ESTRO

NEWSLETTER SEPTEMBER-OCTOBER

ESTRO | EUROPEAN SOCIETY FOR RADIOTHERAPY & ONCOLOGY

PHYSICS

Radiomics and predictive models: the medical physics challenges

MAKE IT HAPPEN

Introducing the Radiation Oncology Safety Education and Information System (ROSEIS) platform

CONFERENCES

ESTRO meets Asia: interview with the chairs

N° 120 | BIMONTHLY | SEPTEMBER - OCTOBER 2018

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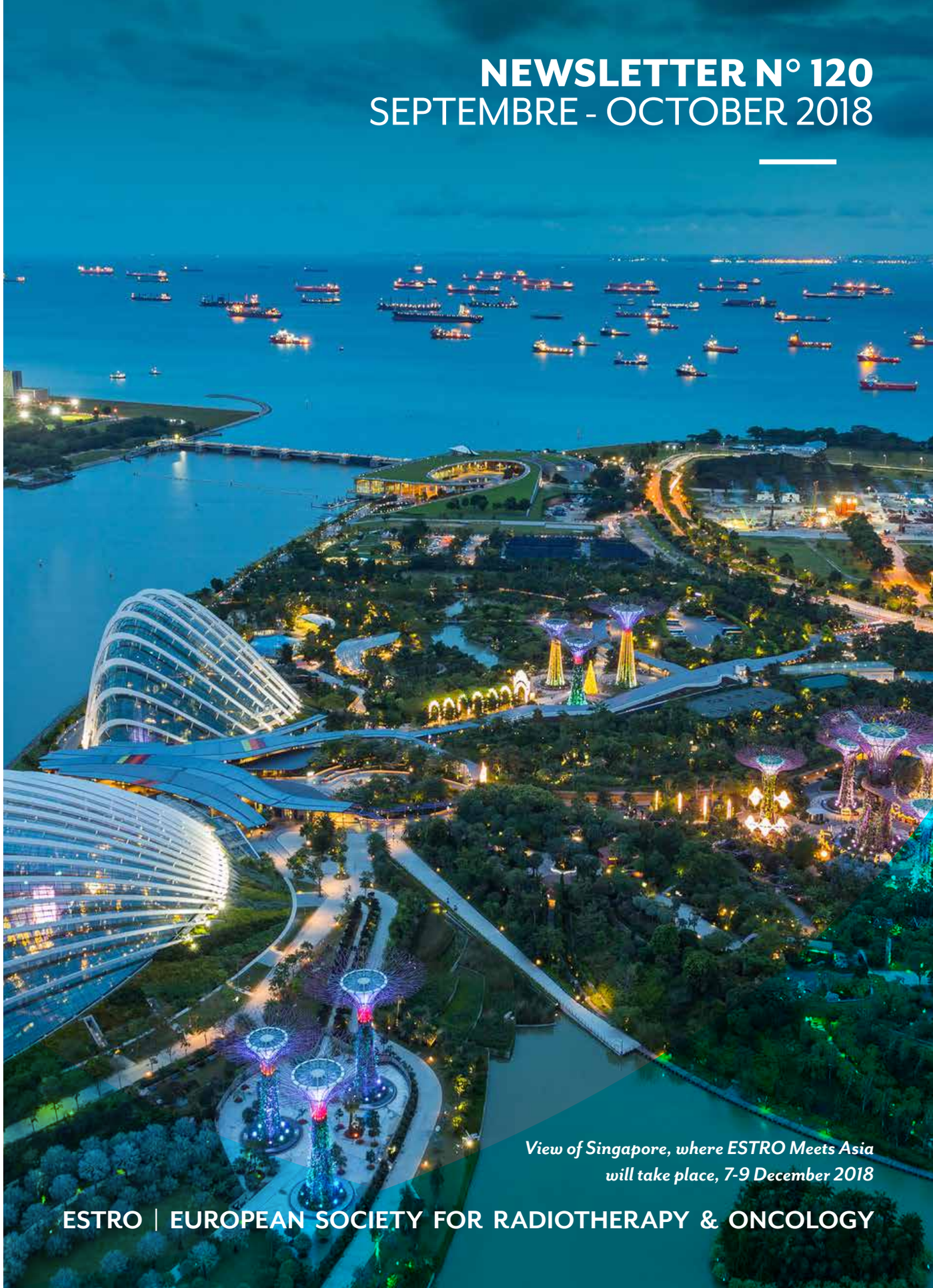
NEWSLETTER N° 120
SEPTEMBRE - OCTOBER 2018



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

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ESTRO MEETS ASIA 2018

7-9 December 2018
Singapore

DEADLINES

Late registration:
5 November 2018

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EDITORIAL

"I urge you to find out more information in the 'ESTRO meets Asia' conference pages of this newsletter"

Dear colleagues and friends,

I hope you all had the chance to enjoy some time with your families and friends over the summer and now are ready and full of energy for the busy months ahead.

For this edition of the ESTRO newsletter I would like to focus mainly on our newest conference: 'ESTRO meets Asia'. As most of you already know, ESTRO's objective in organising this meeting is to promote greater collaboration between Europe and Asia in regard to science, education, technology and professional development, targeting all professionals working in the radiation oncology discipline (clinicians, medical physicists, radiobiologists and RTTs).

The conference will be held in Singapore on 7-9 December, and its interactive format is designed to create a platform where participants will learn from each other by embracing the diversity of clinical practices and exploring the ▼

Umberto Ricardi

development of common solutions to optimise radiotherapy treatment and care for all patients.

The scientific programme of the conference has been designed by a team of ESTRO and FARO specialists from the Asia region, and will be made up of three components: an interdisciplinary component, a radiobiology component and a “professional” component focusing on the practice of medical physicists and RTTs. The conference will also include round table discussions on the organisation of education, training and certification, as well as sessions linked to ongoing projects such as HERO (Health Economics in Radiation Oncology), GTFRCC (Global Task Force on Radiotherapy for Cancer Control) and GIRO (Global Impact of Radiotherapy in Oncology) under the overall umbrella of advocacy.

I urge you to find out more information in the ‘ESTRO meets Asia’ conference pages of this newsletter and on the ESTRO website. We hope to see a large representation from the ESTRO community at the conference.

As a final note, I would like to remind you that the ESTRO guide for 2019 will soon be available to download from our website. In the guide you can find all the important information regarding ESTRO’s activities for the coming year: how to renew your membership, the dates and titles of courses and the School’s online offers, as well as many other useful items of information.

Enjoy the newsletter,

Umberto Ricardi
ESTRO President

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READ IT BEFORE YOUR PATIENTS

INTRODUCTION | BREAST | HEAD AND NECK | BRAIN / CNS | LEUKAEMIA AND BRAIN | LYMPHOMA | OESOPHAGEAL | LUNG | NON-SMALL-CELL LUNG CANCER | CERVIX AND ENDOMETRIUM | MEDULLOBLASTOMA | NASOPHARYNGEAL | OUTCOME PREDICTION

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

INTRODUCTION | BREAST | HEAD AND NECK | BRAIN / CNS | LEUKAEMIA AND BRAIN | LYMPHOMA | OESOPHAGEAL | LUNG | NON-SMALL-CELL LUNG CANCER | CERVIX AND ENDOMETRIUM | MEDULLOBLASTOMA | NASOPHARYNGEAL | OUTCOME PREDICTION

READ IT BEFORE YOUR PATIENTS

BREAST

Association between inflammatory biomarker C-reactive protein and radiotherapy-induced early adverse skin reactions in a multi-racial/ethnic breast cancer population

Hu JJ, Urbanic JJ, Case LD, Takita C, Wright JL, Brown DR, Langefeld CD, Lively MO, Mitchell SE, Thakrar A, Bryant D, Baglan K, Strasser J, Baez-Diaz L, Lesser GJ, Shaw EG.

J Clin Oncol. Epub ahead of print

Purpose

This study examined an inflammatory biomarker, high-sensitivity C-reactive protein (hsCRP), in radiotherapy (RT)-induced early adverse skin reactions or toxicities in breast cancer.

Patients and methods

Between 2011 and 2013, 1,000 patients with breast cancer who underwent RT were evaluated prospectively for skin toxicities through the USA National Cancer Institute-funded Wake Forest University Community Clinical Oncology Program Research Base. Pre- and post-RT plasma hsCRP levels and Oncology Nursing Society skin toxicity criteria (0 to 6) were used to assess RT-induced skin toxicities. Multivariable logistic regression analyses were applied to ascertain the associations between hsCRP and RT-induced skin toxicities after adjusting for potential confounders.

Results

The study comprised 623 white, 280 African-American, 64 Asian/Pacific Islander, and 33 other race patients; 24% of the patients were Hispanic, and 47% were obese. Approximately 42% and 15% of patients developed RT-induced grade 3+ and 4+ skin toxicities, respectively. The hsCRP levels differed significantly by race and body mass index, but not by ethnicity. In multivariable analysis, grade 4+ skin toxicity was significantly associated with obesity (odds ratio [OR], 2.17; 95% CI, 1.41 to 3.34], post-RT hsCRP ≥ 4.11 mg/L (OR, 1.61; 95% CI, 1.07 to 2.44), and both factors combined (OR, 3.65; 95% CI, 2.18 to 6.14). Above-median post-RT hsCRP (OR, 1.93; 95% CI, 1.03 to 3.63), and change in hsCRP (OR, 2.80; 95% CI, 1.42 to 5.54) were significantly associated with grade 4+ skin toxicity in non-obese patients.

Conclusion

This large prospective study is the first to our knowledge of hsCRP as an inflammatory biomarker in RT-induced skin toxicities in breast cancer. We demonstrate that non-obese patients with elevated RT-related change in hsCRP levels have a significantly increased risk of grade 4+ skin toxicity. The outcomes may help to predict RT responses and guide decision-making.

READ IT BEFORE YOUR PATIENTS

BREAST

Quality-of-life results for accelerated partial breast irradiation with interstitial brachytherapy versus whole-breast irradiation in early breast cancer after breast-conserving surgery (GEC-ESTRO): five-year results of a randomised, phase III trial

Schäfer R, Strnad V, Polgár C, Uter W, Hildebrandt G, Ott OJ, Kauer-Dorner D, Knauerhase H, Major T, Lyczek J, Guinot JL, Dunst J, Miguelez CG, Slampa P, Allgäuer M, Lössl K, Kovács G, Fischedick AR, Fietkau R, Resch A, Kulik A, Arribas L, Niehoff P, Guedea F, Schlamann A Gall C, Polat B; Groupe Européen de Curiethérapie of European Society for Radiotherapy and Oncology (GEC-ESTRO).

Lancet Oncol. 2018 Jun;19(6):834-844.

Background

Previous results from the GEC-ESTRO trial showed that accelerated partial breast irradiation (APBI) using multi-catheter brachytherapy in the treatment of early breast cancer after breast-conserving surgery was non-inferior to whole-breast irradiation in terms of local control and overall survival. Here, we present five-year results of patient-reported quality of life.

Methods

We did this randomised controlled phase III trial at 16 hospitals and medical centres in seven European countries. Patients aged 40 years or older with 0-IIA breast cancer were randomly assigned (1:1) after breast-conserving surgery (resection margins ≥2 mm) to receive either whole-breast irradiation of 50 Gy with a boost of 10 Gy or APBI using multi-catheter brachytherapy. Randomisation was stratified by study centre, tumour type, and menopausal status, with a block size of ten and an automated dynamic algorithm. There was no masking of patients or investigators. The primary endpoint of the trial was ipsilateral local recurrence. Here, we present five-year results of quality of life (a pre-specified secondary endpoint). Quality-of-life questionnaires (European Organisation for Research and Treatment of Cancer QLQ-C30, breast cancer module QLQ-BR23) were completed before radiotherapy (baseline 1), immediately after radiotherapy (baseline 2), and during follow-up. We analysed the data according to treatment received (as-treated population). Recruitment was completed in 2009, and long-term follow-up is continuing. The trial is registered at ClinicalTrials.gov, number NCT00402519.

Findings

Between 20 April 2004 and 30 July 2009, 633 patients had accelerated partial breast irradiation and 551 patients had whole-breast irradiation. Quality-of-life questionnaires at baseline 1 were available for 334 (53%) of 663 patients in the APBI group and 314 (57%) of 551 patients in the whole-breast irradiation group; the response rate was similar during follow-up. Global health status (range 0-100) was stable in both groups: at baseline 1, APBI group mean score 65.5 (SD 20.6) versus whole-breast irradiation group 64.6 (19.6), p=0.37; at five years, APBI group 66.2 (22.2) versus whole-breast irradiation group 66.0 (21.8), p=0.94. The only moderate, significant difference (difference of 10-20 points) between the groups was found in the breast symptoms scale. Breast symptom scores were significantly higher (i.e. worse) after whole-breast irradiation than after APBI at baseline 2 (difference of means 13.6, 95% CI 9.7-17.5; p<0.0001) and at three-month follow-up (difference of means 12.7, 95% CI 9.8-15.6; p<0.0001).

Interpretation

APBI with multi-catheter brachytherapy was not associated with worse quality of life compared with whole-breast irradiation. This finding supports APBI as an alternative treatment option after breast-conserving surgery for patients with early breast cancer.

READ IT BEFORE YOUR PATIENTS

BREAST

Cardiac structure injury after radiotherapy for breast cancer: cross-sectional study with individual patient data

Taylor C, McGale P, Brønnum D, Correa C, Cutter D, Duane FK, Gigante B, Jensen MB, Lorenzen E, Rahimi K, Wang Z, Darby SC, Hall P, Ewertz M.

J Clin Oncol. Epub ahead of print

Purpose

Incidental cardiac irradiation can cause cardiac injury, but little is known about the effect of radiation on specific cardiac segments.

Methods

For 456 women who received breast cancer radiotherapy between 1958 and 2001 and then later experienced a major coronary event, information was obtained on the radiotherapy regimen they received and on the location of their cardiac injury. For 414 women, all with documented location of left ventricular (LV) injury, doses to five LV segments were estimated. For 133 women, all with documented location of coronary artery disease with ≥ 70% stenosis, doses to six coronary artery segments were estimated. For each segment, numbers of women with left-sided and right-sided breast cancer were compared.

Results

Of women with LV injury, 243 had left-sided breast cancer and 171 had right-sided breast cancer (ratio of left versus right, 1.42; 95% CI, 1.17 to 1.73), reflecting the higher typical LV radiation doses in left-sided cancer (average dose left-sided, 8.3 Gy; average dose right-sided, 0.6 Gy; left minus right dose difference, 7.7 Gy). For individual LV segments, the ratios of women with left- versus right-sided radiotherapy were as follows: inferior, 0.94 (95% CI, 0.70 to 1.25); lateral, 1.42 (95% CI, 1.04 to 1.95); septal, 2.09 (95% CI, 1.37 to 3.19); anterior, 1.85 (95% CI, 1.39 to 2.46); and apex, 4.64 (95% CI, 2.42 to 8.90); corresponding left-minus-right dose differences for these segments were 2.7, 4.9, 7.2, 10.4, and 21.6 Gy, respectively (P trend < .001). For women with coronary artery disease, the ratios of women with left- versus right-radiotherapy for individual coronary artery segments were as follows: right coronary artery proximal, 0.48 (95% CI, 0.26 to 0.91); right coronary artery mid or distal, 1.69 (95% CI, 0.85 to 3.36); circumflex proximal, 1.46 (95% CI, 0.72 to 2.96); circumflex distal, 1.11 (95% CI, 0.45 to 2.73); left anterior descending proximal, 1.89 (95% CI, 1.07 to 3.34); and left anterior descending mid or distal, 2.33 (95% CI, 1.19 to 4.59); corresponding left-minus-right dose differences for these segments were -5.0, -2.5, 1.6, 3.5, 9.5, and 38.8 Gy (P trend = .002).

Conclusion

For individual LV and coronary artery segments, higher radiation doses were strongly associated with more frequent injury, suggesting that all segments are sensitive to radiation and that doses to all segments should be minimised.

READ IT BEFORE YOUR PATIENTS

HEAD AND NECK

Induction chemotherapy followed by cetuximab radiotherapy is not superior to concurrent chemoradiotherapy for head and neck carcinomas: results of the GORTEC 2007-02 phase III randomised trial

Geoffrois L, Martin L, De Raucourt D, Sun XS, Tao Y, Maingon P, Buffet J, Pointreau Y, Sire C, Tuchais C, Babin E, Coutte A, Rolland F, Kaminsky MC, Alfonsi M, Lapeyre M, Saliou M, Lafond C, Jadaud E, Gery B, Zawadi A, Tourani JM, Khoury C, Henry AR, Hasbini A, Guichard F, Borel C, Meert N, Guillet P, Calais MH, Garaud P, Bourhis J.

J Clin Oncol. Epub ahead of print

Purpose

Both concurrent chemoradiotherapy (CT-RT) and cetuximab radiotherapy (cetux-RT) have been established as the standard of care for the treatment of locally advanced squamous cell carcinoma of the head and neck. It was not known whether the addition of induction chemotherapy before cetux-RT could improve outcomes compared with standard of care CT-RT.

Patients and methods

The current trial was restricted to patients with non-metastatic N2b, N2c, or N3 squamous cell carcinoma of the head and neck and fit for taxotere, cisplatin, fluorouracil (TPF). Patients were randomly assigned to receive three cycles of TPF followed by cetux-RT versus concurrent carboplatin fluorouracil and RT as recommended in National Comprehensive Cancer Network guidelines. The trial was powered to detect a hazard ratio (HR) of 0.66 in favour of TPF plus cetux-RT for progression-free survival at two years. The inclusion of 180 patients per arm was needed to achieve 80% power at a two-sided significance level of .05.

Results

Between 2009 and 2013, 370 patients were included. All patient and tumour characteristics were well balanced between arms. There were more cases of grade 3 and 4 neutropenia in the induction arm, and the induction TPF was associated with 6.6% treatment-related deaths. With a median follow-up of 2.8 years, two-year progression-free survival was not different between the arms (CT-RT, 0.38 v TPF + cetux-RT, 0.36; HR, 0.93 [95% CI, 0.73 to 1.20]; P = .58). HR was 0.98 (95% CI, 0.74 to 1.3; P = .90) for loco-regional control and 1.12 (95% CI, 0.86 to 1.46; P = .39) for overall survival. These effects were observed regardless of p16 status. The rate of distant metastases was lower in the TPF arm (HR, 0.54 [95% CI, 0.30 to 0.99]; P = .05).

Conclusion

Induction TPF followed by cetux-RT did not improve outcomes compared with CT-RT in a population of patients with advanced cervical lymphadenopathy.

READ IT BEFORE YOUR PATIENTS

HEAD AND NECK

Improved outcome by adding concurrent chemotherapy to cetuximab and radiotherapy for locally advanced head and neck carcinomas: results of the GORTEC 2007-01 phase III randomised trial

Tao Y, Auperin A, Sire C, Martin L, Khoury C, Maingon P, Bardet E, Kaminsky MC, Lapeyre M, Chatellier T, Alfonsi M, Pointreau Y, Jadaud E, Géry B, Zawadi A, Tourani JM, Laguerre B, Coutte A, Racadot S, Hasbini A, Malaurie E, Borel C, Meert N, Cornely A, Ollivier N, Casiraghi O, Sun XS, Bourhis J.

J Clin Oncol. 2018 Jun 7:JCO2017762518. doi: 10.1200/JCO.2017.76.2518. [Epub ahead of print]

Purpose
To investigate the effect of adding concurrent chemotherapy (CT) to cetuximab plus radiotherapy (RT; CT-cetux-RT) compared with cetuximab plus RT (cetux-RT) in locally advanced squamous cell carcinoma of the head and neck (LA-SCCHN).

