lung cancer

Liao Z, Lee JJ, Komaki R, Gomez DR, O'Reilly MS, Fossella FV, Blumenschein GR Jr, Heymach JV, Vaporciyan AA, Swisher SG, Allen PK, Choi NC, DeLaney TF, Hahn SM, Cox JD, Lu CS, Mohan R.

J Clin Oncol. 2018 in press

Purpose

This randomised trial compared outcomes of passive scattering proton therapy (PSPT) versus intensity-modulated (photon) radiotherapy (IMRT), both with concurrent chemotherapy, for inoperable non-small-cell lung cancer (NSCLC). We hypothesised that PSPT exposes less lung tissue to radiation than IMRT and thereby reduces toxicity without compromising tumour control. The primary end points were grade ≥ 3 radiation pneumonitis (RP) and local failure (LF).

Patients and methods

Eligible patients had stage IIB to IIIB NSCLC (or stage IV NSCLC with a single brain metastasis or recurrent lung or mediastinal disease after surgery) who were candidates for concurrent chemoradiation therapy. Pairs of treatment plans for IMRT and PSPT were created for each patient. Patients were eligible for random assignment only if both plans satisfied the same pre-specified dose-volume constraints for at-risk organs at the same tumour dose.

Results

Compared with IMRT (n = 92), PSPT (n = 57) exposed less lung tissue to doses of 5 to 10 Gy(RBE), which is the absorbed Gy dose multiplied by the relative biologic effectiveness (RBE) factor for protons; exposed more lung tissue to ≥ 20 Gy(RBE), but exposed less heart tissue at all dose levels between 5 and 80 Gy(RBE). The grade ≥ 3 RP rate for all patients was 8.1% (IMRT, 6.5%; PSPT, 10.5%); corresponding LF rates were 10.7% (all), 10.9% (IMRT), and 10.5% (PSPT). The posterior probability of IMRT being better than PSPT was 0.54. Exploratory analysis showed that the RP and LF rates at 12 months for patients enrolled before versus after the trial midpoint were 21.1% (before) versus 18.2% (after) for the IMRT group (P = .047) and 31.0% (before) versus 13.1% (after) for the PSPT group (P = .027).

Conclusion

PSPT did not improve dose-volume indices for lung but did for heart. No benefit was noted in RP or LF after PSPT. Improvements in both end points were observed over the course of the trial.

COMMENT

Professor Dirk De Ruysscher,
radiation oncologist, Maastricht University Medical Centre, Department of Radiation Oncology (Maastro clinic), The Netherlands

Proton therapy (PT) has been around for decades and except for some rare tumours, its benefit remains uncertain and is the subject of many controversies and vigorous pro- and contra debates in the literature and at scientific meetings. The reason for this disagreement is that although the irradiated low-dose volume is generally lower with PT than with photons, no clear clinical benefit for PT has been reported for the majority of patient groups [1,2]. A major critique to the PT community is the lack of randomised studies comparing PT to photons. This is often countered by the argument that a reduction of the radiation dose to organs at risk should be beneficial.

The authors of this first randomised trial should therefore be applauded [3]. Even though the outcome for patients was similar for PT and photons, this trial is educative in many respects. As pointed out in an excellent accompanying editorial by Dr Kong [4], although the low-dose areas in the lungs (V5-V10) were reduced by PT, the higher dose regions (V20 and higher) were similar in both arms and the V50 + was even bigger with PT than with photons. The mean lung dose was the same. Even in these highly experienced centres, there was a learning curve, with more recent patients showing an improved outcome, both for PT and for photons. The Bayesian study design contributed to an imbalance between both arms. It can also be questioned if the biological effect of protons was modelled adequately.

In a very interesting abstract presented at the ESTRO 36 congress, Deist and colleagues showed in an exploratory analysis of the same trial that the high dose regions in the lungs have a more pronounced effect on the pulmonary toxicity than the low-dose volumes, both in PT and in photon therapy [5]. This underscores the importance to develop adequate models allowing to select patients for PT, which is the basis for the "model-based" strategy in The Netherlands [6].

In my opinion, there is no argument to randomise all patients between PT and photons without a selection model. In the study design of Liao et al, the DVH parameters of the lungs (co-primary endpoint was radiation pneumonitis) in both arms came pretty close to each other, with a similar incidence of radiation pneumonitis as a result. In future studies, we should first optimise the prediction models for the primary endpoint of the study. Thereafter, the models should be validated prospectively. For some patients, there will be a clear indication for PT whereas for most photons will remain the first choice treatment. For a third, intermediate group, clinical equipoise will remain, and these may be suited for randomised trials between PT and photons.

This strategy may work as well for the objective assessment of other technological innovations in radiation oncology, leading to more solid evidence in our specialty.

DIRK DE RUYSSCHER

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READ IT BEFORE YOUR PATIENTS

LUNG

Sequencing of postoperative radiotherapy and chemotherapy for locally advanced or incompletely resected non-small-cell lung cancer

Francis S, Orton A, Stoddard G, Tao R, Hitchcock YJ, Akerley W, Kokeny KE.

J Clin Oncol. 2018 Feb 1;36(4):333-341
doi: 10.1200/JCO.2017.74.4771. Epub 2017 Dec 13.

Purpose
Although several feasibility studies have demonstrated the safety of adjuvant concurrent chemoradiotherapy (CRT) for locally advanced or incompletely resected non-small-cell lung cancer (NSCLC), it remains uncertain whether this approach is superior to sequential chemotherapy followed by postoperative radiotherapy (C→PORT). We sought to determine the most effective treatment sequence.

Patients and methods
Using the National Cancer Database, we selected two cohorts of patients with non-metastatic NSCLC who had received at least a lobectomy followed by multi-agent chemotherapy and radiotherapy; cohort one included patients with R0 resection and pN2 disease, whereas cohort two included patients with R1-2 resection regardless of nodal status. Overall survival (OS) was examined using a propensity score-matched analysis with a shared frailty Cox regression.

Results
A total of 747 patients in cohort one and 277 patients in cohort two were included, with a median follow-up of 32.8 and 27.9 months, respectively. The median OS was 58.8 months for patients who received C→PORT versus 40.4 months for patients who received CRT in cohort one (log-rank P < .001). For cohort two, the median OS was 42.6 months for patients who received C→PORT versus 38.5 months for patients who received CRT (log-rank P = .42). After propensity score matching, C→PORT remained associated with improved OS compared with CRT in cohort one (hazard ratio, 1.35; P = .019), and there was no statistical difference in OS between the sequencing groups for cohort two (hazard ratio, 1.35; P = .19).

Conclusion
Patients with NSCLC who undergo R0 resection and are found to have pN2 disease have improved outcomes when adjuvant chemotherapy is administered before, rather than concurrently with, radiotherapy. For patients with positive margins after surgery, there is not a clear association between treatment sequencing and survival.

READ IT BEFORE YOUR PATIENTS

ENDOMETRIAL

Adjuvant chemoradiotherapy versus radiotherapy alone for women with high-risk endometrial cancer (PORTEC-3): final results of an international, open-label, multicentre, randomised, phase 3 trial

de Boer S, Powell ME, Mileshkin L, Katsaros D, Bessette P, Haie-Meder C, Ottevanger PB, Ledermann JA, Khaw P, Colombo A, Fyles A, Baron MH, Jürgenliemk-Schulz IM, Kitchener HC, Nijman HW, Wilson G, Brooks S, Carinelli S, Provencher D, Hanzen C, Lutgens LCHW, Smit VTHBM, Singh N, Do V, D'Amico R, Nout RA, Feeney A, Verhoeven-Adema KV, Putter H, Creutzberg CL, on behalf of the PORTEC study group

Lancet Oncol. 2018 Mar;19(3):295-309. doi: 10.1016/S1470-2045(18)30079-2. Epub 2018 Feb 12.

Background

Although women with endometrial cancer generally have a favourable prognosis, those with high-risk disease features are at increased risk of recurrence. The PORTEC-3 trial was initiated to investigate the benefit of adjuvant chemotherapy during and after radiotherapy (chemoradiotherapy) versus pelvic radiotherapy alone for women with high-risk endometrial cancer.

Methods

PORTEC-3 was an open-label, international, randomised, phase 3 trial involving 103 centres in six clinical trials collaborating in the Gynaecological Cancer Intergroup. Eligible women had high-risk endometrial cancer with FIGO 2009 stage I, endometrioid-type grade 3 with deep myometrial invasion or lymph-vascular space invasion (or both), endometrioid-type stage II or III, or stage I to III with serous or clear cell histology. Women were randomly assigned (1:1) to receive radiotherapy alone (48.6 Gy in 1.8 Gy fractions given on five days per week) or radiotherapy and chemotherapy (consisting of two cycles of cisplatin 50 mg/m2 given during radiotherapy, followed by four cycles of carboplatin AUC5 and paclitaxel 175 mg/m2) using a biased-coin minimisation procedure with stratification for participating centre, lymphadenectomy, stage of cancer, and histological type. The co-primary endpoints were overall survival and failure-free survival. We used the Kaplan-Meier method, log-rank test, and Cox regression analysis for final analysis by intention to treat and adjusted for stratification factors. The study was closed on 20 December 2013, after achieving complete accrual; follow-up is ongoing. PORTEC-3 is registered with ISRCTN, number ISRCTN14387080, and ClinicalTrials.gov, number NCT00411138.

Results

In total, 686 women were enrolled between 23 November 2006 and 20 December 2013. Of these, 660 eligible patients were included in the final analysis, of whom 330 were assigned to chemoradiotherapy and 330 were assigned to radiotherapy. Median follow-up was 60.2 months (IQR 48.1–73.1). Five-year overall survival was 81.8% (95% CI 77.5–86.2) with chemoradiotherapy versus 76.7% (72.1–81.6) with radiotherapy (adjusted hazard ratio [HR] 0.76, 95% CI 0.54–1.06; p=0.11); five-year failure-free survival was 75.5% (95% CI 70.3–79.9) versus 68.6% (63.1–73.4; HR 0.71, 95% CI 0.53–0.95; p=0.022). Grade 3 or worse adverse events during treatment occurred in 198 (60%) of 330 who received chemoradiotherapy versus 41 (12%) of 330 patients who received radiotherapy (p<0.0001). Neuropathy (grade 2 or worse) persisted significantly more often after chemoradiotherapy than after radiotherapy (20 [8%] women vs one [1%] at three years; p<0.0001). Most deaths were due to endometrial cancer; in four patients (two in each group), ▼

the cause of death was uncertain. One death in the radiotherapy group was due to either disease progression or late treatment complications; three deaths (two in the chemoradiotherapy group and one in the radiotherapy group) were due to either inter-current disease or late treatment-related toxicity.

Interpretation

Adjuvant chemotherapy given during and after radiotherapy for high-risk endometrial cancer did not improve five-year overall survival, although it did increase failure-free survival. Women with high-risk endometrial cancer should be individually counselled about this combined treatment. Continued follow-up is needed to evaluate long-term survival.

READ IT BEFORE YOUR PATIENTS

CERVICAL

Neoadjuvant chemotherapy followed by radical surgery versus concomitant chemotherapy and radiotherapy in patients with stage IB2, IIA, or IIB squamous cervical cancer: a randomised controlled trial.

Gupta S, Maheshwari A, Parab P, Mahantshetty U, Hawaldar R, Sastri Chopra S, Kerkar R, Engineer R, Tongaonkar H, Ghosh J, Gulia S, Kumar N, Shylasree TS, Gawade R, Kembhavi Y, Gaikar M, Menon S, Thakur M, Shrivastava S, Badwe R.

J Clin Oncol. 2018 in press. http://ascopubs.org/doi/abs/10.1200/JCO.2017.75.9985

Purpose
We compared the efficacy and toxicity of neoadjuvant chemotherapy followed by radical surgery versus standard cisplatin-based chemoradiation in patients with locally advanced squamous cervical cancer.

Patients and methods
This was a single-centre, phase III, randomised controlled trial (ClinicalTrials.gov identifier: NCT00193739). Eligible patients were between 18 and 65 years old and had stage IB2, IIA, or IIB squamous cervical cancer. They were randomly assigned, after stratification by stage, to receive either three cycles of neoadjuvant chemotherapy using paclitaxel and carboplatin once every three weeks followed by radical hysterectomy or standard radiotherapy with concomitant cisplatin once every week for five weeks. Patients in the neoadjuvant group received postoperative adjuvant radiation or concomitant chemotherapy and radiotherapy, if indicated. The primary end point was disease-free survival (DFS), defined as survival without relapse or death related to cancer, and secondary end points included overall survival and toxicity.

Results
Between September 2003 and February 2015, 635 patients were randomly assigned, of whom 633 (316 patients in the neoadjuvant chemotherapy plus surgery group and 317 patients in the concomitant chemoradiation group) were included in the final analysis, with a median follow-up time of 58.5 months. The five-year DFS in the neoadjuvant chemotherapy plus surgery group was 69.3% compared with 76.7% in the concomitant chemoradiation group (hazard ratio, 1.38; 95% CI, 1.02 to 1.87; P = .038), whereas the corresponding five-year OS rates were 75.4% and 74.7%, respectively (hazard ratio, 1.025; 95% CI, 0.752 to 1.398; P = .87). The delayed toxicities at 24 months or later after treatment completion in the neoadjuvant chemotherapy plus surgery group versus the concomitant chemoradiation group were rectal (2.2% vs 3.5%, respectively), bladder (1.6% vs 3.5%, respectively), and vaginal (12.0% vs 25.6%, respectively).

Conclusion
Cisplatin-based concomitant chemoradiation resulted in superior DFS compared with neoadjuvant chemotherapy followed by radical surgery in locally advanced cervical cancer.

READ IT BEFORE YOUR PATIENTS

VULVA

Effectiveness of definitive radiotherapy for squamous cell carcinoma of the vulva with gross inguinal lymphadenopathy

Tecklein SR, Frumovitz M, Klopp AH, Gunther JR, Eifel PJ.

Gynecol Oncol. 2018 Jan 11. PMID:29336837

Objective

To evaluate the effectiveness and long-term side effects of definitive groin radiotherapy for vulvar cancer with grossly involved inguinal lymph nodes.

Methods

The records of 407 women with vulvar squamous cell carcinoma treated with radiotherapy at one institution during 1992-2014 were reviewed to identify patients who had radiographic or histologic evidence of grossly involved inguinal lymph nodes. Patients with lymphadenectomy before radiotherapy and patients treated for recurrent disease were excluded. Actuarial incidences of vulvar, inguinal, and distant recurrences, the relationship between vulvar recurrence and inguinal recurrence, and overall survival were analysed using the Kaplan-Meier method.

Results

Thirty-three patients were identified. The median age at diagnosis was 64 years. The median long-axis radiographic diameter of the largest inguinal lymph node or lymph node mass was 2.5 cm (range: 1.4-8.7). Sixteen patients (48%) also had evidence of pelvic lymph node metastasis. The median radiation dose delivered to grossly involved nodes was 66.0 Gy (range: 60.0-70.0). The three-year actuarial incidences of vulvar, groin, and distant recurrences were 24.2%, 17.7%, and 30.3%, respectively. With a median follow-up time of 28 months (range: 2-196), four patients (12%) had groin recurrence, of whom three also had vulvar recurrence. There were few major late adverse effects of regional radiotherapy. The three-year overall survival rate was 51%.

Conclusions

High-dose volume-directed radiotherapy achieves a high rate of local control with low risk of serious long-term toxic effects in patients with vulvar squamous cell carcinoma and grossly involved inguinal lymph nodes.

READ IT BEFORE YOUR PATIENTS

LIVER

Radiofrequency ablation versus stereotactic body radiotherapy for localised hepatocellular carcinoma in non-surgically managed patients: analysis of the National Cancer Database

Rajyaguru DJ, Borgert AJ, Smith AL, Thomes RM, Conway PD, Halfdanarson TR, Truty MJ, Kurup AN, Go RS.

J Clin Oncol. 2018 Jan 12:JCO2017753228.
PMID:29328861

Purpose
Data that guide selection of optimal local ablative therapy for the management localised hepatocellular carcinoma (HCC) are lacking. Because there are limited prospective comparative data for these treatment modalities, we aimed to compare the effectiveness of radiofrequency ablation (RFA) versus stereotactic body radiotherapy (SBRT) by using the National Cancer Database.

Methods
We conducted an observational study to compare the effectiveness of RFA versus SBRT in non-surgically managed patients with stage I or II HCC. Overall survival was compared by using propensity score-weighted and propensity score-matched analyses based on patient-, facility-, and tumour-level characteristics. A sensitivity analysis was performed to evaluate the effect of severe fibrosis/cirrhosis. In addition, we performed exploratory analyses to determine the effectiveness of RFA and SBRT in clinically relevant patient subsets.

Results
Overall, 3,684 (92.6%) and 296 (7.4%) non-surgically managed patients with stage I or II HCC received RFA or SBRT, respectively. After propensity matching, five-year overall survival was 29.8% (95% CI, 24.5% to 35.3%) in the RFA group versus 19.3% (95% CI, 13.5% to 25.9%) in the SBRT group (P < .001). Inverse probability-weighted analysis yielded similar results. The benefit of RFA was consistent across all subgroups examined and was robust to the effects of severe fibrosis/cirrhosis.

Conclusion
Our study suggests that treatment with RFA yields superior survival compared with SBRT for non-surgically managed patients with stage I or II HCC. Even though our results are limited by the biases related to the retrospective study design, we believe that, in the absence of a randomised clinical trial, our findings should be considered when recommending local ablative therapy for localised unresectable HCC.

READ IT BEFORE YOUR PATIENTS

BENIGN: THYROID EYE DISEASE

Combined immunosuppression and radiotherapy in thyroid eye disease (CIRTED): a multicentre, 2 × 2 factorial, double-blind, randomised controlled trial

Rajendram R, Taylor PN, Wilson VJ, Harris N, Morris OC, Tomlinson M, Yarrow S, Garrott H, Herbert HM, Dick AD, Cook A, Gattamaneni R, Jain R, Olver J, Hurel SJ, Bremner F, Drummond SR, Kemp E, Ritchie DM, Rumsey N, Morris D, Lane C, Palaniappan N, Li C, Pell J, Hills R, Ezra DG, Potts MJ, Jackson S, Rose GE, Plowman N, Bunce C, Uddin JM, Lee RWJ, Dayan CM.

Lancet Diabetes Endocrinol. 2018 Jan 30. pii: S2213-8587(18)30021-4.

Background

Standard treatment for thyroid eye disease is with systemic corticosteroids. We aimed to establish whether orbital radiotherapy or anti-proliferative immunosuppression would confer any additional benefit.

Methods

CIRTED was a multicentre, double-blind, randomised controlled trial with a 2 × 2 factorial design done at six centres in the UK. Adults with active moderate-to-severe thyroid eye disease associated with proptosis or ocular motility restriction were recruited to the trial. Patients all received a 24-week course of oral prednisolone (80mg per day, reduced to 20mg per day by six weeks, 10mg per day by 15 weeks, and 5mg per day by 21 weeks) and were randomly assigned via remote computerised randomisation to receive either radiotherapy or sham radiotherapy and azathioprine or placebo in a 2 × 2 factorial design. Randomisation included minimisation to reduce baseline disparities in potential confounding variables between trial interventions. Patients and data analysts were masked to assignment, whereas trial coordinators (who monitored blood results), pharmacists, and radiographers were not. The radiotherapy dose was 20 Gy administered to the retrobulbar orbit in ten to 12 fractions over two to three weeks. Azathioprine treatment was provided for 48 weeks at 100-200mg per day (dispensed as 50 mg tablets), depending on bodyweight (100mg for <50 kg, 150mg 50-79 kg, 200mg for ≥80 kg). The primary outcomes were a binary composite clinical outcome score and an ophthalmopathy index at 48 weeks, and a clinical activity score at 12 weeks. The primary analysis was based on the intention-to-treat allocation and safety was assessed in all participants. This study is registered with ISRCTN, number 22471573.

Findings

Between 15 February 2006 and 3 October 2013, 126 patients were recruited and randomly assigned to groups: 31 patients to radiotherapy plus azathioprine, 31 to sham radiotherapy and azathioprine, 32 to radiotherapy and placebo, and 32 to sham radiotherapy and placebo. Outcome data were available for 103 patients (54 for sham radiotherapy vs 49 for radiotherapy and 53 for placebo vs 50 for azathioprine), of whom 84 completed their allocated treatment of radiotherapy or sham radiotherapy and 57 continued to take azathioprine or placebo up to 48 weeks. There was no interaction between azathioprine and radiotherapy (pinteraction=0.86). The adjusted odds ratio (ORadj) for improvement in the binary clinical composite outcome measure was 2.56 (95% CI 0.98-6.66, p=0.054) for azathioprine and 0.89 (0.36-2.23, p=0.80) for radiotherapy. In a post-hoc analysis of patients who completed their allocated therapy the ORadj for improvement was 6.83 (1.66-28.1, p=0.008) for azathioprine and 1.32 (0.30-4.84, p=0.67) for radiotherapy. ▼

The ophthalmopathy index, clinical activity score, and numbers of adverse events (161 with azathioprine and 156 with radiotherapy) did not differ between treatment groups. In both groups, the most common adverse events were mild infections. No patients died during the study.

Interpretation

In patients receiving oral prednisolone for 24 weeks, radiotherapy did not have added benefit. We also did not find added benefit for addition of azathioprine in the primary analysis; however, our conclusions are limited by the high number of patients who withdrew from treatment. Results of post-hoc analysis of those who completed the assigned treatment suggest improved clinical outcome at 48 weeks with azathioprine treatment.

READ IT BEFORE YOUR PATIENTS

PALLIATION: DYSPHAGIA

Palliative chemoradiotherapy versus radiotherapy alone for dysphagia in advanced oesophageal cancer: a multicentre randomised controlled trial (TROG 03.01)

Penniment MG, De Ieso PB, Harvey JA, Stephens S, Au HJ, O'Callaghan CJ, Kneebone A, Ngan SY, Ward IG, Roy R, Smith JG, Nijjar T, Biagi JJ, Mulroy LA, Wong R; TROG 03.01/ CCTG ES.2 group.

Lancet Gastroenterol Hepatol. 2018 Feb;3(2):114-124.

Background

A short course of radiotherapy is commonly prescribed for palliative relief of malignant dysphagia in patients with incurable oesophageal cancer. We compared chemoradiotherapy with radiotherapy alone for dysphagia relief in the palliative setting.

Methods

This multicentre randomised controlled trial included patients with advanced or metastatic oesophageal cancer who were randomly assigned (1:1) through a computer-generated adaptive biased coin design to either palliative chemoradiotherapy or radiotherapy alone for treatment of malignant dysphagia at 22 hospitals in Australia, Canada, New Zealand, and the UK. Eligible patients had biopsy-proven oesophageal cancer that was unsuitable for curative treatment, symptomatic dysphagia, Eastern Cooperative Oncology Group performance status 0-2, and adequate haematological and renal function. Patients were stratified by hospital, dysphagia score (Mellow scale 1-4), and presence of metastases. The radiotherapy dose was 35 Gy in 15 fractions over three weeks for patients in Australia and New Zealand and 30 Gy in ten fractions over two weeks for patients in Canada and the UK. Chemotherapy consisted of one cycle of intravenous cisplatin (either 80mg/m2 on day 1 or 20mg/m2 per day on days 1-4 of radiotherapy at clinician's discretion) and intravenous fluorouracil 800mg/m2 per day on days 1-4 of radiotherapy in week 1. Patients were assessed weekly during treatment. The primary endpoint was dysphagia relief (defined as ≥1 point reduction on the Mellow scale at 9 weeks and maintained four weeks later), and key secondary endpoints were dysphagia progression-free survival (defined as a worsening of at least 1 point on the Mellow scale from baseline or best response) and overall survival. These endpoints were analysed in the intention-to-treat population. This study is registered at ClinicalTrials.gov, number NCT00193882. This trial is closed.

Findings

Between 7 July 2003 and 21 March 2012, 111 patients were randomly assigned to chemoradiotherapy and 109 patients to radiotherapy. One patient in the chemoradiotherapy group was omitted from analysis because of ineligibility. In total, 50 (45%, 95% CI 36-55) patients in the chemoradiotherapy group and 38 (35%, 26-44) in the radiotherapy group obtained dysphagia relief (difference 10.6%, 95% CI -2 to 23; p=0.13). Median dysphagia progression-free survival was 4.1 months (95% CI 3.5-4.8) versus 3.4 months (3.1-4.3) in the chemoradiotherapy and radiotherapy groups, respectively (p=0.58), and median overall survival was 6.9 months (95% CI 5.1-8.3) versus 6.7 months (4.9-8.0), respectively (p=0.88). Of the 211 patients who commenced radiotherapy, grade 3-4 acute toxicity occurred in 38 (36%) ▼

patients in the chemoradiotherapy group and in 17 (16%) patients in the radiotherapy group (p=0.0017). Anaemia, thrombocytopenia, neutropenia, oesophagitis, diarrhoea, nausea and vomiting, and mucositis were significantly worse in patients who had chemoradiotherapy than in patients who had radiotherapy.

Interpretation

Palliative chemoradiotherapy showed a modest, but not statistically significant, increase in dysphagia relief compared with radiotherapy alone, with minimal improvement in dysphagia progression-free survival and overall survival with chemoradiotherapy but at a cost of increased toxicity. A short course of radiotherapy alone should be considered a safe and well tolerated treatment for malignant dysphagia in the palliative setting.

READ IT BEFORE YOUR PATIENTS

CENTRAL NERVOUS SYSTEM (CNS)

Effect of tumour-treating fields plus maintenance temozolomide vs maintenance temozolomide alone on survival in patients with glioblastoma: a randomised clinical trial

Stupp R, Taillibert S, Kanner A, Read W, Steinberg DM, Lhermitte B, Toms S, Idbaih A, Ahluwalia MS, Fink K, Di Meco F, Lieberman F, Zhu JJ, Stragliotto G, Tran DD, Brem S, Hottinger AF, Kirson ED, Lavy-Shahaf G, Weinberg U, Kim CY, Paek SH, Nicholas G, Burna J, Hirte H, Weller M, Palti Y, Hegi ME, Ram Z.

JAMA. 2017 Dec 19;318(23):2306-2316.

Importance
Tumour-treating fields (TTFields) is an antimitotic treatment modality that interferes with glioblastoma cell division and organelle assembly by delivering low-intensity alternating electric fields to the tumour.