Patients and methods
In this phase III randomised trial, patients with N0-2b, non-operated, stage III or IV (non-metastatic) LA-SCCHN were enrolled. Patients received once-daily RT up to 70 Gy with weekly cetuximab or with weekly cetuximab and concurrent carboplatin and fluorouracil (three cycles). To detect a hazard ratio (HR) of 0.64 for progression-free survival (PFS) with 85% power at a two-sided significance level of P = .05, 203 patients needed to be included in each arm.

Results
In total, 406 patients were randomly assigned to either CT-cetux-RT or cetux-RT. Patient and tumour characteristics were well balanced between arms, including p16 status. With a median follow-up of 4.4 years, the HR for PFS favoured the CT-cetux-RT arm (HR, 0.73; 95% CI, 0.57 to 0.94; P = .015), with three-year PFS rates of 52.3% and 40.5% and median PFS times of 37.9 and 22.4 months in the CT-cetux-RT and cetux-RT arms, respectively. The HR for loco-regional control was 0.54 (95% CI, 0.38 to 0.76; P < .001) in favour of CT-cetux-RT. These benefits were observed regardless of p16 status for oropharynx carcinomas. Overall survival (HR, 0.80; P = .11) and distant metastases rates (HR, 1.19; P = .50) were not significantly different between the two arms. The CT-cetux-RT arm, compared with cetux-RT, had a higher incidence of grade 3 or 4 mucositis (73% v 61%, respectively; P = .014) and of hospitalizations for toxicity (42% v 22%, respectively; P < .001).

Conclusion
The addition of concurrent carboplatin and fluorouracil to cetux-RT improved PFS and loco-regional control, with a non-significant gain in survival. To our knowledge, this is the first evidence of a clinical benefit for treatment intensification using cetux-RT as a backbone in LA-SCCHN.

READ IT BEFORE YOUR PATIENTS

BRAIN / CNS

Effects of surgery with salvage stereotactic radiosurgery versus surgery with whole-brain radiation therapy in patients with one to four brain metastases (JCOG0504): a phase III, non-inferiority, randomised controlled trial

Kayama T, Sato S, Sakurada K, Mizusawa J, Nishikawa R, Narita Y, Sumi M, Miyakita Y, Kumabe T, Sonoda Y, Arakawa Y, Miyamoto S, Beppu T, Sugiyama K, Nakamura H, Nagane M, Nakasu Y, Hashimoto N, Terasaki M, Matsumura A, Ishikawa E, Wakabayashi T, Iwadate Y, Ohue S, Kobayashi H, Kinoshita M, Asano K, Mukasa A, Tanaka K, Asai A, Nakamura H, Abe T, Muragaki Y, Iwasaki K, Aoki T, Watanabe T, Sasaki H, Izumoto S, Mizoguchi M, Matsuo T, Takeshima H, Hayashi M, Jokura H, Mizowaki T, Shimizu E, Shirato H, Tago M, Katayama H, Fukuda H, Shibui S; Japan Clinical Oncology Group.

J Clin Oncol. Epub ahead of print

Purpose

Whereas whole-brain radiotherapy (WBRT) has been the standard treatment of brain metastases (BMs), stereotactic radiosurgery (SRS) is increasingly preferred to avoid cognitive dysfunction; however, it has not been clearly determined whether treatment with SRS is as effective as that with WBRT or WBRT plus SRS. We thus assessed the non-inferiority of salvage SRS to WBRT in patients with BMs.

Patients and methods

Patients aged 20 to 79 years old with performance status scores of 0 to 2 – and 3 if caused only by neurologic deficits – and with four or fewer surgically resected BMs with only one lesion >3cm in diameter were eligible. Patients were randomly assigned to WBRT or salvage SRS arms within 21 days of surgery. The primary end point was overall survival. A one-sided α of .05 was used.

Results

Between January 2006 and May 2014, 137 and 134 patients were enrolled in the WBRT and salvage SRS arms, respectively. Median overall survival was 15.6 months in both arms (hazard ratio, 1.05; 90% CI, 0.83 to 1.33; one-sided P for non-inferiority = .027). Median intracranial progression-free survival of patients in the WBRT arm (10.4 months) was longer than that of patients in the salvage SRS arm (4.0 months). The proportions of patients whose mini-mental status examination and performance status scores that did not worsen at 12 months were similar in both arms; however, 16.4% of patients in the WBRT arm experienced grade 2 to 4 cognitive dysfunction after 91 days post-enrolment, whereas only 7.7% of those in the SRS arm did (P = .048).

Conclusion

Salvage SRS is non-inferior to WBRT and can be established as a standard therapy for patients with four or fewer BMs.

READ IT BEFORE YOUR PATIENTS

LEUKAEMIA AND BRAIN

Radiation exposure from paediatric CT scans and subsequent cancer risk in The Netherlands

Meulepas JM, Ronckers CM, Smets AMJB, Nievelstein RAJ, Gradowska P, Lee C, Jahnen A, van Straten M, de Wit MY, Zonnenberg B, Klein WM, Merks JH, Visser O, van Leeuwen FE, Hauptmann M.

J Natl Cancer Inst. Epub ahead of print

Background

Computed tomography (CT), a strong diagnostic tool, delivers higher radiation doses than most imaging modalities. As CT use has increased rapidly, radiation protection is important, particularly among children. We evaluate leukaemia and brain tumour risk following exposure to low-dose ionising radiation from CT scans in childhood.

Methods

For a nationwide retrospective cohort of 168,394 children (younger than 18 years old) who received one or more CT scans in a Dutch hospital between 1979 and 2012, we obtained cancer incidence, vital status, and confounder information by record linkage with external registries. Standardised incidence ratios were calculated using cancer incidence rates from the general Dutch population. Excess relative risks (ERRs) per 100 mGy organ dose were calculated with Poisson regression. All statistical tests were two-sided.

Results

Standardised incidence ratios were elevated for all cancer sites. Mean cumulative bone marrow doses were 9.5 mGy at the end of follow-up, and leukaemia risk (excluding myelodysplastic syndrome) was not associated with cumulative bone marrow dose (44 cases). Cumulative brain dose was on average 38.5 mGy and was statistically significantly associated with risk for malignant and non-malignant brain tumours combined (ERR/100 mGy: 0.86, 95% confidence interval = 0.20 to 2.22, P = .002, 84 cases). Excluding tuberous sclerosis complex patients did not substantially change the risk.

Conclusions

We found evidence that CT-related radiation exposure increases brain tumour risk. No association was observed for leukaemia. Compared with the general population, incidence of brain tumours was higher in the cohort of children with CT scans, requiring cautious interpretation of the findings.

READ IT BEFORE YOUR PATIENTS

LYMPHOMA

Randomised trial of systemic therapy after involved-field radiotherapy in patients with early-stage follicular lymphoma: TROG 99.03

MacManus M, Fisher R, Roos D, O'Brien P, Macann A, Davis S, Tsang R, Christie D, McClure B, Joseph D, Jayamohan J, Seymour JF.

J Clin Oncol. Epub ahead of print

Purpose

Follicular lymphoma (FL) is curable by involved-field radiotherapy (IFRT) in more than 50% of patients with stage I to II disease. We hypothesised that adding systemic therapy to IFRT would improve long-term progression-free survival (PFS).

Patients and methods

A multicentre randomised controlled trial enrolled patients with stage I to II low-grade FL after staging computed-tomography scans and bone marrow biopsies. 18F-labeled fluorodeoxyglucose-positron emission tomography (PET) was not mandatory. Patients were randomly assigned to either arm A (30 Gy IFRT alone) or arm B (IFRT plus six cycles of cyclophosphamide, vincristine, and prednisolone [CVP]). From 2006, rituximab was added to arm B (R-CVP).

Results

Between 2000 and 2012, 150 patients were enrolled, with 75 per arm. In arm B, 44 patients were allocated to receive CVP and 31 were allocated to receive R-CVP. At randomisation, 75% had stage I, the median age was 57 years, 52% were male, and 48% were PET staged. With a median follow-up of 9.6 years (range, 3.1 to 15.8 years), PFS was superior in arm B (hazard ratio, 0.57; 95% CI, 0.34 to 0.95; P = .033). Ten-year PFS rates were 59% (95% CI, 46% to 74%) and 41% (95% CI, 30% to 57%) for arms B and A, respectively. Patients in arm B who received R-CVP had markedly superior PFS compared with contemporaneous patients in arm A (hazard ratio, 0.26; 95% CI, 0.07 to 0.97; P = .045). Fewer involved regions (P = .047) and PET staging (P = .056) were associated with better PFS. Histologic transformation occurred in four and ten patients in arms B and A, respectively (P = .1). Ten deaths occurred in arm A versus five in arm B, but overall survival was not significantly different (P = .40; 87% and 95% at ten years, respectively).

Conclusion

Systemic therapy with R-CVP after IFRT reduced relapse outside radiation fields and significantly improved PFS. IFRT followed by immunochemotherapy is more effective than IFRT in early-stage FL.

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

OESOPHAGEAL

Detection of residual disease after neoadjuvant chemoradiotherapy for oesophageal cancer (preSANO): a prospective multicentre, diagnostic cohort study

Noordman BJ, Spaander MCW, Valkema R, Wijnhoven BPL, van Berge Henegouwen MI, Shapiro J, Biermann K, van der Gaast A, van Hillegersberg R, Hulshof MCCM, Krishnadath KK, Lagarde SM, Nieuwenhuijzen GAP, Oostenbrug LE, Siersema PD, Schoon EJ, Sosef MN, Steyerberg EW, van Lanschot JJB; SANO study group.

Lancet Oncol. Epub ahead of print

Background

After neoadjuvant chemoradiotherapy for oesophageal cancer, roughly half of the patients with squamous cell carcinoma and a quarter of those with adenocarcinoma have a pathological complete response of the primary tumour before surgery. Thus, the necessity of standard oesophagectomy after neoadjuvant chemoradiotherapy should be reconsidered for patients who respond sufficiently to neoadjuvant treatment. In this study, we aimed to establish the accuracy of detection of residual disease after neoadjuvant chemoradiotherapy with different diagnostic approaches, and the optimal combination of diagnostic techniques for clinical response evaluations.

Methods

The preSANO trial was a prospective, multicentre, diagnostic cohort study at six centres in The Netherlands. Eligible patients were aged 18 years or older, had histologically proven, resectable, squamous cell carcinoma or adenocarcinoma of the oesophagus or oesophagogastric junction, and were eligible for potential curative therapy with neoadjuvant chemoradiotherapy (five weekly cycles of carboplatin [area under the curve 2 mg/mL per min] plus paclitaxel [50 mg/m2 of body-surface area] combined with 41.4 Gy radiotherapy in 23 fractions) followed by oesophagectomy.

Four to six weeks after completion of neoadjuvant chemoradiotherapy, patients had oesophagogastroduodenoscopy with biopsies and endoscopic ultrasonography with measurement of maximum tumour thickness. Patients with histologically proven loco-regional residual disease or no-pass during endoscopy and without distant metastases underwent immediate surgical resection. In the remaining patients a second clinical response evaluation was done (PET-CT, oesophagogastroduodenoscopy with biopsies, endoscopic ultrasonography with measurement of maximum tumour thickness, and fine-needle aspiration of suspicious lymph nodes), followed by surgery 12-14 weeks after completion of neoadjuvant chemoradiotherapy.

The primary endpoint was the correlation between clinical response during clinical response evaluations and the final pathological response in resection specimens, as shown by the proportion of tumour regression grade (TRG) 3 or 4 (>10% residual carcinoma in the resection specimen) residual tumours that was missed during clinical response evaluations. This study was registered with The Netherlands Trial Register (NTR4834) and has been completed.

Findings

Between 22 July 2013, and 28 December 2016, 219 patients were included, 207 of whom were included in the analyses. Eight of 26 TRG3 or TRG4 tumours (31% [95% CI 17-50]) ▼

were missed by endoscopy with regular biopsies and fine-needle aspiration. Four of 41 TRG3 or TRG4 tumours (10% [95% CI 4-23]) were missed with bite-on-bite biopsies and fine-needle aspiration. Endoscopic ultrasonography with maximum tumour thickness measurement missed TRG3 or TRG4 residual tumours in 11 of 39 patients (28% [95% CI 17-44]). PET-CT missed six of 41 TRG3 or TRG4 tumours (15% [95% CI 7-28]). PET-CT detected interval-distant histologically proven metastases in 18 (9%) of 190 patients (one squamous cell carcinoma, 17 adenocarcinomas).

Interpretation

After neoadjuvant chemoradiotherapy for oesophageal cancer, clinical response evaluation with endoscopic ultrasonography, bite-on-bite biopsies, and fine-needle aspiration of suspicious lymph nodes was adequate for detection of loco-regional residual disease, with PET-CT for detection of interval metastases. Active surveillance with this combination of diagnostic modalities is now being assessed in a phase III randomised controlled trial (SANO trial; Netherlands Trial Register NTR6803).

READ IT BEFORE YOUR PATIENTS

LUNG

Defining the biological basis of radiomic phenotypes in lung cancer

Grossmann P, Stringfield O, El-Hachem N, Bui MM, Rios Velazquez E, Parmar C, Leijenaar RT, Haibe-Kains B, Lambin P, Gillies RJ, Aerts HJ.

Elife. 2017 Jul 21;6. pii: e23421. doi: 10.7554/eLife.23421.

Background

Medical imaging can visualise characteristics of human cancer non-invasively. Radiomics is an emerging field that translates these medical images into quantitative data to enable phenotypic profiling of tumours. While radiomics has been associated with several clinical endpoints, the complex relationships of radiomics, clinical factors, and tumour biology are largely unknown.

Method

To this end, we analysed two independent cohorts of respectively 262 North American and 89 European patients with lung cancer, and consistently identified previously undescribed associations between radiomic imaging features, molecular pathways, and clinical factors.

Results

We found a relationship between imaging features, immune response, inflammation, and survival, which was further validated by immune-histochemical staining. Moreover, a number of imaging features showed predictive value for specific pathways; for example, intra-tumour heterogeneity features predicted activity of RNA polymerase transcription (AUC = 0.62, p=0.03) and intensity dispersion was predictive of the autodegradation pathway of a ubiquitin ligase (AUC = 0.69, p<10-4). Finally, we observed that prognostic biomarkers performed highest when combining radiomic, genetic, and clinical information (CI = 0.73, p<10-9) indicating complementary value of these data.

Conclusion

We demonstrate that radiomic approaches permit non-invasive assessment of both molecular and clinical characteristics of tumours, and therefore have the potential to advance clinical decision-making by systematically analysing standard-of-care medical images.

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

NON-SMALL-CELL LUNG CANCER

Prophylactic cranial irradiation versus observation in radically treated stage III non-small-cell lung cancer: a randomised phase III NVALT-11/DLCRG-02 study

De Ruysscher D, Dingemans AC, Praag J, Belderbos J, Tissing-Tan C, Herder J, Haitjema T, Ubbels F, Lagerwaard F, El Sharouni SY, Stigt JA, Smit E, van Tinteren H, van der Noort V, Groen HJM

J Clin Oncol. Epub ahead of print

Purpose

The purpose of the current study was to investigate whether prophylactic cranial irradiation (PCI) reduces the incidence of symptomatic brain metastases in patients with stage III non-small-cell lung cancer (NSCLC) treated with curative intention.

Patients and methods

Patients with stage III NSCLC-staged with a contrast-enhanced brain computed tomography or magnetic resonance imaging-were randomly assigned to either observation or PCI after concurrent/sequential chemoradiotherapy with or without surgery. The primary end point-development of symptomatic brain metastases at 24 months was defined as one or a combination of key symptoms that suggest brain metastases: signs of increased intracranial pressure, headache, nausea and vomiting, cognitive or affective disturbances, seizures, and focal neurologic symptoms, and magnetic resonance imaging or computed tomography demonstrating the existence of brain metastasis. Adverse effects, survival, quality of life, quality-adjusted survival, and health care costs were secondary end points.

Results

Patients were randomly assigned: 87 received PCI and 88 underwent observation only. Median follow-up was 48.5 months (95% CI, 39 to 54 months). Six (7.0%) of 86 patients in the PCI group and 24 (27.2%) of 88 patients in the control group had symptomatic brain metastases (P = .001). PCI significantly increased the time to develop symptomatic brain metastases (hazard ratio, 0.23; [95% CI, 0.09 to 0.56]; P = .0012). Median time to develop brain metastases was not reached in either arm. Overall survival was not significantly different between both arms. Grade 1 and 2 memory impairment (26 of 86 versus seven of 88 patients) and cognitive disturbance (16 of 86 versus three of 88 patients) were significantly increased in the PCI arm. Quality of life was only decreased three months post-PCI and was similar to the observation arm thereafter.

Conclusion

PCI significantly decreased the proportion of patients who developed symptomatic brain metastases with an increase of low-grade toxicity.

READ IT BEFORE YOUR PATIENTS

CERVIX AND ENDOMETRIUM

Patient-reported toxicity during pelvic intensity-modulated radiation therapy: NRG Oncology-RTOG 1203

Klopp AH, Yeung AR, Deshmukh S, Gil KM, Wenzel L, Westin SN, Gifford K, Gaffney DK, Small W Jr, Thompson S, Doncals DE, Cantuaria GHC, Yaremko BP, Chang A, Kundapur V, Mohan DS, Haas ML, Kim YB, Ferguson CL, Pugh SL, Kachnic LA, Bruner DW.

J Clin Oncol. Epub ahead of print

Purpose

The NRG Oncology/RTOG 1203 trial was designed to compare patient-reported acute toxicity and health-related quality of life during treatment with standard pelvic radiation or intensity-modulated radiation therapy (IMRT) in women with cervical and endometrial cancer.

Methods

Patients were randomly assigned to standard four-field radiation therapy (RT) or IMRT radiation treatment. The primary end point was change in patient-reported acute gastrointestinal (GI) toxicity from baseline to the end of RT, measured with the bowel domain of the Expanded Prostate Cancer Index Composite (EPIC). Secondary end points included change in patient-reported urinary toxicity, change in GI toxicity measured with the Patient-Reported Outcome Common Terminology Criteria for Adverse Events, and quality of life measured with the Trial Outcome Index.

Results

Between 2012 and 2015, 289 patients were enrolled, of whom 278 were eligible. Between baseline and end of RT, the mean EPIC bowel score declined 23.6 points in the standard RT group and 18.6 points in the IMRT group (P = .048); the mean EPIC urinary score declined 10.4 points in the standard RT group and 5.6 points in the IMRT group (P = .03); and the mean Trial Outcome Index score declined 12.8 points in the standard RT group and 8.8 points in the IMRT group (P = .06). At the end of RT, 51.9% of women who received standard RT and 33.7% who received IMRT reported frequent or almost constant diarrhoea (P = .01), and more patients who received standard RT were taking anti-diarrhoeal medications four or more times daily (20.4% v 7.8%; P = .04).

Conclusion

Pelvic IMRT was associated with significantly less GI and urinary toxicity than standard RT from the patient's perspective.

READ IT BEFORE YOUR PATIENTS

MEDULLOBLASTOMA

Risk-adapted therapy for young children with medulloblastoma (SJYC07): therapeutic and molecular outcomes from a multicentre, phase 2 trial

Robinson GW, Rudneva VA, Buchhalter I, Billups CA, Waszak SM, Smith KS, Bowers DC, Bendel A, Fisher PG, Partap S, Crawford JR, Hassall T, Indelicato DJ, Boop F, Klimo P, Sabin ND, Patay Z, Merchant TE, Stewart CF, Orr BA, Korbel JO, Jones DTW, Sharma T, Lichter P, Kool M, Korshunov A, Pfister SM, Gilbertson RJ, Sanders RP, Onar-Thomas A, Ellison DW, Gajjar A, Northcott PA.

Lancet Oncol. 2018 May 16. pii: S1470-2045(18)30204-3. doi: 10.1016/S1470-2045(18)30204-3. [Epub ahead of print]

Background

Young children with medulloblastoma have a poor overall survival compared with older children, due to use of radiation-sparing therapy in young children. Radiotherapy is omitted or reduced in these young patients to spare them from debilitating long-term side-effects. We aimed to estimate event-free survival and define the molecular characteristics associated with progression-free survival in young patients with medulloblastoma using a risk-stratified treatment strategy designed to defer, reduce, or delay radiation exposure.

Methods

In this multicentre, phase 2 trial, we enrolled children younger than three years old with newly diagnosed medulloblastoma at six centres in the USA and Australia. Children aged three to five years old with newly diagnosed, non-metastatic medulloblastoma without any high-risk features were also eligible. Eligible patients were required to start therapy within 31 days from definitive surgery, had a Lansky performance score of at least 30, and did not receive previous radiotherapy or chemotherapy.

Patients were stratified postoperatively by clinical and histological criteria into low-risk, intermediate-risk, and high-risk treatment groups. All patients received identical induction chemotherapy (methotrexate, vincristine, cisplatin, and cyclophosphamide), with high-risk patients also receiving an additional five doses of vinblastine. Induction was followed by risk-adapted consolidation therapy: low-risk patients received cyclophosphamide (1,500 mg/m2 on day 1), etoposide (100 mg/m2 on days one and two), and carboplatin (area under the curve 5 mg/mL per min on day two) for two four-week cycles; intermediate-risk patients received focal radiation therapy (54 Gy with a clinical target volume of 5 mm over six weeks) to the tumour bed; and high-risk patients received chemotherapy with targeted intravenous topotecan (area under the curve 120-160 ng-h/mL intravenously on days one to five) and cyclophosphamide (600 mg/m2 intravenously on days one to five). After consolidation, all patients received maintenance chemotherapy with cyclophosphamide, topotecan, and erlotinib.

The co-primary endpoints were event-free survival and patterns of methylation profiling associated with progression-free survival. Outcome and safety analyses were per protocol (all patients who received at least one dose of induction chemotherapy); biological analyses included all patients with tissue available for methylation profiling. This trial is registered with ClinicalTrials.gov, number NCT00602667, and was closed to accrual on 19 April 2017.

Findings

Between 27 November 2007 and 19 April 2017, we enrolled 81 patients with histologically confirmed medulloblastoma. Accrual to the low-risk group was suspended after an interim analysis on 2 December 2015, when the one-year event-free survival was estimated to be below the stopping rule boundary.

After a median follow-up of 5.5 years (IQR 2.7-7.3), five-year event-free survival was 31.3% (95% CI 19.3-43.3) for the whole cohort, 55.3% (95% CI 33.3-77.3) in the low-risk cohort (n=23) versus 24.6% (3.6-45.6) in the intermediate-risk cohort (n=32; hazard ratio 2.50, 95% CI 1.19-5.27; p=0.016) and 16.7% (3.4-30.0) in the high-risk cohort (n=26; 3.55, 1.66-7.59; p=0.0011; overall p=0.0021).

Five-year progression-free survival by methylation subgroup was 51.1% (95% CI 34.6-67.6) in the sonic hedgehog (SHH) subgroup (n=42), 8.3% (95% CI 0.0-24.0%) in the group 3 subgroup (n=24), and 13.3% (95% CI 0.0-37.6%) in the group 4 subgroup (n=10). Within the SHH subgroup, two distinct methylation subtypes were identified and named iSHH-I and iSHH-II. Five-year progression-free survival was 27.8% (95% CI 9.0-46.6; n=21) for iSHH-I and 75.4% (55.0-95.8; n=21) for iSHH-II.

The most common adverse events were grade 3-4 febrile neutropenia (48 patients [59%]), neutropenia (21 [26%]), infection with neutropenia (20 [25%]), leucopenia (15 [19%]), vomiting (15 [19%]), and anorexia (13 [16%]). No treatment-related deaths occurred.

Interpretation

The risk-adapted approach did not improve event-free survival in young children with medulloblastoma. However, the methylation subgroup analyses showed that the SHH subgroup had improved progression-free survival compared with the group 3 subgroup. Moreover, within the SHH subgroup, the iSHH-II subtype had improved progression-free survival in the absence of radiation, intraventricular chemotherapy, or high-dose chemotherapy compared with the iSHH-I subtype. These findings support the development of a molecularly driven, risk-adapted, treatment approach in future trials in young children with medulloblastoma.

READ IT BEFORE YOUR PATIENTS

NASOPHARYNGEAL

Analysis of Plasma Epstein-Barr Virus DNA in nasopharyngeal cancer after chemoradiation to identify high-risk patients for adjuvant chemotherapy: a randomised controlled trial

Chan ATC, Hui EP, Ngan RKC, Tung SY, Cheng ACK, Ng WT, Lee VHF, Ma BBY, Cheng HC, Wong FCS, Loong HHF, Tong M, Poon DMC, Ahuja AT, King AD, Wang K, Mo F, Zee BCY, Chan KCA, Lo YMD.

J Clin Oncol. Epub ahead of print

Purpose

The contribution of adjuvant chemotherapy after chemoradiation therapy (CRT) in nasopharyngeal cancer (NPC) remains controversial. Plasma Epstein-Barr virus (EBV) DNA is a potential biomarker of subclinical residual disease in NPC. In this prospective, multi-centre, randomised controlled trial, we used plasma EBV DNA to identify patients with NPC at a higher risk of relapse for adjuvant chemotherapy.

Patients and methods

Eligible patients with histologically confirmed NPC of Union for International Cancer Control stage IIB to IVB, adequate organ function, and no loco-regional disease or distant metastasis were screened by plasma EBV DNA at six to eight weeks after radiotherapy (RT). Patients with undetectable plasma EBV DNA underwent standard surveillance. Patients with detectable plasma EBV DNA were randomly assigned to either adjuvant chemotherapy with cisplatin and gemcitabine for six cycles (arm 1) or observation (arm 2). Patients were stratified for primary treatment (RT v CRT) and stage (II/III v IV). The primary end point was relapse-free survival (RFS).

Results

In total, 789 patients underwent EBV DNA screening. Plasma EBV DNA was undetectable in 573 (72.6%) and detectable in 216 (27.4%); 104 (13.2%) with detectable EBV DNA were randomly assigned to arms 1 (n = 52) and 2 (n = 52). After a median follow-up of 6.6 years, no significant difference was found in five-year RFS rate between arms 1 and 2 (49.3% versus 54.7%; P = .75; hazard ratio for relapse or death, 1.09; 95% CI, 0.63 to 1.89). The level of post-RT plasma EBV DNA correlated significantly with the hazards of loco-regional failure, distant metastasis, and death.

Conclusion

In patients with NPC with detectable post-RT plasma EBV DNA, adjuvant chemotherapy with cisplatin and gemcitabine did not improve RFS. Post-RT plasma EBV DNA level should be incorporated as the selection factor in future clinical trials of adjuvant therapy in NPC.

READ IT BEFORE YOUR PATIENTS

OUTCOME PREDICTION

Machine learning algorithms for outcome prediction in (chemo) radiotherapy: an empirical comparison of classifiers

Deist TM, Dankers FJWM, Valdes G, Wijsman R, Hsu IC, Oberije C, Lustberg T, van Soest J, Hoebers F, Jochems A, El Naqa I, Wee L, Morin O, Raleigh DR, Bots W, Kaanders JH, Belderbos J, Kwint M, Solberg T, Monshouwer R, Bussink J, Dekker A, Lambin P.

Med Phys. 2018 May 15. doi: 10.1002/mp.12967. [Epub ahead of print]

Purpose

Machine learning classification algorithms (classifiers) for prediction of treatment response are becoming more popular in radiotherapy literature. General machine learning literature provides evidence in favour of some classifier families (random forest, support vector machine, gradient boosting) in terms of classification performance. The purpose of this study is to compare such classifiers specifically for (chemo) radiotherapy datasets and to estimate their average discriminative performance for radiation treatment outcome prediction.

Methods

We collected 12 datasets (3,496 patients) from prior studies on post-(chemo)radiotherapy toxicity, survival, or tumour control with clinical, dosimetric, or blood biomarker features from multiple institutions and for different tumour sites, that is, (non-)small-cell lung cancer, head and neck cancer, and meningioma. Six common classification algorithms with built-in feature selection (decision tree, random forest, neural network, support vector machine, elastic net logistic regression, LogitBoost) were applied on each dataset using the popular open-source R package caret. The R code and documentation for the analysis are available online (https://github.com/timodeist/classifier_selection_code). All classifiers were run on each dataset in a 100-repeated nested fivefold cross-validation with hyper-parameter tuning. Performance metrics (AUC, calibration slope and intercept, accuracy, Cohen's kappa, and Brier score) were computed.

We ranked classifiers by AUC to determine which classifier is likely to also perform well in future studies. We simulated the benefit for potential investigators to select a certain classifier for a new dataset based on our study (pre-selection based on other datasets) or estimating the best classifier for a dataset (set-specific selection based on information from the new dataset) compared with uninformed classifier selection (random selection).

Results

Random forest (best in 6/12 datasets) and elastic net logistic regression (best in 4/12 datasets) showed the overall best discrimination, but there was no single best classifier across datasets. Both classifiers had a median AUC rank of 2. Pre-selection and set-specific selection yielded a significant average AUC improvement of 0.02 and 0.02 over random selection with an average AUC rank improvement of 0.42 and 0.66, respectively.

Conclusion

Random forest and elastic net logistic regression yield higher discriminative performance in (chemo)radiotherapy outcome and toxicity prediction than other studied classifiers. ▼

Thus, one of these two classifiers should be the first choice for investigators when building classification models or to benchmark one's own modelling results against. Our results also show that an informed pre-selection of classifiers based on existing datasets can improve discrimination over random selection.

CLINICAL

CLINICAL

Reflections on my years as chair of the clinical committee

Read the report on the Early Breast Cancer Trialists' Collaboration Group (EBCTCG), in the Young Corner on page 93

DANIEL ZIPS

After six years chairing the ESTRO clinical committee, Professor Daniel Zips has stepped down, passing on his responsibilities to Professor Karin Haustermans from Leuven, Belgium. In this piece, Prof Zips looks back on his experience and the achievements of the committee.

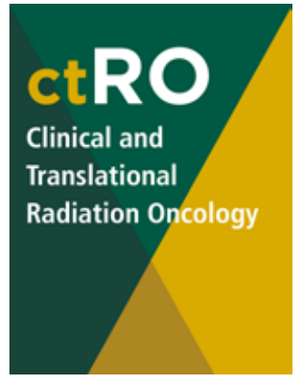
It has been a great honour to be chair of the clinical committee for the past six years, the full term for this position. In that time I can honestly say that ESTRO has come a long way.

When I started, one of the first things we had to do was to understand the remit of the committee: what we were expected to do, which topics we should prioritise, which projects we should initiate and which others we should follow up.

We focused on three priorities. The first was involving patients in our work; the second was consolidating our strong links with research; and the third, which came much later, was establishing the new journal *Clinical and Translational Radiation Oncology (ctRO).*

Our daily work revolved around representing ESTRO members, appointing experts, cooperation with other committees – especially the young ESTRO committee, involvement in the organisation of the scientific programme of the annual conference, producing basic guidelines and so on.

Among our top achievements, we were able to embed patients in ESTRO's complex structure so that they would be able to advocate for radiotherapy with politicians and health authorities. Another success was our endeavours in linking clinical radiation oncology with research, including organising a workshop with the radiobiology committee to understand what the unmet needs were and how to move forward.



Prof Zips is co-editor in chief of *ctRO*

Finally, our involvement in establishing the *ctRO* journal was an incredible accomplishment. Recently, our journal has been published on PubMed: a landmark for its visibility and credibility.

Among the challenges, I think the main one would be the overall commitment to the committee and ESTRO alongside our regular jobs. As a member of the committee, you have many meetings, people to share responsibility with, and you need to be organised and structured at all times, maintaining regular and close contact with other members, and incorporating different views and perspectives.

To conclude, I would like to thank Vincenzo Valentini, Eralda Azizaj, Donal Hollywood and all the colleagues who supported me on this journey.

Now that I am the past-chair, I will focus mainly on the development of ctRO and supporting the new chair, Prof Karin Haustermans.

Daniel Zips
Past-chair of the ESTRO clinical committee

BRACHYTHERAPY

INTRODUCTION

REFLECTIONS ON MY YEARS AS CHAIR OF GEC-ESTRO BRACHYTHERAPY COMMITTEE

EDITORS' PICKS

CELEBRATING 25 YEARS OF PAPILLON IN THE UK

BRACHYTHERAPY

"The position of chair of the Groupe Européen de Curiethérapie (GEC)-ESTRO committee is a vital one for the brachytherapy community"

Welcome to the Brachytherapy Corner.

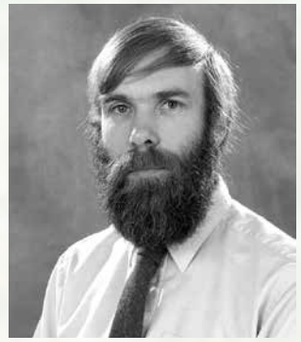
The position of chair of the Groupe Européen de Curiethérapie (GEC)-ESTRO committee is a vital one for the brachytherapy community. In this Corner, our past-chair, Christian Kirisits, offers his reflections on his term of office and gives some insight into the multifaceted nature of the role. We are indebted to Christian for all his work and wish his successor, Bradley Pieters, similar success in maintaining the high profile of brachytherapy within the ESTRO community.

This edition's Editors' Picks includes something for both physicists and clinicians. The first article on Monte Carlo dosimetry for permanent seed brachytherapy in prostate cancer describes important new insights beyond conventional TG43 dose calculations, which may impact on local control using this modality. The second article describes the importance of tumour regression after initial chemoradiation for locally advanced cervical cancer, which is both prognostic and also predicts for dose response to subsequent brachytherapy.

Finally, on the occasion of their 25th anniversary, we celebrate the work of the Papillon group in the UK, with an article from Arthur Sun Myint, the group's lead clinician, who describes their work.

We hope you find this edition of the Brachytherapy Corner interesting and useful.

Peter Hoskin, Bradley Pieters and Åsa Tedgren



PETER HOSKIN

BRADLEY PIETERS

ÅSA CARLSSON TEDGREN

BRACHYTHERAPY

Reflections on my years as chair of GEC-ESTRO brachytherapy committee

CHRISTIAN KIRISITS

After two years chairing the Groupe Européen de Curiethérapie (GEC)-ESTRO brachytherapy committee, Christian Kirisits has stepped down, passing on the reins to Bradley Pieters from Amsterdam, The Netherlands. In this piece, Christian reflects on his experience and the committee's achievements.

I started chairing the GEC-ESTRO committee in 2016 and was chair-elect for two years before that. I believe that the GEC-ESTRO committee should be seen as a role model for other committees as it combines both research within its various working groups and practical results at its workshops.

The GEC-ESTRO committee has three unique features: first, we collaborate closely with the ESTRO School; second, we drive the development of recommendations within ESTRO, the Advisory Committee on Radiation Oncology Practice (ACROP), other international societies and the *Handbook of Brachytherapy*; and third, we publish research results in scientific publications.

At the beginning of my chairmanship I set out to change two important discrepancies. There was a geographical and an age imbalance within the GEC-ESTRO committee. Most of the members came from north-western Europe, with very few from eastern and southern Europe. For these reasons, we held the fifth workshop in Poznań, Poland, and the sixth in Rome, Italy. Throughout my two years as chair, I advocated to have more bright young people involved in the committee.

Concerning the challenges faced, I have to admit our failure in consolidating our links with eastern Europe, despite holding the GEC-ESTRO workshop in Poznan, as well as other initiatives. This lack of success may have been down to budget, infrastructure or language factors. Nevertheless, I very much hope the next chair will focus on investing in creating a stronger link with members in eastern Europe.

Another challenge was involving more young people in the GEC-ESTRO committee. However, thanks to our enduring cooperation with the ESTRO young committee, we are changing this trend and have more young members involved.

Last but not least, chairing a committee and being involved in several scientific planning committees for meetings requires a lot of time and effort. The introduction of the GEC-ESTRO workshop and our contribution to other workshops has been a success. However, I would prefer to have bigger meetings on a bi-annual basis, rather than annually, with a focus on quality rather than quantity.

To conclude, I will do my best to support the next chair and chair-elect in my new position as past-chair and wish them the very best.

Christian Kirisits
Past-chair of the GEC-ESTRO brachytherapy committee

Large-scale retrospective Monte Carlo dosimetric study for permanent implant prostate brachytherapy ▶▶

Miksys N, Vigneault E, Martin A-G, Beaulieu L and Thomson RM

Tumour shrinkage during chemoradiation in locally advanced cervical cancer patients: prognostic significance and impact for image-guided adaptive brachytherapy ▶▶

Schernberg A, Bockel S, Annede P, Fumagalli I, Escande A, Mignot F, Kissel M, Morice P, Bentivegna E, Gouy S, Deutsch E, Haie-Meder C, Chargari C

Large-scale retrospective Monte Carlo dosimetric study for permanent implant prostate brachytherapy

Miksys N, Vigneault E, Martin A-G, Beaulieu L and Thomson RM

Int. J. Rad. Onc. Biol. Phys. 97: 606-615, 2018

ROWAN M THOMSON

NELSON MIKSYS

What was your motivation for initiating this study?

Permanent implant prostate brachytherapy (PIPB) continues to play an important role in the treatment of prostate cancer. Dose evaluations typically follow the water-based TG-43 formalism, but there is growing interest in adopting advanced (TG-186) model-based dose evaluations that include non-water tissues and brachytherapy seeds. The motivation for this study was to better understand PIPB dose distributions by comparing traditional TG-43 and state-of-the-art Monte Carlo (TG-186) dose evaluations.

What were the main challenges during the study?

The development of realistic virtual patient models for use in Monte Carlo (MC) simulations presented challenges. We considered CT images and treatment data for more than 2,000 patients for the study, but ultimately, 613 patients were included based on our stringent requirements for contours and plan data (for developing accurate virtual patient models). Post-implant CT images were compromised by streaking artefacts due to the metal brachytherapy seeds present during the scan. This necessitated pre-processing the images with a metallic artefact reduction algorithm to avoid the misassignment of tissues in the virtual patient models, which would lead to inaccurate dose calculations. There were also uncertainties in tissue elemental compositions that we addressed by performing a sensitivity analysis.

What is the most important finding of your study?

Over the patient cohort, D90 was consistently lower for MC compared with TG-43, by 6% (on average); patients with intraprostatic calcifications (11% of cohort) were found to have substantial under-dosed volumes in the target due to calcification shielding, lowering D90 by up to 25%. These clinically important cold spots were identified with full-tissue MC dose calculations, but not with the water-based TG-43 approach.

What are the implications of this research?

With considerable variation in relative TG-43 and MC doses between patients, and larger dose differences for patients with calcifications, ▼

clinical adoption of advanced MC dose calculations for prostate brachytherapy should be pursued to improve treatment planning and evaluation. Patients with large intraprostatic calcifications should be considered carefully when using TG-43 for treatment planning to avoid under-dosing the target. Future research should consider correlations of treatment outcomes with accurate MC dose evaluations.