Objective
To investigate whether TTFields improves progression-free and overall survival of patients with glioblastoma, a fatal disease that commonly recurs at the initial tumour site or in the central nervous system.

Design, setting, and participants
In this randomised, open-label trial, 695 patients with glioblastoma whose tumour was resected or biopsied and had completed concomitant radiochemotherapy (median time from diagnosis to randomisation, 3.8 months) were enrolled at 83 centres (July 2009-2014) and followed up through December 2016. A preliminary report from this trial was published in 2015; this report describes the final analysis.

Interventions
Patients were randomised 2:1 to TTFields plus maintenance temozolomide chemotherapy (n = 466) or temozolomide alone (n = 229). The TTFields, consisting of low-intensity, 200 kHz frequency, alternating electric fields, was delivered (≥ 18 hours/d) via 4 transducer arrays on the shaved scalp and connected to a portable device. Temozolomide was administered to both groups (150-200 mg/m2) for five days per 28-day cycle (6-12 cycles).

Main outcomes and measures
Progression-free survival (tested at $\alpha = .046$). The secondary end point was overall survival (tested hierarchically at $\alpha = .048$). Analyses were performed for the intent-to-treat population. Adverse events were compared by group.

Results
Of the 695 randomised patients (median age, 56 years; IQR, 48-63; 473 men [68%]), 637 (92%) completed the trial. Median progression-free survival from randomization was 6.7 months in the TTFields-temozolomide group and 4.0 months in the temozolomide-alone group (HR, 0.63; 95% CI, 0.52-0.76; $P < .001$). Median overall survival was 20.9 months in the TTFields-temozolomide group versus 16.0 months in the temozolomide-alone group (HR, 0.63; 95% CI, 0.53-0.76; $P < .001$). Systemic adverse event frequency was 48% in the TTFields-temozolomide group and 44% in the temozolomide-alone group. Mild to moderate skin toxicity underneath the transducer arrays occurred in 52% of patients who received TTFields-temozolomide versus no patients who received temozolomide alone. ▼

Conclusions and relevance

In the final analysis of this randomised clinical trial of patients with glioblastoma who had received standard radiochemotherapy, the addition of TTFields to maintenance temozolomide chemotherapy versus maintenance temozolomide alone, resulted in statistically significant improvement in progression-free survival and overall survival. These results are consistent with the previous interim analysis.

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READ IT BEFORE YOUR PATIENTS

IMMUNE THERAPY

Safety and clinical activity of pembrolizumab and multisite stereotactic body radiotherapy in patients with advanced solid tumours

Luke JJ, Lemons JM, Karrison TG, Pitroda SP, Melotek JM, Zha Y, Al-Hallaq HA, Arina A, Khodarev NN, Janisch L, Chang P, Patel JD, Fleming GF, Moroney J, Sharma MR, White JR, Ratain MJ, Gajewski TF, Weichselbaum RR, Chmura SJ.

J Clin Oncol. 2018 Feb 13:JCO2017762229

Purpose

Stereotactic body radiotherapy (SBRT) may stimulate innate and adaptive immunity to augment immunotherapy response. Multisite SBRT is an emerging paradigm for treating metastatic disease. Anti-PD-1-treatment outcomes may be improved with lower disease burden. In this context, we conducted a phase I study to evaluate the safety of pembrolizumab with multisite SBRT in patients with metastatic solid tumours.

Patients and methods

Patients progressing on standard treatment received SBRT to two to four metastases. Not all metastases were targeted, and metastases > 65 mL were partially irradiated. SBRT dosing varied by site and ranged from 30 to 50 Gy in three to five fractions with predefined dose de-escalation if excess dose-limiting toxicities were observed. Pembrolizumab was initiated within seven days after completion of SBRT. Pre- and post-SBRT biopsy specimens were analysed in a subset of patients to quantify interferon-γ-induced gene expression.

Results

A total of 79 patients were enrolled; three patients did not receive any treatment and three patients only received SBRT. Patients included in the analysis were treated with SBRT and at least one cycle of pembrolizumab. Most (94.5%) of patients received SBRT to two metastases. Median follow-up for toxicity was 5.5 months (interquartile range, 3.3 to 8.1 months). Six patients experienced dose-limiting toxicities with no radiation dose reductions. In the 68 patients with imaging follow-up, the overall objective response rate was 13.2%. Median overall survival was 9.6 months (95% CI, 6.5 months to undetermined) and median progression-free survival was 3.1 months (95% CI, 2.9 to 3.4 months). Expression of interferon-γ-associated genes from post-SBRT tumour biopsy specimens significantly correlated with non-irradiated tumour response.

Conclusion

Multisite SBRT followed by pembrolizumab was well tolerated with acceptable toxicity. Additional studies exploring the clinical benefit and predictive biomarkers of combined multisite SBRT and PD-1-directed immunotherapy are warranted.

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BRACHYTHERAPY

BRACHYTHERAPY

"We are happy to announce that the GEC-ESTRO brachytherapy committee has a new chair elect"

Welcome to the Brachytherapy Corner.

In this issue we are happy to announce that the GEC-ESTRO brachytherapy committee has a new chair elect: Ina Jürgenliemk-Schulz.

We also provide you with four 'Editors' picks'.

Kishan *et al* report on a retrospective study (North America, Norway) comparing the outcome of radical prostatectomy (RP), external beam radiation therapy (EBRT) and EBRT+brachytherapy (BT) for Gleason score 9-10 prostate cancer.

Strouthos *et al* from Germany report their follow-up data on use of a three-fraction scheme of 192Ir HDR as monotherapy for prostate cancer.

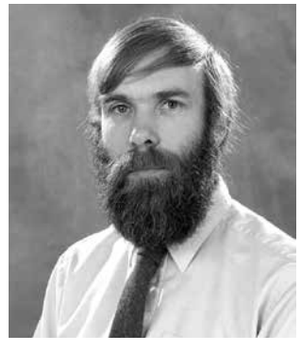
Thiruthaneeswaran *et al* report on a planning study for cervix cancer BT and demonstrate that further dose escalation to the residual gross tumour volume is feasible.

Diez *et al* report on a "A multicentre audit of HDR/PDR brachytherapy absolute dosimetry in association with the INTERLACE trial (NCT015662405)". Dosimetric quality assurance of clinics before enrolling in clinical trials is increasingly required. This is the first dosimetric audit on absolute dosimetry for BT. The study provided many insights for future audits and quality assurance services.

At the time of reading this newsletter we are already well into spring and ESTRO 37 in Barcelona is over. Reports from the meeting will be available in the next issue of the Brachytherapy Corner.

The upcoming 6th GEC-ESTRO workshop in Brussels later this year (29-30 November) is now on the ESTRO website. The theme of the year is "Performing optimal brachytherapy". The workshop is a small-scale meeting aiming to provide an open and informal platform to spread knowledge, experiences and network on brachytherapy. It also aims to encourage active involvement from participants. We hope to meet you there.

Peter Hoskin, Bradley Pieters, Åsa Tedgren and Robert Hudej



PETER HOSKIN

BRADLEY PIETERS

ÅSA CARLSSON TEDGREN

ROBERT HUDEJ

Introducing the new GEC-ESTRO committee chair-elect

Ina Jürgenliemk-Schulz
Radiation oncologist
University Medical Centre Utrecht
The Netherlands

Following the elections held earlier this year, the Groupe Européen de Curiethérapie (GEC)-ESTRO committee has a new chair-elect, Ina Jürgenliemk-Schulz of the University Medical Centre Utrecht, The Netherlands. Ina's term of office began at the GEC-ESTRO assembly on 21 April at ESTRO 37 in Barcelona, Spain.

Reflecting on her appointment, Ina says: "Radiotherapy is a major player in the vast field of cancer treatments and takes a leading role in further individualising oncological treatments. Image guidance in combination with adaptive treatment strategies helps in achieving this goal, with brachytherapy, in particular, being an early adopter of new technology and concepts.

"GEC-ESTRO is an effective platform for promoting innovations to the European brachytherapy community and beyond. In contributing to international radiotherapy and multidisciplinary oncology communities, GEC-ESTRO aims to achieve further clinical benefit for patients."

To learn more about Ina, visit:
www.estro.org/binaries/content/assets/estro/about/gec-estro/inaschulz.pdf

EDITORS' PICKS

A multicentre audit of HDR / PDR brachytherapy absolute dosimetry in association with the INTERLACE trial (NCT01566240)

Díez P, Aird EGA, Sander T, Gouldstone CA, Sharpe PHG, Lee CD, Lowe G, Thomas RAS, Simnor T, Bownes P, Bidmead M, Gandon L, Eaton D, Palmer AL.

Radical prostatectomy, external beam radiotherapy, or external beam radiotherapy with brachytherapy boost and disease progression and mortality in patients with Gleason score 9-10 prostate cancer

Kishan AU, Cook RR, Ciezki JP, Ross AE, Pomerantz MM, Nguyen PL, Shaikh T, Tran PT, Sandler KA, Stock RG, Merrick GS, Demanes DJ, Spratt DE, Abu-Isa EI, Wedde TB, Lilleby W, Krauss DJ, Shaw GK, Alam R, Reddy CA, Stephenson AJ, Klein EA, Song DY, Tosoian JJ, Hegde JV, Yoo SM, Fiano R, D'Amico AV, Nickols NG, Aronson WJ, Sadeghi A, Greco S, Deville C, McNutt T, DeWeese TL, Reiter RE, Said JW, Steinberg ML, Horwitz EM, Kupelian PA , King CR

High dose rate brachytherapy as mono-therapy for localised prostate cancer

Strouthos I, Tselis N, Chatzikonstantinou G, Butt S, Baltas D, Bon D, Milickovic N, Zamboglou N

Focal boost to residual gross tumour volume in brachy-therapy for cervical cancer – a feasibility study

Thiruthaneeswaran N, Groom N, Lowe G, Bryant L, Hoskin PJ

A multicentre audit of HDR / PDR brachytherapy absolute dosimetry in association with the INTERLACE trial (NCT015662405)

Díez P, Aird EGA, Sander T, Gouldstone CA, Sharpe PHG, Lee CD, Lowe G, Thomas RAS, Simnor T, Bownes P, Bidmead M, Gandon L, Eaton D, Palmer AL.

Phys Med Biol. 2017 Nov 9;62(23):8832-8849. doi: 10.1088/1361-6560/aa91a9.

PATRICIA DIEZ

What was your motivation for initiating this study?

The UK has been carrying out quality assurance for radiotherapy clinical trials for over two decades, the first dosimetry audit being carried out for the CHART trial in the early 1990s [1]. The UK National Radiotherapy Trials Quality Assurance (RTTQA) group was formalised about a decade later and has continued this valuable work for a wide variety of clinical trials, covering most anatomical sites, radiotherapy planning and delivery techniques and performing quality assurance (QA) of all aspects of the radiotherapy process. However, brachytherapy has never been subject to the same level of quality assessment as there had been no UK radiotherapy trials involving brachytherapy.

In 2012, the INTERLACE trial, a phase III multicentre randomised controlled trial of weekly induction chemotherapy followed by standard chemo-radiation (investigational arm) versus standard chemo-radiation alone (control arm) in patients with locally advanced cervical cancer [2], opened in the UK. This was the first UK multicentre trial of cervical cancer with an associated independent radiotherapy QA programme implemented through the RTTQA group as well as the first to include a brachytherapy component. Around this time a UK Institute of Physics and Engineering in Medicine (IPEM) working party formed to discuss the need for brachytherapy audit. Three separate audits were commissioned by the group: the first, a well chamber intercomparison of source strength; the second, an end-to-end film dosimetry audit for cervix high dose rate (HDR) brachytherapy [3] and the third, the work discussed here, a measurement of absolute absorbed dose at a typical treatment distance of 20mm from a simulated line source (representative of Point A of the Manchester System). In line with the external beam work carried out by the RTTQA group, we felt it was important that an absolute measurement of absorbed dose traceable to a primary standards laboratory (National Physical Laboratory – NPL, Teddington, UK) was carried out, and that this measurement was at a clinically relevant position.

What were the main challenges during the work?

Where to start? The challenges were many, starting with the logistical issues associated with organising 47 audits across the whole of the UK in less than a year, whilst also liaising with the 'end-to-end' film audit, and in a cost-effective way. It involved different auditors coming ▼

together from different parts of the country to carry out visits consecutively by geographical location, and managing to get centres within that location to have machine availability around the same time. This was an uphill battle on its own. It must be noted that it was always the same team of auditors performing the visits, thereby reducing any potential variation in measurements and allowing any issues to be resolved during the audit. For the absolute dose measurements, we needed to develop a phantom and methodology that could be used for every HDR and pulsed dose rate (PDR) unit in the UK. Each centre uses different sized catheters and needles. We spoke to the two main manufacturers who supplied us with connectors and catheters to carry out the audit. We would like to thank Varian Medical Systems and Nucletron (an Elekta Brachytherapy company) for their help with this. The main challenges were then three, and I am very grateful to all the co-authors on this paper for their advice and expertise, which helped immensely in resolving these problems.

The first was, of course, the choice of an absolute dosimeter that was dimensionally small, versatile and with a good energy response. Collaboration with NPL meant we could use alanine, an already established absolute dosimeter at their primary standards laboratory [4, 5] that fulfilled all these criteria. The only issue was that it required a typical dose of 10 Gy to obtain the desired uncertainty, meaning very lengthy exposures at PDR centres. A Farmer ion chamber was also used to allow correct centring of the simulated line source before the alanine irradiation and, also, as a consistency check of delivered dose.

Second, and probably the most challenging, was designing a phantom that would minimise positional and anisotropy uncertainties as much as possible. A tiny shift in position, with such a short source-to-detector distance (20mm) and the very steep dose gradients inherent to brachytherapy, would translate to a significant error in the dose measurement. Therefore, we chose a three-hole design (120 degrees apart) to accommodate both alanine (stacked within PEEK holders) and the Farmer ion chamber around a central bore hole where the source was located. Centring collars in each hole were used to ensure no inadvertent tilt of the PEEK holders. A fourth hole at 50mm from the source was made for set-up checks.

Finally, we needed to account for the different scatter conditions (due to size and occupancy of rooms) existing at each centre. This was a bit of an unknown as we hadn't been to any of the centres yet, so NPL suggested we use 10cm of Perspex (PMMA) blocks around the central core of the phantom, increasing its size to 30x30x30 cm 3, which also provided full scatter conditions [6, 7].

What are the most important findings of your study?

We successfully completed the first absolute measurement of absorbed dose at 2cm, traceable to a primary standard. All 47 centres were found to be within 5% of the expected dose, with an average difference of 1.1%. The phantom design was simple but effective, having been expertly manufactured to an accuracy of tens of µm, and I would like to thank Peter Pryce from the Clatterbridge Cancer Centre Workshop for his amazing engineering skills.

The ion chamber was found to be an essential tool both to locate the source sweet spot on each occasion, and to check the dose delivery before the exposure of the expensive alanine dosimeters. Use of the ion chamber at 20mm also allowed for an assessment of positional and anisotropy variations of the source from the charge measurements in each of the charge three holes ▼

(up to 4.9% between two holes). Reporting the mean dose from the three holes using alanine, however, made measurements less sensitive to positioning errors.

One of most important findings was the significant difference observed between locally measured Reference Air Kerma Rate (RAKR) by GammaMed centres and the source certificate. All centres followed the IPEM 2010 Code of Practice [8] and their measurement uncertainty was therefore typically <1%. The source calibration on the certificate comes with an associated uncertainty of 5%. At the time, many centres were entering the certificate RAKR into their treatment planning systems and treatment units, against the code of practice recommendation of using the locally measured value instead. Varian have since changed the source manufacturer used to supply the UK.

What are the implications of this research?

This set of 47 visits provides information as to the accuracy with which HDR and PDR brachytherapy is delivered in the UK. The issues highlighted by our results are a reflection of the differences between the source RAKR calibration used in the TPS and treatment unit, as well as the equipment and source manufacturer used at each centre. The findings of this study support the recommendation of Bidmead *et al* [8] that the measured RAKR value should be used in the TPS and treatment unit, rather than the certified value, for UK centres when the well chamber is NPL-calibrated.

The phantom and procedures we used in the audit have shown it is possible to accurately measure absolute dose at clinically relevant distances using alanine dosimetry. The next step is to derive an ion chamber calibration for HDR and PDR equipment to make this system accessible to centres through a postal service for repeat measurements or for use as an extra check when commissioning new treatment units or planning systems.

Patricia Diez
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High dose rate brachytherapy as monotherapy for localised prostate cancer

Strouthos I, Tselis N, Chatzikonstantinou G, Butt S, Baltas D, Bon D, Milickovic N, Zamboglou N

Radiother Oncol. 2018 Feb;126(2):270-277. doi: 10.1016/j.radonc.2017.09.038. Epub 2017 Oct 23.

IOSIF STROUTHOS

What was your motivation for initiating this study?

More than 1,200 patients with organ-confined prostate cancer have been treated using high dose rate (HDR) brachytherapy (BRT) as monotherapy since the beginning of our programme in 1998. The mentioned series discusses the current protocol through its fascinating evolution aimed at improving clinical workflow and patient comfort. Starting with a single implant of four fractions at 9.5 Gy (William Beaumont Hospital protocol by Alvaro Martinez), evolving to two implants with two fractions per implant, we finally settled at three single-fraction-implants at 11.5 Gy, separated by an interfractional interval of 21 days. To our knowledge, this study represents the largest patient collective using a three fraction-implant approach up to a total physical dose of 34.5 Gy. Our goal was to evaluate and compare the oncological outcomes and treatment-related toxicities of this treatment scheme with the outcomes of other institutions after an adequate follow up.

What were the main challenges during the work?

The main hurdle in this study was to update the clinical data of all treated patients within a specific time frame. We managed to overcome these difficulties thanks to excellent collaboration with all referring urologists, who provided us with their systematically collected follow-up information on treated patients. It was also due to the hard work of our nurses, who maintained our follow-up database, with a special focus on systematic evaluation with well-structured questionnaires, which the vast majority of patients filled with ease and returned promptly.

What are the most important findings of your study?

It is proven that radiation dose escalation in prostate cancer translates into improved biochemical-failure-free survival, while at the same time radiobiological data suggest a low alpha / beta-ratio for prostate adenocarcinoma, supporting the use of hypofractionated treatment regimes. Our treatment schedule through its high BED (299 Gy) based on its hypofractionated nature, meets this objective while ensuring low GU/GI toxicity. Furthermore, the fact that the patients included were from all risk groups, opens a therapeutic window for HDR monotherapy.

A comment should be made here about the use of androgen deprivation therapy (ADT), since ▼

an increasing body of literature suggests that the beneficial impact of ADT, as far as oncological outcomes are concerned, could be compensated through intraprostatic dose escalation and that this might be a better approach than.

What are the implications of this research?

Our data, in alongside with recent results from other institutions, justify the role of HDR monotherapy in the field of localised prostate cancer as a safe and effective radiotherapeutic approach. HDR proves to be the ideal modality in delivering high doses in the most conformal way possible, while at the same time it ensures minimal toxicity.

Iosif Strouthos
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ESTRO School 2018

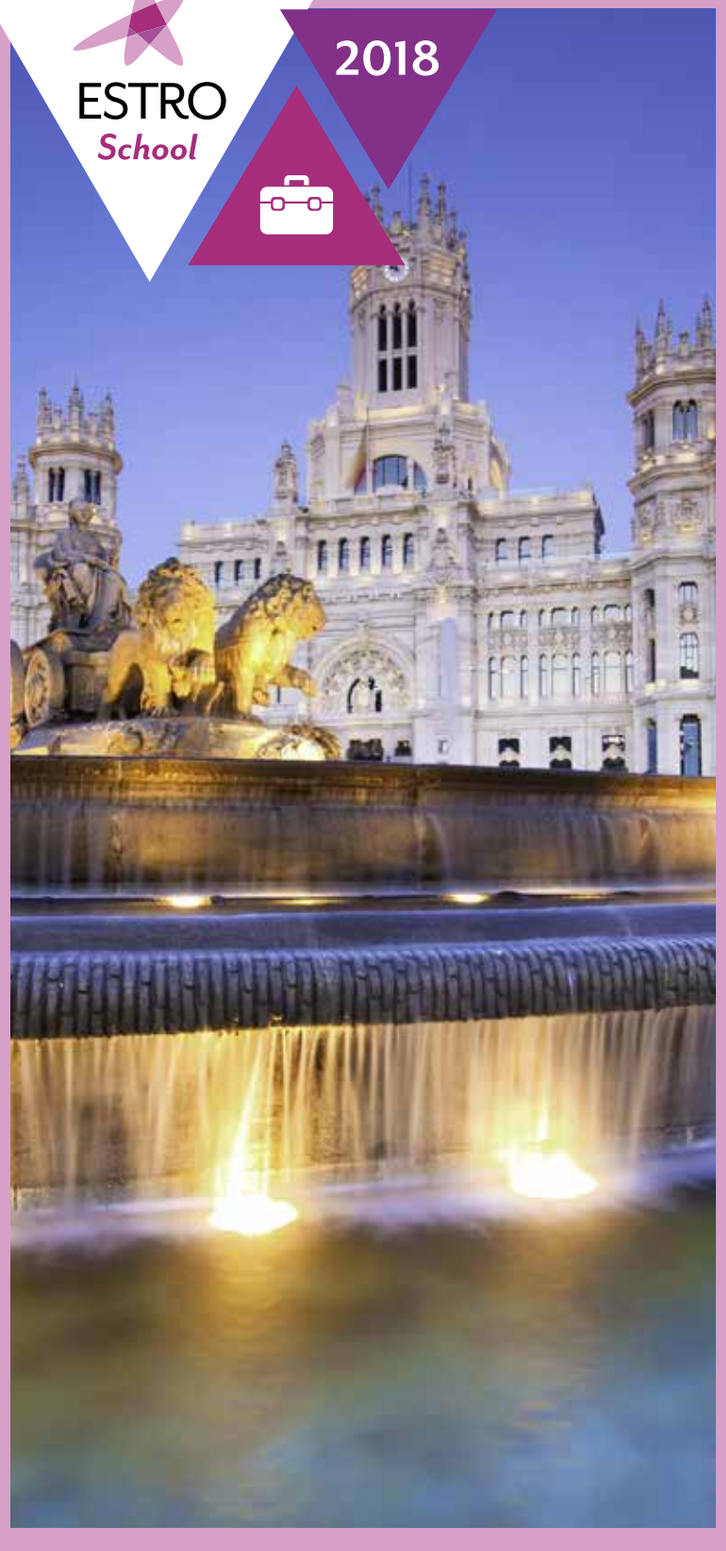

Image-guided radiotherapy and chemotherapy in gynaecological cancer: focus on MRI-based adaptive brachytherapy

2-6 September 2018 | Madrid, Spain

Early registration deadline: 5 June 2018

This course provides understanding of the rationale for advanced image guided external beam and brachytherapy techniques in gynaecological cancer. With this course you will learn tools to update and change clinical practice in your institution.

LEARNING OUTCOMES

By the end of this course participants should be able to:

- Understand a comprehensive multi-modality approach to gynaecological cancers with special emphasis on radiation oncology
- Understand the rationale and apply concepts of advanced brachytherapy techniques in clinical practice
- Perform contouring, treatment planning and image guidance for EBRT and brachytherapy in clinical practice
- Adopt, refine and implement advanced radiation techniques including image guidance in gynaecological cancers.

www.estro.org/school >

Radical prostatectomy, external beam radio-therapy, or external beam radiotherapy with brachy-therapy boost and disease progres-sion and mortality in patients with Gleason score 9-10 prostate cancer

Kishan AU, Cook RR, Ciezki JP, Ross AE, Pomerantz MM, Nguyen PL, Shaikh T, Tran PT, Sandler KA, Stock RG, Merrick GS, Demanes DJ, Spratt DE, Abu-Isa EI, Wedde TB, Lilleby W, Krauss DJ, Shaw GK, Alam R, Reddy CA, Stephenson AJ, Klein EA, Song DY, Tosoian JJ, Hegde JV, Yoo SM, Fiano R, D'Amico AV, Nickols NG, Aronson WJ, Sadeghi A, Greco S, Deville C, McNutt T, DeWeese TL, Reiter RE, Said JW, Steinberg ML, Horwitz EM, Kupelian PA , King CR

JAMA. 2018 Mar 6;319(9):896-905. doi: 10.1001/jama.2018.0587

AMAR U KISHAN

What was your motivation for initiating this study?

I was motivated to pursue this study by a patient I saw in clinic with Gleason score 9 prostate cancer, who was weighing up his treatment options. On doing a literature review, I found that there were very little data to guide treatment strategy in this very high-risk subgroup of patients. Further, when looking at research on comparative outcomes for patients with very high-risk prostate cancer, I found that many studies pooled outcomes for patients treated over the span of multiple decades. This was necessary in order to have enough clinical outcomes events to make conclusions (because, thankfully, even high-risk prostate cancer can follow a prolonged natural history). However, including patients treated many years ago enriches study populations with patients who received sub-standard treatment according to modern criteria and techniques. Specifically, many radiation patients received too little, or no, androgen deprivation therapy, and many radiation patients received low doses of radiation. Finally, most prior studies did not clearly separate 'extremely dose-escalated radiotherapy' (radiation with a brachytherapy boost) from standard radiation, even though the philosophy, implications, and outcomes of these treatments might be quite different.

What were the main challenges during the work?

The main challenge of this work was identifying enough patients with Gleason score 9-10 disease to produce any conclusions. This is a rare subtype of localised prostate cancer (in the order of 7%-10% of patients at diagnosis). The first part of this challenge was identifying enough patients at my own institution to begin to do this research. The second part was identifying collaborators who were willing to contribute patient data to a large consortium. Thankfully, I was able to find great collaborators at multiple institutions.

What is the most important finding of your study?

The most important finding is that when looking at this particular subset of patients with aggressive disease, external beam radiotherapy with a brachytherapy boost and a median of one year of androgen deprivation therapy was associated with significantly improved distant metastasis-free survival, cancer-specific survival, and even overall survival (the latter only in the first 7.5 years of follow-up, which is expected given the overall high age of the population). In both absolute and relative terms, these were large benefits.