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Tumour shrinkage during chemoradiation in locally advanced cervical cancer patients: prognostic significance and impact for image-guided adaptive brachytherapy

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Int J Radiat Oncol Biol Phys. 2018 Jun 16. pii: S0360-3016(18)30967-2. doi: 10.1016/j.ijrobp.2018.06.014. [Epub ahead of print]

ANTOINE SCHERNBERG

CYRUS CHARGARI

What was your motivation for initiating this study?

Increasing evidence suggests that dose escalation is beneficial in locally advanced cervical cancer (LACC), and retrospective data have shown that the largest benefit of image-guided adaptive brachytherapy (IGABT) was achieved for patients with tumours >5cm at diagnosis [1]. It is, however, still necessary to identify early biomarkers to guide brachytherapy treatment planning objectives, and it remains unknown whether all patients will get the same benefit from dose escalation [2]. Tumour shrinkage during chemoradiation logically reflects tumour radiosensitivity, but it has never been examined as a potential biomarker to guide dose (de) escalation indications.

What were the main challenges during the study?

The main difficulty was defining the response and residual volume after chemoradiotherapy. This requires some knowledge of the tumour's evolution on pelvic MRI imaging. Several approaches were considered including the delineation of the initial and residual tumours to measure their volume, and measurement of a single dimension (for example, initial width, and then at the time of brachytherapy). Ultimately, the method that appeared to us to be the most reproducible was a measurement of three perpendicular dimensions of the height, width and tumour thickness, to define the volume according to the appropriate formula.

What is the most important finding of your study?

This study described how tumour shrinkage after chemoradiotherapy was associated with LACC patients' outcome and local control. Furthermore, in this study, we identified an association between this early tumour response, measured at the time of brachytherapy, and the benefit of a dose escalation. In patients with a good response (> 90% response), no dose/effect relationship could be identified for local control. On the contrary, in patients poorly responding to chemoradiotherapy, there was a strong dose effect and increasing the D90 CTVHR appeared to drastically increase local control. ▼

What are the implications of this research?

These results may warrant prospective dose de-escalation studies to investigate if there is a decrease in acute and late toxicities in good responding patients, defined as patients with tumour shrinkage ≥ 90%, without compromising local control. Conversely, although these results are only descriptive, the benefit of dose escalation for poor responding patients could be reinforced.

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Check out the GEC-ESTRO Breast APBI trial publication, in the Read it Before Your Patients Corner on page 10

Celebrating 25 years of Papillon in the UK

Receiving the cancer care team of the year award at the BMJ Awards 2018

ARTHUR SUN MYINT

This year we are celebrating 25 years of Papillon in the UK. In 1992, a team from Clatterbridge Cancer Centre, led by me, visited Lyon, France, to study the technique of contact X-ray brachytherapy (Papillon) for rectal cancer. The first Papillon facility in the UK was set up at Clatterbridge in 1993. We have now treated over 1,500 patients, which is the world's largest cohort of patients treated by CXB (Papillon) in a single institution. Initially, most referrals were elderly patients not suitable for surgery or referrals for palliation in patients with local recurrence not suitable for surgery. We gained much needed experience over the years from treating these cohorts with CXB.

More recently, we have received referrals for much younger patients not keen on surgery, ▼

as they are stoma phobic. Most of these patients have residual tumour following external beam conformal radiation therapy (EBCRT) and have been offered completion surgery. However, after refusing completion surgery, they have been referred to be considered for CXB boost to avoid surgery, if possible. No guidelines exist on how best to treat this type of patient and usually they are not included in current protocols. There are no right or wrong answers in managing these cases as they are quite complex. Paternalist views on how best to treat these patients echoed in most colorectal multidrug-resistant (MDR) recommendations are now frowned upon. The rights of patients to choose their treatment is encouraged and hailed as 'shared decision-making'.

I was invited to present our data at the ESTRO 35 meeting in Turin, Italy, as an oral presentation in the 'highlights of proffered papers' (OC 283) [1]. We have now published this data [2, 3]. The important message from our data is that if CXB boost is offered to patients with small residual tumour that are not suitable for surgery or the patient is refusing surgery, 68% can achieve clinical complete response (cCR), which is higher than can be achieved with EBCRT alone. Although 11.7% did develop local regrowth after achieving cCR, this is much lower than the reported 25-38% of regrowth which occurs after cCR following EBCRT alone [4, 5]. Successful salvage surgery can be offered to 77% of these patients. Surprisingly, only 8.5% developed distant metastases. Our data showed that when CXB was used alone for small rectal cancer or as a boost in combination with EBRT/EBCRT for more advanced rectal tumours, CXB could reduce local regrowth rates. Therefore, CXB can be considered a viable treatment option to reduce local regrowth in patients with rectal cancer who are not suitable for salvage surgery or who are fit but refuse surgery as they are stoma averse. There have been further publications from other International COntact radiotherapy NEtwork (ICONE) members to support our data [6, 7]. We have also evaluated the cost effectiveness of CXB compared to surgery and EBCRT alone and published our data [8].

After 25 years of sweat, blood and tears trying to establish CXB as a treatment for rectal cancer, we are pleased to report the national recognition of our Papillon team in the UK. Our Papillon team won the prestigious BMJ 'Cancer team of the year' award at a high-profile ceremony held at the Park Plaza Westminster Bridge Hotel in London on 10 May 2018 [9]. The National Institute for Health and Care Excellence (NICE) has also reviewed the safety and efficacy of CXB and recommended this for patients not suitable for surgery in their Interventional Procedure Guideline (IPG 532) published in September 2015 [10].

Although CXB as a treatment for rectal cancer has been around for over 80 years, it is still not regarded as the standard of care. Most clinicians feel that there is no randomised trial evidence to support its use. This is not true as there has been a French randomised trial Lyon 96-02 published, which randomised between EBRT and EBRT followed by CXB boost. The main end point was sphincter preservation and the trial showed significant sphincter preservation (24 % vs 78%) in favour of CXB boost [11]. Moreover, ten-year mature data published confirmed the initial results with a longer follow up [12]. The main criticism was that this trial used only radiation and not chemoradiation, which we would use today. Also, most patients were not staged with MRI, which is now the standard of care.

ICONE, under the auspices of the Groupe Européen de Curiethérapie GEC-ESTRO Anorectal group, has initiated a new multi-centre European phase 3 trial, OPERA (Organ Preservation in Early Rectal Adenocarcinoma). This trial is part-funded by the National French Public Hospital Clinical Research Programme (PHRC) and is sponsored by the Centre Antione-Lacassagne in Nice, France [13]. This trial (NCT02505750) is recruiting well and has randomised nearly 70 patients in the past two years. This should provide the much-needed randomised trial evidence to establish CXB as the standard of care not only for patients unsuitable for surgery, but also for those who are fit, but refusing it to avoid a stoma. ▼

Clatterbridge Cancer Center

One of the major drawbacks with CXB treatment was the lack of available machines to treat when Phillips (Eindhoven and Amsterdam, The Netherlands) discontinued the production of their low energy X-ray machine in the mid-1970s. Ariane Medical Systems (Alfreton, UK) started producing a dedicated machine for contact radiotherapy and Clatterbridge was the first centre to use their prototype machine for rectal contact X-ray brachytherapy in 2009 [14]. This year, Ariane won the Medilink East Midlands (UK) innovation award for their efforts.

As the population is ageing in Europe [15] and with the initiation of bowel cancer screening programmes in many European countries, early rectal cancers are being diagnosed in older patients. We need alternative treatment options to treat these early tumours as opposed to extirpative surgery that was designed in the past for more advanced rectal cancers. We need to change our mind-set to favour non-surgical treatment options to minimise surgical harm, which is far greater in older patients. There are now four oncology centres offering CXB (Papillon) facilities in the UK: Clatterbridge (started in 1993), Hull (2011), Guildford (2014), Nottingham (2014). There are ten oncology centres offering CXB (Papillon) in Europe and more centres are preparing to set up CXB facilities so that personalised non-surgical treatments can be offered to older patients not suitable for surgery because of their age or medical comorbidities.

A watch-and-wait approach was initially reported by Habr Gama's group from São Paulo, Brazil [3]. There is increasing interest in this approach from both clinicians and patients as this avoids extirpative surgery and a stoma, which most patients do not like [16]. External beam chemo radiotherapy can achieve cCR in approximately 20-50% of patients. However, many patients will still have residual tumour. CXB can be regarded as an extension of the 'watch and wait' approach in those patients who achieve a near complete response as more patients are likely to achieve cCR after CXB boost. This also reduces the chance of a local regrowth [2,3]. This is important in patients who are not suitable for surgery or younger patients who are vehemently opposed to surgery as they are not keen to have a stoma. Treatment options for rectal cancer are getting more complex and we cannot force patients to have treatments they are not prepared to accept. Patients have the right to refuse treatment and we must respect their wishes [17]. All clinicians involved in the management of rectal cancer should be aware of the treatment options that ▼

are currently available, whether they practise it or not. Patients must have all the treatment options explained to them so that patients and carers can make an informed consent for their choice of treatment [18].

A full technique and description of CXB is available in the revised GEC-ESTRO brachytherapy handbook (2nd Edition) [19] and also in our book chapter on 'Modern management of cancer of the rectum' for those who wish to learn more about this [20]. If you are involved with rectal cancer management, your patients will benefit from this knowledge. Clatterbridge Cancer Centre organises Papillon courses annually and this year courses will be on 9-10 October 2018. There will also be a GEC-ESTRO Anorectal group meeting in Brussels on 22 November this year. Please contact me for more information if you are interested in attending or joining our GEC-ESTRO Anorectal group. All those interested are most welcome to join and I would like to encourage you to contribute to our group activities.

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PHYSICS

INTRODUCTION

RADIOMICS AND PREDICTIVE MODELS

BOOK INTERVIEW

EDITORS' PICK

PHYSICS

"Medical physicists can play an important role in tackling the challenges involved in the practical use of radiomics-based prediction models"

Welcome to the Physics Corner.

We hope that you enjoyed your well-deserved summer holidays.

This edition starts with an interesting contribution from Claudio Fiorino about the promises and perils of radiomics. He argues that "the road is still long" before radiomics will be able to "to fully drive diagnosis, prognosis and treatment". The good news is that medical physicists can play an important role in tackling the challenges involved in the practical use of radiomics-based prediction models.

This edition also contains an interview with the authors of the new book *Fundamentals of ionizing radiation dosimetry*, an update of the classic textbook *Introduction to radiological physics and radiation dosimetry* by F.H. Attix, first published in 1986. The authors give an overview of their book and explain what motivated them to write it.

This edition's Editors' Picks section features a study using phase-contrast computed tomography. The authors optimised this technique to detect effects of microbeam radiation therapy in brain tissues and small animal models.

As always, we welcome any feedback on the Physics Corner. We also invite you to send in your suggestions for PhD profiles, back-to-school topics, and other subjects for our forthcoming Corners.

Finally, do not to forget to check out the ESTRO website for information about the 2nd ESTRO Physics Workshop: Science in Development, which is being held at the end of October in Malaga, Spain. We hope to see you there.

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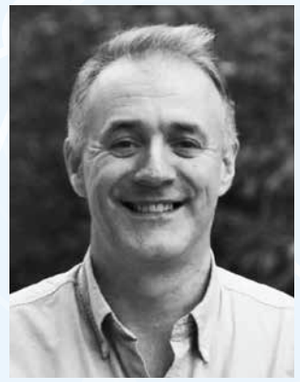
BRENDAN MCLEAN


CHRISTIAN RICHTER

PHYSICS

Radiomics and predictive models: the medical physics challenges

CLAUDIO FIORINO

The term radiomics emerged a few years ago [1] in analogy with other "omics" and describes the intriguing concept that tumour phenotypes may be described by features extracted from medical images in a multi-dimensional domain, including morphology, intensity distribution and textural features of different order. Apart from the quite appealing name, radiomics falls firmly within the wide field of quantitative imaging and is not as new as we sometimes believe, with the first pioneers in this area working in the 1960s and the first systematic applications appearing in the 1980s [2].

However, more recent technological developments made the dreams of the pioneers of this field more attainable. These technologies include the rapid development of computer-aided diagnosis tools; machine learning and artificial intelligence approaches to data and images applied to medicine; and the increasingly easy process of storing and sharing images on appropriate technological platforms .

The enthusiasm around radiomics and its potential, for instance in predicting the outcome of a certain therapy, has been particularly strong in radiation oncology [3,4], extending also to the characterisation and prediction of normal tissue effects [5,6]. This is not by chance. Compared to other branches of medicine and oncology, radiation oncology is more reactive to technological innovations and advances in fields such as computing, imaging and data science. In fact, the growing success of radiation oncology owes much to these recent technical advances. In this context, the contribution of medical physicists represents a crucial and pivotal added value to the field, both in boosting efforts and energies in research and, very importantly, in translating this rapidly evolving field into clinically orientated activities and applications.

After the early promising results, there was a general feeling that things were quite easy and that radiomics would be able to fully drive diagnosis, prognosis and treatment in the next few years thanks to the perfect image-based characterisation of each individual patient. This distorted perception, not new in medical sciences, led to many researchers dedicating their energies to the field, and at the same time, raised the naïve expectations of radiation oncologists. After this first period, we are now in a quite different situation; it is much clearer that the road is still long and that we need to work hard to make radiomics a useful tool in the hands of radiation oncologists [7,8]. In particular, we are increasingly realising that researchers need to be more cautious about the generalisability of their results, especially in relation to physics-related and technical issues [9,10].

In particular, the different ways in which images (e.g. CT, MRI, PET and US) are acquired and processed has a significant influence on how informative they are, as well as on the value of any considered feature. Segmentation and ▼

delineation are also crucial, as the robustness of features set against this potentially large source of uncertainty has been poorly investigated [11,12]. The necessity to move towards standardised image acquisition and processing methods [10] is another important issue. The timing of this development will determine the timing of translation of radiomics applications into clinical applications.

In relation to all the above challenges, medical physicists can make an important contribution: they are based in the hospitals, they know the physics, they use the technology, they work every day with radiation oncologists and with all the specialists involved in imaging sciences, and they often work with imaging-orientated physicists in their departments and/or with a university. As such, we can expect that medical physicists working in radiation oncology will be increasingly asked to deal with radiomics in the short and longer term, in a variety of ways.

This is not the appropriate place to describe the huge potentials (and pitfalls) of advanced machine learning approaches combining image features with other dosimetry / clinical predictors to improve diagnosis, prognosis and the performance of predictive tools [7,8,10]. However, even in this context, medical physicists are being asked to contribute and, in particular, to use their understanding of the value of 'radiomics-based' models to generate more robust and generalisable models.

Among the many issues in this area, I wish to underline two:

1. Often we do not need complex models to robustly predict the outcome of radiotherapy: in general, "simple is better" and more complex models (which are often unable to find causality between predictors and outcome) should be preferred only if they significantly improve our ability to predict [13]. In other words, we should not confound aims and tools; the aim is to develop high performing predictive models that can be robustly applied after, possibly multiple, independent validations. We don't need to develop models based on complex combinations of tens of image-based features whose meaning is obscure with little or no possibility of any validation, and which have a high risk of overfit and of being of little clinical utility.
2. The move toward phenomenological modelling, including image-based features, should not discourage researchers (particularly radiation biologists) from making efforts to investigate the biological meaning of selected features and of their modifications in tumours and normal tissues during and after therapy. The understanding of mechanisms relating to imaging biomarkers and radiation delivery should remain one of the most prominent fields of investigations in the coming years. This could encourage a focus on specific features in the different domains of applications, instead of fishing in the open sea of the large number (often hundreds or thousands) of textural and intensity-based features.

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PHYSICS

BOOK INTERVIEW

Fundamentals of Ionizing Radiation Dosimetry

Interview with the authors: Professor Pedro Andreo, Dr David T. Burns, Professor Alan E. Nahum, and Professor Jan Seuntjens

By Andreo P, Burns D, Nahum A, Seuntjens J, Attix F

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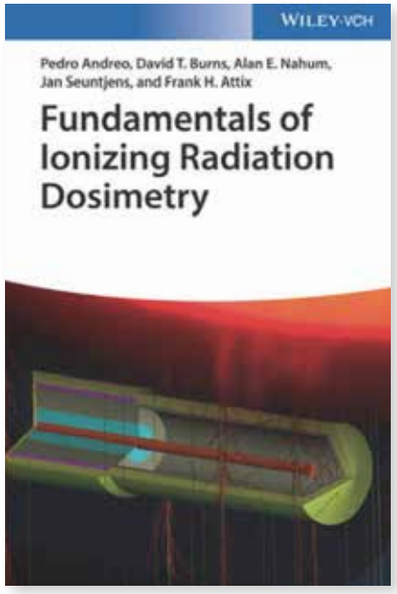
www.wiley.com/en-gb/Fundamentals+of+Ionizing+Radiation+Dosimetry-p-9783527808243Fundamentals+of+Ionizing+Radiation+Dosimetry-p-9783527808243



Prof Pedro Andreo, Dr David T Burns, Prof Alan E Nahum and Prof Jan Seuntjens are leading scientists in radiation dosimetry, having published between them more than 600 papers in the field. They have co-authored most of the existing national and international recommendations for radiotherapy dosimetry and received a number of international awards for their contributions. Information about their publications and research activities can be found at: www.researchgate.net

Can you provide an outline of the book?

This is a comprehensive update of the classic textbook by F.H. Attix: *Introduction to Radiological Physics and Radiation Dosimetry* (1986). It covers the substantial developments in dosimetry since the early 1980s. Charged and uncharged particle interactions are covered at quite an advanced level consistent with the chapter on Monte Carlo simulation. Chapters on radiation quantities, macroscopic behaviour of and characterisation of radiation fields and beams follow. The theoretical aspects of dosimeter response are covered in cavity theory, followed by detailed descriptions of primary measurement standards, ionisation chambers, chemical dosimeters and solid-state detectors. There are chapters on reference dosimetry for standard and for small fields in radiotherapy, on diagnostic radiology, on the dosimetry of unsealed and sealed radionuclide sources, and on neutron-beam dosimetry. In addition, there are addenda offering new insights into established dosimetric principles and concepts. We have tried to present the topics in a logical sequence accompanied by numerous illustrative diagrams, tables and appendices. We have also followed Attix's excellent example by including exercises at the end of each chapter; detailed solutions to these are given in a companion book.

What was your motivation to write this book?

Our primary motivation to write this book was that each of us had been involved in important developments in radiation dosimetry throughout our careers. We wanted to tell the story of the last 30 years, building on the excellent foundations of Frank Attix's 1986 text. ▼

The authors, from left to right: Jan Seuntjens, Pedro Andreo, David Burns and Alan Nahum

What were the main challenges?

There were many challenges, including deciding which new developments to include (e.g. Monte-Carlo simulation, small-field dosimetry) and in how much detail and depth, what sections of Attix (1986) to simply 'paste in' and what parts to revise substantially. But perhaps the greatest challenge was to maintain our focus on the project over its several years' duration, and in particular, to find the time to work on our contributions given our respective day jobs, including research, teaching, clinical and management duties.

What makes the book different from other medical physics books?

Our book takes a more in-depth approach to radiation dosimetry than is generally found in textbooks covering the applications of ionising radiation, especially those labelled 'medical physics' and/or 'radiotherapy physics'. In particular, a deeper connection is made between basic radiation physics and radiation dosimetry.

Was there a direct or indirect contribution of ESTRO activities to the book?

ESTRO activities have contributed to our work through the creation of a favourable climate for research into many aspects of the use of ionising radiation in medicine, and in radiotherapy and imaging in particular.

Based on your experience, what would you recommend to others when editing such a book?