A second point, and perhaps a broader interpretation, is that 'multimodality' therapy is critical for patients with Gleason score 9-10 disease. The patients who had the best outcome received both intense local treatment (the brachytherapy boost) and systemic treatment (median one year of androgen deprivation therapy). The external beam radiation therapy (EBRT) patients did not have that level of local treatment intensity, even though they actually received longer duration systemic therapy (median 22 months). The surgery patients had a very intense local therapy, but did not necessarily have a defined multimodality treatment protocol – about 20% had neoadjuvant systemic therapy and 40% received postoperative radiation, but there was no rigorous protocol for these treatments.

What are the implications of this research?

The two major implications are that patients with Gleason score 9-10 cancer should have a discussion about receiving external beam radiation with a brachytherapy boost and androgen deprivation therapy. If this is not the chosen treatment strategy, there should be a plan in place for multimodality treatment. If the treatment strategy is external beam radiation alone, this should include at least 78 Gy of radiation and long-term androgen deprivation therapy (possibly with new systemic agents). If the treatment strategy is surgery, a defined protocol should be in place for post-operative radiation with or without androgen deprivation therapy, and potentially for neoadjuvant androgen deprivation therapy as well. Also, a major implication is that patients with Gleason score 9-10 disease are still curable with local intent, definitive therapy and should always be considered as such unless staging studies show distant disease.

Amar U Kishan
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Focal boost to residual gross tumour volume in brachytherapy for cervical cancer – a feasibility study

Thiruthaneeswaran N, Groom N, Lowe G, Bryant L, Hoskin PJ

Brachytherapy. 2018 Jan - Feb;17(1):181-186. DOI: 10.1016/j.brachy.2017.09.012

NILUJA THIRUTHANEESWARAN

What was your motivation for initiating this study?

Image-guided plan optimisation with MRI and CT for interstitial (IS) and intracavitary (IC) brachytherapy is an established technique and forms part of the multimodality approach to treating locally advanced cervical cancer. Current prescription to the high-risk clinical target volume (HR-CTV) incorporates residual disease and the whole cervix. We wanted to see if it was feasible to dose escalate by 40% of the HR-CTV dose to the residual disease (GTV-Tres) while maintaining current organs at risk dose constraints. The rationale is that an MRI-guided focal brachytherapy boost may overcome radiobiological resistance and improve local tumour control. This dose escalation was chosen to achieve ≥ 100 Gy EQD2 to the residual tumour volume GTV-Tres.

What were the main challenges during the work?

One of the main challenges (which has contributed to lower than expected rate of reaching the pre-determined planning aims) was that we were using retrospective brachytherapy planning scans where the applicator position was based on achieving optimal dose delivery to the original HR-CTV rather than specifically for a focal boost volume. Therefore, re-optimising the plans to achieve our planning goals was challenging. Another challenge as we move towards MRI-based brachytherapy plans was evaluating and defining tumour response after external beam radiotherapy in order to maintain consistency and reproducibility.

What is the most important finding of your study?

Based on 50 plans we demonstrated that we could achieve the planning goal in 24 of the plans with 29 plans achieving GTV-Tres D98 ≥ 100 Gy. Interestingly, we found that there was no difference between the intracavitary-interstitial (IC-IS) and IC applicator alone plans in achieving planning goals. Instead, a number of key factors were identified that were limiting dose escalation. The proximity of organs at risk to the HR-CTV was, not surprisingly, one of the factors. Others included <5 mm distance from GTV-Tres outline to the HR-CTV outline where the dose gradient was too steep to cover the volumes differentially and the position of the IC relative to the GTV-Tres and HR-CTV. ▼

What are the implications of this research?

In this planning study, it has been demonstrated that dose escalation to the GTV-Tres to 140% is feasible if IC and IS needles are optimally positioned. A focal boost to residual disease enables further dose escalation to optimise local control in patients with locally advanced cervical cancer and ongoing trials such as the EMBRACE II study will inform current practice on the clinical application of dose escalation.

Niluja Thiruthaneeswaran
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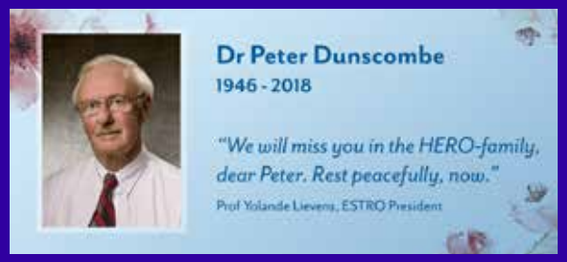
PHYSICS

PHYSICS

"We also have news of the second ESTRO physics workshop to be held in Malaga, Spain, in October this year"



REMEMBERING DR PETER DUNSCOMBE

Read in the Health Economics Corner on page 117 the orbituary of Dr Peter Dunscombe, a medical physicist well known in the ESTRO community >

Welcome to the Physics Corner. In this issue, we have two small deviations from the usual format that we hope you will find interesting. The first is the 'Editors' pick': while we know that radiation therapy is used primarily as an effective local treatment, Suk-Whan Yoon and his colleagues have investigated an approach that uses Cherenkov Light produced by the radiotherapy treatment beam in the treated tissue to photo-activate an anti-cancer therapeutic inside the tumour, simultaneously with radiation treatment. This is a good example of lateral thinking, which offers some exciting possibilities for treatment.

The other difference is that we have included an interview with Ben Mijnheer, editor of a new medical physics book, *Clinical 3D Dosimetry in Modern Radiation Therapy*. Many readers will know Ben, as he has been very active in ESTRO since its foundation and is a familiar presence at meetings and in classrooms. Ben has drawn on his encyclopaedic knowledge of dosimetry to produce a valuable textbook. In this interview, Ben provides an outline of the book, and also describes the ups and downs of taking on the onerous task of editing a major textbook, which will be of interest to anyone thinking of undertaking a similar exercise.

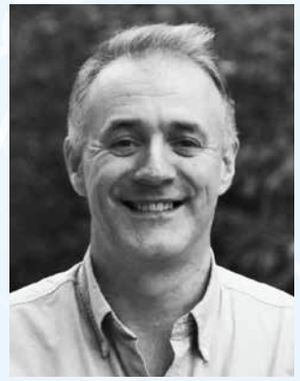
The description of PhD research this month is by Laura Shields from Dublin, Ireland. Laura completed her PhD in the area of out-of-field radiation in radiotherapy. Laura outlines why this is an increasingly important area to study, together with a description of her experience in measuring, modelling and investigating the effects on cells of dose in out-of-field regions.

We also have news of the second ESTRO physics workshop to be held in Malaga, Spain, in October this year. Following the great success of the first workshop in 2017 we look forward to the one this year, which focuses on 'Science in development'. We are now asking for contributions around current research, so please start drafting your submission.

As usual, we welcome any feedback on the Corner. We would also like to invite you to offer suggestions for PhD research, back-to-school topics, and other subjects for future issues.

Mischa Hoogeman (m.hoogeman@erasmusmc.nl),
Brendan McClean (Brendan.McClean@slh.ie)
Christian Richter (christian.richter@oncoray.de)

MISCHA HOOGEMAN



BRENDAN MCLEAN

CHRISTIAN RICHTER

2

ESTRO PHYSICS workshop

Science in development

26-27 October 2018

Malaga, Spain

REGISTRATION OPENS
Early May 2018

DEADLINES
Contributions
on ongoing research:
27 June 2018

Early registration:
21 August 2018

Late registration:
20 October 2018

No onsite registration.

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European Society for
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PHYSICS

2nd ESTRO physics workshop:

Science in development

26-27 October 2018
Malaga, Spain

NÚRIA JORNET

After the success of the first ESTRO physics workshop, *Science in development*, held in 2017 in Glasgow, UK, the ESTRO physics committee is delighted to announce the second edition, to be held in the city of Malaga, Spain, from 26-27 October 2018.

This workshop aims to facilitate scientific and professional networking opportunities within the ESTRO physics membership and with physicists working in other areas, and also to create close interaction with developers in commercial companies. It is the perfect forum to share projects in their earliest stages that would benefit from discussion with colleagues. We believe that by promoting these interactions we will capture scientific developments that could be applied in practice and have a real impact on improving the treatment of cancer.

The programme will open with a plenary lecture, then break out into different topics that will run in parallel. The workshop is based on a concept tailored to foster scientific exchange and has a number of unique features. These include:

- A topic-orientated programme. Participants register for a single topic. The topics this year are:
  - Strategies for patient-specific quality assurance (QA) pre-treatment or *in vivo*
    Chairs: Jeroen Van der Kamer and Dirk Verellen
  - Predictive models of toxicity in radiation therapy
    Chairs: Tiziana Rancatti and Claudio Fiorino
  - Improving range accuracy in particle therapy
    Chairs: Christian Richter and tbc
  - Real time (adaptive) radiotherapy
    Chairs: Ben Heijmen and tbc
  - Quantitative imaging for treatment planning
    Chairs: Uulke Van der Heide and Daniela Thorwarth
- A programme prepared by the different chairs that combines invited talks by leading scientists, proffered papers on current projects (open call) and plenty of time for discussion.
- A limited number of participants per topic to stimulate lively discussion and guarantee interaction.
- Updates not only on the latest research around a topic, but also opportunities to share experiences and promote collaboration between different groups and members working on the same topic. We hope that the workshop will contribute to establishing long-term collaborations within ESTRO.

This new workshop is especially targeted at medical physicists working in the radiation oncology area.

We hope that you find it interesting and look forward to your participation in Malaga.

Núria Jornet
Chair, ESTRO physics committee

EDITORS' PICKS

Enhancing radiation therapy through Cherenkov light-activated phototherapy

Yoon SW, Tsvankin V, Shrock Z, Meng B, Zhang X, Dewhirst M, Fecci P, Adamson J, Oldham M.

Int J Radiat Oncol Biol Phys. 2018 Mar 1;100(3):794-801. doi: 10.1016/j.ijrobp.2017.11.013. Epub 2017 Nov 16.

SUK-WHAN (PAUL) YOON

JUSTUS ADAMSON

MARK OLDHAM

What was your motivation for initiating this study?

Radiation therapy is known to be an effective local treatment, often capable of achieving tumour control in well-localised regions of disease. However, patients may still suffer from a systemic disease burden, which is typically not affected by the local effects of radiation. The main motivation for this work was to investigate the basic feasibility of an exciting new approach that preserves all the local benefits of radiation therapy, but which may add or amplify any systemic immunogenic anti-cancer response. The approach is called 'radiotherapy enhanced by Cherenkov photo-activation' (RECA). In RECA, Cherenkov light produced in treated tissue, by the radiotherapy treatment beam itself, is used to photo-activate an anti-cancer therapeutic inside the tumour simultaneously with radiation treatment.

The significance of RECA is that the strengths of current state-of-the-art radiation treatment are enhanced by a novel photo-therapeutic component that has potential to improve local tumour control and promote a systemic response. RECA has the potential to be applied to many cancer types and photo-therapeutics. This initial work investigated RECA with the photo-therapeutic psoralen, which has a well-documented anti-cancer and immunogenic activity, and which also has photo-activation wavelengths that are well matched to the Cherenkov emission spectrum.

What were the main challenges during the work?

This early work focused on acquiring in vitro data as a preliminary step towards in vivo work. The first major challenge was to find a rigorous in vitro experimental approach that would enable quantification of any extra therapeutic benefit of RECA when compared to radiation and psoralen alone (i.e. the control condition where radiation and psoralen are present, but the psoralen has not been photo-activated). This challenge was addressed through the elegant 'half-plate light block' approach, in which cell culture plates had identical radiation treatment except that Cherenkov light was prevented from reaching half the wells in a plate by virtue of a thin light block. This method enabled high quality inter-plate self-controls.

A second key challenge was to increase the rigour of the work through incorporating multiple independent assays for independent confirmation of any RECA benefit. Three assays were included in the work: ATP luminescence, clonogenic cell survival studies, and flow cytometry with fluorescence-tagged surface major histocompatibility complex (MHC I) antibody. The luminescence assay measures total cell metabolic activity, which serves as a surrogate for cell proliferation and viability. Flow cell cytometry was used to determine change in MHC I expression on the cell surface, which is an indicator of likely tumour immunogenicity ▼

and thus, potentially, improved visibility to the immune system.

What is the most important finding of your study?

This work demonstrates for the first time the basic feasibility of enhancing radiation therapy by using the Cherenkov light generated by the megavoltage (MV) radiation treatment beam itself, to photo-activate an anti-cancer drug (psoralen). The main finding was that increased therapeutic effect was observed for RECA-treated cells in all three independent assays, and two cell lines, when compared to cells treated with radiation alone (or radiation and inactivated psoralen). Of particular interest was the observation of up-regulated MHC I in RECA-treated cells, which would be consistent with immunogenic amplification through increased antigen exposure to the immune system (an observation consistent with prior psoralen studies and trials). This differential was not observed for psoralen-free cells, strongly suggesting a combinatory effect of Cherenkov light with psoralen.

What are the implications of this research?

The main implication is that this work opens a new field of opportunity for utilising the Cherenkov light that is generated in the treated tissue of all patients undergoing MV treatment. (This light has historically been ignored as therapeutically inconsequential, although there is currently much interest in a separate application – the imaging of Cherenkov light emitted from the patient's surface for positioning verification.) This work provides a strong rationale and justification for moving from in vitro work to in vivo studies, where the clinical impact of RECA treatment can be investigated. If RECA treatments are indeed able to add or amplify a systemic anti-cancer response to radiation treatment this will be a major advantage, and treatment paradigm-changing approach. It is also possible that future innovations may include the development of stronger photo-therapeutics that are more efficiently activated by Cherenkov, and more effective in immune response amplification. The clinical translation of RECA is expected to be straightforward, as the approach is compatible with existing treatment technology and treatments, and psoralen is a US Food and Drug Administration (FDA)-approved agent.

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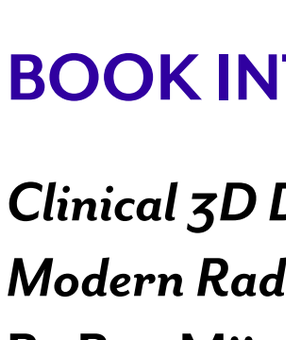
BOOK INTERVIEW

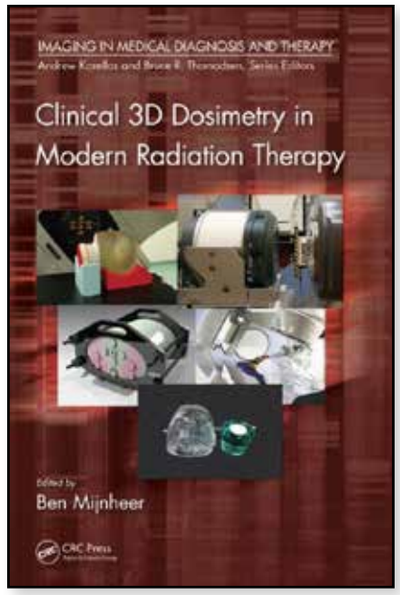
Clinical 3D Dosimetry in Modern Radiation Therapy

By Ben Mijnheer (Editor)

Published by CRC Press
www.crcpress.com/Clinical-3D-Dosimetry-in-Modern-Radiation-Therapy/Mijnheer/p/book/9781482252217



BEN MIJNHEER



Prof Ben Mijnheer has recently published a book on Clinical 3D Dosimetry. For over 20 years, Prof Mijnheer has taught on the physics ESTRO courses. We are pleased to have him present an overview of the book, that could be a very useful companion in education and training, not only for medical physicists but other radiation oncology professionals.

Can you provide an outline of the book?

The book has 26 chapters and is divided into five sections dealing with various aspects related to clinical 3D dosimetry. After summarising the main topics discussed in the different chapters in this book, in the "Introduction" the clinical need for accurate 3D dosimetry is elucidated from different points of view. In the second section on "Instrumentation", experts in the use of the many different types of dosimeters describe the specific application of these detectors for 0D (using point detectors) to 4D dosimetry. The emphasis is on the clinical application of these detectors with a brief overview of their unique characteristics of importance to 3D dosimetry. In the third section on "Measurement and computation", various 3D and 4D dosimetry methods required for special treatment techniques, both already routinely applied or at the developmental stage, are described. In the fourth section of the book on "Clinical applications", a range of 3D dosimetry methods are extensively discussed for a large variety of disease sites and treatment techniques including IMRT, VMAT, brachytherapy and proton/carbon ion therapy. In the final section, 3D dosimetry techniques used for emerging technological developments in the field of radiotherapy are introduced.

What was the motivation to act as editor of the book?

For a number of years I had been thinking about how to follow up on the somewhat outdated ESTRO booklets dealing with dose determination and dose verification. There were many new developments, both in advanced treatment techniques and in dosimetry methods, that would justify updated reviews and new recommendations. ▼

However, in the US many American Association of Physicists in Medicine (AAPM) task groups were already active in these fields. Therefore, when I got the request in 2013 from Taylor & Francis to edit a book on 3D dosimetry in their series *Imaging in Medical Diagnosis and Therapy*, I hesitated at first. But information on clinical 3D dosimetry in modern radiotherapy is scattered over many places. Innovations in 3D dosimetry are mainly described in review articles and conference proceedings. Clinical applications of 3D dosimetry can be found in some books but mainly concern conventional treatment techniques, while information on clinical 3D dosimetry of advanced treatment techniques can only be found in the scientific literature. Therefore, I came to the conclusion that there really was a need for a book that provides valuable guidance to those involved in the design and implementation of new treatment technology and its application in modern radiation therapy.

What were the main challenges during the work?

The main challenge was that I was too optimistic with respect to the time required for editing such a multi-author book; the unexpected factor was always much bigger than expected. Many things happened in the three to four years preparing and editing the book. During that time several authors indicated they were having unforeseen problems, for instance, due to a sudden heavy work load, a change of job, or personnel problems, that caused a delay in the contribution of their chapter. Although all authors promised to submit their chapter before an agreed deadline, a rather large percentage of them was (much) too late or even unable to submit a complete chapter. A potential editor or group of editors of such a book should be able to find quick solutions for these problems, including writing missing parts of chapters themselves.

What makes the book different from other medical physics books?

3D dosimetry has been used in clinical practice for several decades but until relatively recently has been largely based on point, 1D and 2D practical approaches, such as the use of ionisation chambers and planar films or diode arrays. Major recent advances in the field have demanded new and innovative direct 3D, semi-3D, or even 4D dosimetric tools and methods to accurately characterise and validate hardware and software, and to determine and verify patient- and organ-specific doses. This book is unique in the sense that it aims to bring together these developments and information to cover the state-of-the-art of the accuracy, instrumentation, methods, and clinical applications of 3D dosimetry in modern radiation therapy. The last section of the book discusses pre-clinical applications of 3D dosimetry for small animal precision irradiators, in synchrotron radiation therapy, and in magnetic fields.

The topic of the book is wide, but its main focus is on dose measurement, although dose calculations are also discussed in a restricted manner. Dose calculation algorithms are not discussed in detail; however, the verification of the algorithms and their clinical application is an important part of the book. The theoretical physical aspects of the characteristics of dose computation models and measurement devices can be found in many medical physics textbooks and were only discussed briefly. In this book the focus is on new developments of measurement techniques and 3D dosimetry of modern radiotherapy techniques, including those of new image-guided treatment modalities.

Was there a direct or indirect contribution from ESTRO activities to the book? Where do you see ESTRO's role in this respect?

The direct or indirect contribution of ESTRO activities was modest. As an editor I carefully checked if the European activities in a certain field were sufficiently elucidated in a chapter; for instance, by referring to ESTRO booklets dedicated to the topic of that chapter. ESTRO's role could be to inform its members about the publication of the book, which is happening now thanks to the opportunity to have this interview.

Furthermore, I hope that the book will be used during several ESTRO courses dealing with the ▼

topics discussed in the book, varying from more general information about accuracy requirements for 3D dosimetry, to 3D dosimetry in emerging technological developments. The information provided in the chapters dedicated to detectors for reference dosimetry, small field dosimetry, 2D, semi-3D and 4D dosimetry, light-ion beam dosimetry, as well as in the more clinically oriented chapters on patient-specific quality assurance, audits using end-to-end tests, and dose verification of proton and carbon ion beam treatments, might be useful during relevant ESTRO courses.

From your experience, what would you recommend to other editors when editing such a book?

The main recommendation I would give to other editors is to start such an exciting but time-consuming project with several (for instance, three or four) co-editors who are able to react in a timely way to unexpected problems. Not only is it good to share the contacts with authors with several people, but also the editing process itself was much more complex than I thought. For instance, almost no author applied entirely the guidelines for manuscript preparation, including the reference system, as required by the publisher. Also, somewhat to my surprise, some texts needed a lot of improvement in communicating the main messages of that chapter to potential readers. Finally, the quality of the print proofs was not optimal and needed a lot of attention, even after return from the authors. All these activities would have been completed faster if those tasks would have been performed by a (small) team of editors.

Who should read the book and why?

The target audience is primarily physicists involved in clinical radiotherapy. These include medical physicists working in radiotherapy departments, medical physics residents and graduate students training in the field of radiotherapy physics. The book provides a comprehensive overview of many aspects related to clinical 3D dosimetry, which they may consult for possible implementation in their daily clinical work.

In addition, the book is intended to provide state-of-the-art information on relevant dosimetry methods for basic scientists and other researchers working on the development of new radiation detectors or dosimetry techniques. Often these scientists, coming from other fields of physics, require more knowledge of radiotherapy physics. The book offers the fundamentals necessary for these newcomers to get started in the field.

Finally, some chapters of the book are suitable for education of radiation oncologists and RTTs, and may serve as teaching material for radiation oncology residents and other students and trainees. Modern radiotherapy can only be performed in an optimal way if all members of the radiation therapy team are aware of the possibilities and limitations of the equipment they are using. A number of chapters in the book provide background information on those dosimetric issues with which they may not be very familiar. ▼

ABOUT THE AUTHOR

Ben Mijnheer got his PhD in 1971 at the University of Amsterdam, The Netherlands, based on a study concerning neutron measurements. He was appointed to a neutron therapy project in the Netherlands Cancer Institute – Antoni van Leeuwenhoek Hospital in Amsterdam, and after this project finished, he joined this institution as a medical physicist, where he is involved in various research projects and teaching activities.

His main research activities are in the field of dosimetry of ionising radiation, the development of new irradiation techniques, and quality assurance of radiotherapy in general. He was professor of medical technology in oncology at Inholland University of Professional Training, and the first physics editor of *Radiotherapy and Oncology*. He is author and co-author of about 250 articles and chapters in books, and recently finished editing the book "Clinical 3D Dosimetry in Modern Radiation Therapy".

He has received approximately 20 personal research grants and was supervisor of about 25 PhD theses. He was involved in the organisation of the physics part of many ESTRO scientific meetings, and faculty member/course director of several ESTRO teaching courses. He was also involved in numerous other courses dealing with various aspects of radiotherapy for medical physicists, radiation oncologists and radiation therapy technologists, both at the national and international level.

He received the ESTRO Breur Gold Medal Award in Edinburgh in 1998, the ESTRO Emmanuel van der Schueren Award in 2013 in Geneva, and the ESTRO Lifetime Achievement Award in 2016 in Turin.

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PHD RESEARCH

Characterisation and effect of out-of-field radiation in radiotherapy

Interview with the author, Laura Shields

LAURA SHIELDS

What was your motivation for choosing this PhD topic?

Interest in out-of-field radiation in radiotherapy has increased with the introduction of intensity-modulated radiation therapy (IMRT) and volumetric modulated arc therapy (VMAT). While these techniques offer a more conformal dose distribution to the target, an unwanted drawback is that there is also more healthy tissue being irradiated at a low dose. As treated patients are now living longer, clinical concern has been raised in relation to these low doses, particularly in relation to normal tissue toxicity and secondary cancer induction. Until recently, most of the attention in radiotherapy studies focused on delivering the correct dose to the target, with relatively little attention paid to doses out-of-field.

What are the main findings of your PhD?

Monte Carlo (MC) modelling revealed that 40x40cm2 profiles were more sensitive to changes in flattening filter material while central axis 10x10cm2 percentage depths doses (PDDs) were insensitive. Agreement between MC and measurement within 0.5% was achieved by tweaking the incident electron beam parameters along with the flattening filter material when both the PDDs and profiles were employed to match the model.

The waterproof Farmer chamber revealed closest agreement with MC out-of-field simulations.

The pinpoint chamber revealed the smallest energy dependence. Divergent depth dose curves acquired out-of-field displayed a dose minimum at a depth of dose maximum in-field.

Calculation of out-of-field doses by the different TPSs showed considerable variation, with both under-estimations and over-estimations observed.

Out-of-field radiation dose alone was shown to have a detrimental effect on the survival of normal healthy prostate cells positioned out-of-field. When bystander factors are taken into account cells showed an adaptive response to out-of-field radiation damage. ▼

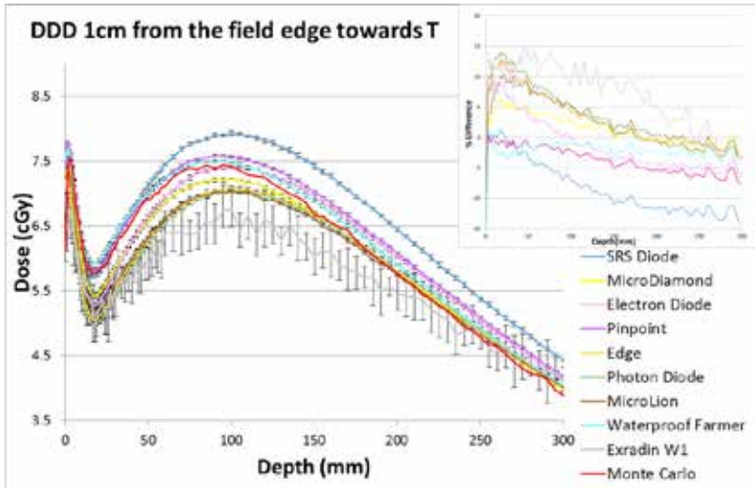

Figure 1: Comparison between MC-calculated and measured divergent depth doses 1cm from the field edge

What is the impact of your work on the field?

My work provided a comprehensive study on all aspects of out-of-field radiation from MC modelling, detector response and choice, TPS accuracy to radiobiological effects. The work highlighted an improved method for matching MC models to reality and how agreement to within 0.5% was possible. The MC model was used to help characterise out-of-field radiation. The response of a range of clinically available detectors to out-of-field radiation was examined along with a study on their energy dependence. The accuracy of three modern TPSs employing four different dose calculation algorithms was assessed and highlighted the variation in out-of-field dose calculation accuracy between systems. The radiobiological effect of out-of-field radiation both with and without bystander factors was examined on normal healthy cells located outside a 6MV photon beam.