We began with an analysis of the strengths and weaknesses of Attix (1986) in order to identify both what could be improved and what new topics should be added in the light of the developments of the previous three decades. This approach worked well and can be recommended.

Who should read the book and why?

Besides being a manual for scientists employed in the clinical applications of ionising radiation, the book is a work of reference for researchers and for teachers of postgraduate courses involving the applications of ionising radiation.

Prof Pedro Andreo (Karolinska, Stockholm, SE)
Dr David T. Burns (BIPM, Paris, FR)
Prof Alan E. Nahum (University of Liverpool, Liverpool, UK)
Prof Jan Seuntjens (McGill University, Montreal, CA)

EDITORS' PICK

Micro-imaging of brain cancer radiation therapy using phase-contrast computed tomography

Barbone GE, Bravin A, Romanelli P, Mittone A, Bucci D, Gaaβ T, Le Duc G, Auweter S, Reiser MF, Kraiger MJ, Hrabě de Angelis M, Battaglia G, Coan P.

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GIACOMO E BARBONE

PAOLA COAN

What was your motivation for initiating this study?

Novel brain radiosurgery approaches based on spatial fractionation of dose delivery are being investigated worldwide because of their tissue-sparing capabilities and their reported treatment efficacy. One such experimental technique, microbeam radiation therapy (MRT), administers X-rays spatially reshaped into highly collimated micrometre-thick arrays of high dose (>100 Gy) beams (so-called 'microbeams'). To better understand the bio-mechanisms of this protocol, current biomedical research is studying the effects of MRT irradiations on nervous tissue, tumour tissue and brain vasculature. In order to overcome some of the current limitations in neuroimaging, we thought of applying X-ray phase contrast micro-computed tomography (PCI-μCT), which is a high-resolution and soft-tissue sensitive experimental imaging technique. The aim was to non-invasively detect the effect of MRT treatment in the normal and tumoural brain tissues as well as in the vasculature at the micrometre level in a small animal model.

What were the main challenges in this work?

The experimental setup for PCI-μCT had to be optimised for full-organ *ex vivo* rodent brain micro-imaging. Moreover, the visualisation and analysis of high-resolution CT imaging required apposite computing power and the automation of data reconstruction and segmentation.

Last, a careful and precise interpretation and validation of the results, which are very rich in terms of information thanks to the high sensitivity of the imaging technique we applied, warranted extensive histological comparative analysis.

What is the most important finding of your study?

Ex vivo PCI-CT can detect the effects of MRT treatment protocols throughout targeted brain samples. MRT marks normal brain tissues with 50μm-thick tissue ablations, creating a characteristic comb-like pattern, which is rendered by PCI as arrays of hypo-intense parallel lines. Moreover, PCI visualises cancerous tissue morphology, cancer spread, pathologic vasculature and intra-tumour accumulation of calcium and iron deposits, and differentiates them from healthy brain anatomy (including cerebellar, cortical, thalamic and hypothalamic structure) and micro-vasculature. Glioblastoma tissues are visible in images as regions of higher phase-contrast relative to normal nervous tissues. Last, full-organ vessel-network trees, including deep hyper-dense micro-vascularisation, can be extracted and rendered in 3D. Importantly, PCI image contrast of both tumour and vasculature matches histology and immune-histology follow-up work.

What are the implications of this research?

This study shows how PCI could be employed to precede and guide histological analysis of rodent ▼

brain samples. PCI does not require extensive sample preparation and its visualisation of normal and tumour tissues, micrometric angio-structure, and the effects of high-dose ionising radiation in a 'one-shot' 3D image enables *post mortem* full-organ morphological analyses, which would otherwise prove extremely laborious if even possible with standard histological techniques. PCI's sensitivity to brain tissue abnormality allows for volumetric quantification of tissue modifications and the verification of cancer tissue survival following MRT, so that the technique could potentially be used for studies of brain tumour tissue radio-resistance or to assess drug efficacy. Further, the precise detection of micro-beam paths could help verify the correct spatial delivery of brain tumour treatment protocols in quantitative animal model studies of fractionated radiotherapy.

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Have you just completed or are you about to complete an interesting PhD thesis?

Then please share it with the ESTRO physics community by contacting Christian at christian.richter@oncoray.de

Imaging for Physicists

23-27 September 2018 | Vienna, Austria

The role of MR, PET and advanced CT imaging in radiotherapy is increasing. The course provides the knowledge necessary to introduce and maintain these facilities in a radiotherapy department and awareness of possibilities and limitations.

TARGET GROUP

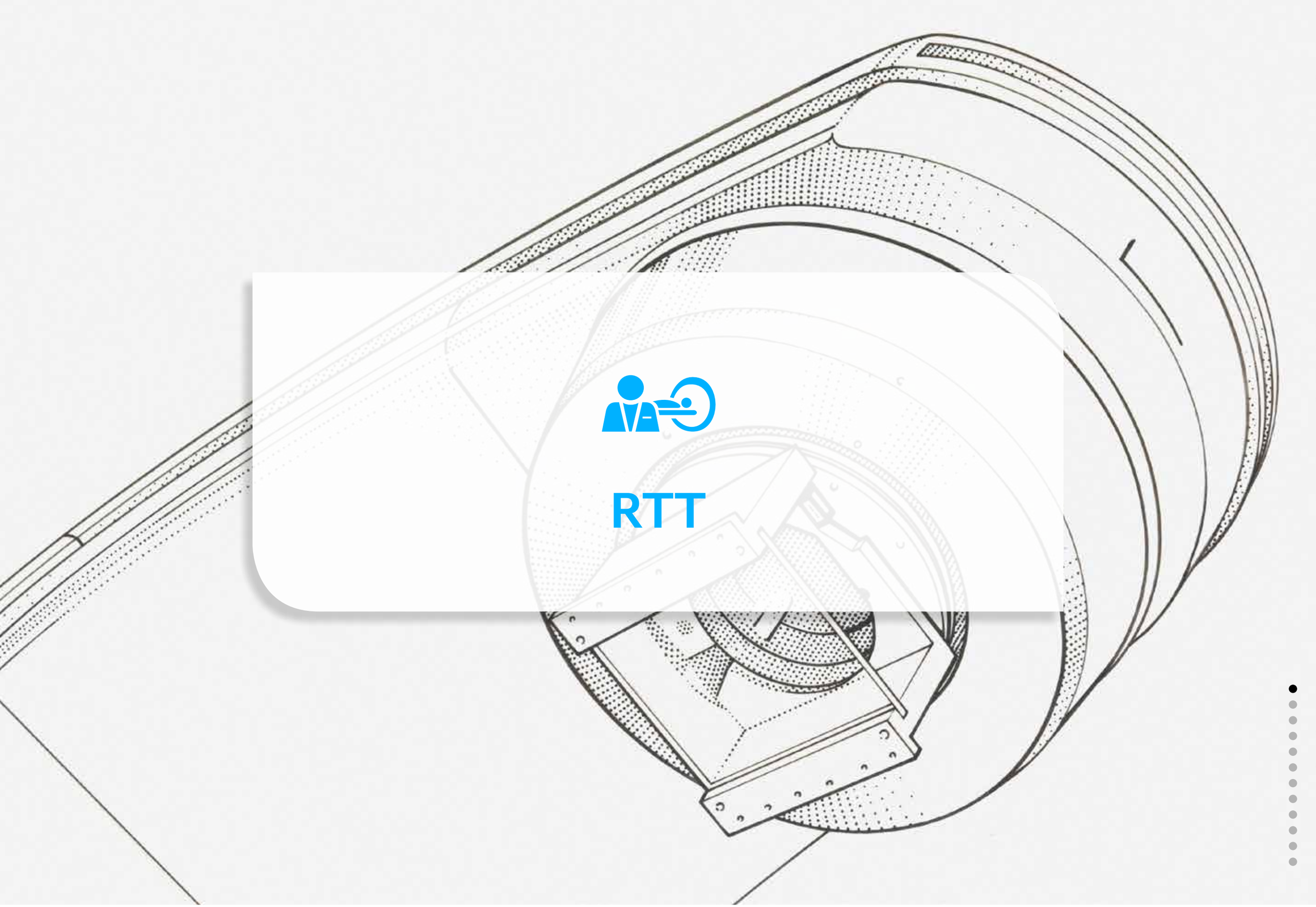
The course is aimed at trainees in radiotherapy physics, researchers and also more experienced radiotherapy physicists with an interest in the application of advanced imaging techniques in their radiotherapy practice.

COURSE AIM

The course aims to:

- Improve the understanding of the physics principles of MRI, PET and CT
- Explore potential applications of these imaging modalities in clinical practice.

www.estro.org/school



RTT

RTT

"We would like to continue bringing you interesting articles that demonstrate the diversity of RTT roles"

Welcome to the RTT Corner. Following the last newsletter's report on ESTRO 37, we would like to continue bringing you interesting articles that demonstrate the diversity of RTT roles. To that end, for this Corner, our international colleagues have prepared articles that consider the educational development and research activities of RTTs across different settings. The importance of education is highlighted by all the authors, each of whom works as an integral member of the specialist multidisciplinary team.

First we hear from Simon Goldsworthy, who has an MSc in therapeutic radiography and works at the Beacon radiotherapy department, Musgrove Park Hospital, Taunton, UK. Simon has 13 years' clinical experience in radiotherapy and four years' experience in clinical research, and is currently undertaking a PhD. His research is centred on improving positioning, immobilisation and patient comfort, with an aim to improve the stability and accuracy of radiotherapy.

We have also invited Vickie Kong, a clinical specialist radiation therapist (CSRT) from Princess Margaret Cancer Centre, Toronto, Canada, to discuss her advanced role. After graduating from her radiation therapy undergraduate degree, she specialised in implementing an effective care plan for patients receiving radiation therapy to the pelvic region, before going on to complete an MSc programme in radiotherapy planning at Sheffield Hallam University, UK. Vickie discusses her advanced role, which includes the assessment of dose accumulation, the adaptive radiotherapy process and her participation in research projects.

Ludwig Van Den Berghe, who was recently elected a member of the RTT committee in the RTT Alliance elections, brings us information about a service improvement initiative for clinical staff in the department of radiotherapy at UZ Ghent, Belgium. With the help of two visiting RTT experts, Annette Bojen and Mary Coffey, a three-day programme was developed to improve skills and procedures in clinical practice.

Finally, we close this edition with a short explanation about the importance of the ESTRO RTT Alliance for Serbian RTTs.

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

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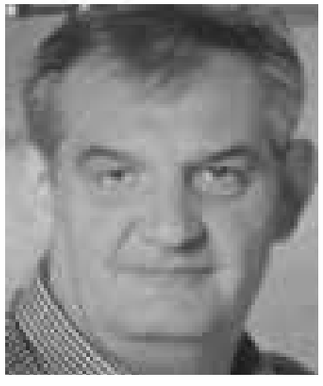

ILIJA ČURIĆ

RTT

Developing an advanced RTT clinical research role

SIMON GOLDSWORTHY

The early career of an independent RTT clinical researcher

As the principal research radiographer at the Beacon radiotherapy (RT) department, Musgrove Park Hospital, Taunton, in the South-West of England, UK, I provide expertise in radiotherapy research and development from a radiation therapist (RTT) perspective. Beacon RT serves a population of 500,000 and treats 1,500 radiotherapy patients per year. The service has one Toshiba CT simulator and three Elekta Linear accelerators for clinical planning and treating patients. We have a team of eight oncologists, 29 RTTs, six dosimetrists and eight physicists. Beacon RT is not a large service, but has a growing reputation for research, development and innovative practice.

The evolution of the RTT research role

I lead on changes to clinical practice by integrating research findings into existing radiotherapy practice within the service. I maintain clinical practice creditability as a member of the image-guided radiotherapy (IGRT) specialist team and through supporting the advanced practitioner team and service developments as required. I am also passionate about growing a research culture and providing other RTTs with opportunities to develop their research skills. As such, we have one RTT undertaking a funded master's in clinical research programme, developing training guidance for IGRT, and a second RTT secondment working with me two days per week on local developments.

In total, I have 13 years' clinical experience in radiotherapy and four concurrent years in clinical research. I work closely with the multi-profession team, including oncologists, physicists, radiographers, a range of allied health professionals, clinical librarians and nurses to develop the radiotherapy service, manage portfolio trials in radiotherapy and undertake primary research within my PhD programme. My research has centred on improving the use of positioning and immobilisation and, more recently, to improve patient comfort, with the aim to improve stability and accuracy of radiotherapy. My PhD research is to develop a comfort intervention for patients undergoing radiotherapy with an extended treatment time as observed in stereotactic ablative body radiotherapy and for MRI Linear accelerator deliveries. This focus has also led to the development of a robotic solution to replace the thermoplastic mask that patients have to wear during head and neck cancer radiotherapy.

My current role has evolved considerably since it began in 2014. I was initially employed as a research and development radiographer and then this developed to include: an associate lecturer position on the radiotherapy and oncology pre-registration RTT programmes at the University ▼

of the West of England, later as a clinical fellow at Musgrove Park Hospital with Plymouth University. In May 2015, after making the case for the importance of clinical radiotherapy research to the directors of Musgrove Park Hospital, writing a business case and job description, the new position of principal research radiographer was approved. This new position includes greater autonomy and a greater proportion of time dedicated to 'in-house' research and development.

Research RTTs adding value

An RTT undertakes specific training to deliver radiotherapy for patients undergoing cancer treatment, resulting in a bachelor's or master's degree. In the UK it is compulsory for RTTs, known in the UK as therapeutic radiographers, to register with the Health and Care Professions Council to practise as a healthcare professional. Therefore, RTTs are experts in their own area of professional practice, who contribute to the effectiveness of the multidisciplinary team working to improve patient outcomes.
RTTS are uniquely positioned to translate clinical research into radiotherapy practice, acting as an integral cog in the delivery and leadership of research. RTTs really add value to a research team when acting as co-investigators, principal investigators or as chief investigator in an area of practice where they have a unique expertise. RTTs are frontline practitioners who expertly simulate, plan, and deliver radiotherapy, in addition to reviewing patient experiences and care. In regard to research deliverables, RTTs can offer unique insights into the acceptability of novel radiotherapy technologies, techniques and also the impact on patients in their care.

Education and training

From 2007 to 2009, I undertook a master's degree in therapeutic radiography; this included statistical courses in SPSS Statistics (a statistical package for the social sciences) and good clinical-practice. As part of the master's, I was principal investigator of a randomised clinical trial of radiotherapy breast immobilisation. This study investigated the stability and reproducibility of unilateral compared to bi-lateral arm abduction for patients undergoing breast irradiation.

I was responsible for the study processes and experienced running and conducting a study, including developing a protocol, ethical application, patient information, budget management, approaching and consenting patients, ensuring standards and compliance to the protocol, and the evaluation of data and publication[1]. From 2009, I have worked periodically as a research RTT. I have undertaken tasks related to the organisation, set-up, information, informed consent, trial and data collection, for National Institute for Health Research (NIHR)-funded radiotherapy trials. This has given me invaluable exposure to larger multi-centre trials.

From 2010, I have conducted further observational studies to improve techniques and RTTs' refresher training, which have been published[2]. In 2013, I was appointed as the research and development radiographer, developing a strategic plan for research in radiotherapy at my institution and developing more initiatives that give my service a solid foundation in research. I was successful in obtaining an NHS Health Education South West research internship in 2014. The award has allowed me access to high-quality mentorship and support from academics and research design service (RDS) representatives. It has allowed me to undertake several training courses and workshops on topics such as patient engagement, consent, and a European School of Oncology masterclass in systematic reviews. It has also given me the time to conduct a preliminary consultation focus group of patients undergoing head and neck radiotherapy[3], which has led to the development of a robotic pillow system for patients with head and neck cancer[4-5].

In 2016, I registered for a PhD at the University of the West of England and have recently passed the transfer viva with supervision from four supervisors: Dr Mary Cramp (physiotherapist and Director of Studies), Professor Shea Palmer (physiotherapist), Professor Jos Latour (nurse) and Dr Helen McNair (RTT). In 2017, I was lucky enough to be awarded a Doctoral Fellowship by the Society and College of Radiographers, which supports my PhD academic fees, patient ▼

The motion capture pillow – aiming to replace thermoplastic masks in radiotherapy (Fig. 1)

research partners, attendance at conferences and, importantly, gives me time to focus on the PhD research. So far I have completed master's modules in qualitative research and a range of researcher workshops, all of which will provide me with a solid foundation as an independent researcher. Other than my own professional development, I set up and organised a multi-profession research symposium in the South West of England that I co-chair. The aim is to grow new and current researchers in a region not known for research output.

Research outputs

Below is a small selection of my research outputs that are complete or in progress:

Strategic plan for research in Beacon radiotherapy

In 2014, when I was appointed as a research and development RTT, my first task was to develop a strategic plan for research in radiotherapy to give my service a solid foundation in research. A five-year strategy was implemented with longer-term targets such as growing research capacity through innovation, education, training, participation in clinical trials and other initiatives. Currently we have RTTs undertaking a master's in clinical research, a PhD, and another on a research RTT secondment. One of our oncologists is chief investigator (CI) of an international trial, and another is in the process of writing a proposal for research as CI. We also host many clinical trials.

The motion capture pillow – aiming to replace thermoplastic masks in radiotherapy (Fig. 1)

My initial aim with this project was to improve patient comfort. I proposed that we used something like a pressure sore mattress with lots of tiny hydraulic air flutes *in situ* to sense and actuate a patient's position during radiotherapy, therefore enabling us to improve comfort and manage motion in real-time. In discussion with a professor of medical robotics it was decided that a different sensor technology should be used and that maybe we should focus on head and neck cancer patients and remove the mask and, at the same time, provide a stable safe system that would interlock to the linear accelerator. This was confirmed with professionals and in a focus ▼

group of patients who felt their comfort was far from well managed. One of them said: "It felt like I was being suffocated with Clingfilm and being immersed in a vacuum former". This emphasised the need to improve comfort, coupled with the potential to provide a motion management and actuation system.

This project was my initial PhD focus to improve comfort; however, after consideration it was felt that comfort is more complex than just physical, with social, psychological and environmental attributes.

A prototype system using a robotic motion capture pillow (MCP) was investigated for proof-of-concept, as this device is a very good tool for tracking the head. The device has an international patent and has potential to be used in clinical practice. The current challenge and future work is to develop a clinical system that will cause limited radiation attenuation, preserve some skin sparing, and is non-ferrous when considering magnetic resonance imaging. This work has grown to include three radiotherapy departments and two universities, and as a platform technology, there is already interest beyond radiotherapy from surgeons undertaking computed tomography guided surgery.
Watch the animation: Motion Capture Pillow

PhD topic: Improving comfort for cancer patients receiving radiotherapy (COMFORT): integrating an intervention acceptability study

Background: Patients undergoing radiotherapy are positioned to restrict motion to ensure treatment reproducibility and accuracy. Immobilisation can be uncomfortable and research suggests that patient discomfort is associated with reduced treatment accuracy. Treatment times are increasing for stereotactic ablative radiotherapy, presenting further challenges for positioning. Radiographers are responsible for managing patient comfort, yet there is little evidence to guide practice.

Aim: This project aims to develop and test a comfort intervention for cancer patients undergoing radiotherapy with extended treatment times.

Method: A mixed-method approach of three work-packages (WP) is planned. **WP1** includes a qualitative study of patients' and radiographers' experiences of comfort management in radiotherapy using semi-structured interviews. Purposive samples of 15-25 patients and 15-25 radiographers will be recruited. Data will be thematically analysed. **WP2** will develop the comfort intervention for radiotherapy by evaluating and mapping data from a literature review and the findings of WP1 with a stakeholder group. **WP3** will be an intervention acceptability study. We will establish the acceptability of delivering the comfort intervention and investigate important parameters for the design of a substantive feasibility RCT.