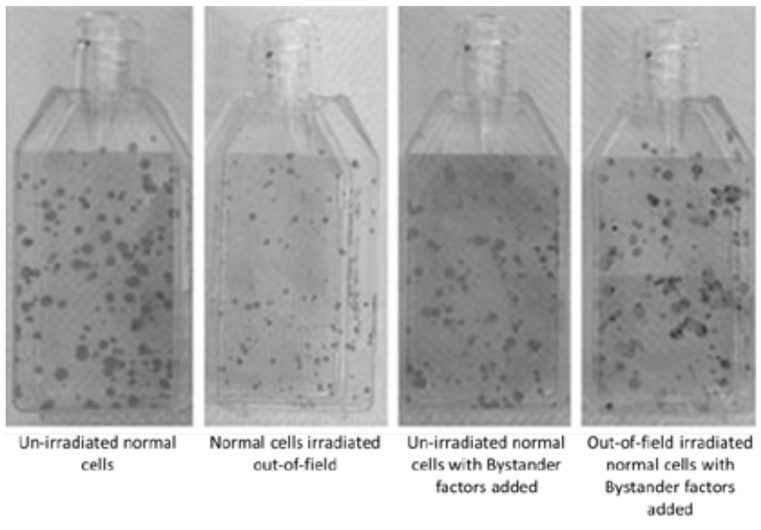

Figure 2: Effect of out-of-field radiation alone on normal healthy cells and the effect of adding bystander factors.png

What was the most challenging part of your PhD?

The most challenging part was the very beginning. Having come through years of structured programmes (degree, master's, training scheme), I found myself having to create my own structure and choose my own avenue of research. Initially I found this very daunting and challenging. I dug into the literature in search of an area that I felt I could advance and was interesting. Now, having finished my PhD, I appreciate the skills I have gained in being able to define my own research topic and how much this will help me in the future as a researcher.

Who or what inspired you most during your studies?

My biggest inspiration was the need to discover the answers to the many research questions that were posed along the way. My work spanned Monte Carlo modelling, dosimetry, treatment planning and radiobiological investigations, which kept everything very interesting. I was able to perform experiments allowing me to examine effects from multiple different angles, some of which were very new to me, which I found really interesting.

Will you stay in the field? What are your plans for the future?

Yes, of course! I'm currently working as a medical physicist in St Luke's Radiation Oncology Network, Dublin, Ireland. My plans for the future are to continue learning, absorbing and researching in the area of radiotherapy physics.

Laura Shields
Senior physicist
St Luke's Radiation Oncology Centre
St James's Hospital
Dublin, Republic of Ireland

ABSTRACT

Out-of-field radiation in radiotherapy has gained increased attention with the introduction of intensity-modulated radiation therapy (IMRT) and volumetric modulated arc therapy (VMAT). While these new delivery techniques now offer a more conformal dose distribution to the target there is also more healthy tissue being irradiated at a low dose. As treated patients are now living longer, clinical concern has been raised in relation to these low doses.

The aim of the work presented in this thesis was to provide a comprehensive study of some key aspects of out-of-field radiation, with a view to improving our understanding of its nature and effects on healthy tissue. Four main areas were identified as requiring investigation and have been the subject of study during this work. The first area relates to Monte Carlo (MC) modelling, and the optimisation of model input parameters for accurate out-of-field dose simulation. The second area focuses on detector suitability for out-of-field dosimetry, as detectors used in radiotherapy have been primarily developed and characterised for in-field measurements. The third area investigated deals with the accuracy of clinically used treatment planning systems (TPSs), and the extent to which different TPSs are able to reproduce measured and MC-simulated dose out-of-field. The fourth area considers the radiobiological effect of low radiation doses out-of-field on normal healthy cells.

A MC model of a 6 MV Elekta Synergy linac was developed using BEAMnrc. A matching procedure involving comparison of (i) measured central axis (CAX) percentage depth dose profiles for a 10x10cm2 field, and (ii) cross-plane and in-plane profiles for a 40x40cm2 field, with MC-simulated data was proposed, which allows accurate determination of the incident electron beam energy, taking into account the flattening filter material composition. By using this method, agreement to within 0.5% between measured and simulated data was achieved. The ZLAST tool of BEAMnrc was used to establish phantom scatter as the dominant source of out-of-field radiation, supporting the view that there is no need to include peripheral linac head components in the model, especially when calculating out-of-field doses at typical patient distances.

The response of eleven clinically available detectors to out-of-field radiation was investigated. Agreement between all detectors was found to be within 2% (expressed as percentage of the CAX dose), but local agreement with MC-simulated doses varied with depth and distance from the field edge. Agreement with MC deteriorated with increasing distance from the field edge. The waterproof Farmer chamber, despite its slight over-response at low energies, had the closest response to MC-simulated out-of-field dose profiles and divergent depth doses, and it is, therefore, recommended as a suitable detector for out-of-field dosimetry.

The out-of-field accuracy of three modern TPSs employing four different dose calculation algorithms was investigated by comparison of calculated doses out-of-field with those determined by MC simulation and measured with the waterproof Farmer chamber. Considerable variation in the out-of-field dose calculated by the different TPSs was observed. Previous studies had reported an under-estimation of out-of-field doses by a number of TPSs, but this study revealed that over-estimation can also occur in some cases. It was concluded that the clinical acceptance criteria for TPS models out-of-field are ambiguous and should be redefined. The MC model was then used to extract energy spectra at various depths and out-of-field distances to help characterise the incident out-of-field radiation.

Finally, a radiobiological study was carried out to examine the impact of out-of-field radiation on cell survival and DNA damage of normal prostate PNT1A cells positioned out-of-field and to investigate the role of the bystander effect on out-of-field cells. The study showed that out-of-field radiation dose alone can have a detrimental effect on the proliferation of normal prostate cells. The addition of bystander factors suggests an adaptive response in the PNT1A cells irradiated out-of-field. The study also highlighted the lack of correlation between cell survival (as determined by clonogenic assay) and DNA damage (as determined by γH2AX assay), which indicates that not all DNA damage leads to cell death. ▼

ABOUT THE AUTHOR

Laura Shields obtained a BA(Mod) in Physics from Trinity College Dublin in 2009. It was in her third year of studies that she learned of a possible career in medical physics during a lunchtime 'wild geese' seminar. The 'wild geese' seminars invited working physicists to talk about life after their degree to explore future career options for students. It was Dr Patrick Kenny, chief medical physicist in the Mater Hospital in Dublin, who described life as a working medical physicist that inspired Laura to pursue a career in the field.

After completing her undergraduate degree, Laura went on to complete an MSc in Physical Sciences in Medicine, finishing top of her class and receiving the Robert Boyle Prize Medal for her MSc research project. She then secured a place on the Institute of Physics and Engineering in Medicine (IPEM) training scheme at the Merseyside Training Consortium at the Royal Liverpool University Hospital and Clatterbridge Cancer Centre.

Her three major subjects were nuclear medicine, MRI physics and radiation therapy. The training scheme provided her with a multi-faceted insight and training experience in the application of physical sciences to medicine, which she successfully completed in 2012. During her training, Laura missed having a research project and decided to accept the offer to study for her doctorate in radiotherapy physics under the supervision of Professor Brendan McClean (St Luke's Radiation Oncology Network (SLRON)) and Dr Luis Leon Vintro (University College Dublin (UCD)). She began her PhD journey in 2012, was awarded the Irish Association of Physicists in Medicine Young Investigator Grant in 2013 and successfully defended her thesis in 2016. Laura has been working as a 50% clinical, 50% research physicist in SLRON since September 2015.

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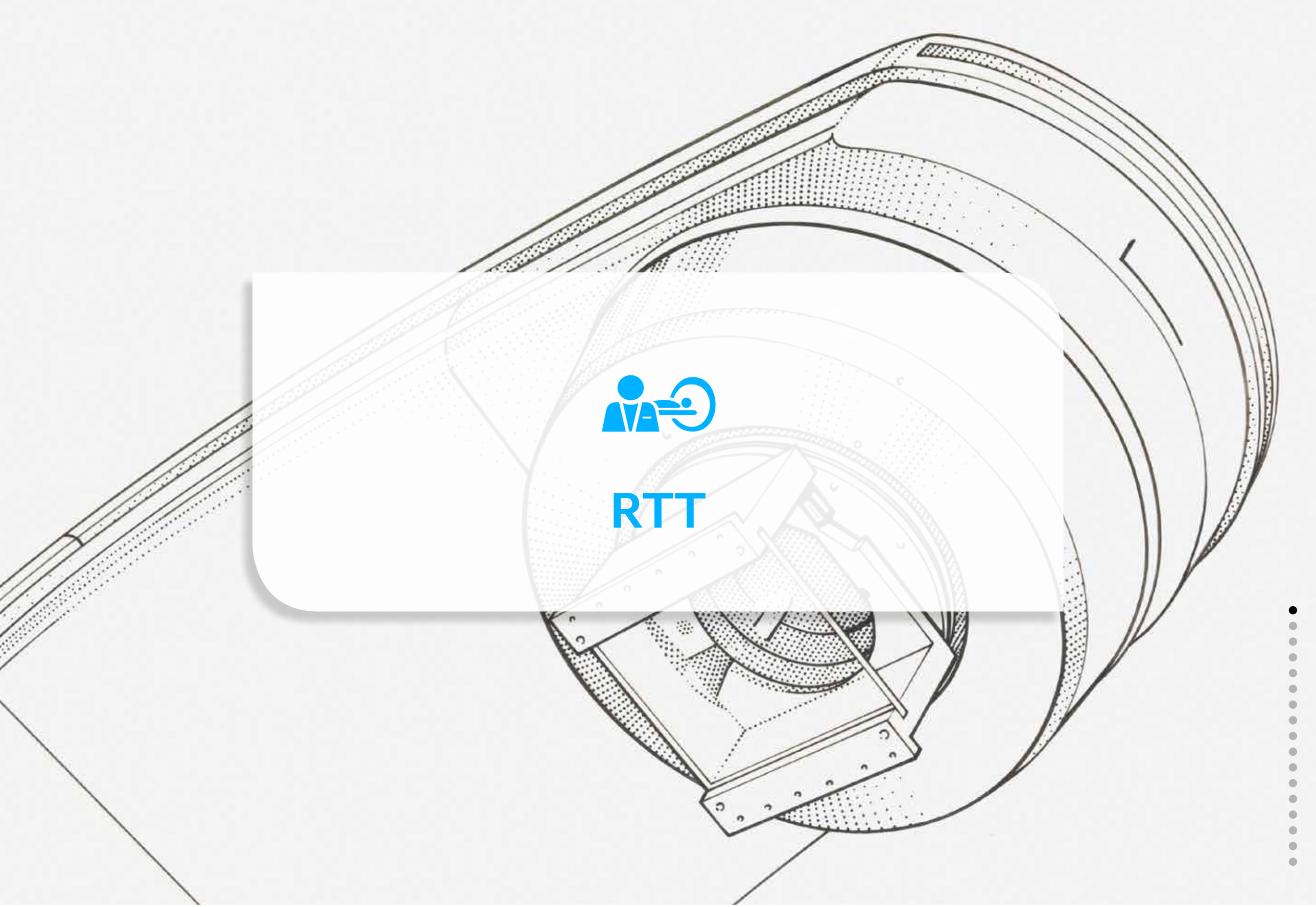


RTT

RTT

"This Corner focuses on advanced practice and education"

Welcome to the RTT Corner.

So far, 2018 has been a very interesting year for the implementation of new technologies in radiation oncology. Radiation therapists (RTTs) play a fundamental role, not only in the planning and treatment management of patients, but also in the implementation of advanced practice. In order to further increase our autonomy and professional responsibilities, we must provide high-level education that enables and motivates RTTs to perform at an even higher standard. As such, this Corner focuses on advanced practice and education.

Recently, RTT Corner committee and board member Laura Mullaney co-authored a publication in *Clinical and Translational Radiation Oncology* (ctRO). The original research article, 'Learning in radiation oncology: results of the ESTRO multidisciplinary survey', discusses the importance of the ESTRO School's educational role for young professionals. In this Corner, we have invited Laura to answer questions about the importance of the ESTRO School, education for RTTs and our profession.

RTT Guilherme Couto is an assistant lecturer at the University of Malta, and finished his MSc in Medical Physics at Faculdade de Ciências do Porto, Portugal. He is currently reading for a PhD at Ulster University in Northern Ireland, UK, where he is focusing on the development of RTT competencies, practising on the linear accelerator. In February this year, Guilherme had an article published in Radiotherapy on the 'Evaluation of the educational requirements to practice radiography in the European Union', emphasising the need for further professional regulation in the EU. We have published a review of this article here.

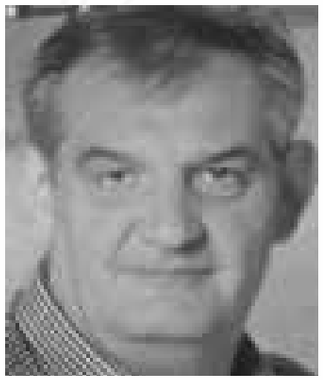
Our final piece is written by Aoife Williamson, RTT neuro-oncology specialist working at the Beatson West of Scotland Cancer Centre (BWOSCC) in the UK. Aoife has developed this role over the past ten years and has completed an MSc in 'Advanced practice in radiotherapy and oncology' at Sheffield Hallam University, UK, in 2013. In this Corner, Aoife shares her broad experience in technical advances, patient care and quality assurance (QA) within her specialist role.

We hope you enjoy reading this Corner. If you have any interesting ideas or suggestions for articles, please do not hesitate to contact us.

Aileen Duffton, Isabel Lobato and Ilija Čurić

AILEEN DUFFTON

ISABEL LOBATO



ILIJA ČURIĆ

RTT

Developing advanced practice RTT roles in neuro-oncology

Case study by Aoife Williamson

AOIFE WILLIAMSON

As the neuro-oncology advanced practitioner at the Beatson West of Scotland Cancer Centre (BWOSCC), Scotland, UK, I provide expert knowledge on all aspects of radiotherapy for central nervous system (CNS) tumours, including immobilisation, imaging, target delineation and treatment verification.

My current role has evolved considerably since the scope of my practice was first agreed in 2007. I was initially tasked with on-treatment assessment of patient side-effects and image verification review. I received formal teaching from the neuro-oncology clinical oncologists on epidemiology, pathology, anatomy and management of brain tumours. Protocols and competencies were specified for non-medical on-treatment review protocols, including drug modification and non-medical image review protocols. In order for me to achieve the required competence, an observation period was followed by one month's direct supervision. After three months, I completed my competencies and was able to practice autonomously. In the months that followed, my scope of practice was reviewed and rewritten to include:

- Development and implementation of the stereotactic radiosurgery (SRS) service
- Development and implementation of volumetric modulated arc therapy (VMAT) for brain tumour patients
- Implementation of CT / MRI fusion for radiotherapy planning
- Undertake consent for grade IV glioma patients.

Implementation of new technology

The first implementation remit that I took on was for the development of a stereotaxy service. One of the most important aspects of the implementation of any new technique is ensuring effective working and communication within the multi-disciplinary team. It is crucial to meet frequently and define timelines for tasks. All the disciplines involved have their own responsibilities, which once completed, ensure a smooth introduction of the new technique. I was responsible for training all radiation therapists (RTT) and created a set of competencies for simulator and treatment RTTs. I wrote the quality assurance documentation for this technique, including the clinical protocol, associated work instructions, forms and data sheets. Awareness sessions for all staff were then conducted to update them on this new technique, the training involved, and the treatment and imaging specifications required.

Since the introduction of the service, I have been involved in every aspect of the patient's journey for SRS from reviewing set up in the mould room and CT simulation, to MRI fusion and target delineation, to approving kV and cone beam computed tomography (CBCT) imaging for treatment. In 2013 our department introduced flattening filter free (FFF) on Truebeam STX linear accelerators. I undertook an audit: acomparison of two SRS delivery techniques: conformal 6MV photon fields versus 10MV FFF VMAT. Our study showed that VMAT FFF ▼

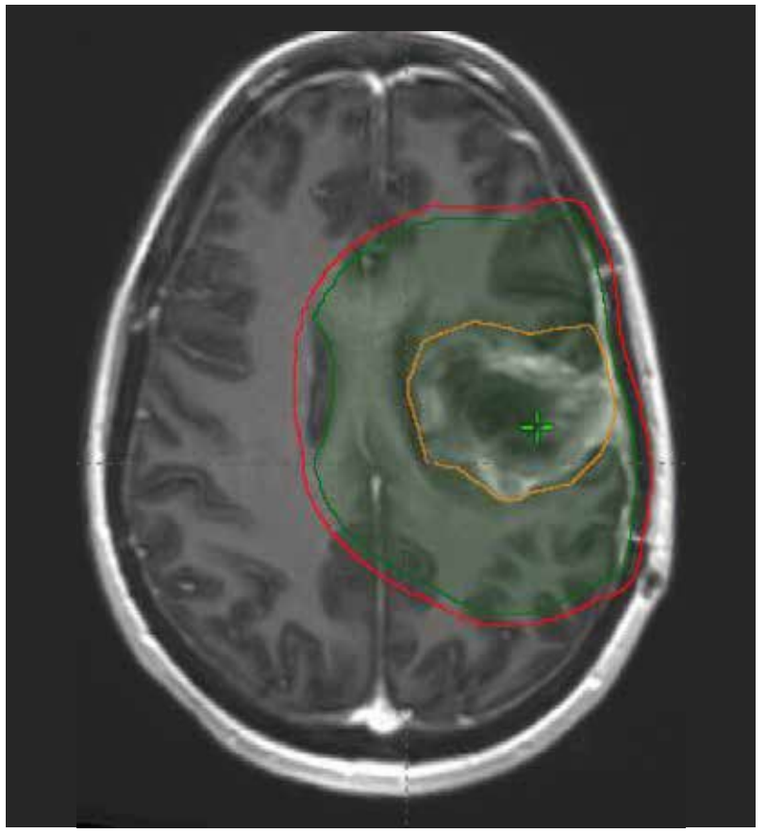


Image 1- GTV- CTV-PTV of Glioblastoma

reduced the beam on time and time in room by almost 50%. This audit was accepted for an oral poster presentation at ESTRO and was also nominated for best poster.

Being involved in the implementation of an entirely new service was a fantastic opportunity for me. The leadership skills I learned, the knowledge and understanding I gained and the confidence the process gave me has really benefitted my practice. After the success of this service, I played a pivotal role in the implementation of VMAT for all glioma patients. I was part of a team who initiated a business plan to secure dedicated MRI radiotherapy planning sessions on a local diagnostic scanner.

Consent for radiotherapy

I believe that with the appropriate training and competencies, RTTs are perfectly placed to undertake the consenting procedure. We have high-level knowledge in anatomy and physiology, knowledge and competence in the management of side effects and demonstrate great expertise in treatment-delivery techniques. We are involved in the physics planning process, work within International Commission on Radiation Units and Measurements (ICRU) guidelines [2], and understand the relevance of the prescribed radiotherapy dose and the tolerance of sensitive structures to these doses. Consenting patients with incurable brain tumours presents challenges for the RTT, where patients are informed the aim of treatment is tumour control. Patients, understandably, are devastated by this, and these discussions can be extremely emotional. Patients and their families are often well informed about their tumour type and can engage in discussion about tumour pathology and characteristics and the impact these results have on their overall survival. Before undertaking the consenting process, I followed the same route to develop competency as described above: observation, training, writing of non-medical consenting protocols and individual competency. I have been involved in many difficult consultations over the years. An inexperienced professional can quickly become out of their depth when confronted with difficult questions. The training and the support I received from my clinical team has enabled me to become proficient at this task.

Education

To support this clinical learning, I enrolled on an MSc in Advanced Practice in Radiotherapy and Oncology at Sheffield Hallam University, which I completed in 2013. My MSc helped me to develop the knowledge, skills, competencies and professional behaviours required to function as an advanced clinical practitioner. There was an emphasis on reflective practice throughout, which is essential to any advanced practitioner's role. This wide range of knowledge helped to underpin my clinical reasoning and safe decision-making. The research component of the MSc gave me the skills required to write a research proposal and to undertake a robust physics planning study. I presented my dissertation, a comparison of three dimensional-conformal radiotherapy (3D-CRT) and volumetric modulated arc therapy (VMAT) for meningiomas at the ESTRO annual congress in 2013.

Advanced practitioners enhancing the patient pathway

Pre-treatment assessment clinic

In patients with high-grade glioma (HGG), the period between neurosurgery and starting ▼

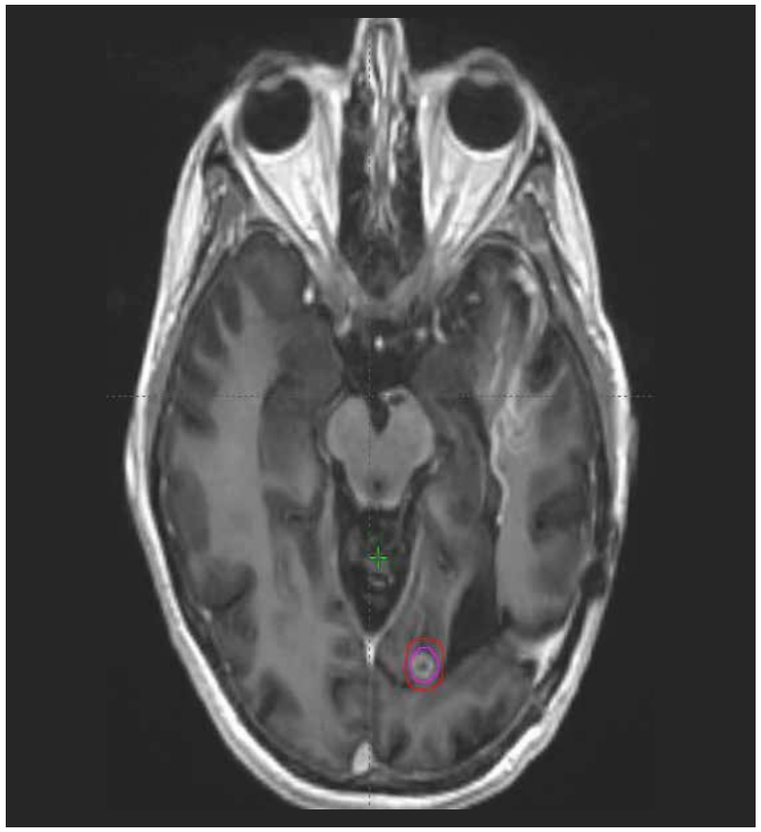


Image 2 - Image shows GTV & PTV . Images 2, 3 & 4 are all the same patient: Patient with multiple metastases.

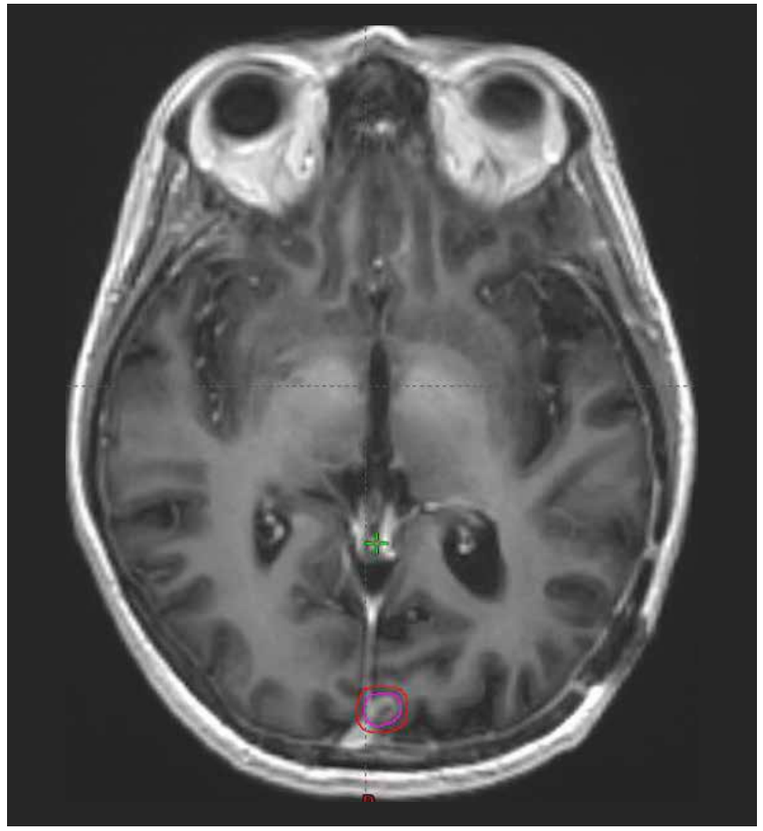


Image 3: Patient with multiple metastases. Image shows GTV & PTV 2

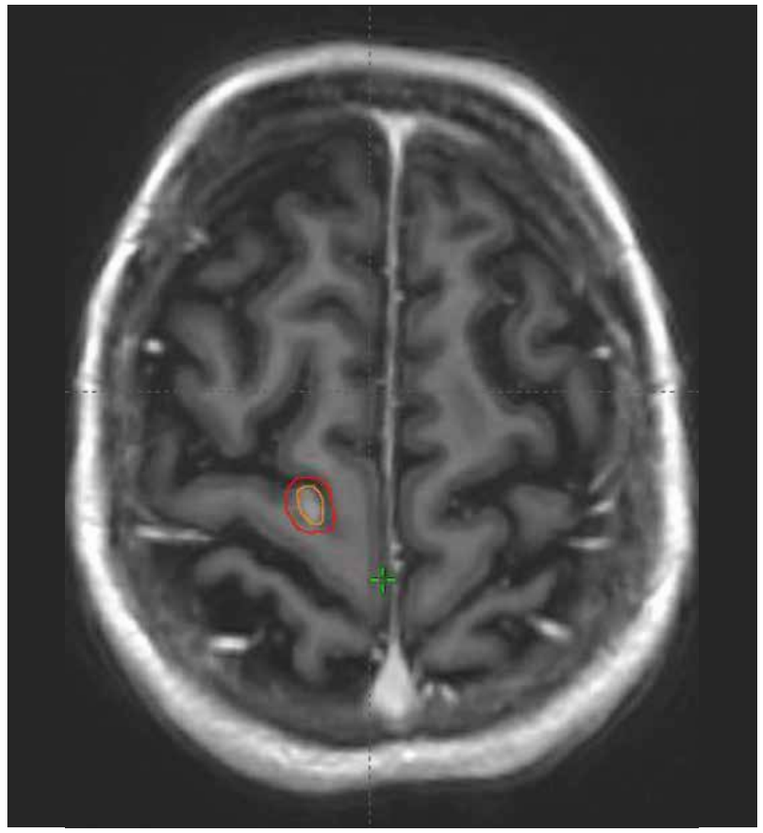


Image 4: Patient with multiple metastases. Image shows GTV & PTV 3

oncological treatment is a particularly vulnerable time. With this in mind, a pre-treatment assessment clinic (PTAC) was implemented in 2010 with the aim of conducting more detailed clinical and psychosocial assessments of patients in whom radical treatment (radiotherapy and/or chemotherapy) had been recommended at their first oncology appointment. The PTAC is jointly run by an advanced nurse specialist and myself. Performance status, steroid requirement, current medication, physical and psychosocial symptoms are reviewed and recorded as baseline measurements. The continued suitability of the intended treatment plan is assessed, potential toxicities discussed and informed consent obtained.