Future plans
My career aim, starting with this PhD and this award, is to become an independent RTT researcher increasing research activity and collaboration in nursing, allied health professions (AHP), medicine and leading on radiotherapy research. I would like to inspire nurses and allied health professionals such as RTTs to get involved in research, increase research capacity and improve patient care. I will continue to do this through embedding a culture of research in seminars for pre- and post-registration students, through a variety of methods at Musgrove Park Hospital, including research sessions, one-to-one support and supervision, workshops, and the continuation of the research symposium that I started in 2014.

I would like to pave the way to increase the number of RTT researchers moving towards PhD-level qualifications, and to support, mentor and supervise others following the same pathway. This will enable a sustainable research support structure in healthcare services that may not have hosted rigorous primary research before. ▼

The findings of my PhD research to develop a comfort intervention and test it in an acceptability study will inform the development of a multi-centred randomised controlled trial to further develop comfort management in radiotherapy. Based on this study's findings and the future RCT, it is anticipated that there could be a further implementation phase to implement the technique nationally, which would require further funding and which I would take forward to ensure that all patients will benefit.

In particular, I intend to develop skills associated with qualitative design, and have already completed a master's-level qualitative research module as part of my PhD programme, to comprehend the reasoning behind patient behaviours to improve patient care. This is an area which would complement investigatory teams testing novel radiotherapy techniques and technologies, where there may also be a gap in RTT representation.

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Taunton, Somerset
United Kingdom

INTERESTED IN THE STUDY?

Are you an RTT delivering stereotactic ablative radiotherapy (SABR) / stereotactic body radiation therapy (SBRT) or similar that takes longer than ten minutes to deliver?

If you would like more details or are interested in being contacted about recruitment to the study, please contact me, simon.goldsworthy@tst.nhs.uk
Twitter: @ComfortStudy

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RTT

Navigating the path together to deliver personalised radiation medicine

VICKIE KONG

Delivering precision radiation medicine is one of the strategic priorities at the Princess Margaret Cancer Centre, Toronto, Canada, where I work. The institution recognises that radiation therapists play an important role in achieving this goal. In 2012, I became an advanced practice radiation therapist (known in Canada as a clinical specialist radiation therapist (CSRT)) and became involved in the development and implementation of adaptive radiation therapy for my department.

After graduating from the radiation therapy undergraduate degree programme in 2002, I specialised in implementing an effective care plan for patients receiving radiation therapy to the pelvic region. Prior to taking on the role of CSRT, I developed the necessary core clinical, technical and professional competencies by taking on various roles in the department. I was involved in the initial phase of the cone-beam CT implementation, gaining knowledge in formulating imaging workflow process and interpreting cone-beam computed tomography (CBCT). With my solid background in image-guided radiation therapy (IGRT) and treatment planning for the pelvic site groups, I assumed the role of combined clinical practice / genitourinary research therapist to enhance my research and technical skills. In this role, I developed a real appreciation of the value of evidence-based research in improving the quality and outcome of patients' health. I continued to advocate and support different research activities when I became the team coordinator in 2009. In this leadership role, I engaged in resource and process management, safety and quality improvement, and mentoring staff and students.

The first few months as a CSRT were a major adjustment for me due to the changes in the nature of the tasks I was involved in. To complement my experience working in a fast-paced clinical environment where multi-tasking and efficiency are highly valued, I spent some time attending specialised training and performing literature reviews to become more broadly informed about adaptive radiotherapy. I also enrolled on an MSc programme in radiotherapy planning at Sheffield Hallam University, UK, which I completed in 2016. This programme deepened my knowledge of different aspects of radiotherapy planning, such as imaging, motion management and radiobiology. There was also opportunity to learn from students at various cancer centres about their clinical practice through the online platform, which broadened my perspective and promoted the integration of knowledge from various sources to consolidate my clinical decision-making skills. I am very thankful to my radiation medicine colleagues for teaching me about image assessment, volume delineation and deformable image registration. I am also grateful for the guidance and support I've received from my department director and research practice leader, which has facilitated a smooth transition into my new role. ▼

Nevertheless, there were challenges, especially as the adaptive radiotherapy treatment planning system had only recently been acquired by the department and everyone was still trying to get the hang of it. Strong problem-solving skills, persistence, patience and emotion-management were definitely needed during that trial-and-error process. To help me become more familiar with the tools and the workflow, I decided to conduct a research study using this system to compare the efficacy of various adaptive strategies for bladder cancer. This gave me the direction and focus to explore the boundaries of this new technology in a rigorous and clinically meaningful way. I presented the findings from this work at the ESTRO annual congress in 2017 and was awarded the best poster for the RTT track.

Currently, I am involved in the development of the dose accumulation and adaptive radiotherapy process with a team of radiation physicists, computer programmers and two other CSRTs. Our goal is to automate the process and to identify criteria for initiating adaptive radiotherapy so that it can be performed in a safe and efficient manner, and that resources are optimised to achieve the best outcome for patients and the healthcare system. In addition, I am collaborating with a radiation oncologist and physicist in investigating the dosimetric impact of applying different image guidance strategies for the loco-regional irradiation of prostate cancer, for which I received funding as the principal investigator from the Sanofi-Canadian Association of Radiation Oncology (CARO) award last year. I am also a member of the Canadian dosimetry certificate committee, working with clinical educators and dosimetrists to provide relevant and up-to-date material for the professional development of radiation therapists in the area of dosimetry. Recognising the importance of research in advancing our practice, I have volunteered to be a supervisor for undergraduate student research projects. It is a rewarding experience to pass on what I have learnt to the next generation.

As an CSRT, I am learning new things every day, which is very motivating. There is more opportunity for interdisciplinary collaboration in this role than in my previous roles, and I really enjoy meeting people within and outside my institution to share knowledge and gain insight. I want to express my gratitude to my department directors, Julie Wenz, Elen Moyo and Colleen Dickie, for endorsing the CSRT role in the department, and my mentor, Tara Rosewall, for investing her time and believing in my ability to excel.

Vickie Kong
Princess Margaret Cancer Centre
Toronto, Canada

RTT

Improving service: a visit from RTT experts to the radiotherapy department at UZ Ghent, Belgium

Inside the department's radiotherapy treatment room

LUDWIG
VAN DEN BERGHE

The department of radiotherapy at UZ Ghent, Belgium, had the privilege of welcoming two visiting international radiation therapist (RTT) experts from 23-25 May this year.

As a nurse in Belgium, we have no formal training in radiotherapy. We usually work independently and under the entrusted act of a radiotherapist-oncologist and are not very involved in research; we have little contact with colleagues from other countries. Nurses often ask themselves what role and responsibilities they should be taking on in delivering radiotherapy. We wanted to learn from the visiting experts what role we should take, and where the weaknesses of the department are with regard to education. We also wanted to ask how, as managers, we can inspire the group and make radiotherapy an important part of nurses' working lives.

In this work, we had the support of Professor Dr Yolande Lievens, medical head of our department, Professor Rik Verhaeghe, the head of the nursing department, as well as Jan Vercruysse, the care manager of the clinical support sector. ▼

Outside the treatment room

View of the department of radiotherapy, UZ Ghent, Belgium

The two visiting RTT experts were: Annette Bojen from Aarhus University Hospital, Denmark, and Mary Coffey from Trinity College Dublin, Ireland.

It was not easy to prepare for this three-day event, as we were aiming for a high level of participation from our colleagues. It was a challenge to define our goals and it required a lot of discussion, as well as consultation with nurses to finalise the programme. The nurses felt it was important to have the experts on the hospital floor, offering expert advice to our staff as they went about their work. It was also felt that it would be beneficial to have the opportunity to discuss certain topics in small groups. A proposal was developed and discussed with both the experts in advance of their visit.

The final programme was a combination of workplace visits taking in various radiation devices and the CT simulator, as well as four round-table conversations with different nurses. In addition, there was a separate consultation with the head and deputy-head nurse. On the first day, the local organisers delivered a presentation during lunch, providing information about the hospital, including the organisational chart, the structure of the department, highlights from our most recent annual report and our infrastructure. This was followed by a guided tour of the department.

The round-table discussions were prepared by the nurses around four topics chosen to encourage discussion and to help improve clarification around roles and responsibilities. The topics were:

- Needs of a new employee (what do we do now, what we could do better, what else?)
- Working independently, but closely with other disciplines
- Our roles and responsibilities and how we take these on
- Making radiotherapy part of our working lives.

The experts did an excellent job in leading the conversation, engaging staff in open, honest and enjoyable discussions.

On the Thursday afternoon, Mary Coffey gave a presentation: 'New roles in advanced practice for RTTs', and on Friday afternoon, Annette Bojen gave a presentation: 'Use of the VERT in radiotherapy results, impact on education and outcomes for patients'. Both presentations were well attended by nurses and other interested health professionals.

The three-day event concluded with a joint meeting with all the nurses, together with the head and deputy-head nurse, at which the two experts presented their initial findings and recommendations.

The main take-away points from these recommendations for us as a department are:

- Staff should be working on communication with their own discipline and other professional groups ▼

- A proposal is needed for the implementation of new protocols, techniques and new devices
- We need to increase the educational level of nurses in relation to radiotherapy
- Nurses should work on developing their roles and taking on responsibilities (e.g. working out protocols from their own expertise, using literature in the development of procedures, setting up projects and working on them over an indefinite period of time).

As a department we learned a lot from this three-day event and hope to implement these changes to the benefit of our patients. Now it is time to start this work. A big thank you to Mary, Annette and the whole team, for their work and effort during the visit.

Ludwig Van den Berghe
Head nurse
Department of Radiotherapy at UZ Ghent
Ghent, Belgium

ROSEIS

The Radiation Oncology Safety Education and Information System

Read the interview with Mary Coffey in the Make it Happen Corner on page 102

ESTRO
RTT Alliance
member
2018

TOGETHER WE ARE STRONGER!

Join the RTT Alliance

"For our members being part of the RTT Alliance is a challenge and an opportunity. The ultimate aim for us is to become a more established part of the European and global RTT family. We expect to achieve this through opportunities for common survey projects and by using guidelines with the aim of improving our knowledge and skills. The main positive aspect of being part of the Alliance is the way in which it champions young technicians."

Ilija Curic, President of Sebian Society of Radiotherapy Technicians
Belgrade | www.surtt.rs

The ESTRO RTT Alliance aims to support radiation therapists (RTTs) to play a major role in the political arena for a better representation of RTTs on the oncopolicy scene and for an improved recognition of the profession in the treatment of cancer patients.

If your national society joins the RTT Alliance, you will benefit from:

- a reduced fee for attending an ESTRO event or joint events/courses, once a year
- reduced publishing fee for the open access journal *Technical Innovations and Patient Support in Radiation Oncology (tipsRO)*
- eligibility for grants and awards
- online access to ESTRO physics booklets, ESTRO EU affairs and monitoring report, ESTRO guidelines, and membership directory
- reduced members' prices on ESTRO publications and handbooks.

RTT Alliance membership can be granted to individual RTTs who are members of a national society which benefits from a joint membership agreement with ESTRO. The membership fee for the RTT Alliance is then covered by the annual fee paid by the partner society to ESTRO.

Fee: €15 (VAT included) | For more information, email Myriam Lybeer at: rttalliance@estro.org

RADIOBIOLOGY

Fractionation effects and the linear-quadratic model

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The Legacy of Eddie Barendsen

14 August 1927-20 June 2018

By Conchita Vens and Klaas Franken

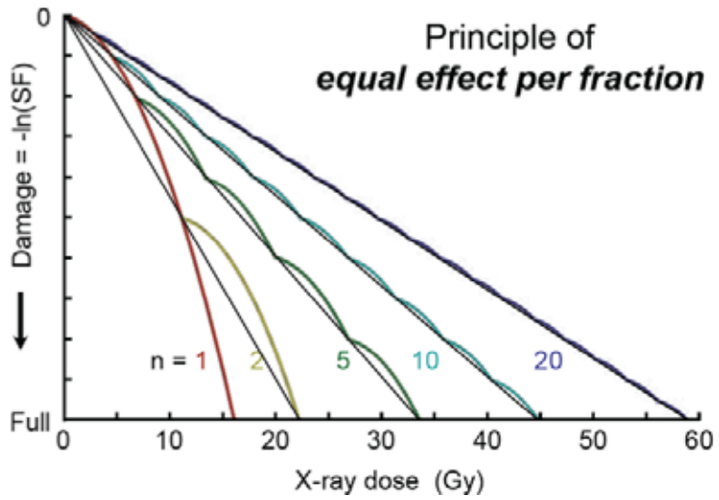
Eddie Barendsen in 1983 at the Radiobiologisch Instituut (RBI) in Rijswijk, The Netherlands

CONCHITA VENS

KLAAS FRANKEN

For radiation oncologists, the most palpable of all the past achievements in radiobiology is probably the discovery and description of the changes in tissue and cell responses when radiation is given in fractions and the linear-quadratic (LQ) model that attempts to predict it.

Last month we learned that Professor Eddie (Gerrit Willem) Barendsen had died. Eddie had contributed to and developed the largely applied 'LQ model'. Trying to describe cellular responses in mathematical terms, he introduced the now widely used linear quadratic equation in 1982. Initially, the two constants that define the curvature of cell survival curves were a_1 and a_2, later replaced by α (alpha) and β (beta). We learn from his obituary[1] that his friends recall he preferred the Latin letters over the ancient ▼



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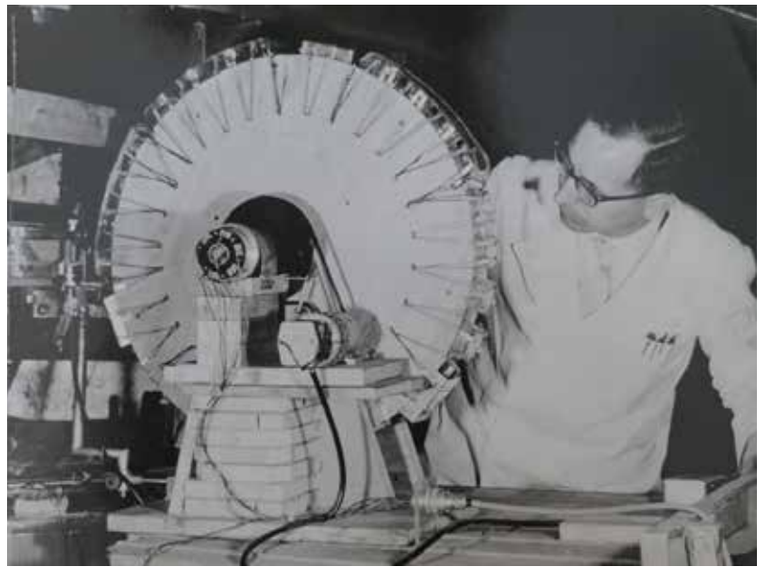

Eddie Barendsen at work


Eddie Barendsen with his prestigious award from Her Majesty

Greek, because they emphasised that this was a mathematical expression.

While the inverse exponential decrease in cellular survival fraction in any radiation dose response curve is a simple reflection of probability laws, the two constants a_1 (α) and a_2 (β) capture the radiobiological response parameters of the biological model under investigation. They differ by cell or tissue or radiation source. Together, however, they describe the curvature (α/β ratio) of the response curve and with that predict the alteration in responses when radiation is given in fractions. Eddie considered it important to develop a possible measure of relative effectiveness. In the absence of accurate predictors (the individual term alpha or beta), the fractionation sensitivity quantitatively described by the α/β ratio term can help to compare the impact of fractionation schedule changes. Eddie proposed to apply such linear quadratic models to evaluate the impact of fractionation on normal tissue complications. Indeed it still forms the basis of normal tissue complication probability models today[2]. More than 35 years on, the concepts at the heart of the model are still being applied and have endured many discussions of more sophisticated and complicated models. This is probably because it is a pragmatic solution and provides mathematical terms for a response behaviour that can be measured in the clinic: the overall sensitivity of tumours or a tissue to respond to fractionation[3].

Eddie Barendsen was probably one of the best and most well-known radiobiologists of his time. Shortly after his landmark publication on 'Dose fractionation, dose rate and iso-effect relationships for normal tissue responses' in 1982 he was appointed Professor of Radiobiology and Experimental Oncology at the University of Amsterdam, The Netherlands, a position which he occupied until his retirement in 1992. His career started in Groningen measuring C-14 activity in archaeological samples and led him to radiobiology research in the late 1950s. Numerous and highly cited publications in many areas of radiobiology followed and demonstrate a productive research career – a scientific life full of investigations, discoveries, teaching, mentoring and societal activities and engagements. Based on his achievements he was awarded with the "Her Majesty's Officer of the Royal Order of Oranje

The ‘three Bs’ of Dutch radiobiology: van Bekkum, Broerse and Barendsen

Nassau” in 1990, a very prestigious award from the Dutch monarch.

Together with his colleagues and students, Eddie’s achievements had a substantial impact on radiobiology and radiation oncology, then and now. He also left a legacy of radiobiologists and oncologists, who were trained and mentored by him and remember him as one the ‘three Bs’ of Dutch radiobiology: van Bekkum, Broerse and Barendsen. Eddie died peacefully at the age of 91. His loss will be mourned by his large family, and many friends and former colleagues.

Conchita Vens
The Netherlands Cancer Institute
Amsterdam, The Netherlands

Klaas Franken
Amsterdam UMC
Amsterdam, The Netherlands

REFERENCES

[1] “Obituary of Professor Gerrit Willem Barendsen”, Franken *et al, Int J Rad Onc Biol Phys*, in press

[2] *Basic Clinical Radiobiology* edited by Joiner and van der Kogel

[3] Brown *et al. Int J Radiat Oncol Biol Phys* 2014; 88(2): 254-262; *Brenner Semin Radiat Oncol.* 2008; 18(4): 234-239

ESTRO SCHOOL

ESTRO SCHOOL

“We will soon release online our programme for 2019”

Welcome to the ESTRO School Corner.

After a nice, relaxing summer, we are all back to our clinical, teaching and research duties. This includes the ESTRO School. We will soon release online our programme for 2019. The programme will help you to choose your next training activity so that you can keep your knowledge up-to-date and at the cutting-edge. All the available courses are described in detail, as well as the FALCON workshops, which have been designed to offer members a multifunctional platform for contouring and delineation.

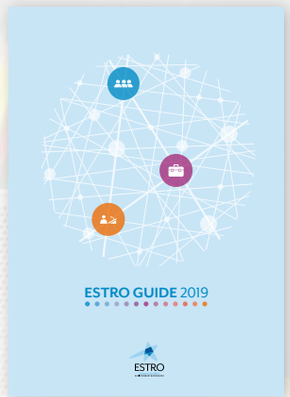
We hope you find the right course or workshop for your needs. See you there in 2019!

Jesper Eriksen, Marie-Catherine Vozenin and Christine Verfaillie

JESPER ERIKSEN
Chair of the education council

MARIE-CATHERINE VOZENIN
Member of the education council

CHRISTINE VERFAILLIE
ESTRO Managing director education and science



2019 ESTRO GUIDE
Soon available online!

Find out everything about the ESTRO School programme for 2019 in the ESTRO Guide: teaching courses, online workshops, grants…

We look forward to welcoming you as a participant in 2019!

Soon released on estro.org and on social media.