Clinical trials

The PTAC is also a vital component in optimising recruitment to clinical trials in newly diagnosed patients requiring multiple assessments in a short period of time. My team are active recruiters in many national and international clinical trials. I have been tasked for completion of site-specific information (SSI), radiotherapy trial quality assurance (RTTQA) questionnaires and outlining exercises for several national and international neuro-oncology studies.

Target delineation

Within my team I am responsible for the primary delineation of target volumes: gross tumour volume (GTV), clinical target volume (CTV) and planning target volume (PTV) and organs at risk within the brain. ▼

All volumes are peer-reviewed by the neuro-oncology team (clinical oncologists and RTT) as per Royal College of Radiologists RCR guidelines [1]. Clinical details and relevant pre-treatment imaging are reviewed by the team prior to volume review. All delineated volumes are discussed to ensure that the size and extent of the volume is appropriate. Any changes required are made in the presence of the team and reviewed again before approval by the clinical oncologists.

Peer review of all radiotherapy target volumes ensures that every volume undergoes a systematic review to ensure transparency, quality and safety, and to promote knowledge sharing. The involvement of the RTT in the peer-review session is crucial. It promotes discussion of the volumes you have delineated and addresses any concerns you may have about the extent of disease. It also highlights the fact that there is inter-observer variation between experienced clinicians when delineating volumes. Volumes are frequently revised. In the future, I hope to formalise a competency structure for this task, which could potentially lead to autonomous RTT approval for volume review of high-grade gliomas.

Audit and research

It is essential for RTTs to initiate and lead clinical audit. Audit can influence clinical practice and potentially improve outcomes for patients. In 2017, I led on the implementation of multiple isocentric VMAT for supine craniospinal treatments. I undertook an audit to assess our patient setup and explore whether we could safely reduce our CTV-PTV margins. Treatment images were analysed to determine interfraction motion from which population systematic and random errors were calculated. Setup margins were calculated using the Van Herk margin recipe [3]. This audit resulted in a change to our craniospinal tumour volume and margin protocol, with a reduction in CTV-PTV margins of 0.5cm.

In October 2017, the BWOSCC was one of the first centres in the world to implement HyperArc™ high definition radiotherapy (HDRT) for brain metastases patients. HyperArc is a frameless, multileaf collimator (MLC)-based, non-coplanar intracranial stereotactic radiosurgery solution, designed to automate and simplify SRS treatments. I was the lead RTT involved in the development, training and implementation of this new technique. I am now responsible for overseeing all aspects of the patient pathway, including the primary delineation of the target volumes. HyperArc patients are planned with a single isocentre, allowing for multiple metastases to be treated simultaneously. I am entitled to give final approval to all treatment imaging. I have to make complex decisions on patient setup within short time frames to ensure treatment accuracy. I must consider the impact that translational and rotational errors can potentially have on target coverage and on the dose delivered to organs at risk (OARs). I plan to audit this new technique, evaluating our setup accuracy and treatment delivery times.

What advanced practice means to me

Working within the neuro-oncology team at the Beatson, patient-centred care is of paramount importance. I believe my role has made a contribution to enhancing the quantity and quality of life for all patients receiving radiotherapy. I mentioned earlier the importance of the multidisciplinary team. I am very fortunate to have an extremely progressive team, focused on embracing the benefits of new technology to enhance our treatment delivery and improve our patients' care. The neuro-oncology team has always supported my role and my ever-evolving practice. As a result, I have become an advanced practitioner who takes accountability, responsibility and autonomy for broader aspects of our service. I have defined my own scope of practice. Continuous reflection has helped me to develop my clinical practice and influence the service through effective teaching and leadership.

REFERENCES

[1] RCR guidance radiotherapy target volume definition and peer review 2017.

[2] ICRU 83

[3] Van Herk M. Errors and margins in radiotherapy. *SeminRadiatOncol* 2004;14:52-64.

LAURA MULLANEY

INTERVIEW WITH LAURA MULLANEY
Co-author of the paper on

Learning radiation oncology in Europe: Results of the ESTRO multidisciplinary survey

Bibault JE, Francoad P, Borst GR, Elmpt WV, Thorwhart D, Schmida MP, Rouschop KMA, Spalek M, Mullaney L, Redalen KR, Dubois L, Verfaillie C, Eriksen JG
Clinical and Translational Radiation Oncology 2018 **February 2018;9:61-67**

RTT education
Where do we stand?

Interview with Laura Mullaney

LAURA MULLANEY

Results have shown that RTTs either participated in ESTRO courses less often, or were not as aware of them as other professions. Can you describe how relevant you think ESTRO courses are to the RTT profession?

Yes, this is true, according to this research, only 30% of the RTT respondents attended an ESTRO course. However, 70% of all respondents found the ESTRO school programme relevant to their practice. Exploring the results in a little more detail, the median age of the RTT respondents was 30 years old. This may explain the low numbers attending and awareness of ESTRO courses. I would expect that as they progress and develop within their careers, this number would increase accordingly.

The ESTRO School is committed to providing education for all ESTRO members. In recent years, the School has expanded the number and breadth of courses to 45 different course topics, including courses of particular interest to RTTs. There are 20 courses that are applicable to RTTs in the 2018 School calendar; these courses range from image-guided radiation therapy (IGRT) to risk management. The teaching faculty on these courses include RTT members; this helps to ensure that the content is multidisciplinary and applicable to an RTT audience. Three of these courses are specifically focused for RTTs: 'Advanced skills in modern radiotherapy', 'Best practice in radiation oncology' (TTT) and, new this year is a blended learning course on 'Best practice in positioning and immobilisation'.

In addition to the live courses, ESTRO also provides online contouring workshops, including organ at risk delineation, that are of interest to RTTs. I believe that the broad spectrum of ESTRO courses on offer appeals to the RTT profession no matter what your area of interest may be. Find out more about the courses on offer: www.estro.org/school/courses/FirstLevel/Courses

The article describes some of the educational resources available through ESTRO. Can you describe your personal experience of these and how important they are to the educational development of our profession?

In addition to the many live educational courses provided by the ESTRO School, there are several other very useful online educational resources on offer. ESTRO has acknowledged some of the identified barriers to education for members, mainly time and cost, and in an effort to ▼

address both of these it has incorporated online and blended learning educational resources to meet the new needs of radiation oncology professionals. ESTRO has invested in this area with Moodle (ESTRO's new Virtual Learning Environment) FALCON and DOVE. ESTRO is using Moodle to facilitate the blended learning courses on offer.

FALCON is the ESTRO contouring workshop platform and is used in both live events and online; currently, 100 experts and 7000 participants have used it. By way of my own experiences, I joined one of the FALCON online head and neck contouring workshops in 2016. The course was fully interactive, integrating lectures focused on organs-at-risk (OAR) delineation and providing valuable tips and tricks from experts in the field. I particularly liked the very practical hands-on nature of the course. This involved pre-course contouring homework using the FALCON Educase platform. During our first online lesson, the faculty members gave an overview of consensus guidelines for OAR CT-based delineation. They also reviewed and commented on our homework contours. These contours were all anonymised, so there was no embarrassment if the contours were incorrect.

Then we contoured the same case a second time based on the taught guidelines. For the second online lesson, the faculty members compared the first and the second submitted contours to the reference contours and provided valuable comments and insights into the head and neck delineation.

If I had any problems during the course, they were dealt with by the very helpful FALCON tutors, who were always on hand to offer guidance. I would highly recommend this and other FALCON courses for RTTs working in delineation. It can be challenging to use a contouring atlas and guidelines in isolation. This course explains the basis of the guidelines, the associated anatomy and provides valuable advice on contouring practices for the particular disease sites. Find out more about the FALCON courses on offer here: www.estro.org/school/articles/online-workshops/online-workshops-schedule

Another useful ESTRO resource is DOVE. This is an online searchable repository of radiotherapy specific content from the ESTRO journals, abstracts from the ESTRO meetings, webcasts and guidelines. So, if I'm interested in finding out about a new technique, I can search DOVE on the ESTRO homepage and it will provide me with all the ESTRO journal articles, conference abstracts and webcasts on this topic. What I particularly like about this tool is the availability of webcasts; it allows me to watch past ESTRO conference presentations from international experts.

One of the topics covered in the questionnaire was professional mobility. What is the importance of this within the RTT profession?

I believe this is an important issue for all radiation oncology professions including RTTs. The ability to travel and work in different countries benefits both the individual RTT and the department in which they work. It facilitates the sharing of best practice and clinical experiences between countries. We have seen this is a small way through the increased demand for the ESTRO mobility grant. In Ireland, many of the new (and not so new) RTT graduates want to travel abroad and work in other countries. Despite the existence of EU Directives on the movement of professionals, there are barriers to professional mobility, namely the lack of harmonised education, titles and work practices within the RTT profession ▼

across Europe. For its part, ESTRO has agreed on the professional title of 'Radiation therapist (RTT)' and developed a core educational curriculum with the aim to harmonise the different RTT education programmes.

Motivation from mentor and more time for training courses scored highly as the most important potential improvements. As an RTT, can you comment on the benefits of mentorship?

Mentoring can mean different things to different people and it can be a very structured or unstructured relationship. I see mentoring as more than just a supervision role; a mentor is an experienced person that may have travelled the same career path as you and, as a result, understands the time constraints and clinical demands that you are dealing with. They can offer you specific advice and support. Some of the benefits of having a mentor include: help to identify more efficient ways of doing things; insights into what skills and courses are needed as you progress through your career; help to reflect on your work and identify your strengths and areas for development.

Do you think RTTs get the same opportunity to attend training courses?

In my opinion, no. There are many reasons for this including lack of time, clinical workforce constraints, not seen as equal partners in the multidisciplinary team, and the financial costs of attending courses. Thankfully, I think the opportunities for RTTs to attend courses is changing with initiatives like the ESTRO RTT Alliance (https://www.estro.org/members/rtt-alliance-member/rtt-alliance-member). With this initiative, RTTs can become an ESTRO member through their national societies for a reduced fee of €15 per year. Some of the benefits of this membership include a reduced fee to attend an ESTRO course annually, eligibility for grants and awards and access to this newsletter, which highlights the educational opportunities available to RTTs.

For you, if there was one single thing you could improve for RTTs what would it be?

Harmonising education across Europe through the implementation of the ESTRO core curriculum for RTTs (www.estro.org/binaries/content/assets/estro/school/european-curricula/recommended_core_curriculum-radiationtherapists---3rd-edition-2011.pdf). This would secure an evidence-based education for the profession and increase the standards for RTT education and training throughout Europe. Given the wide variation in the duration and content of education programmes for RTTs, the core curriculum was designed to increase the level of awareness of the role of the RTT within the multidisciplinary team, to highlight the associated need for specialist radiation therapy education, and to facilitate mobility between EU Members States.

The median duration of education was ten years for RTTs. Does this suggest there are good postgraduate opportunities available throughout Europe?

This is a surprising and unexpected result that I would like to investigate further. This is in contrast to the survey completed as part of the RTT core curriculum revision in 2011, where the majority of programmes were three to four years in duration, with four programmes of two-year duration and only four programmes were dedicated to radiotherapy. ▼

It would appear to suggest that many of the respondents in the most recent survey had undertaken post-graduate education to work in their countries. I am course director of the Trinity College Online Advanced Radiotherapy Practice Course; this is a fully online part-time course that provides RTTs with the opportunity to study and work at the same time. There are also other online and taught options available for radiation therapy postgraduate education throughout the EU.

Laura Mullaney is course director of the new ESTRO course on 'Positioning and immobilisation, specially targeted for radiation therapists'.

In case you missed it, you can find her interview in the March-April issue of the newsletter newsletter.estro.be/2018/2018MarchApril/08-ESTRO-School_7.html

Positioning and immobilisation for radiotherapy

NEW

Online sessions: 4 October – 22 November 2018

Practical weekend in Vienna, Austria: 3-4 November 2018

Early registration deadline: 9 July 2018

COURSE AIM

The course aims to provide:

- Knowledge of the impact patient immobilisation and positioning has on the radiotherapy process and treatment outcomes
- Practical experience of constructing and using immobilisation devices for a range of disease site and treatment techniques
- A forum for participants to gain and exchange knowledge on patient immobilisation and positioning.

www.estro.org/school

PAPER REVIEW

By Isabel Lobato

ISABEL LOBATO

An evaluation of the educational requirements to practise radiography in the European Union

Couto JG, McFadden S, Bezzina P, McClure P, Hughes C.
Radiography (Lond). 2018 Feb;24(1):64-71. doi: 10.1016/j.radi.2017.07.009. Epub 2017 Aug 4.

An evaluation of the educational requirements to practise radiography in the European Union

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Radiography (Lond). 2018 Feb;24(1):64-71. doi: 10.1016/j.radi.2017.07.009. Epub 2017 Aug 4.

Discussing the implementation of new technology in radiation therapy without considering education, will result in a 'missing link' and is a cause for concern regarding our professional competencies. This could have major repercussions not only on radiation therapists (RTTs), but also in radiation therapy departments, multidisciplinary teams and, most importantly, impact on patient outcomes.

Our colleague Guilherme Couto, a teacher at the University of Malta, has led a study regarding the professional regulation of RTTs in the EU and the education required to ensure best clinical practice. The results of this study are summarised below.

Background

In the European Union (EU), the basis for the recognition of qualifications between EU Member States is established by Directive 2005/36/EC. Some professions' education, including physicians, nurses and pharmacists amongst others, are regulated at the European level, and this means that a graduate in any of these professions is able to get their education automatically recognised in any other Member State. However, this does not happen for RTTs, diagnostic radiographers or nuclear medicine technologists. For these professionals, the professions are regulated in each nation, and they must apply for the general recognition system, which establishes that any professional can get their qualifications recognised as long as the profession is regulated both in the home and host country and that the academic level of qualification is similar between the countries.

As the work of RTTs has health and safety implications, there is another criterion for recognition: the professional qualifications must be such that they do not compromise safe practise. In light of this, this study aimed to identify the criteria established by the regulatory bodies of EU Member States to practise as an RTT, a diagnostic radiographer and a nuclear medicine technologist.

Methods

Our contacts across the EU were asked to identify if the professions were regulated at the national level and to identify the national regulatory body. In the countries where the professions were regulated, national regulatory bodies were asked to identify the legal requirements to practise these professions. The data were then analysed using thematic analysis techniques. ▼

Findings

Only one EU country does not regulate the professions. In 83% of cases, a single profession encompasses the work of RTTs, diagnostic radiographers and nuclear medicine technologists, versus 21% of cases where the professions are regulated separately. All countries (n = 27) require specific education to practice; however, the academic level varies from secondary school (EQF5) to master's degree (EQF7) with programmes varying from two to four years and from 120 to 240 European Credit Transfer and Accumulation System (ECTAS) credits.

There was great heterogeneity in the criteria for subject areas covered by the education programme. In fact, 35% of the respondents (n = 23) did not identify the subjects and only 26% defined the subjects in terms of competencies.

Relevance to radiotherapy

Professional education is one of the most important routes to achieving high-quality RTT practice. We know that many educational programmes are designed to comply with the legal requirements to practice in the home country. However, the findings of this study show that these legal requirements vary considerably between EU Member States, which hinders the movement of graduates from certain countries due to differences in the academic level of professional education.

Most significantly, this study shows that very few countries define the competencies RTTs must develop in order to be able to practise. If the minimum competencies are not defined, graduates may comply with the criteria of their home country, thus being able to practise, despite the fact that they have underdeveloped competencies that may put patient safety at risk. In addition, these graduates may find barriers when applying for recognition of their qualifications in other countries, since the design of their professional education may not match the requirements of other countries.

In view of the current situation in Europe, the existing European recommendations on education of RTTs are very important: educational institutions have a guideline for the design of their education that would ensure RTTs develop competencies that would be similar across countries. Nevertheless, since these guidelines are not binding, stronger regulation seems to be required to ensure patient safety and that the movement of professionals across Europe is not compromised.

RTT

RTT ALLIANCE ELECTIONS

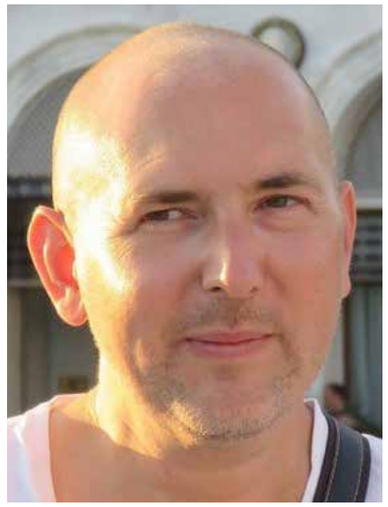
Following the RTT Alliance elections that ran from 20 February to 2 March 2018, ESTRO is pleased to announce that Ludwig Van den Berghe (Vereniging Verpleegkundigen Radiotherapie en Oncologie - Belgium) and Filipe Cidade de Moura (Associação Portuguesa de Radioterapeutas - Portugal) were elected as ESTRO RTT Alliance representatives. They both became members of the RTT committee during ESTRO 37 in Barcelona.

Out of the 543 eligible members (RTT full members and RTT alliance members), 157 voted (around 29% of the ballot). ESTRO would like to thank all those who voted, for taking part in this first ESTRO RTT alliance elections.

FOR MORE INFORMATION:

- **about the RTT Alliance elections, visit:**
  www.estro.org/about-us/governance-organisation/committees-activities/rtt-alliance-elections-2018/rtt-alliance-elections-2018
- **about the RTT Alliance, visit:**
  www.estro.org/members/rtt-alliance-member/rtt-alliance-member

Ludwig van den Berghe, elected RTT alliance representative



LUDWIG VAN DEN BERGHE

I am very happy to be elected to ESTRO's radiation therapists (RTT) group. It gives me the opportunity to work with colleagues from other countries and in the interests of ESTRO.

Belgium is not only a country with a distinct politics, but also a distinct healthcare system. Legally, nurses and technologists have been able to work in the hospitals' departments for some weeks now (following the law published in December 2017). However, they have different training profiles. It will be a challenge to integrate both and to work together.

The expertise of other countries within ESTRO in this matter is very important. As a Society, ESTRO offers an accessible platform where we can borrow and share information.

I want to be the link between ESTRO and Vereniging Verpleegkundigen Radiotherapie en Oncologie (VVRO, Flemish Nursing Society for Radiotherapy and Oncology) to develop future professionalisation. I also want to encourage our nurses to actively cooperate with ESTRO, register for the training programmes, and participate in conferences.

Dr Ludwig Van den Berghe
Head nurse
Department Radiation Oncology
MTD Radiotherapie-Oncologie
University Hospital Ghent - Belgium

RTT

Filipe Moura, elected RTT alliance representative

FILIPE MOURA

It is a great honour to be elected one of the representatives of the ESTRO RTT ALLIANCE, within the ESTRO RTT committee. Thank you to all the radiation therapists (RTTs) who have trusted me with this professionally and scientifically demanding role.

I believe that effective cooperation between ESTRO and national societies is the key to achieving uniform radiation oncology across Europe, ensuring best practice, and high-quality education and continuous professional development.

Based on the principle that joint efforts between national societies and ESTRO will attain specific goals and establish ongoing relationships, the mission of the ESTRO RTT ALLIANCE is to continuously promote better understanding of professional needs, and disseminate valuable information for improving RTTs' education, roles and recognition across Europe.

Filipe Moura
President of Association of Radiotherapy Technologists (ART)
Portugal

RADIOBIOLOGY

RADIOBIOLOGY

SPOTLIGHT ON... Professor Dr H. Peter Rodemann

Interview by Professor Dr Nils Cordes, member of the radiobiology committee

NILS CORDES

H. Peter Rodemann had been deeply involved in ESTRO's activities over the past years. This is why the Society is pleased to pay him tribute in the Radiobiology Corner at the occasion of his retirement.

Introduction

Professor Dr H. Peter Rodemann is the retiring chair of the Division of Radiobiology and Molecular Environmental Research, Department of Radiation Oncology at the Eberhard Karls University Tübingen, Germany. Peter studied biology at the University of Hohenheim, Germany, undertaking a PhD in the field of molecular mechanisms of pathophysiological cellular ageing between 1975-1979. After finishing his PhD, Peter moved to the USA to take up a postdoctoral research position at the Department of Physiology at Harvard Medical School, Boston. After this he returned to Germany to develop his postdoctoral thesis ('Habilitation') in cell biology at the Department of Cell Biology, Institute of Genetics, University of Hohenheim. Many of us got to know Peter through his activities as a member of the board of the German Society for Radiation Oncology (DEGRO) and as a member, and later chair, of ESTRO's radiobiology committee.

In recognition of his numerous achievements, Peter received ESTRO's Klaas Breur Award in 2006 and, in 2017, the Lifetime Achievement Award. Among a long list of merits, it is important to say that Peter is a selected member of the Leopoldina – the German National Academy of Sciences. Overall, Professor Peter Rodemann is one of the most renowned, visible, active and enthusiastic colleagues, collaborators and friends in our community: the evidence for which can be seen in his 224 publications, the nearly 50 young scientists who he mentored, and through his extensive work as a reviewer.

H. Peter "the Skipper" Rodemann (middle), Ekkehard Dikomey (left) and Nils Cordes (right) sailing on the Lake of Constance.

Last but not least, is Peter's work establishing the Wolfsberg Meeting Series on Molecular Radiation Biology / Oncology. This is probably the event for which Peter will be best remembered for decades. In short, it is the best sports event in the world, the best conference in the field, and in a wonderful Swiss venue. If you haven't been, you must go.

H. Peter Rodemann

Group members of the Division of Radiation Biology & Molecular Environmental Research, University of Tübingen

What stimulated you to go into radiobiology, Peter?

Well, I started studying biology, focusing on major cell and molecular biology, and then did my PhD in the field of molecular mechanisms of pathophysiological cellular ageing from 1975-1979. After receiving my PhD, I took up a postdoc position at the Department of Biophysics and Physiology at Harvard Medical School, where I became interested in protein metabolism under physiological cellular stress conditions.

On returning to Germany, I continued developing the topic of protein metabolism and expanded it to pathophysiological processes leading to replicative senescence of fibroblasts resulting in kidney fibrosis. From that, it was only a short step to implement radiation exposure as a trigger of premature terminal differentiation processes of fibroblasts. Thus, the basis for analysing the underlying molecular and cellular mechanisms, resulting in radiation fibrosis was set.

Then, the University of Tübingen opened a position for a full professorship in radiation biology to lead the Division of Radiation Biology in the Department of Radiation Oncology. As a research group leader in the Department of Developmental Biology at the University of Bielefeld, I applied for the new position. Despite not being formally trained as a radiation biologist, I was appointed professor of radiation biology in 1992. In the first eight years my group worked mainly on the molecular biology of radiation-induced fibrosis and potential protective mechanisms. Then, around the turn of the millennium, when we realised that receptor-mediated signalling is the important trigger of fibrosis, we focused on the general role of inter- and intracellular signalling mechanisms induced by radiation. One of the major breakthroughs from this work was the characterisation that cytoplasmic as well as nuclear erbB signalling and, especially, the Akt-mediated pathway is a major part of the regulatory processes in DNA-double-strand break (DSB) repair. ▼

Peter opening the 15th International Wolfsberg Meeting 2017

Peter as keynote speaker at the SASRO Meeting 2012 in Winterthur, Switzerland

Did you achieve what you wanted to achieve?

I guess so. My work as a PhD student and, especially, my nearly three-years' experience as a postdoc at Harvard convinced me to stay in research and start an academic career. Fortunately, it worked out.

How has the field changed over the last 25 years? From your perspective, what are the greatest discoveries in that time?

Certainly the implementation of detailed cell and molecular biology techniques and approaches has changed the field of radiation biology. These techniques allowed many new discoveries at a qualitative as well as on a quantitative level and opened a number of straightforward developments to implement knowledge from basic research in radiation biology into clinical-orientated translational strategies. Perhaps the most intriguing aspects are the identification of targetable biomarkers in various oncogenic pathways and the role of cancer stem cells for radiation responses of tumours. Likewise, the insights we have gained from normal stem cell research will open a number of new strategies to counteract detrimental radiation responses in normal tissues.

What are the greatest challenges for the next generation of radiobiologists?

The broad implementation of various omics-technologies will generate a tremendous amount of data that need to be handled properly to get the best out of it. Thus, bioinformatics will become the key for solving many questions, especially with regards to clinical applicability. However, at least currently, the problem is that scientists from the biomedical area on one side and from informatics on the other, do not really speak the same language. I think the next generation of biomedical researchers, and especially radiation biologists, will need to engage more with the field of data science and big data handling. To do that, they need to be trained. Without that, the upcoming 'tsunamis' of bioinformatic data cannot be handled with respect to selection and development of meaningful and successful translational strategies that can be implemented into clinical strategies. ▼

What were your intentions and hopes when you set up the first Wolfsberg Meeting twenty years ago?

As a postdoc at Harvard and in the years after, I attended several Gordon Research Conferences on cell and molecular biology. Having participated in conventional and often rather big conferences before and later on, I was always impressed by the unique character of the Gordon conferences, which allowed very tough and sometimes controversial scientific discussions between scientists without losing their personal respect for each other. I strongly believe that the quality of a conference is to a great extent dependent on the quality of the venue and that really fruitful discussions are only possible when participants stay together in the same place during the conference. When Stephan Bodis and I met first in 1994, there was no such conference in radiation biology / oncology. Over a bottle of wine in a Tübingen restaurant we came up with the idea for the Wolfsberg Meeting Series on Molecular Radiation Biology / Oncology. We wanted to create a format that allowed not only discussion of high-profile science among experienced and young scientists, but also to make new personal contacts during social events and the obligatory Wolfsberg Cup sports event, the sports competition between the teams of the different scientific topics. We thought that this format would provide a successful conference, and I guess, based on the success of the Wolfsberg Meeting Series over the last 20 years, we were not wrong.

Do you have any advice you would like to give the next generation of radiobiologists?

You know, giving advice is always difficult, as anyone in research has to find their own way. But I would foresee that the next generation of radiation biologists will, in developing their area of research, always need to consider both basic and translational science, as well as potentially clinical applicable topics and questions. Only on the basis of solid basic radiation biology results can one develop translational studies, which then will open new strategies in clinical radiation oncology in combination with functional targeting.

Peter, please finish these sentences...

I begin each day... usually at 6am walking our dog Bo for about 45 minutes in the nearby woods.

I had my best ideas... both for science and life when I spent relaxing days out of the lab.

If I need advice... I usually discuss the problem or topic with my wife Katja or close friends.

I am concerned about... the current political developments in many and especially leading western countries.

I get energy from... a successful working day, a good book and, last but not least, from a nice day of sailing with my wife Katja.

If I had more time... (which as a retired scientist I will), I'll do many things that make life as worthy as science!

Stephan Bodis, Philippe Lambin and Peter at the Sunday evening party of the International Wolfsberg Meeting 2017

With one million Euros I would... possibly buy a new sailing boat (!), but primarily set up a foundation to support students coming from crisis-hit countries to Germany.

I ask myself sometimes... whether politics and science will ever be able to create a safe world for all people.

To find the truth is... the utmost aim in science as well as in all other aspects of life.

Creativity develops from... allowing sometimes what seem to be crazy ideas. ▼

Scientist are people who... do not always know exactly what they do or should do.

If I was the German Federal Minister of Education and Science I would... like to increase the money spent on science and education (currently only €16 billion) to at least the amount of money spent for defence and military (currently €36 billion).

The advancement of science and technology... is the main driving force for prosperity and quality of life in any society.

Peter, thank you very much for sharing your thoughts and opinions with us. We've known each other for a very long time – 19 years now. During this time, I am very grateful to see how you have changed from being my mentor to a very good friend.

On behalf of many colleagues, I would like to say it has been wonderful working with you. We will miss you! I also want to wish you and your family all the best with your life after science and many sailing trips with a nice warm breeze behind you.

ESTRO School 2018

Research course in translational radiation biology and oncology

Special focus in 2018: radio-immunotherapy

11-14 November 2018 | Florence, Italy

Early registration deadline: 14 August 2018

The course will provide an understanding on current research trends and will outline research opportunities in radiation biology and translational radiation oncology to improve clinical practice and outcome.

LEARNING OUTCOMES

By the end of this course participants should be familiar with:

- Current research topics of translational research in the field of radiation oncology
- Relevant methodologies for translational research in the field of radiation oncology
- Relevant endpoints of translational research in the field of radiation oncology.

By the end of this course participants should feel motivated to improve:

- Their basic research projects with translational research aspects.
- Their clinical research projects with translational research aspects.

Register on www.estro.org/school

ESTRO SCHOOL

INTRODUCTION

FALCON

LIVE COURSES

ESTRO SCHOOL

"Do not miss this invaluable opportunity to visit an institute"

A date for your calendars: Thursday 31 May 2018 is the deadline to apply for an ESTRO mobility grant. Do not miss this invaluable opportunity to visit an institute and to learn from others' practice. If your application is successful, you will be able to spend three weeks at an institute different to your own, learning about new techniques and methods, and also observing how professionals in another institute and country treat their patients. We look forward to receiving your applications.

Many ESTRO School courses are scheduled to take place after the summer, with nine courses being held in September and three in October 2018. However, if you want to benefit from the early registration fee, you must register now. Please take a look at the ESTRO School website and register as soon as possible to attend the course that is best suited to your needs.

Jesper Eriksen, Marie-Catherine Vozenin and Christine Verfaillie

JESPER ERIKSEN
Member and chair of the education council

MARIE-CATHERINE VOZENIN
Member of the education council

CHRISTINE VERFAILLIE
ESTRO Managing director education and science

MOBILITY GRANTS

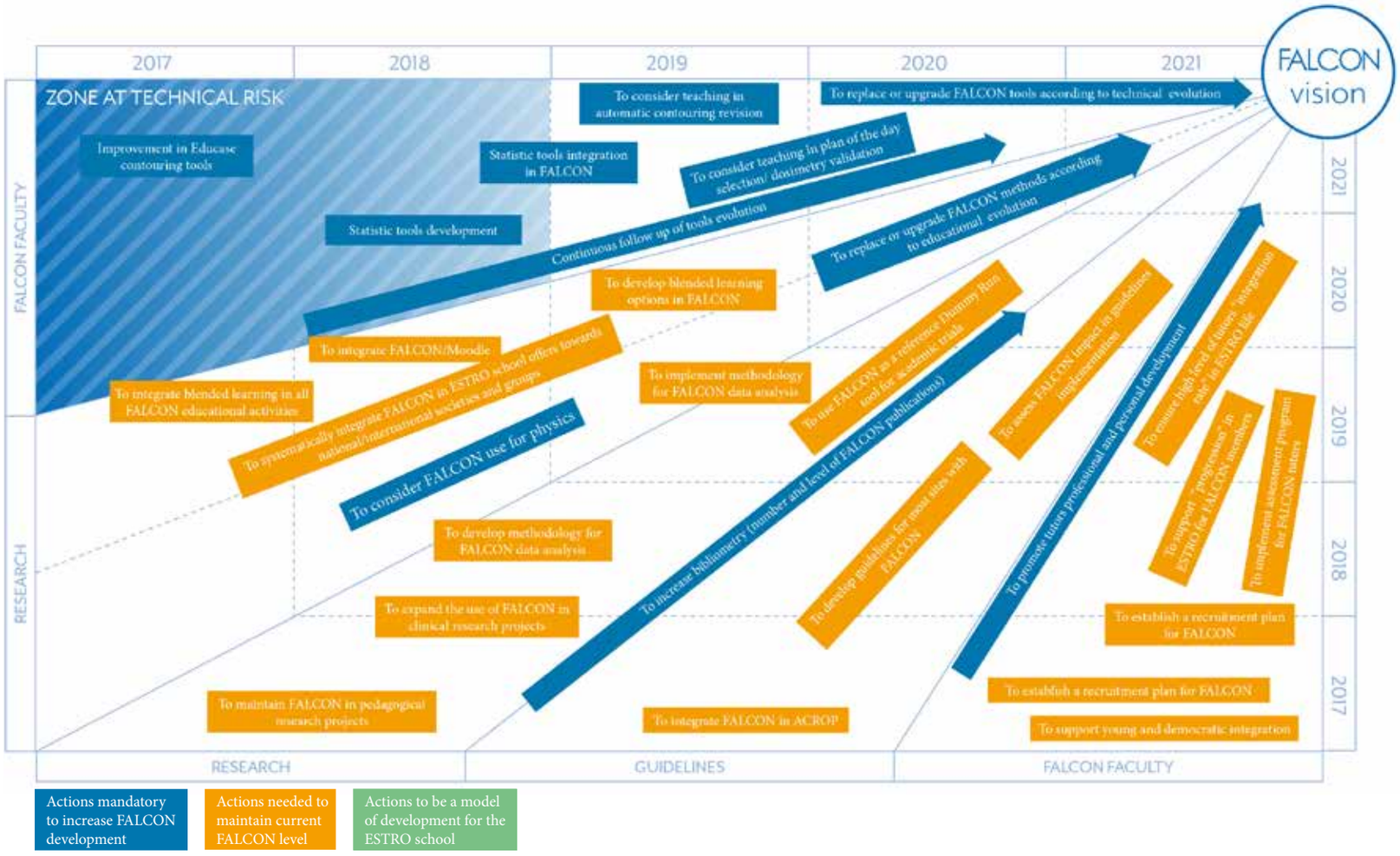
Learn, exchange ideas, get inspired and return to work with new knowledge.
Apply by 31 May!

Please email your application to vvanegten@estro.org

www.estro.org

2018 FALCON Roadmap

Interview with Sofia Rivera, Chair of the FALCON group



SOFIA RIVERA

Can you explain what the FALCON roadmap is?

The Fellowship in Anatomic delineation and CONtouring (FALCON) is an educational programme that aims to improve contouring skills so that we can achieve homogenisation of the contouring process. Over the last three to four years, FALCON has evolved to offer a wide range of different activities. We now need to structure these operations into groups with their group leaders managing them. It is therefore important that we define clear objectives for ▼

each group since they oversee the teaching courses, live and online workshops, communications and development of the programme and the Educase tool. The aim is to maintain the activities we offer and to expand into other areas such as workshops organized by other scientific societies and other scientific projects. The roadmap describes how to reach our ultimate goal of standardization.

What do you feel is the most innovate aspect of the FALCON roadmap for 2018?

I believe it is the focus on 'blended-learning'. This consists of blending live and online activities before and/or after live teaching courses, for example as homework to assess participants' learning. We are also planning to coordinate between the dates of courses and online workshops, so that participants from either event can benefit from additional education by using their preferred method of learning.

How does the FALCON roadmap integrate into ESTRO School?

FALCON has several activities that have an objective defined by the FALCON roadmap. The activities are currently seamlessly integrated in ESTRO School's core curricula in its courses and workshops. Due to the educational symbiosis, participants benefit from a better learning experience, allowing them to use all learning methods available to them.

How will the FALCON programme benefit from this roadmap?

Due to the continued expansion of the FALCON group, it is important to have a solid structure to keep everything running smoothly. I believe the roadmap offers a clear and structured plan for the future operations of FALCON. For example, one of the main axes of the FALCON roadmap is the focus on tutors. They are the oncology professionals who operate contouring workshops, aid the teaching by collecting questions and encourage discussions and debates. As the number of activities grows, we need to increase the number of tutors. Thus we must be able to standardize the training of this diverse group of people so that all of the tutors are able to provide similar kind of support to the workshops.

There are 12 people involved in the FALCON taskforce developing initiatives throughout the year. Why is ESTRO investing so much in the programme?

Because contouring is the weakest point in modern radiotherapy. Any mistake in contouring can result in permanent damage to the patient. The first step in the treatment chain is when radiation oncology professionals contour. If there is a mistake at this point the whole chain is affected. Contouring relies heavily on the interpretation of the images, the situation of the patient and its variability. All these factors can be interpreted differently depending on the professional. However, based on literature, if the contouring process is homogenised better results and patient outcomes will be achieved. FALCON's aim is ultimately to help improve contouring skills to achieve homogeneity.

What is your vision for FALCON in 2021?

FALCON will be influenced by the evolution of the discipline's technology. We foresee that new software will take over the base contouring skills and human input in contouring will be ▼

increasingly reduced by 2021. At this point, the obvious question is why teach contouring if the skill will eventually be made redundant? Well, I believe firstly that even if machines improve contouring software, the responsibility for treating the patient will still lie with the professional in charge and not the machine.

Humans will have to check the delineated contours and this cannot be done if there is a lack of knowledge in contouring. Training is the key in evaluating the machine's work. Secondly, we haven't reached that point where machines could take over contouring. Nonetheless, I am sure that by 2021, FALCON will be entirely different from the one we know today.

Mark your calendar

ESTRO members can benefit from a discount on the registration fee to attend an online workshop.

2018 ONLINE CONTOURING WORKSHOPS

Each online workshop includes two sessions

Breast cancer	8 May 2018	15 May 2018
Gyneacological Cancer Brachy	3 June 2018	13 June 2018
Spine stereotactic body radiation therapy (SBRT)	12 June 2018	19 June 2018
Oesophagus Cancer	20 June 2018	27 June 2018
Rectal cancer	4 September 2018	11 September 2018
Lung cancer	18 September 2018	25 September 2018
Organs at risk - abdomen	9 October 2018	16 October 2018
Prostate cancer	24 October 2018	31 October 2018
Anal cancer	6 November 2018	13 November 2018
Gyneacological Cancer EBRT	14 November 2018	21 November 2018

ESTRO SCHOOL

COURSE REPORTS

Image-guided and adaptive radiotherapy in clinical practice

11-15 February 2018 | Budapest, Hungary

Second ESTRO-AROI GYN teaching course

8-11 March 2018 | Lucknow, India

Particle therapy

5-9 March 2018 | Vienna, Austria

Multidisciplinary management of lung cancer

10-12 March 2018 | Brussels, Belgium

Image-guided and adaptive radiotherapy in clinical practice

11-15 February 2018
Budapest, Hungary

COURSE DIRECTORS:
Marianne Aznar,
medical physicist,
The Christie,
University of Manchester, UK

Coen Rasch,
radiation oncologist,
Academic Medical Centre,
Amsterdam, The Netherlands

CHAN WAI

The 2018 ESTRO course on 'Image-guided radiotherapy (IGRT) in clinical practice' was held in Budapest, Hungary. The participants included radiation oncologists, physicists and radiation therapists from more than 20 countries. It is a huge challenge to organise any course for participants with such diverse backgrounds. This course handled this challenge exceptionally well.

On the first two days we started with the basics of error calculation, image verification equipment and correction strategies. We were then introduced to more clinical examples of radiotherapy in the prostate, breast, lungs and other sites. The final day gave us a glimpse of the future, with discussion of MR-guided radiotherapy and IGRT for proton therapy. The content of each day was carefully chosen so that it prepared us for the more advanced materials presented the next day.

Given the wide range of topics covered in this course, some of them were inevitably outside our own expertise. ▼

As a radiation oncologist I was very happy to learn from the participants sitting around me, including physicists and radiation therapists

It is a huge challenge to organise any course for participants with such diverse backgrounds

That is when the multidisciplinary background of the participants came into its own. For instance, as a radiation oncologist I was very happy to learn from the participants sitting around me, including physicists and radiation therapists. They were very helpful and often gave brilliant answers to my questions. Our faculty would specifically ask if we had any questions after each lecture too. It ensured that this five-day programme stayed interactive with lots of input from participants and the faculty.

This learning and enjoyment was not limited to the classroom. The social event dinner and the coffee breaks each day were excellent occasions in which we could talk to other participants. I got to meet many participants during the hotel buffet breakfasts too, as many of us stayed in the same hotel. We talked about work, food, local attractions and many other things. In the age of e-conferences, when video recordings of lectures can easily be uploaded to the internet, meeting new friends is certainly one reason to travel long distances to attend courses or conferences.

The breakout sessions were another great feature of this course. There were two sessions in which we were divided into groups according to our area of interest. Each group had around three members from the faculty who acted as moderators. We had lots of intense discussion about topics such as stereotactic body radiotherapy (SBRT) or delineation in the presence of respiration. Our teachers and course directors were experts in their field who have published extensively in areas related to IGRT.

This course was a rare and valuable opportunity to seek their advice on the challenges we face at work.

I would also like to take this opportunity to thank the ESTRO staff. The excellent hotel location, well designed programme and good choice of venue for the dinner were testimony to their hard work. Without their help, this course wouldn't have been as successful as it was.

Chan Wai
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ac_wai@hotmail.com

Particle therapy

5-9 March 2018
Vienna, Austria

COURSE DIRECTORS:
Wilfried De Neve,
UZ Gent,
Gent, Belgium

Oliver Jäkel,
University Hospital Heidelberg,
Heidelberg, Germany.

The ESTRO particle therapy course, now in its tenth year, continues to increase in popularity and now attracts delegates from all around the world

PETER GORAYSKI

BENJAMIN CHUA

Across the world, there is an increasing interest in particle therapy to harness the unique physical and biological characteristics of this advanced therapeutic modality. Many national health systems have opened or advanced business plans for particle therapy centres, the majority of which are focused on proton beams. The ESTRO particle therapy course, now in its tenth year, continues to increase in popularity and now attracts delegates from all around the world seeking to increase their knowledge of physics, radiobiology and clinical evidence.
Australia is nearing a population of 25 million people and due to its relative geographical isolation, one or more particle therapy centres are needed in order to negate the need for patients and their families to travel long distances overseas for treatment. In 2017, the Australian government announced funding to build the first proton therapy centre in the southern ▼

hemisphere in Adelaide, South Australia. Aptly named, the Australian Bragg Centre for Proton Therapy and Research (www.australianbraggcentre.com) pays tribute to Nobel laureate Sir William Henry Bragg, who discovered the eponymous 'Bragg peak', and who spent much of his career at the University of Adelaide, Australia. This institution is one of three leading research universities involved in the Australian centre, together with the South Australian Health and Medical Research Institute.

The four-and-a-half-day course was held in Vienna, Austria, and despite the unseasonably chilly weather, the excellent organisation and venue allowed time to explore the magnificent city centre to enjoy Viennese cuisine, architecture and culture. Introductory sessions on physics and biology set the stage for more in-depth understanding of particle therapy in operation. The physics faculty, in particular, excelled in building the group's knowledge from the ground up on all aspects of the hardware, irrespective of vendor or institutional preference.

As radiation oncologists, it was invaluable for us to understand the complexities and limitations of this technology, and consider what unique adaptations are needed to successfully implement a service. Other worthwhile sessions included the journal club, where valuable discussion took place among delegates and faculty to the benefit of all attendees. The inclusion of some multidisciplinary case-based discussions would have also been useful to see how different clinicians and institutions would approach the same scenario.

No doubt the highlight of the week was a visit to the MedAustron carbon ion/proton centre in Wiener Neustadt, about 60km south of Vienna. A well-structured tour of the facility by the local clinicians and medical physicists allowed for direct questioning on many aspects of hardware and service delivery.

What this course did not provide was an opportunity for policymakers and other stakeholders to appreciate the multitude of hurdles that must be overcome in such a complex undertaking as building a particle therapy unit, particularly within the context of different health systems. To our knowledge, no such course exists, but it would be useful to learn from others' experiences in planning and delivering a service like this.

We wish the course faculty and organisers continued success and recommend this ESTRO School course to anyone involved in particle therapy in the early stages, and for trainees in all radiotherapy-related disciplines to increase their general knowledge of what will be a more widely available option for patients with cancer in the not-so-distant future.

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3D radiotherapy with a special emphasis on implementation of MRI / CT-based brachytherapy in cervical cancer

2nd ESTRO-AROI GYN teaching course

8-11 March 2018 | Lucknow, India

ESTRO COURSE DIRECTORS
Richard Pötter, radiation oncologist, Vienna, Austria
Kari Tanderup,medical physicist, Aarhus, Denmark

AROI COURSE DIRECTORS
Umesh Mahantshetty, radiation oncologist, Mumbai, India
Jamema Swamidas, medical physicist, Mumbai, India

AJEET KUMAR GANDHI

In total, 97 delegates, including 78 physicians and 19 physicists from across India and neighbouring countries, including Nepal, Singapore, Hong Kong, Myanmar and Indonesia attended the course

The ESTRO-Association of Radiation Oncologists of India (AROI) gynaecological (GYN) teaching course was set up with the aim of enhancing current standards to develop uniform protocols in brachytherapy for cervical cancers. The first course was conducted at the Ramaiah Advanced Learning Centre in Bengaluru, India, last year. This second ESTRO-AROI GYN teaching course was designed to refine the concepts and emphasise reporting parameters. The theme of the course was '3D radiotherapy with a special emphasis on implementation of MRI / CT-based brachytherapy in cervical cancer'. In total, 97 delegates, including 78 physicians and 19 physicists from across India and neighbouring countries, including Nepal, Singapore, Hong Kong, Myanmar and Indonesia attended the course. This also included 19 teams of physicians and physicists.

Given the abundance of cervical cancers in India (it is the second most common cancer among women), this teaching course was both an apt and enriching educational experience ▼

for the attendees. The unique blend of European and Indian course directors and faculties enabled a comprehensive overview of principles and practices of brachytherapy for cervical cancers. The scientific programme included lectures, tutorials, practical workshops, video presentations and interactive sessions. The practical hands-on demonstration was very evident in the presentation of brachytherapy techniques, contouring exercises, evaluation and discussion of 3D radiotherapy. The interactive feedback through audience voting on specific questions during lectures, evaluation and feedback on homework cases for contouring and planning exercises were very insightful. One unique learning experience was the video and case presentations by the institutions who had attended the first teaching course at Bengaluru. This led to a valuable interactive opportunity to reflect on practical hurdles and on how to improve the implementation of advanced brachytherapy techniques in participants' own institutions.

Successful implementation of advanced brachytherapy techniques in cervical cancers requires teamwork between the physician and physicist. Workshops dedicated to applicator reconstruction, commissioning and planning for physicists, held alongside workshops on applicator insertion, target volume delineation and plan evaluation for physicians offer a distinctive opportunity to develop effective teamwork, which can be translated immediately into practice on return to your home institute. As such, I would recommend that participants come as part of a team to get the maximum benefit from the course.

The application of advanced brachytherapy techniques, particularly MRI-based / guided planning may not be feasible at many centres in India owing to resource constraints. The course directors laid special emphasis on the translation of current existing knowledge and experience (mostly derived from MRI-based practice) of advanced brachytherapy applications using CT-based planning. Practical tips relating to image acquisition, target volume delineation and planning based on CT may widen the practice of image-based brachytherapy practice.

The participants developed a strong professional bond over the four days and this was also reflected during the social event, which had 'Lakhnavi attire' as the dressing theme. The event was studded with some musical performances and everyone found the local cuisine delicious.

Overall, the enthusiasm of the course directors and faculties transferred to the attendees, helping them to return with a road map for their institution to implement and further enhance the practices of advanced brachytherapy techniques. I am sure that the inspiring approach of the faculties will lead to passionate institutional practice culminating in a pan-India / Indo-European GYN network, which will further augment the practice of image-based brachytherapy in cervical cancers.

Dr Ajeet Kumar Gandhi
Assistant Professor, Department of Radiation Oncology

Dr Ram Manohar Lohia Institute of Medical Sciences, Lucknow, India
ajeetgandhi23@gmail.com

Multidisciplinary management of lung cancer

10-12 March 2018
Brussels, Belgium

COURSE DIRECTOR:
Paul Van Houtte,
Radiation oncologist,
Institut Bordet,
Brussels, Belgium

LOTTE ENGELL NOERREGAARD

KRISTIN SKOUGAARD

METTE POHL

In March 2018, we attended the ESTRO course on the 'Multidisciplinary management of lung cancer' held in Brussels, Belgium. We found the course very interesting due to the multidisciplinary approach and the involvement of ESTRO, the European Society of Thoracic Surgeons (ESTS) and the European Society of Surgical Oncology (ESSO).

The aim of the course was to promote an integrated approach to the management of lung cancer. Participants from all over Europe, as well as Australia and New Zealand joined the course. The majority of attendees were radiation oncologists, albeit physicians in the nuclear medicine field. A number of clinical oncologists were also on the course. ▼

We were welcomed by the course director Professor Paul Van Houte, who guided us through the course with great enthusiasm and knowledge. For three days we enjoyed interesting presentations with plenty of time included for discussion and questions.

The first day's topics were staging limits of PET-CT, lung function, the different treatment modalities (surgery, radiotherapy and adjuvant chemotherapy) and follow-up in early stage lung cancer settings. This was followed by good discussion and clinical cases presented by the attendees.

The second day covered systemic treatments, immunotherapy and radiotherapy, thymoma, mesothelioma and the challenges of brain metastases. The lessons were followed by interesting discussion and debate.

On the third day, we discussed treatment of locally advanced lung cancer and palliation. There was also a very interesting presentation of oligometastatic disease and its treatment challenges. The presenters came from many different specialties with expertise in their respective fields. This led to many motivating discussions between faculty members and participants.

There were signs of spring in Brussels, and we were able to enjoy brief glimpses of the sun after pleasant lunches. The coffee breaks also allowed us to talk with fellow participants.

All attendees were asked to submit a clinical radiotherapy case and to present it at one of the afternoon sessions. This led to many fascinating discussions. It was very interesting to hear about the different challenges that participants face in their daily clinical practice, depending on the size and logistical features of different centres.

The social dinner was very well organised by Laura at a pleasant restaurant in the centre of Brussels. The evening was filled with many interesting stories, in particular about the many languages of Belgium, including Dutch, French, German, Flemish and Walloon, as well as the variety of dialects used throughout the country. After conversation and wine, a small stroll through the Galeries of St Hubert finished a lovely evening.

Overall, this course provided a unique opportunity to experience how physicians from different countries and specialties manage daily treatment of lung cancer and provide comprehensive and up-to-date information of the evidence in staging, management and treatment techniques in thoracic tumours.