ESTRO SCHOOL

FALCON CONTOURING WORKSHOPS

2018 ONLINE WORKSHOPS PROGRAMME

Mark your calendar ▶▶

ESTRO SCHOOL

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

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

* workshops are in Australian time

FALCON

ESTRO SCHOOL

LIVE COURSES

Comprehensive and practical brachytherapy

4-8 March 2018 | Ljubljana, Slovenia

Brachytherapy for prostate cancer

14-16 June 2018 | Avignon, France

IMRT and other conformal techniques in practice

3-7 June 2018 | Tallinn, Estonia

20th MCCR workshop Methods in clinical cancer research

16-22 June 2018 | Zeist, The Netherlands

Dose-modelling and verification for external beam radiotherapy

10-14 June 2018 | Dublin, Ireland

Big Data 4 Imaging – radiomics, deep learning and distributed learning. A hands-on course

9-12 December 2018 | Maastricht, The Netherlands

Comprehensive and practical brachytherapy

4-8 March 2018
Ljubljana, Slovenia

COURSE DIRECTOR:
Bradley Pieters, radiation oncologist,
Academic Medical Centre, Amsterdam, The Netherlands

Ljubljana, Slovenia

AMIN ALI

I had the pleasure of attending the ESTRO 'Practical and comprehensive brachytherapy' course in beautiful Ljubljana, Slovenia. The course was very well organised and in keeping with its title was comprehensive and practical. There were 60 participants from all over the world with different backgrounds including clinicians, physicists and radiographers. Brachytherapy has always amazed me with its potential and far-ranging applications worldwide. The wide scope of lectures from fundamental basics of brachytherapy to the state-of-the-art applications of its use, delivered by world-renowned experts in the field, together with hands-on practical sessions made the course well worth attending.

Delineation of targets has always been a source of potential error in radiation therapy and this course has successfully highlighted this aspect. Interactive sessions where participants had to do 'homework', after which there was discussion, ▼

with the participants shown some tricks of the trade to improve target contouring was helpful in the learning process.

However, it was not all serious work. We were treated to dinner in the city and also watched the Champions League football matches. A definite plus for a football fan like me.

I would highly recommend this course to my fellow colleagues. Being able to discuss cases and techniques with experts and other participants in such a conducive atmosphere made the whole experience of learning very inspirational.

I would like to thank the course director, all members of the teaching staff and local organisers for making this event a memorable success. This will spur me on to attend more ESTRO courses in the future.

Amin Ali
Clinical Fellow in Advanced Radiotherapy
The Christie NHS Foundation Trust
Manchester, UK

Find out more about the book: *Fundamentals of Ionizing Radiation Dosimetry*, in the Physics Corner on page 50

ESTRO SCHOOL

IMRT and other conformal techniques in practice

3-7 June 2018
Tallinn, Estonia

COURSE DIRECTOR:
Marco Schwarz, Medical Physicist, Proton Therapy Centre, Trento, Italy

Tallinn, Estonia

MAHBOD SEDAGHAT

For many of us, the chance to plan a visit to Estonia's capital, Tallinn, comes along much less often than the chance of attending a work-related event in other European cities such as Barcelona, London or Paris. I was therefore very pleased to see Tallinn was the choice of venue for the 2018 ESTRO course on 'IMRT and other conformal techniques in practice'.

The training course was structured to be a condensed review of the most essential elements of intensity-modulated radiation therapy (IMRT) treatments, touching on a variety of subjects from the theoretical and technical to more clinical topics. ▼

The course started at the North-Estonian Regional Hospital Cancer Centre (NEMC) with an introduction to the history of their radiotherapy department and their IMRT practices. This was followed by demonstrations of their adopted workflow and equipment.

As an attendee, several points caught my attention at NEMC; in particular:

- Their approach and success in forming a well-trained team of experts for advanced radiotherapy both by absorbing local resources and by cooperating with the International Atomic Energy Agency;
- The development of their in-house oncology imaging systems (OIS), known locally as 'KIR', which matches commercial OIS in its performance, but is tailored to their specific needs and preferences, with many useful visual effects featured in the user interface.

Special thanks go to Maire Kuddu, Eduard Gershkevitsh and other colleagues at NEMC for their excellent lectures, demonstrations and for organising the visit.

The following four days of the course included lectures, demonstrations, presentations and clinical case discussions. Naturally, everyone has their own highlights when faced with such a rich flow of information. As I am more a technical enthusiast than a clinical expert, I enjoyed and contributed more to the physics and technical lectures than the clinical presentations. However, I can certify that all the lectures were very well prepared and delivered by real experts in their field.

The second day started with 'Rationale for IMRT' by Franc Lohr, an Italian-based German physician who speaks English (and Italian) as his mother tongue. Franc is the type of source of reliable expertise and information that you always want to have in your department. Other lectures were given by Marco Schwarz, Lone Hoffmann, and Andrea Riccardo Filippi, of whom only Lone was not Italian.

All the essentials for a medical physicist's everyday work in an advanced clinic, including treatment planning system (TPS) commissioning, IMRT quality assurance (QA) and dosimetry were comprehensively reviewed before lunch. After lunch the tone changed from this more technical information, to a more clinical focus, with two successive lectures on IMRT in lung cancer and another two on IMRT in breast cancer and for treating Hodgkin disease.

On the third day, Mischa Hoogeman impressed me with his excellent presentation on algorithms and cost functions in IMRT optimisation. What is special about his presentations is that he presents complicated mathematical concepts visually on simple graphs or schemes, so that you get a clear feeling of the functionality he talks about. Then Eva Onjukka extensively reviewed all the radiobiological models I had ever heard of, some of which I've not had the chance to study in detail; I hope I receive her slides for further study as the talk was so neatly organised and classified.

Three distinct clinical cases were discussed in the afternoon sessions in separate lecture theatres, each allocated to a specific case with rotating sub-groups of attendees. This was based on homework posted to all attendees in advance for them to study and suggest a planning solution.

On the fourth day, Sophie Ceberg and Carmen Rubio delivered their talks. I know Sophie from previous meetings and enjoyed her excellent ▼

presentation on geometrical uncertainties and the system they have helped to develop at Lund University, Sweden, to monitor patient surface movements during treatment delivery. The system has been commercialised and I found the chance to observe its functionality when visiting a clinic in Sweden later after the course. The afternoon session was allocated to vendors to present their products, solutions and new treatment planning packages.

If you think the last day of a training course would be less intense, I would disagree based on my experience in Tallinn. Lots of information was delivered about biological optimisation, adaptive treatments, static and rotational IMRT dose calculation and so on.

Two things I won't forget from this trip to Tallinn are the tour of the historic centre of Tallinn, guided by a beautiful, cheerful and energetic leader, and the dinner at Rae Meierei restaurant afterwards in a cosy atmosphere that mixed the modern and traditional. Both events were organised by ESTRO and our Estonian hosts. The historic centre of Tallinn was next to the course venue and you had the chance to walk into it each day in the evening after the course. In a group of four, we went there one evening for dinner and accidentally ordered a wrong item on the menu, which we later found was grilled bear meat. We also asked for Coke and the waiter said it was not yet invented! The centre was very festive at this time of the year with many restaurants decorated in medieval themes. You could see waiters and bar tenders dressed in medieval costumes serving guests or advertising their venues. If you ever go to Tallinn, don't forget to visit some famous medieval taverns in the heart of the city.

Overall, the course was both fun and informative. I enjoyed networking and meeting new colleagues from across the globe, some working with equipment and facilities similar to our own and some in centres with a different level of sophistication and workflow complexity. Although we may use similar equipment and techniques, we are never the same and we can learn from this diversity.

Although I am unintentionally tuned to be critical, I don't have much to criticise about the organisation of the course. On a minor note, however, the course was very much about IMRT, and the proportion of 'other conformal techniques' in the presented material was tiny. This included just a glimpse of proton therapy and stereotactic body radiation therapy (SBRT) treatments. Most of the talks were very rich in content, like comprehensive summaries; but at points some of them – especially the ones on the final day – were sometimes difficult to follow, or were presented in a rushed manner due to their rich content and the numerous subjects covered.

Overall, I enjoyed the course and learnt much from it. I made new friends and will learn from them. This is more than enough to be grateful for and I am happy that I attended.

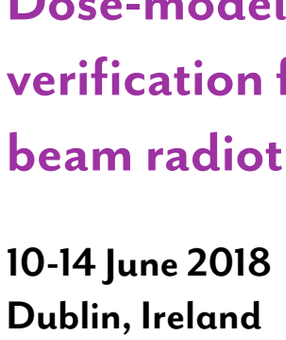
Mahbod Sedaghat (PhD)
Medical physicist
Radiotherapy department, Razavi Hospital
Mashad, Iran

Dose-modelling and verification for external beam radiotherapy

10-14 June 2018
Dublin, Ireland

COURSE DIRECTORS:
Tommy Knöös, Medical Physicist,
Skåne University Hospital and Lund University,
Lund, Sweden

Brendan McClean, Medical Physicist,
St Luke's Radiation Oncology Network,
Dublin, Ireland



DIANA BINNY

"I would like to thank and congratulate the organisers and presenters for designing this fantastic programme for physicists from around the world"

Since 1998, the 20 continuously developing ESTRO 'Dose-modelling verification' courses have been held in Dublin, Ireland. Like every curious person who loves medical physics combined with some great food and location, I decided to participate to advance my understanding of the recent international developments and recommendations for dose verification in external beam therapy.

As a clinical medical physicist and a researcher in Australia who has worked in both government and private sectors for some years, I have experienced the constant need for complex, efficient and high-quality treatment planning and delivery in radiotherapy.

In recent times, more than ever, we have seen the development of a huge number of competitive treatment planning, delivery and imaging ▼

systems, and patient-specific measurement detectors, all designed to achieve quality treatment. We are also faced with deviations from standard radiotherapy treatments due to the need to tighten treatment margins, verify the smallest possible field size and understand associated complications in dosimetry and algorithms. I believe there is a strong need for a platform for discussion of recent radiotherapy treatment advances to reach some consensus on the best options available based on the experiences and statistics from field experts. I hoped to find this on the ESTRO course.

After being involved in multiple planning systems and intensity-modulated radiation therapy (IMRT) / volumetric modulated arc therapy (VMAT) and stereotactic commissioning projects, I was often in two minds about various detectors, algorithms and patient representations. I found this course to be a real eye-opener and a paradise for those looking for answers to dose-modelling-related questions about a variety of radiotherapy systems.

The course began with an introduction to the basics in radiotherapy physics followed by in-depth concepts detailing treatment machine and patient modelling used by several algorithms. Aspects of the recently debated small-field characterisations by various detectors and algorithms was explained in immense detail, with clinical examples followed by some practical and interactive sessions using interactive software. I found this particularly fascinating.

Each subsequent day began with a recap session and interactive questionnaires that drew on everyone's recollections from the previous day, cementing the learning from wonderfully presented sessions by experts in the field. The course also discussed some challenges that are prevalent with the choice of current radiotherapy detectors, planning systems and delivery machines and provided measurement-based recommendations in line with recent international guidelines for quality assurance.

The course was conducted in the huge and historic campus of Trinity College Dublin, which was founded in 1592 by Queen Elizabeth I. The four-and-a-half-day course included traditional Irish lunch served in a palatial 18th century dining hall. On one of the evenings, an amazing food walking tour was organised, in which we had the opportunity to enjoy the sights and history of downtown Dublin with great food in the company of fellow attendees and faculty.

I cannot emphasise enough how relevant I found this course to the modern age of radiotherapy dose modelling. I would like to thank and congratulate the organisers and presenters, especially the course directors Brendan McClean and Tommy Knöös and their team for designing this fantastic programme for physicists from around the world. Special thanks to the course coordinators Alessandra Nappa and Elena Giusti for making the event a memorable one.

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ESTRO SCHOOL

Brachytherapy for prostate cancer

14-16 June 2018
Avignon, France

COURSE DIRECTOR:
Peter Hoskin, radiation oncologist,
Mount Vernon Hospital, London, UK

Avignon, France

MARIEKE VAN SON

This year, ESTRO's teaching course on brachytherapy for prostate cancer was held in the city of Avignon, France, in mid-June. As a PhD student doing research in this field, this promised to be a very interesting and informative course. The programme included a list of relevant topics for anyone working or interested in the field of brachytherapy for prostate cancer. Starting with basic concepts such as prostate anatomy, patient selection and imaging techniques, the course gradually focused in on brachytherapy techniques, with video demonstrations and lectures on tumour delineation and image registration. Important aspects such as quality assurance and radiation protection were also covered.

Together with a radiotherapy technician from my institution in Utrecht, The Netherlands, I travelled down to the beautiful Provence region of southern France. On the first morning, we were introduced to our five teachers who are all experts in their field. Dr Peter Hoskin and Dr Carl Salembier would draw on their experience ▼

as clinical / radiation oncologists; Dr Bashar Al-Qaisieh and Dr Frank-André Siebert represented the field of medical physics; and Dr Stefan Machtens provided the perspective of a urologist who is also experienced in brachytherapy treatment. This mixture of different specialties from different countries made the course an interesting multidisciplinary meeting. With a group of 34 participants, the atmosphere was very informal and interactive. From the start, we were encouraged to actively participate in the lectures, asking questions and exchanging views on different topics. This created a very pleasant learning environment. The group of participants also had a mixed background, including researchers, radiation oncologists, technicians and medical physicists.

Each day was filled with interesting lectures, alternated with coffee breaks where we could speak to representatives from different industries in the field, as well as a delicious lunch. At the end of each day, our newly acquired knowledge was tested with a comprehensive review session with questions on the topics discussed. A surprising element of the course was the homework assignment in which we had to do contouring work for two prostate cancer cases. Together, we reviewed the contours (anonymously) and we were all amazed by the differences we saw between delineations. It was a good exercise that made us realise contouring is a skill that needs to be maintained.

After the second day, we were all invited to a networking dinner across from the Palais des Papes, a historic palace in the centre of Avignon. This was an inspiring location for a pleasant dinner with fellow course participants and teachers. The next morning, the final part of the course was filled with lectures on focal therapy and salvage brachytherapy. The course ended with some interesting discussions on the different available treatment modalities for prostate cancer. After everything we had learned about brachytherapy, it was nice to take a step back, discuss different patient scenarios and talk about real world decision-making in choosing the best treatment. We concluded that prostate cancer treatments (in the primary setting) all have similar long-term oncologic outcomes, but that the risk of toxicity and affecting quality of life is becoming increasingly important in deciding what treatment is best for the patient.

Overall, the ESTRO course on brachytherapy for prostate cancer was very comprehensive, touching upon all the important aspects of treatment. I would certainly recommend this course to anyone who is interested in starting brachytherapy treatment in their clinic or anyone who wants to refresh their knowledge. I would like to thank the enthusiastic teachers and Elena Giusti from the ESTRO staff, for making this course possible.

Marieke van Son
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Utrecht, The Netherlands
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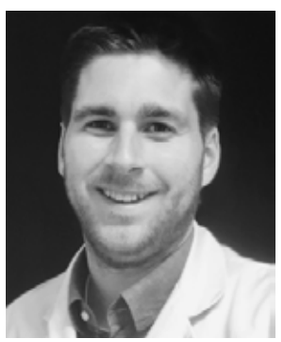
Read the second report on the course by the winner of the Felix Mick Brachytherapy 2018 award, in the Young Corner on page 96

20th MCCR workshop Methods in clinical cancer research

Supported by ESTRO

16-22 June 2018
Zeist, The Netherlands



MARTIJN INTVEN

REPORT BY MARTIJN INTVEN

From 16-22 June 2018, I attended the 20th 'Methods in clinical cancer research' workshop in Zeist, The Netherlands. It was an amazing week. I joined the workshop with the aim of developing a clinical research protocol, but I came away with so much more.

The workshop was attended by 81 fellows and a faculty of 41 world-renowned biostatisticians and clinical scientists. The concentration of biostatisticians was a special feature: there was one statistician for every eight fellows, a luxury we are unlikely to experience again. As well as scientists there were also patient advocates with whom we could discuss the design of the trial we were developing from a patient perspective.

Great lectures from the faculty and the fantastic interaction between faculty members and fellows in the protocol development group significantly improved the quality of my research protocol. Tight deadlines helped us to keep on track for finishing the research protocol, which sometimes meant that sleep was reduced to a more theoretical concept than I'm used to… but it was all worth it!

I left the workshop with a clinical research protocol and lots of new friends. Despite the lack of sleep, I also left it with a lot of positive energy and good ideas for developing my clinical research skills in my own institute. In this way, the workshop was a life-changing experience. It confirmed that, despite the fact that it is sometimes accompanied by frustrations, clinical research can be really satisfying and fun and that it is very important for improving future outcomes for cancer patients.

Thanks to ESTRO for the support and making this workshop possible. And many thanks to everybody at the workshop, including faculty, fellows and staff for making this workshop an unforgettable experience.

Martijn Intven
Radiation oncology
UMC Utrecht
Utrecht, The Netherlands

REPORT BY ARABELLA HUNT

I have recently returned from the fantastic 'Methods in clinical cancer research' workshop in Zeist, The Netherlands. What a busy but educational week it was.

This workshop brings together fellows and faculty members from around the world who have an interest in producing high-quality cancer research. A wide range of specialties are represented including medical and radiation oncologists, oncological surgeons and biostatisticians. The workshop consists of a packed schedule of lectures, small group work, protocol development sessions, 'meet your expert' appointments and the occasional social activity.

ARABELLA HUNT

We started off the week with introductory lectures on the importance of research and good trial design before breaking off into our protocol development groups, which served as the backbone of the course. The ultimate aim of the workshop is to facilitate the production of high-quality research protocols, with the goal that by the end of the week each fellow will have a critically appraised protocol that they can take back to their institution for implementation. Each protocol development group consisted of eight fellows with four faculty members who were expert in trial design. As fellows we each presented our initial trial concept to the group, which was then developed and adjusted as the course went on.

In addition to protocol development groups, there are lectures on key concepts within clinical trial design including excellent talks on statistics.

Fellows are also encouraged to seek out faculty members outside their own group for one-on-one 'meet your expert' sessions where they can discuss key aspects of their trial design with faculty who have expertise in that field.

The workshop offers an excellent opportunity for networking with colleagues from around the world. I learnt a great deal and have grown in confidence as a researcher. I would highly recommend it to others interested in pursuing a career in academic medicine and would like to thank ESTRO for their ongoing support of the programme.

Arabella Hunt
Institute of Cancer Research
Clinical Oncology
London, UK

ESTRO SCHOOL

Big Data 4 Imaging – radiomics, deep learning and distributed learning. A hands-on course

9-12 December 2018
Maastricht, The Netherlands

ENDORSED BY ESTRO

BigData Imaging

bigdata4imaging.info

Artificial intelligence (AI) will transform the field of medicine with more personalised and cost-effective treatments. One of the first opportunities for AI in medicine may be in the large-scale analysis of medical images for clinical applications of detection, workflow optimisation, segmentation and modelling. For example, we have demonstrated that radiomics and deep learning, can reveal key components of tumour phenotype for multiple lesions at multiple time points over the course of treatment. Extracted engineered and deep quantitative features on three-dimensional medical images with standardised software have been used for better spatial and longitudinal understanding of tumour biology and for the prediction of diverse outcomes. In addition, new paradigms of distributed learning will enable the evaluation/validation of prognostic models without the difficulty and risk of sharing patient health information.

Unfortunately, the rapid growth in popularity of this immature scientific discipline has resulted in a large number of early publications missing key information and/or utilising underpowered patient datasets. It is a complex field of research, and key principles should be followed to realise its full potential.

The four-day hands-on Big Data 4 Imaging course has the following learning objectives:

1. Understand the fundamentals of big data for imaging
2. Critically evaluate the literature and review published articles
3. Understand best practices to generate robust prognostic models
4. Make the data FAIR (Findable, Accessible, Interoperable, Reusable)
5. Comply with regulation and privacy laws.