Lotte Engell-Noerregaard, Kristin Skougaard and Mette Pohl
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ESTRO School of Radiotherapy and Oncology

WWW.ESTRO.ORG

2018 ESTRO School

POSTGRADUATE COURSES IN EUROPE

Image Guided Radiotherapy in Clinical Practice
11-15 February 2018 | Budapest, Hungary

Comprehensive and Practical Brachytherapy
4-8 March 2018 | Ljubljana, Slovenia

Particle Therapy
5-9 March 2018 | Vienna, Austria

Multidisciplinary Management of Lung Cancer
10-12 March 2018 | Brussels, Belgium

Foundation of Leadership in Radiation Oncology
20 April 2018 | Barcelona, Spain

Advanced Skills in Modern Radiotherapy
6-10 May 2018 | Rome, Italy

Target Volume Determination - From Imaging to Margins
13-16 May 2018 | Prague, Czech Republic

Evidence Based Radiation Oncology
27 May - 1 June 2018 | Athens, Greece

IMRT and Other Conformal Techniques in Practice
3-7 June 2018 | Talinn, Estonia

Dose Modelling Verification for External Beam Radiotherapy
10-14 June 2018 | Dublin, Ireland

Brachytherapy for Prostate Cancer
14-16 June 2018 | Avignon, France

Basic Clinical Communication in Oncology
15-17 June 2018 | Brussels, Belgium
POSTPONED

Clinical Practice and Implementation of Image-Guided Stereotactic Body Radiotherapy
2-6 September 2018 | Porto, Portugal

Image-Guided Radiotherapy and Chemotherapy in Gynaecological Cancer: Focus on Adaptive Brachytherapy
2-6 September 2018 | Madrid, Spain

Haematological Malignancies
5-8 September 2018 | Utrecht, The Netherlands

Physics for Modern Radiotherapy (joint course for clinicians and physicists)
9-13 Spetember 2018 | Budapest, Hungary

Basic Clinical Radiobiology
15-19 September 2018 | Dublin, Ireland

Target Volume Determination - From Imaging to Margins
23-26 September 2018 | Moscow, Russia

Imaging for Physicists
23-27 September 2018 | Vienna, Austria

Advanced Treatment Planning
23-27 September 2018 | Athens, Greece

Multidisciplinary Management of Head and Neck Oncology
30 September - 3 October 2018 | Lisbon, Portugal

Multidisciplinary Management of Non-Melanoma Skin Cancer
4-6 October 2018 | Brussels,Belgium

Advanced Brachytherapy Physics
7-10 October 2018 | Valencia, Spain

Best Practice in Radiation Oncology - Train the RTT (Radiation Therapists) Trainers - Part I
22-26 October 2018 | Vienna, Austria

Positioning and Immobilisation for Radiation Therapy
3-4 November 2018 | Vienna, Austria

Comprehensive Quality Management in Radiotherapy - Risk Management and Patient Safety
4-7 November 2018 | Athens, Greece

ESTRO/ESOR Multidisciplinary Approach of Cancer Imaging
5-6 November 2018 | Rome, Italy

Accelerated Partial Breast Irradiation
11-14 November 2018 | Brussels, Belgium

Research Course in Translational Radiation Biology and Oncology
11-14 November 2018 | Florence, Italy

POSTGRADUATE COURSES OUTSIDE EUROPE

3D Radiotherapy with a Special Emphasis on Implementation of MRI/CT Based Brachytherapy in Cervical Cancer
8-11 March 2018 | Lucknow, India

Basic Clinical Radiobiology
Endorsed by ESTRO
10-13 May 2018 | Melbourne, Australia

Multidisciplinary Management of Head and Neck Oncology
11-13 May 2018 | Osaka, Japan

Palliative Care and Radiotherapy
5-7 June 2018 | Mexico City, Mexico

Combined Drug Radiation Treatment: Biologic Basis, Current Applications and Perspectives
13-16 June 2018 | Chengdu, China

AROI Course in Collaboration with ESTRO on Advanced Technologies -
Endorsed by ESTRO
7-10 October 2018 | Rajamahendravaram, India

Advanced Technologies
28-31 October 2018 | Petaling Jaya, Malaysia

PRE-MEETING COURSES

Six Pre-Meeting Courses at ESTRO 37
20 April 2018 | Barcelona, Spain

UNDERGRADUATE COURSES

Medical Science Summer School in Oncology for Medical Students
2-11 July 2018 | Groningen, The Netherlands

ESO-ESSO-ESTRO Multidisciplinary Course in Oncology for Medical Students
August 2018 | Poznan, Poland

- MULTIMODAL CANCER TREATMENT
- RADIOTHERAPY TREATMENT PLANNING AND DELIVERY
- BIOLOGY
- IMAGING
- RESEARCH
- BEST PRACTICE

BCY4

4TH ESO-ESMO BREAST CANCER IN YOUNG WOMEN INTERNATIONAL CONFERENCE

6-8 October 2018
Lugano, Switzerland

Chair: O. Pagani, CH

Scientific committee: F. Cardoso, PT - N. Harbeck, DE
S. Paluch-Shimon, IL - F. Peccatori, IT - A. Partridge, US
E. Senkus, PL - Y. Wengström, SE

IMPORTANT DEADLINES

- Abstracts and travel grants: **6 May 2018**
- Early registration: **by 17 June 2018**
- Late registration: **by 23 September 2018**
- Onsite registration: **from 24 September 2018**

ORGANISING SECRETARIAT: European School of Oncology (ESO) | Via Turati, 29 | 20121 Milan | Italy | Francesca Marangoni | fmarangoni@eso.net | ph +39 02 85464 525

Further information available at www.eso.net | Follow us on #BCYlugano

INSIDE TRACK CONFERENCE

YOUNG ESTRO

"The young ESTRO committee (yESTRO) has a new chair, Pierfrancesco Franco"

2nd ESTRO PHYSICS WORKSHOP
Science in development
26-27 October 2018 | Malaga, Spain

More information in the Physics Corner on page 52 >

Welcome to the Young Corner. We are pleased to announce that the young ESTRO committee (yESTRO) has a new chair, Pierfrancesco Franco, who officially started after the ESTRO conference in Barcelona, Spain. In this Young Corner you can read an interview with the past-chair, Jean-Emmanuel Bibault, in which he discusses his experiences with both ESTRO and yESTRO and what has been achieved over the past three years. You will be able to read an interview with our new chair in the July-August issue of the newsletter.

This Corner also features an interesting report from six members of the early career investigator (ECI) group in the European Organisation for Research and Treatment of Cancer (EORTC), who participated in a joint clinical research symposium organised by the Japan Clinical Oncology Group (JCOG) and EORTC in Japan in December 2017.

In addition, we have a mobility report from Kai Dolde, a PhD student based at the German Cancer Research Centre in Heidelberg, who visited the Paul Scherrer Institute in Villigen, Switzerland, to learn how to generate 4D-CT based on 4D-MRI and static CT of pancreatic cancer patients. If you are interested in taking advantage of an opportunity like this, the next deadline to apply for funding is 31 May: www.estro.org/careers-grants/grants--fellowship/estro-mobility-grants/estro-mobility-grants

We hope you enjoyed the ESTRO conference in Barcelona. A forthcoming event for ESTRO's young members, at least the medical physicists among you, is the second ESTRO physics workshop: "Science in development". You can already read the welcome letter from Núria Jornet, chair of the physics committee, in the Physics Corner on page 53. Please follow the latest news about the programme and abstract submissions on the ESTRO website and Young ESTRO Facebook page.

Kathrine Røe Redalen and Pierfrancesco Franco

KATHRINE RØE REDALEN

PIERFRANCESCO FRANCO

YOUNG ESTRO

Interview with Jean-Emmanuel Bibault, past-chair of the young ESTRO committee

JEAN-EMMANUEL BIBAULT

You were chair of the young ESTRO committee for the past three years. What did this experience mean for you professionally?

It was a great opportunity to be the first chair of the young committee. Before that, as you know, there was no committee representing young radiation oncology professionals within ESTRO. There was a young task force that had already done a lot of good work, but having a committee gave us more visibility and legitimacy within the Society. Being the chair of the committee was a great opportunity to network on a professional level.

What did it mean for you personally?

On a more personal level, I was able to meet many young professionals across Europe. I also learned how to collaborate better and how to construct and lead projects from an idea to the end result. It was a very enriching experience for which I'm very grateful.

What was the main focus of your activities during your time as chair?

Before I became chair, I was part of the young task force (YTF), where I edited the Young Corner of the ESTRO newsletter. Later, when I became committee chair, I had several goals set by the Board or that were a continuation of the YTF's activities: choosing the chairs for the Young Track at the annual congress, organising the track, inviting other young European societies to participate and encouraging them to join ESTRO.

We also organised the second Agora meeting, designed to bring together potential young leaders in radiation oncology from all over Europe. The aim of the meeting was to plan the strategies that ESTRO needs to implement to meet long-term challenges. I think the meeting was a great success. Later, I joined ESTRO's education council to represent young members. During my last year as chair, we created a survey in order to better understand the different education systems in Europe. We have also reinforced the young representation within other ESTRO committees, such as the clinical committee. At the moment, the young committee is involved in the revision of the ESTRO core curriculum, which should be published soon.

What do you think was the greatest accomplishment of the committee during these years?

As a matter of fact, I believe the education survey was a great achievement for several reasons: it had never been done before and it clearly showed that Europe's education systems are very heterogeneous. ESTRO has a leading role in promoting quality education through the ESTRO core curriculum, the ESTRO ▼

School and its online offerings. We had over 400 participants from 34 countries, which is quite a high number.

What insight did you get into the workings of ESTRO during your time as chair?

It gave me a lot of insight. Most importantly, I understood that ESTRO is very active and always looking for new ways to engage radiation oncology professionals and stakeholders. Ideas can come from the bottom and go to the top, and new proposals are always welcome.

YOUNG ESTRO

The Japan Oncology Group (JCOG) travel grant for EORTC early career investigators

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ORIT
KAIDAR-PERSON

Young researchers from JCOG and EORTC joining forces at the JCOG-EORTC symposium

There are many challenges in conducting clinical trials, particularly when you are trying to take an innovative research idea and develop it into a trial that will successfully recruit patients. Details of methodology, patient safety and budget are only some of the challenges in designing and running such trials. Even large, highly experienced organisations face challenges. International collaboration in cancer research can help to overcome many of these obstacles [1] enabling faster accrual, avoiding duplication and improving the use of resources.

Since 2015, the Japan Clinical Oncology Group (JCOG) and the European Organisation for Research and Treatment of Cancer (EORTC) have been working together to promote partnership in research and identifying strategies for successful collaborations between the East and West [1]. As part of this effort, the first JCOG-EORTC Clinical Research Symposium was held in Tokyo, Japan, in December 2017. This initiative came with a travel grant for young EORTC investigators, known as early career investigators (ECIs), who are willing to develop projects within the ▼

JCOG-EORTC partnership. We hope that by inviting young researchers to Japan to see different departments in action we will enable better communication and mutual understanding in order to achieve successful international research partnerships. A key individual in initiating and organising this event and the JCOG travel grant was Kozo Kataoka, past-EORTC fellow, and clinical-research physician at JCOG. In this article, we share the experiences of six ECIs who visited Japan under the scheme.

Improving surgical research through EORTC-JCOG collaboration, by Carmela Caballero

I am a clinical research physician for the EORTC gastrointestinal cancer and head and neck cancer groups and SURCARE (a quality assurance programme for surgical clinical trials). Thanks to the ECI grant, I visited the Kanagawa Cancer Centre and National Cancer Centre (NCC) East to observe and participate in colorectal and upper gastrointestinal surgery and to discuss research ideas on improving perioperative care.

I believe that this partnership between EORTC and JCOG will pave the way for better surgical oncology trials by engaging surgeons from both networks to improve research methodology, analyse tumour biology and incorporate patient-reported outcomes in future joint trials. During my visit, we discussed strategies to strengthen the collaboration between EORTC and JCOG for SURCARE. We agreed that this can be achieved by continuing the EORTC-JCOG surgical research fellowships to train young surgeons in research methodology and the coordination of international clinical trials, identifying common clinical questions and developing high quality and patient-centred surgical studies with translational research based on these.

Learning from the surgical oncologist in Japan, by Patrick Starlinger

As a European surgical oncologist, it was very interesting for me to explore the role of Japanese surgeons in the management of oncological patients' care in detail during my stay at the NCC Hospital (NCCH) in Tokyo. A member of EORTC's gastrointestinal group, I work at the Medical University of Vienna, Austria, with a main interest in hepatobiliary (HB) and colorectal cancer, with an additional focus on translational research. I am also involved in the DREAM (Diffusion-weighted Magnetic Resonance Imaging Assessment for Liver Metastasis to improve surgical planning) study, which is the first collaborative study between EORTC and JCOG, and which made my stay even more meaningful.

It was certainly impressive to observe the very skilled surgical performance of the HB team at the NCCH and the multimodal treatment approaches used. With more than 125 liver resections per year the NCCH is certainly a high volume centre and the complexity of surgical procedures is high. These complex cases are extensively discussed pre- and post-operatively in the weekly multidisciplinary team meeting, integrating several oncological aspects of patients' care.

It was very interesting to note that the Japanese surgical oncologist differs in several respects to the European surgical oncologist. Presumably based on the historical development, the surgical oncologist in Japan has a far more central role in the management of oncological patients than in Europe. Indeed, while in Europe the medical oncologist works closely together with the surgeon, the Japanese surgeons seem to integrate these two disciplines, as clinical oncology remains a fairly 'young' discipline in Japan. My impression was that this results, in terms of research, in a more pronounced integration of surgery in oncological trials, which certainly represents an attractive opportunity for collaborative studies in this area.

The multi-layered structure of sarcoma care, by Bernd Kasper

I visited both the Department of Musculoskeletal Oncology and the Department of Breast and Medical Oncology at the NCCH in Tokyo. I am a medical oncologist trained at the University of Heidelberg, Germany, ▼

and am currently working at the Sarcoma Unit at the Mannheim University Medical Centre, Germany, with a professional interest in patient care and research in bone and soft tissue sarcomas, desmoid-type fibromatosis and gastrointestinal stromal tumours. I am currently serving as the secretary of the EORTC soft tissue and bone sarcoma group (STBSG).

The Rare Cancer Centre (RCC) at the NCCH opened in June 2014 as a multidisciplinary team taking measures against the innate problems associated with rare cancers, with the mission to establish a vital network for rare cancers at the NCC and to review the problems associated with rare cancers in Japan. Since it was set up, 45 doctors, nurses and researchers dealing with rare cancers have joined the RCC.

During my stay, I was able to get considerable insight into how sarcoma patients are treated and managed at the NCCH. The Department of Musculoskeletal Oncology takes care of around 500 newly diagnosed benign and malignant bone and soft tissue tumours per year, performing more than 400 sarcoma operations. Sarcoma treatment in Japan is organised as a multi-layered structure for national and international cooperation. The Japanese Musculoskeletal Oncology Group (JMOG) covers 90 institutions for cooperative studies all over the country. The bone and soft tissue tumour study group within JCOG represents 33 institutions mainly focusing on phase II / III trials. The Japan Sarcoma Experimental Therapeutics Consortium (JSET) covers 13 institutions with a focus on early clinical phase I trials. Currently, a new structure is being implemented with the Japanese Association of Sarcoma Treatment and Research (JSTAR) covering almost all hospitals in a multidisciplinary structure; a first JSTAR meeting will be held in February 2018. In addition, the annual meeting of the Connective Tissue Oncology Society (CTOS) will be held in Tokyo in 2019 with Akira Kawai as host and CTOS president.

Overall, my visit provided me with a great opportunity to learn how sarcoma treatment is organised and functions at the NCCH. I also got a strong insight into the multi-institutional and multi-layered structure of cooperation for sarcoma treatment in Japan. I experienced exceptional kindness, great hospitality and an absolute eagerness and willingness for collaboration during my stay.

Lung cancer care and phase I trials in Japan, by Jessica Menis and Lizza Hendriks

Jessica Menis is a medical oncologist currently working in the phase I unit of Gustave Roussy (IGR), Villejuif, France, specialising in thoracic tumours. Lizza Hendriks is a pulmonologist and is currently a member of the pulmonary diseases department at Maastricht University Medical Centre, The Netherlands. From November 2017 until October 2018, Lizza is also working at IGR for a postdoctoral research project on brain metastases in lung cancer. Both are members of the EORTC lung cancer group (LCG) and LCG young investigator group; Lizza Hendriks is the coordinator of this group.

Due to our clinical and research speciality, we visited the Division of Thoracic Oncology and the phase I unit of the NCCH in Tokyo, as well as the JCOG data centre. The Thoracic Oncology unit at the NCCH has seven staff and about 15 residents. The unit consists of 60 beds and over 1,000 bronchoscopies are performed each year. Almost all lung cancer diagnoses are made using this procedure. Over 400 new lung cancer patients are seen each year, the majority (approximately 85%) being non-small cell lung cancer patients (NSCLC), still predominantly in early stage thanks to the ongoing screening programme (chest X-ray followed by a CT scan in case of suspicious test results) for all high-risk lung cancer patients.

The thoracic surgeons (based in a different unit in the NCCH) perform over 660 pulmonary procedures each year, of which almost 500 are for primary lung cancer. Systemic treatment strategies overlap with European ones with two exceptions concerning the adjuvant ▼

chemotherapy for NSCLC (S-1 versus platinum-based doublet) and the standard chemotherapy for SCLC (irinotecan versus etoposide in combination with platinum).

The main research foci of the thoracic oncology unit are lung cancer molecular screening (LC-SCRUM) and phase II / III trials with tyrosine kinase inhibitors, immunotherapy and chemotherapy in both NSCLC and SCLC. Within these areas of research, malignant pleural mesothelioma and thymic malignancies are covered, but still remain a niche area of interest.

Phase I trials are performed in a different department; however, there is a good connection and collaboration between the phase I department and the different groups responsible for each tumour type. Approximately 10-12 trials are currently open, mainly pharma-sponsored trials, covering both immunotherapy compounds and targeted treatments, and on average ten patients are enrolled each month.

Cancer care in Japan is embedded within a network of two NCC, with 49 prefectural, 348 district and 35 other cancer centres. Lung cancer trials are run within these centres, with the JCOG as the largest cancer research organisation in Japan, including for lung cancer.

When looking for future collaborative projects on lung cancer, one has to understand the daily clinical care, the patient populations and the existing research structures in Europe and Japan, as well as the funding opportunities and different regulatory policies.

For clinical care, the most important differences are the implemented lung cancer-screening programme in Japan (i.e. more early stage disease) and the options for molecular testing for driver mutations (varying in Europe, although usually the targetable drivers are covered) compared to the national LC-SCRUM molecular screening project in Japan.

Regarding patient populations: besides the differences in early stage incidence, Japanese patients are diagnosed with epidermal growth factor receptor (EGFR)-mutated disease more frequently than Caucasian patients. Furthermore, the metabolism of drugs and adverse events can be different between Japan and Europe (e.g. different standard dose of alectinib, and more pneumonitis with EGFR-TKI in Japan). These differences are challenges (different histology, prognosis and metabolism), but also opportunities for research, for example, on the biological mechanisms of developing EGFR-mutated NSCLC. Our experiences and insights can be the basis for discussion about future collaborations.

Radiation oncology and proton therapy, by Orit Kaidar-Person

I am a radiation oncologist, working at Rambam Medical Centre in Haifa, Israel. Since 2012, I have been the chair of the young radiation oncology group (YROG) at EORTC. In 2017, I joined the EORTC-ECI programme, and was looking forward to visiting Japan and participating in the JCOG-EORTC symposium.

In preparation for the meeting, I read about Japan and especially about the country's radiation oncology. As one of the world's strongest economies and most technologically advanced countries, I was surprised to learn that radiation therapy is used significantly less frequently in Japan than in Western countries [2]. It is estimated that only about 30% of the cancer patients receive radiation therapy compared to around 60% in Europe. This issue was openly addressed in an editorial published in 2015, and was partly put down to highly skilled surgeons and early detection, but also to the negative history of the Japanese people in relation to radiation [2].

My visit to Japan included a three-day visit to the proton centre at NCCH-East in Chiba. My mentor during the visit was Dr Nakamura, a senior doctor at the department. The department includes four linear accelerators for photon therapy and one cyclotron with two gantry heads, allowing for two treatment ▼

suites using different proton beam therapy (PBT) techniques (one passive beam and one active beam). The patient population treated by PBT at the NCCH-East are mainly adults, with prostate cancer forming approximately one third of the cases followed by lung cancer, upper gastrointestinal tract (oesophageal cancer, liver cancer), and head and neck cancers.

In recent years, the number of high-precision radiation therapy devices has steadily increased. Japan is also known for a relatively high number of particle therapy facilities (carbon ion and PBT), and there are estimated to be 15 new centres in the next few years. Compared to other industrialised countries, Japan has the most particle centres and is highly experienced. The PBT centre at the NCC-East, is also involved in basic research associated with PBT [3].

After spending time at the department and learning about JCOG and oncology in Japan at the JCOG-EORTC symposium, I think it is our responsibility for the benefit of our patients to support collaboration between these two organisations. From my point of view, PBT has been in use for quite some time, yet there is limited preclinical and clinical research, and little high-level evidence for a small number of indications. Research in PBT is challenging due to the limited number of centres and the high costs associated with conducting such trials. It is therefore essential that we explore ways to collaborate to fully understand the biology of particle therapy and how to use it best for our patients.

In summary

Providing opportunities for young researchers to engage in international research initiatives and participate in cultural exchanges can help bridge the gap between Europe and Asia. Research networks such as EORTC, ESTRO and JCOG will need to develop a sustainable infrastructure that will allow these ideas to become practice-changing clinical research. We would like to thank JCOG and the EORTC for the opportunity to visit the different departments in Japan and to take part in this important initiative. We hope to be part of a future that is open for collaboration between Asia and Europe for the benefit of our patients.

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YOUNG ESTRO

MOBILITY REPORT

Generation of 4D-CT based on 4D-MRI and static CT of pancreatic cancer patients

23 October to 16 November 2017
Paul Scherrer Institute (PSI),
Villigen, Switzerland

PSI, Villigen, Switzerland (www.psi.ch)

KAI DOLDE

Thanks to an ESTRO mobility grant, I had the opportunity to visit the Paul Scherrer Institute (PSI) in Villigen, Switzerland, in October and November last year as a part of my PhD project on the generation of 4D-CT based on both 4D-MRI and static CT of pancreatic cancer patients.

Pancreatic cancer patients have a very low survival rate and radiotherapy treatment is very challenging due to the many organs at risk with limited dose tolerance surrounding the pancreas. In addition, as an abdominal organ, the pancreas is exposed to respiration motion, which leads to motion-induced uncertainties during treatment. Time-resolved volumetric magnetic resonance imaging (4D-MRI) shows great potential for extracting both tumour motion and deformation information to finally be able to account for these during treatment. The PSI in the Centre for Proton Therapy (CPT), has developed a method to create 4D-CT based on static CT and 4D-MRI data, the feasibility of which has been demonstrated for a liver patient (Boye et al, 2013). The aim of my stay at PSI was to investigate whether this method could ▼

Autumn in the neighbourhood of Villigen, Aargau

be used to generate synthetic 4D-CT based on 4D-MRI data acquired from pancreatic cancer patients at the German Cancer Research Centre (DKFZ) in Heidelberg, Germany, in order to perform a subsequent 4D dose calculation for particle therapy treatment on the data.

At PSI, I was supervised by Dr Ye Zhang, a postdoctoral researcher with a lot of experience in 4D-MRI, which I could profit from. Even before the stay we started planning our common project via Skype calls and emails, discussing timelines and the structure of my visit.

When I arrived at PSI, I was warmly welcomed by Ye, introduced to other group members of the Centre for Proton Therapy and guided to my office, where everything was already settled and installed for me to start without any bureaucratic hurdles or paperwork. It was a very nice, uncomplicated and relaxed working atmosphere at PSI and I felt welcomed by the group. Regular lunch and coffee breaks (occasionally with cake) took place among the PhD students, with lots of time for scientific and non-scientific conversations. I was also welcomed by Professor Anthony Lomax and Professor Damien Weber, who both offered any help and support that I needed.

During my stay at PSI, I had regular meetings with Ye to discuss both results and the next steps in our project. Ye had already prepared a set of presentations and papers for me ahead of my stay, so I was able to get used to the workflow of 4D-CT generation very quickly and start working on our collaborative project straight away. During one scientific seminar with the CPT group I was also given the opportunity to present my home institution and discuss some selected projects on MR-guided radiotherapy that my colleagues and I are working on.

Overall, I had a very enjoyable and productive stay at PSI and we made some good progress in both generating 4D-CT data for the pancreas cancer patients from Heidelberg and performing

Autumn in the neighbourhood of Villigen, Aargau

4D dose calculations for these patients. We have already prepared the results for a conference presentation. It was also a great networking opportunity for me and I am looking forward to continuing our collaboration.

I am very happy to have had the opportunity to stay at PSI and it was interesting to get an insight into a different institute. I also had a comprehensive guided tour through the CPT facility where I could see the different gantries and had the chance to observe and learn about patient workflows for proton therapy treatments with pencil beam scanning ▼

at PSI. It was interesting to compare the workflows and procedures with those used at the Heidelberg Ion-Beam Therapy Centre.

During my stay at PSI I lived next to the campus in the PSI guest house, which was convenient. I also borrowed a bike while I was there, which was a great way to explore the region and see more than the campus…

I would like to thank Professor Dr Anthony Lomax for hosting me and giving me the opportunity to come to PSI. I would also like to thank Dr Ye Zhang for her great efforts and help during my stay. Finally, I would really like to thank Professor Dr Oliver Jäkel for his support and ESTRO for enabling my research visit by providing me with an ESTRO mobility grant.

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HEALTH ECONOMICS

HEALTH ECONOMICS

Improved cost-effectiveness of short-course radiotherapy in elderly and/or frail patients with glioblastoma

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MADELON JOHANNESMA

Glioblastoma multiforme (GBM) is predominantly a disease of the elderly, with a median age of diagnosis of 64 years and the highest incidence in those aged 75–84 years. Outcomes remain poor, with median survival approximately 12–15 months. In elderly and/or frail patients, survival time is, on average, around six months. The age-standardised incidence continues to increase and it is expected that two-thirds of GBM patients will be over the age of 65 years by 2030.

Radiotherapy and temozolomide are the standard course of care for patients with good performance status under the age of 65 years. Recently Gosh *et al* [1] published the results of a cost-effectiveness comparison between a short and longer-course regime in elderly and/or frail patients with GBM. This comparison followed the results of a recent randomised phase III trial that showed that short-course radiotherapy (25 Gy in five fractions) was non-inferior to a longer-course of 40 Gy in 15 fractions.

Effectiveness was measured by overall survival (OS) and progression free survival (PFS). OS was calculated as the time between randomisation and death. PFS was calculated as the time between treatment received and death or disease progression. Effectiveness was also assessed as quality-adjusted life-years gained (QALYs). Quality of life (QLC) was assessed using the European Organisation for Research and Treatment of Cancer (EORTC) QLQ-C30 questionnaire and the brain module QLQ-BN20 at baseline prior to radiotherapy, four weeks after completion of radiotherapy, and every three months thereafter until disease progression.

The direct unit costs of imaging, radiotherapy (RT), and dexamethasone were collected from the five primary contributing countries to the trial. Costs were calculated by multiplication of each resource by its unit price.

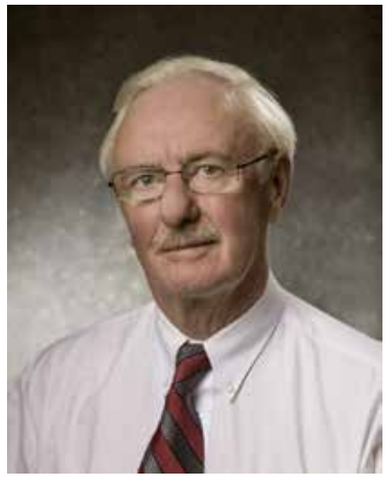
The median OS for the short-course and commonly used RT was 8.2 (95% confidence interval [CI] 6.1–10.3) and 7.7 (95% CI 5.5–9.9) months, respectively (log rank p = 0.340). Median PFSs were also not different (p = 0.686). The differences in the RMOS and the incremental cost-effectiveness ratio (ICER), however, were +0.11 life-years and -$3062 United States dollars (USD) per life-year gained, respectively. The differences in the RMPFS and the ICER were +0.02 PFS and -$17,693 USD, respectively. It was concluded that the ICER of -$3062 per life-year gained and -$17,693 per PFS gained indicates that short course RT is less costly compared to the longer RT regimen.

In recent years, there has been an increasing awareness of the escalating costs of oncology care in addition to the traditional endpoints of clinical efficacy and treatment toxicity. The impact on patients in terms of the inconvenience and time associated with treatment is another consideration, and this may be particularly significant in malignancies with short overall survival times such as GBM.

Madelon Johannesma

HEALTH ECONOMICS

Obituary
Dr Peter Dunscombe
1946 – 2018



ESTRO is sad to announce the death of Dr Peter Dunscombe on 22 March 2018. Dr Dunscombe was deeply involved at ESTRO, an active member of the Health Economics in Radiation Oncology (HERO) group and co-author of several publications. He also taught on the ESTRO School course 'Comprehensive quality management in radiotherapy – risk management and patient safety', and was a co-editor of the Health Economics Corner of the newsletter. He will be deeply missed by his ESTRO colleagues and friends.

Dr Peter Dunscombe completed his undergraduate studies in physics at the University of London, UK, and then went on to complete a PhD in nuclear physics at the University of Birmingham, UK. His career in medical physics began at Charing Cross Hospital, London, where he stayed for eight years before emigrating to Canada. He was successively Director of Medical Physics in Winnipeg, Sudbury and Calgary, before retiring in 2014. Each post included academic appointments and entailed comprehensive educational, training and research components. Peter's professional activities included President of the Canadian College of Physicists in Medicine and Vice-Chair of the Commission on the Accreditation of Medical Physics Educational Programmes (CAMPEP), as well as continuing involvement with the TG 100 initiative.

Besides research interests in clinical medical physics, Peter continued to be active in accreditation of residency programmes under CAMPEP, health economics with the ESTRO-HERO group and the ESTRO newsletter, as well as quality and safety in radiotherapy with the American Association of Physicists in Medicine (AAPM) and the International Atomic Energy Agency (IAEA).

ESTRO Past-President, Professor Yolande Lievens, paid tribute: *"A friend has left us. I have known Peter for about ten years, first as a co-author in publications, then as one of our core HERO-team members. His firm opinions were an essential sounding board, his determination to make things work helped to shape and drive the project. As a physicist, he stood for quality and safety of radiotherapy, in a context of interdisciplinary collaboration.*

"As much as we enjoyed working together, we equally valued the time spent together over a good dinner, a drink, or at a concert.

We will miss you in the HERO family, dear Peter. Rest peacefully, now."

CONFERENCES

FOCUS ON FORTHCOMING CONGRESSES

FOCUS ON PAST CONGRESSES

ESTRO 38

26-30 April 2019
Milan, Italy

DEADLINES

Abstract submission:
22 October 2018

Early registration:
16 January 2019

Late registration:
26 March 2019

Desk registration
as of 27 March 2019

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FORTHCOMING CONFERENCES

IN SCIENTIFIC COLLABORATION WITH ESTRO

European CanCer Organisation (ECCO) Cancer Summit
7-9 September 2018
Vienna, Austria

London Breast Meeting 2018. Common problems in aesthetic and reconstructive breast surgery
6-8 September 2018
London, UK

ENDORSED BY ESTRO

Summer school in oncology Bucharest
11–15 June 2018
Bucharest, Romania

Masterclass in neuro-oncology: multidisciplinary management of adult brain tumours
20-22 September 2018
Milan, Italy

Global Congress on Prostate Cancer (PROSCA 2018)
28-30 June 2018
Frankfurt, Germany

The International Marie Sklodowska-Curie Meeting: from radiation to innovation in medicine 2018
12 October 2018
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European CanCer Organisation (ECCO) Cancer Summit

7-9 September 2018
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Interview with Philip Poortmans, ECCO President

ECCO EUROPEAN CANCER ORGANISATION

PHILIP POORTMANS

From science to real-life oncology: what should we expect from this theme at the upcoming ECCO Summit?

The aim of the ECCO Summit is different to a conventional scientific congress or conference. It is not to share research findings or to disseminate research data, but is instead to translate into practice and share work in the field of oncopolicy and quality cancer care that has been done over the past year with member societies and other stakeholders. At the summit, we want to bring together not only the leadership of our member societies, but also hospital directors, representatives from patient organisations, insurance companies and policy makers. The aim is to address the problem of existing or new research results not finding their way into concrete policy making. How can we change that? By sharing and promoting our activities in oncopolicy with all our stakeholders.

What is the main concept underpinning the ECCO Cancer Summit?

During the summit several topics around the three main themes will be discussed: outcome research, health economics of cancer care and the organisation of cancer care delivery. These will also be the leitmotif for resolution-forming debates that are carefully prepared beforehand. The stakeholders that are present at the sessions will be able to vote on a number of statements. A summary of the statements that are endorsed will be presented and signed by the congress chair and societies' representatives present during the final session of the summit. This will then be sent to European policy makers, including a strong demand for action to be taken to improve quality cancer care in Europe.

What do you think are the main actions that should be undertaken in oncopolicy to improve patients' outcomes?

Societies must collaborate for the benefit of the patient. Even today, on many occasions, there remains insufficient collaboration among professionals and departments, following which the patient isn't offered all options or alternatives for the management of their cancer. We need to bring this to the attention of the policy makers.

Is multidisciplinarity at the heart of the programme?

Definitely. ECCO has two core values: multidisciplinarity and patient-centred care. ▼

The aim of multidisciplinarity is to offer patients all treatment options in a fair, open and collaborative way. In terms of patient-centred care, ECCO is one of the few organisations in this field that has a patient as a full member of the board – and who is a co-chair of the summit.

Access and value of treatment is a priority at ESTRO. Will this topic be tackled as well?

Definitely. Lack of access and value of treatment can have different causes, including lack of training / multidisciplinarity and shortage of infrastructure. We will tackle the topic of the right to equal access to quality cancer care, as it is inherent to the central theme of the summit.

Will there be any debates?

Indeed. We will have interactive sessions where we will debate (albeit not in the well-known Oxford style), how to implement the outcome of new research into daily practice and how it will relate to patients.

Can you give some examples of topics that will be covered as part of the programme?

All the topics are related to the central themes. One of the 'hot' topics will be big data, as well as the themes of multidisciplinarity, the costs of cancer medicines and other treatments, the organisation of quality cancer care, equal access to the latter and survivorship. Overall, the essential requirements for quality cancer care, on which ECCO, together with its members, has worked so hard over the past two to three years, is the main theme for 2018.

Which oncology professionals should definitely attend?

Our target audience includes department managers, department heads, other oncology professionals (radiation therapists, physicists), finance managers, insurance companies' representatives and, of course, policy makers.

Can you give us some examples of sessions?

Just to name one practical example: one session will focus on what structures should be in place at a hospital, regional or country level in order to deliver the essential requirements for quality care for colorectal, gastric, oesophageal, prostate and breast cancers, melanoma and soft tissue sarcoma in children and adults.

Will the summit include an exhibition? What industries are represented?

There will not be a conventional exhibition. Companies' contribution will be centred on policy-making and the other themes of the summit.

Summer school in oncology Bucharest

11–15 June 2018
Novotel Hotel
Bucharest, Romania

The Carol Davila University of Medicine and Pharmacy in Bucharest, Romania, the Romanian Radiotherapy Association, the Medical University of Vienna International (MUVI), the Central European Cooperative Oncology Group (CECOG) and the Trestioreanu Foundation invite you to the sixth edition of the 'Summer school in oncology Bucharest', which is being held between 11-15 June 2018. This year's event, like the last three editions, is endorsed by ESTRO.

Led by a group of national and international experts, the event is designed for fully-trained medical oncologists, radiation therapists and medical residents who want to be up-to-date with the latest research, but who have not been able to attend the major international conferences. Doctors from the wider region, including Hungary, Moldavia and Bulgaria, have also been invited to take part.

This year the theme of the summer school is 'Facts and controversies in today's oncology'. The course will present well-known issues, and also many controversies related to the prevention, diagnosis and treatment of major cancer localisations, including breast, lung, colorectal, genital, malignant melanoma, renal, bladder and prostate cancer.

Each year some of our most popular sessions have been the tumour boards. Tumour board and case discussions are designed to contextualise the most recent scientific results and their role in daily practice, with each speaker discussing real-life cases with the audience. They also provide an opportunity for audience members to raise their own cases for discussion.

This year the course directors are Professor Dr Christoph Zielinski, Professor Dr Thomas Brodowicz and Professor Dr Rodica Anghel who started the project six years ago, and also Dr Laurentia Gales and Dr Mircea Dediu.

This year's summer school will be of interest to anyone who would like to explore topical issues related to the prevention, diagnosis and treatment of major cancer localisations.

Global Congress on Prostate Cancer (PROSCA 2018)

28-30 June 2018
Frankfurt, Germany

Whether you're a seasoned urologist, a radiotherapist in residency, a medical oncologist dedicated to prostate cancer or a researcher looking for new evidence, the Global Congress on Prostate Cancer (PROSCA) is the educational event for all prostate cancer professionals.

The concept is simple: over three days, leading prostate cancer experts bring you up to date with all the latest and most relevant data to help you treat the disease.

By attending, you will get a complete update on prostate cancer in just three days. You will be able to discuss your questions with a multidisciplinary faculty – the leading voices in prostate cancer – and meet colleagues from around the world in a relaxed atmosphere.

Highlights this year include: the state-of-the-art lecture on prostate-specific membrane antigen (PSMA) for diagnosis and treatment of prostate cancer; sessions on the challenges in the management of oligometastatic and advanced prostate cancer; and insights into the role of modern imaging and biomarkers throughout the course of the disease.

You will have the opportunity to:

- join discussions,
- participate in lively debates, and
- meet like-minded prostate cancer management professionals.

The multidisciplinary, international faculty will deliver presentations and interactive case discussions on state-of-the-art diagnosis and treatment of patients with various stages of prostate cancer.

Early registration deadline: 14 May 2018

London Breast Meeting 2018

6-8 September 2018
With pre-conference video workshops on 5 September 2018

The Royal College of Physicians
London, UK

www.londonbreastmeeting.com

September 5-8, 2018

LONDON BREAST MEETING

Conference Co-Chairs
Professor Jian Farhadi, Consultant Plastic and Reconstructive Surgery, Guy's & St Thomas' Hospital, London, UK
Professor Jaume Masia, Chief of Plastic Surgery Department, Hospital de la Santa Creu i Sant Paul, Barcelona, Spain

Conference Secretary
Ms Marlene See, Consultant Plastic and Reconstructive Surgeon, Guy's & St Thomas' Hospital, London, UK

Common Problems in Aesthetic and Reconstructive Breast Surgery

About the meeting

This international, CPD-certified annual conference brings together some of the world's most highly respected professionals working in the fields of breast oncology and reconstructive breast surgery. It follows on from the success of the last four meetings, which have all sold out.

This year the programme will focus on **common problems in aesthetic and reconstructive breast surgery**. Attendees will have the opportunity to hear from a panel of national and international surgeons who will share their expertise in the form of lectures, video sessions and panel discussions.

The programme has been organised by co-chairs, **Professor Jian Farhadi**, consultant plastic and reconstructive surgeon, Guy's and St Thomas' Hospital, London, and **Professor Jaume Masia**, chief of the plastic surgery department at the Hospital de la Santa Creu i Sant Pau, Barcelona, Spain.

Programme highlights will include:

- The ductal carcinoma *in situ* (DCIS) dilemma: current recommendations and trends
- The integrated port-expander: challenges for the radiologist and radio-oncologist
- The diagnosis of capsular contracture
- The breast multidisciplinary meeting: challenging cases
- Oncoplastic surgery
- Implant-based reconstruction
- Autologous reconstruction.

European School of Oncology (ESO) Masterclass in neuro-oncology: multidisciplinary management of adult brain tumours

20-22 September 2018
Milan, Italy

This Masterclass offers plenary lectures on state-of-the-art clinical evaluation and treatments with reference to clinical guidelines. It concludes by offering a set of key take-home messages. Participants will deliver case presentations within small groups and discuss them with the course faculty. Contouring sessions will give participants the opportunity to experience challenging situations in the treatment of gliomas. You will also be able to exchange ideas with the experts teaching on the course about controversies in the management of difficult cases encountered in daily radiotherapy practice.

The International Marie Sklodowska-Curie Meeting: from radiation to innovation in medicine 2018 (IMSCM2018)

12 October 2018
Institut Curie
Paris, France

RADIATE-ITN is an innovative training network funded by the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement (No: 642623). We are pleased to invite you to the IMSCM2018 meeting, which will take place at the Institut Curie, Paris, France, on 12 October 2018.

The theme of this year's meeting is the use of radiation biology in the treatment of cancer. Aimed particularly at young researchers, the meeting will feature talks by leading international investigators and poster sessions dedicated to research in the field of radiation biology and oncology. It promises to be a highly interactive and informative meeting.

Topics of interest include:

tumour microenvironment, DNA repair, immune response and innovative therapies. Further details of the programme, including the keynote speakers can be found on our conference website.

Important dates:

Deadline for abstract submission: 13 August 2018
Deadline for registration: 15 September 2018

For further details and information on registration and abstract submission, visit www.radiate.eu

All abstracts must be sent to radiate@oncology.ox.ac.uk. For any enquiries regarding the programme, and all general enquiries, please email: radiate@oncology.ox.ac.uk

We look forward to seeing you at IMSCM2018 in Paris.

FOCUS ON PAST CONFERENCES

Report from the second Assisi think tank meeting (ATTM) on research challenges in breast cancer ▶▶

1-3 March 2018

Assisi, Italy

Fourth conference on small animal precision image-guided radiotherapy ▶▶

Endorsed by ESTRO

12-14 March 2018,

Lisbon, Portugal

EBCC 11
European Breast Cancer Conference

European Breast Cancer Conference (EBCC-11) ▶▶

21-23 March 2018

Barcelona, Spain

Report from the second Assisi think tank meeting (ATTM) on research challenges in breast cancer

1-3 March 2018
Assisi, Italy

Endorsed by ESTRO

The second Assisi think tank meeting (ATTM) on research challenges in breast cancer was held in the ancient Palazzo Bernabei, part of the University of Perugia in Assisi, Italy. The scientific organisers – Professors Philip Poortmans, Cynthia Aristei and Vincenzo Valentini – identified an international board of radiation oncologists working in research on breast cancer. The members of this board of experts were: Meritxell Arenas, Céline Bourgier, Orit Kaidar-Person, Icro Meattini, Liesbeth Boersma, Charlotte Coles, Birgitte Offersen, Bruno Cutuli, Sofia Rivera, Angel Montero Luis, Lurdes Trigo, Vassilis Kouloulias, Ugur Selek, Raphael Pfeffer, Antonella Ciabattoni, Lorenzo Falcinelli, Pierfrancesco Franco, Giovanni Frezza, Domenico Genovesi, Marco Krengli, Valentina Lancellotta, Cristina Leonardi, Lorenzo Livi, Fabio Marazzi, Valeria Masiello, Nadia Pasinetti, Elisabetta Perrucci, Luigi Pirtoli, Riccardo Santoni, Daniela Smaniotto, Vincenzo Tombolini and Cristiana Vidali.

The aims of the ATTM were to:

- identify grey areas in daily clinical practice in breast cancer treatment by detecting where research evidence could be more robust
- brainstorm issues around combined treatment modalities
- identify feasible and affordable trials ▼

to address these issues and put them forward to the scientific community, public and private sponsors
- promote breast cancer cures and enhance patients' quality of life.

Ahead of the meeting, the expert board members were asked to complete a survey to help determine clinical choices of different treatments for three representative clinical case studies. The following topics were then analysed in depth at the ATTM:
- primary systemic therapy, mastectomy and breast reconstruction, post-mastectomy radiation therapy
- therapeutic options in ductal carcinoma *in situ*
- de-escalated therapies in early breast cancer.

On day one, the expert board discussed the survey results, emphasising the grey areas where agreement on treatment was under 70%, analysed the current state of the art and ongoing studies, and proposed a number of new trials, which were then debated the next day.

On day two, meeting attendees validated the expert board's choice of clinical cases and grey areas of research, and then commented on the proposals.

On day three, the expert board:
- defined the way forward for a set of trial proposals covering each topic, each of which will include the aim, primary endpoint, patient selection, treatment modalities to be tested, research method (e.g. a perspective study, where the expected benefit needs to be defined to set the accrual, or a large database collection)
- planned the outline of a forthcoming white paper.

One factor that contributed to the success of the ATTM is the peace and tranquillity to be found in Assisi, which encourages in-depth thinking. The participants debated keenly, ensuring the emergence of new ideas for research and all returned to their national societies and working groups to discuss the trial proposals and sound out interest in participation. Once again, the ultimate goal of each Assisi think tank meeting – to return home with a trial proposal 'in the pocket' – was achieved.

Fourth conference on small animal precision image-guided radiotherapy

Endorsed by ESTRO

12-14 March 2018,
Lisbon, Portugal

Endorsed by ESTRO

small-animal-rt-conference.com

The fourth edition of this meeting was attended by radiobiologists, physicists and also some radiation oncologists

In March this year the small but rapidly growing community active in research in image-guided precision irradiation of small animals met at the Instituto Superior Técnico (IST), University of Lisbon, Portugal. This field is concerned with highly precise irradiation of tumours or normal tissue in small animals. It is a relatively recent research field that aims to use novel research platforms, combining precision irradiation with high-resolution imaging to study the response of animal models to synergistic combinations of radiation and other agents such as chemotherapy, hyperthermia and immune therapy. The ultimate aim of this new research field is to discover novel therapies that can then be translated to human radiotherapy trials.

The fourth edition of this meeting was attended by radiobiologists, physicists and also some radiation oncologists. It is one of those rare ▼

The event was well attended by vendors, exhibiting and discussing their highly specialised products for this field

meetings where the different disciplines involved make a real effort to communicate their work clearly outside their own specialism. The two-and-a-half days were packed with talks about radiation targeting of animal tissues (tumours and normal tissue), combination of radiation with other agents, development of novel imaging and irradiation techniques, dose calculation techniques, dosimetry and translational studies. The event was well attended by vendors, exhibiting and discussing their highly specialised products for this field. There was a dedicated session to radiation targeting with proton beams, but most of the work dealt with photon irradiation.

This research field is one of the most rapidly growing in radiotherapy. Already, around 100 research centres have invested in the specialised equipment needed for this work. Biologists and physicists work shoulder to shoulder to develop new equipment and animal models, with the hope of significantly advancing cancer treatment. The next conference is due in 2020. Watch out for papers from the 2018 conference in a special issue of the *British Journal of Radiology* to be published in early 2019.

Professor Frank Verhaegen
Maastro Clinic, Maastricht, The Netherlands

Professor Pedro Vaz, Dr Ana Belchior,
IST, University of Lisbon, Portugal

REFERENCES

Verhaegen, Frank *et al.* ESTRO ACROP: Technology for precision small animal radiotherapy research: Optimal use and challenges. *Radiotherapy and Oncology*, Volume 126 , Issue 3 , 471 - 478

European Breast Cancer Conference (EBCC-11)

21-23 March 2018
Barcelona, Spain

Inscientific collaboration with ESTRO

This year's conference brought together a diverse group of clinicians, scientists, patient representatives and health professionals

The 11th European Breast Cancer Conference (EBCC-11) hosted by Europa Donna, the European Organisation for Research and Treatment of Cancer (EORTC) and the European Society of Breast Cancer Specialists (EUSOMA) was held at the end of March 2018 at the CCIB conference centre in Barcelona, Spain.

EBCC-11 once again took place in the context of very tangible advances made for patients in prevention, diagnosis, treatment and survivorship, and of advances driven by research in recent years, emphasising the successful application of a multidisciplinary approach. This year's conference was firmly based on an inclusive vision of breast cancer, and brought together a diverse group of clinicians, scientists, patient representatives and health professionals to tackle key issues facing patients throughout the breast cancer journey. The programme highlighted the importance of teamwork and interactions between all professionals and specialties involved in breast cancer treatment. A number of exciting innovations and their implementation into clinical practice were discussed, with data presented. ▼

A key theme that emerged at the conference was patient-reported outcomes (PROs), one of the most important factors that has been added to the assessments of outcomes in breast cancer. New research and clinical practice involving PROs was presented, illustrating how these assessments can improve relationships between physicians and patients, enhance shared decision-making, and ultimately impact on final outcomes in the management of breast cancer patients.

Another theme covered at the conference was individualising prevention strategies and treatments in order to help to avoid over-treatment. In addition, participants discussed the need to address the concerns about direct-to-consumer genetic testing for breast cancer and its use in predicting risk and in devising appropriate treatment, to ensure the maximum benefits of genetic testing while minimising potential harms. A call to action will be published later this year.

View the abstract book, browse the posters, read the press releases and watch the webcasts at www.ecco-org.eu/ebcc

CALENDAR OF EVENTS

MAY 2018

16-19 MAY 2018 | BERLIN, GERMANY

ESHO 2018: 32nd Annual meeting of the European Society for Hyperthermic Oncology

www.esho.info

SCIENTIFIC COLLABORATION

28-29 MAY 2018 | DUBLIN, IRELAND

Irish Annual SRS/SABR symposium

www.futurehealthsummit.com

ESTRO ENDORSED EVENT

JUNE 2018

11-15 JUNE 2018 | BUCHAREST, ROMANIA

Bucharest Oncology Summer School

ESTRO ENDORSED EVENT

16-22 JUNE 2018 | ZEIST, THE NETHERLANDS

MCCR - Methods in Clinical Cancer Research Workshop

www.ecco-org.eu/Events/MCCR-Workshop

28-30 JUNE 2018 | FRANKFURT, GERMANY

Global Congress on Prostate Cancer 2018

http://prosca.org

ESTRO ENDORSED EVENT

JULY 2018

03-07 JULY 2018 | LJUBJANA, SLOVENIA

AAPM-ISEP: Challenges in Modern Radiation Therapy Physics

http://www.aapm-isep.si

ESTRO ENDORSED EVENT

AUGUST 2018

01-03 AUGUST 2018 | TEHRAN, IRAN

2nd International Conference on Head and Neck Cancer

http://ihncc.ir/en

ESTRO ENDORSED EVENT

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22 AUGUST 2018 | COPENHAGEN, DENMARK

IMRT and VMAT planning in practice at ECMP2018

ecmp2018.org/fileadmin/user_upload/ECMP_2018/IMRT_VMAT_planning_in_practice.pdf

ESTRO ENDORSED EVENT

SEPTEMBER 2018

05-08 SEPTEMBER 2018 | LONDON, UK

London Breast meeting

www.londonbreastmeeting.com

ESTRO ENDORSED EVENT

7-9 SEPTEMBER 2018 | VIENNA, AUSTRIA

ECCO 2018: European cancer summit

www.eccosummit.eu

SCIENTIFIC COLLABORATION

20-21 SEPTEMBER 2018 | CAIRO, EGYPT

Arab African International Cancer Congress (AAICC)

www.aaicc.net

ESTRO ENDORSED EVENT

20-21 SEPTEMBER 2018 | MADRID, SPAIN

BLADDR 2018

http://bladdr.org

ESTRO ENDORSED EVENT

20-22 SEPTEMBER 2018 | MILAN, ITALY

ESO masterclass in neuro-oncology, Multidisciplinary management of adult brain tumour

www.eso.net/en/education/future/events/eso-masterclass-in-neuro-oncology:-multidisciplinary-management-of-adult-brain-tumours

ESTRO ENDORSED EVENT

20-22 SEPTEMBER 2018 | PARIS, FRANCE

International conference on immunotherapy radiotherapy combinations 2018

www.radio-immuno.siricsocrate

ESTRO ENDORSED EVENT

26-28 SEPTEMBER 2018 | TEHRAN, IRAN

Perspectives of Advanced Radiotherapy in Middle Income Countries

http://parimics.isco.ir

SCIENTIFIC COLLABORATION

OCTOBER 2018

12 OCTOBER 2018 | PARIS, FRANCE

International Marie Sklodowska-Curie Meeting: From Radiation to Innovation in Medicine

www.radiate.eu/imscm-2018-conference

ESTRO ENDORSED EVENT

26-27 OCTOBER 2018

2nd ESTRO Physics Workshop - Science in Development

www.estro.org/congresses-meetings/items/2nd-estro-physics-workshop-science-in-development

ESTRO EVENT

NOVEMBER 2018

29-30 NOVEMBER 2018 | BRUSSELS, BELGIUM

6th GEC-ESTRO Workshop

www.estro.org/congresses-meetings/items/6th-gec-estro-workshop

ESTRO EVENT

DECEMBER 2018

7-9 DECEMBER 2018 | SINGAPORE

ESTRO Meets Asia 2018

www.estro.org/congresses-meetings/items/estro-meets-asia-2018

ESTRO EVENT

MARCH 2019

14-16 MARCH 2019 | BARCELONA, SPAIN

7TH ICHNO

www.estro.org/congresses-meetings/items/7th-ichno

ESTRO EVENT

APRIL 2019

26-30 APRIL 2019 | MILAN, ITALY

ESTRO 38

www.estro.org/congresses-meetings/items/estro-38

ESTRO EVENT

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Bimonthly newsletter
N° 118 | May - June 2018
European Society for
Radiotherapy & Oncology

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Published every two months and distributed by the European Society for Radiotherapy & Oncology.

DEADLINES FOR SUBMISSION OF ARTICLES IN 2018
September-October 2018 > 20 June 2018
November-December 2018 > 3 September 2018

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