We believe the quantitative imaging scientific community requires a renewed focus on optimal study design/reporting practices, standardisation, interpretability, data sharing and clinical trials. In this course, hands-on sessions will supplement conventional lectures from international experts with the sole purpose of producing high-impact research and the development of actionable prediction models that will yield more meaningful applications and collaborations in the field of precision cancer medicine.

On behalf of the organising and scientific committees for the course, we are looking forward to seeing you and to growing the exciting quantitative imaging scientific community.

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

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

ESTRO School of Radiotherapy and Oncology

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2019

ESTRO School

POSTGRADUATE COURSES IN EUROPE

Comprehensive Quality Management in Radiotherapy – Risk Management and Patient Safety
15-18 February 2019 | Moscow, Russia

Image Guided Radiotherapy in Clinical Practice
17-21 February 2019 | Porto, Portugal

Basic Clinical Radiobiology
3-7 March 2019 | Brussels, Belgium

Comprehensive and Practical Brachytherapy
3-7 March 2019 | Athens, Greece

Particle Therapy
18-22 March 2019 | Groningen, The Netherlands

Lower GI – Technical and Clinical Challenges for Radiation Oncologists
20-22 March 2019 | Amsterdam, The Netherlands

Upper GI – Technical and Clinical Challenges for Radiation Oncologists
23-26 March 2019 | Amsterdam, The Netherlands

Fundation of Leadership in Radiation Oncology
26 April 2019 | Milan, Italy

ESTRO/ESMIT course on Molecular Imaging and Radiation Oncology
15-18 May 2019 | Location to be confirmed

Advanced Skills in Modern Radiotherapy
19-23 May 2019 | Brussels, Belgium

Multidisciplinary Management of Prostate Cancer
19-23 May 2019 | Pisa, Italy

Dose Modelling and Verification for External Beam Radiotherapy
19-23 May 2019 | Lisbon, Portugal

Target Volume Determination – From Imaging to Margins
2-5 June 2019 | Athens, Greece

IMRT and Other Highly Conformal Techniques in Practice
2-6 June 2019 | Budapest, Hungary

Brachytherapy for Prostate Cancer
13-15 June 2019 | Prague, Czech Republic

Evidence Based Radiation Oncology
24-29 June 2019 | Montpellier, France

Clinical Practice and Implementation of Image-Guided Stereotactic Body Radiotherapy
1-5 September 2019 | Florence, Italy

Physics for Modern Radiotherapy
A joint course for clinicians and physicists
8-12 September 2019 | Riga, Latvia

Advanced Treatment Planning
22-26 September 2019 | Budapest, Hungary

Imaging for Physicists
29 September - 3 October 2019 | Manchester, UK

Image-Guided Radiotherapy and Chemotherapy in Gynaecological Cancer: Focus on MRI Based Adaptive Brachytherapy
12-16 October 2019 | Cluj, Romania

Comprehensive Quality Management in Radiotherapy – Quality Assessment and Improvement
13-16 October 2019 | Dublin, Ireland

Best Practice in Radiation Oncology
Train the RTT (Radiation Therapists) Trainers - Part II
14-16 October 2019 | Vienna, Austria

Positioning and Immobilisation for Radiation Therapy
19-20 October 2019 | Brussels, Belgium

Multidisciplinary Management of Breast Cancer NEW
27-30 October 2019 | Budapest, Hungary

Research Course in Radiation Oncology
How to develop research/validation programmes when implementing new technology?
Edition 1: MRI Linac
3-6 November 2019 | Madrid, Spain

Research Course in Radiotherapy Physics
3-6 November 2019 | Madrid, Spain

ESTRO/ESOR Multidisciplinary Approach of Cancer Imaging
4-5 November 2019 | Rome, Italy

Multidisciplinary management of non-melanoma skin cancer
7-9 November 2019 | Brussels, Belgium

Palliative Care and Radiotherapy
A course on prognosis, symptom control, re-irradiation, oligometastases
26-28 November 2019 | Brussels, Belgium

Paediatric Malignancies
1-3 December 2019 | Utrecht, The Netherlands

Multidisciplinary Management of Brain Tumours
1-3 December 2019 | Brussels, Belgium

POSTGRADUATE COURSES OUTSIDE EUROPE

3D Radiotherapy with a Special Emphasis on Implementation of MRI/CT Based Brachytherapy in Cervical Cancer
14-17 March 2019 | Rishikesh, India

Palliative care and Radiotherapy
A course on prognosis, symptom control, re-irradiation, oligometastases
26-28 March 2019 | Manila, Philippines

Combined Drug-radiation Treatment: Biological Basis, Current Applications and Perspectives
7-9 June 2019 | Seoul, South Korea

Multidisciplinary Management of Head and Neck Oncology
Date to be confirmed | Mexico City, Mexico

Advanced Technologies
China and India

PRE-MEETING COURSES

Eight Pre-Meeting Courses at ESTRO 38
26 April 2019 | Milan, Italy

UNDERGRADUATE COURSES

Medical Science Summer School Oncology for Medical Students
15 -27 July 2019 | Vienna, Austria

ESO-ESSO-ESTRO Multidisciplinary Course in Oncology for Medical Students
26 August - 6 September 2019 | Turin, Italy

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

YOUNG ESTRO

INTRODUCTION

REPORT ON THE EARLY BREAST CANCER TRIALISTS' COLLABORATIVE GROUP

COURSE REPORT ON BRACHYTHERAPY FOR PROSTATE CANCER

MOBILITY REPORT

YOUNG ESTRO

"Don't forget to submit your abstract for ESTRO 38"

Welcome to the Young Corner. We hope you had a relaxing summer and productive return to work.

In this issue, we have a report from Icro Meattini of the Department of Radiation Oncology at the University of Florence, Italy, on the Early Breast Cancer Trialists' Collaborative Group's (EBCTCG) 11th Main Meeting, which was held in June in Oxford, UK. It is an interesting insight into the work of one of the most prominent cooperative groups in breast cancer oncology.

Also in the Corner, Andreia Ponte, a trainee in radiation oncology at the Centro Hospitalar e Universitário de Coimbra, in Portugal, and recipient of the Felix Mick Brachytherapy Award, reports on the ESTRO teaching course 'Brachytherapy for prostate cancer', which was held in Avignon, France, in June.

We also feature a mobility report. Giuseppina Di Marco, Paola Ceroni and Stefania Morselli from the Department of Radiation Oncology at the Modena University Hospital, in Modena, Italy, visited the Department of Radiation Oncology at the Medical University of Vienna, Austria, to learn more about the integration of imaging information into the planning process for invasive brachytherapy applications in cervix cancer.

For young medical physicist members, there's the 2nd ESTRO physics workshop, Science in development, 26-27 October 2018, in Malaga, Spain. Please follow the latest news about the workshop on the ESTRO website and young ESTRO Facebook page and don't forget to register.

Finally, don't forget to submit your abstract for ESTRO 39, which will take place in Milan, Italy, from 26-30 April 2019. The submission deadline (22 October 2018) is fast approaching.

We hope you enjoy this issue of the Young Corner and wish you a rewarding autumn.

Kathrine Røe Redalen and Pierfrancesco Franco

KATHRINE RØE REDALEN

PIERFRANCESCO FRANCO

YOUNG ESTRO

Early Breast Cancer Trialists' Collaborative Group (EBCTCG)

11th Main Meeting

24-26 June 2018, Said Business School, Oxford, UK

Meeting report by Icro Meattini

View of Balliol College, Oxford

ICRO MEATTINI

The Early Breast Cancer Trialists' Collaborative Group (EBCTCG) 11th Main Meeting has just ended. Held every four years, the meeting is a great opportunity for exchange of knowledge and interesting updates on the hot topics of oncology and future perspectives.

In high-income countries, most breast cancers are diagnosed at an early stage, when all detected deposits of the disease are in the breast or nearby lymph nodes and can be removed surgically. Although most women with early breast cancer now survive, some have undetected deposits of cancer cells remaining after surgery in, or near, the breast, or at distant sites. These can lead to a recurrence, even many years later. Hence, in addition to surgery for early breast cancer, several adjuvant treatments may also be given – most commonly radiotherapy, various different types of chemotherapy and endocrine therapy. These treatments act directly on cancer cells, ▼

Plenary at the Said Business School

Professor Lorenzo Livi and Dr Icro Meattini at the EBCTCG 11th Main Meeting

although, unfortunately, they can also damage healthy cells. Early clinical trials have established that the benefits outweigh the risks for most patients, so the focus of many recent trials is to identify more efficacious and/or least toxic radio- and chemotherapy regimens [1].

To assess the long-term benefits and side effects of this wide range of treatment options, over the past 50 years there have been several hundred randomised trials of various aspects of the treatment of early breast cancer, involving several hundred thousand women. To understand this huge body of evidence, every few years since 1985, the EBCTCG has brought together all the evidence on the major questions for central analysis. It continues to do so, with the emphasis being on large-scale randomisation and long-term follow-up. The EBCTCG involves almost all trialists worldwide who have done relevant randomised trials of the treatment of women with breast cancer, inviting them periodically to send data on each individual woman randomised in each relevant study. Several hundred research groups have shared individual patient data on more than 450,000 women in 400 randomised trials for meta-analyses that have produced definitive estimates of the effects of various treatments on time to recurrence, breast cancer death, second cancers and death from other causes [2].

At this year's meeting, several updates from recently published meta-analysis were presented: long-term outcomes for neo-adjuvant versus adjuvant chemotherapy in early breast cancer [3], risks of breast-cancer recurrence after stopping endocrine therapy at five years [4], the risks of breast cancer radiotherapy from modern radiation doses to the lungs and heart [5], adjuvant bisphosphonate treatment in early breast cancer [6], aromatase inhibitors versus tamoxifen in early breast cancer [7], and the effect of radiotherapy after mastectomy and axillary surgery on recurrence and breast cancer mortality [8].
It was a great and inspiring opportunity to attend this meeting of such an important cooperative group. The EBCTCG findings are widely used in consensus statements, clinical guidelines, decision aids, and treatment decisions around the world. They have influenced the care of millions of women over the last 30-40 years, making a major contribution to the large falls worldwide in breast cancer mortality seen over recent decades.

Icro Meattini, MD
Radiation Oncology Unit
University of Florence, Italy

REFERENCES

[1] https://www.ctsu.ox.ac.uk/research/ebctcg.

[2] http://gas.ndph.ox.ac.uk/ebctcg.

[3] Long-term outcomes for neoadjuvant versus adjuvant chemotherapy in early breast cancer: meta-analysis of individual patient data from ten randomised trials (*Lancet Oncol* 2018; 19: 27-39).

[4] 20-year risks of breast-cancer recurrence after stopping endocrine therapy at 5 years (*N Engl J Med* 2017; 377: 1836-1846).

[5] Estimating the risks of breast cancer radiotherapy: evidence from modern radiation doses to the lungs and heart and from previous randomized trials (*J Clin Oncol* 2017; 35: 1641-49).

[6] Adjuvant bisphosphonate treatment in early breast cancer: meta-analyses of individual patient data from randomised trials (*Lancet* 2015; 386: 1353-61).

[7] Aromatase inhibitors versus tamoxifen in early breast cancer: patient-level meta-analysis of the randomised trials (*Lancet* 2015; 386: 1341-52).

[8] Effect of radiotherapy after mastectomy and axillary surgery on 10-year recurrence and 20-year breast cancer mortality: meta-analysis of individual patient data for 8135 women in 22 randomised trials (*Lancet* 2014; 383: 2127-35).

YOUNG ESTRO

Brachytherapy for prostate cancer

14-16 June 2018
Avignon, France

Course report by Andreia Ponte, recipient of the Felix Mick Brachytherapy Award 2018

ANDREIA PONTE

Panoramic view of the city from the left bank of the Rhône River

It was a pleasant surprise when I received the news that I'd been chosen as the winner of the Felix Mick Brachytherapy Award 2018. When I applied, I never imagined I would win, and I'm very grateful. The award is designed to support young radiation oncologists to continue their education and training and comprised full support for taking part in the ESTRO teaching course 'Brachytherapy for prostate cancer'.

The course took place in Avignon, a medieval city in south-eastern France on the bank of the River Rhône. Like all the other ESTRO courses that I've attended it was a great course. One of its best features was that we were a small group (only 30 people) leading to easy interaction between teachers and participants. For example, we were able to ask questions and clarify issues during oral presentations, and we also shared our own experiences. This meant that we learned a lot from each other as well as from the experts.

The sessions covered all the important topics around prostate brachytherapy, including aspects related to low dose rate (LDR) and high dose rate (HDR) applications, indications, dosimetry planning, acute and late toxicity, complications and also some hot topics like focal brachytherapy. There was also space for industry, represented by Eckert & Ziegler BEBIB®, Elekta® and Varian®, to show their products (templates, applicators etc) and their planning systems devices on site. Over two-and-a-half days of ▼

Palais des Papes, the largest Gothic palace in all of Europe with the cathedral Notre-Dame des Doms on the left

My colleague Dr José Antonio Rullán from Madrid, Spain, and I receiving the Felix Mick Brachytherapy Award 2018 certificate onsite at the course, given by Dr Adina Esterlin, Eckert & Ziegler BEBIG general manager

The old city seen from the Ile de la Barthelasse, one of the biggest river islands in Europe

intense learning about prostate brachytherapy, participants increased their knowledge of this field.

As well as the academic side of the course there was some time to explore Avignon, which was an amazing surprise. The old town is located inside walls built during the 14th century when the papacy left Rome and shifted its official residence to Avignon until 1377. It left behind a wonderful set of gothic architecture buildings, which are now listed as UNESCO World Heritage sites. There are many places worth visiting, namely the Palais des Papes, a huge palace that dominates the city skyline; the Petit Palais, where you can find art exhibitions; the Cathedral Notre-Dame des Doms, with its large golden St Marie des Doms on the top of the dome; and the Avignon bridge, also known as Pont Saint-Bénézet, famous around the world as the subject of the children's song "Sur le pont d'Avignon". I certainly returned to Portugal enriched by knowledge and culture.

I couldn't finish this review without thanking the young ESTRO committee for choosing me to receive this award. I would also like to thank Eckert & Ziegler BEBIG who supported me, especially Sebastian Mildschlag who made every effort to arrange everything in one week. Finally, I would like to thank Pierfrancesco Franco, co-editor of the Young Corner, for the invitation to describe my experience in the ESTRO newsletter.

Andreia Ponte
Radiation oncologist in training
Centro Hospitalar e Universitário de Coimbra, Portugal

YOUNG ESTRO

MOBILITY REPORT

Integration of image information into the planning process and invasive radical cervix applications

14-25 May 2018
Department of Radiation Oncology of the Medical University of Vienna, Austria

Department of Radiation Oncology of the Medical University of Vienna, Austria

GIUSEPPINA DI MARCO

PAOLA CERONI

STEFANIA MORSELLI

The aims of the visit

The brachytherapy team at the University Hospital Modena, Italy, is planning to improve the integration of advanced imaging into the brachytherapy workflow and to expand our normal intracavitary treatments with invasive applications.

To support this process, three members of the group (a physician, physicist and nurse) visited the Department of Radiotherapy at the Medical University of Vienna, Austria, which has been instrumental in advancing modern brachytherapy techniques over the last few decades.

Our centre concentrates on gynaecological brachytherapy. The main goal for the visit was to expand our knowledge regarding advanced treatment planning and integration of imaging, the cornerstones of successful brachytherapy, in order to improve our clinical workflow. The visit had two primary objectives:

- To observe and adapt for the local situation in Modena optimised integration of image information (mainly MRI) into the treatment planning process
- To learn how to add invasive applicators to the currently available standard geometries used in Modena, to improve target coverage in geometrically complex advanced cervical cancer cases. ▼

Content of the visit

We decided to apply to visit the Medical University of Vienna as it has the largest academic department for radiation oncology in Austria, and one of the largest in Europe with a high brachytherapy caseload, using the most advanced technology. Although the department uses brachytherapy in various types of cancer treatment, it is best known for its development of image-guided adaptive brachytherapy (IGABT) for cervical cancer. The department is a major driver and author of Groupe Européen de Curiethérapie (GEC)-ESTRO recommendations and it is the study coordinator of EMBRACE, a multicentre study on MRI-guided brachytherapy in locally advanced cervical cancer.

As the gynaecological GEC-ESTRO network coordinator, the radiation oncology staff have organised several ESTRO teaching courses on gynaecological brachytherapy.

Our visit began with a formal introduction to IGABT for gynaecology combining intracavitary-interstitial techniques.

The ability to perform MRI before each brachytherapy implant allows clinicians to adapt the dose given to each patient considering not only the position of organs at risk but also tumour regression.

The major advantage of IGABT is that it enables you to deliver higher doses to tumour volume to improve local control with a concomitant decrease in local failure and morbidity. It is an approach that had recently been proven to result in improvements in oncological outcomes.

During the clinical observation programme, we were given guidance by the physicians Alina Sturdza and Maximilian Schmid and clinical physicist, Daniel Berger. They recommended different approaches to contouring tumour targets and organs at risk as well as appropriate dose volume parameters for image-guided brachytherapy when treating locally advanced cervical cancer. We observed different types of implants for various gynaecological cancers.

For each of these cases we had the chance to evaluate imaging techniques (MRI and ultrasound), target definition and organs at risk contouring, treatment planning and patient care and clinical assessment.

We really appreciated the department's in-depth expertise in advanced brachytherapy. Staff were very kind and provided us with a plethora of information, doing their best to give us the opportunity to practice our contouring and treatment planning skills.

Alongside this fantastic clinical experience we were also able to get to know Vienna. It is an amazing city, and, as we walked around, we were able to take in its magical atmosphere with its elegant buildings, abundance of live music and rich history. In particular, we enjoyed Vienna's gardens and parks, especially the Volksgarten, which is home to more than 200 types of roses. In May, when we visited, the garden was full of lovely colour and fragrances.

From left to right: Stefania Morselli (nurse), Paola Ceroni (physicist) and Giuseppina Di Marco (MD)

After our training in Vienna we plan to introduce image-guided adaptive intracavitary-interstitial brachytherapy (ultrasound, MRI-based) into the clinical routine, adding invasive applicators to the currently available standard geometries used in Modena. ▼

Given the facilities that we have in Modena, we will proceed to apply EMBRACE recommendations, particularly as far as they concern target volume definition, organ at risk contouring and dose volume parameter reporting.

We enjoyed the visit very much, gaining a deeper understanding of the clinical potential of brachytherapy. We will seek further opportunities to improve our knowledge and proficiency in order to be able to give the best possible care to our patients.

This great opportunity also further strengthened the relationship between members of our team. It was an amazing experience that helped us grow. We are very grateful to ESTRO for the opportunity.

Giuseppina Di Marco, Paola Ceroni and Stefania Morselli
Department of Radiation Oncology at the Modena University Hospital
Modena, Italy

Burn-out syndrome in radiation oncology professionals

Help us to understand the syndrome better by participating in a survey

Radiation oncology professionals are exposed to a range of stresses in their work environment and can be prone to developing burn-out syndrome. Personality traits may predispose individuals to develop this syndrome. Being aware of potential risk factors may help in implementing protection strategies for radiation oncology professionals.

This survey has been developed by the young ESTRO committee as part of a project to investigate whether personality traits such as alexithymia (low level or lack of ability to describe emotions in the self) and empathy (capacity to understand or feel someone else's experience from his / her perspective) affect the likelihood of developing burn-out syndrome.

The survey is aimed at radiation oncologists, RTTs, medical physicists and radiobiologists worldwide, and is completely anonymous.

The results will be presented at ESTRO 38 in Milan, Italy, in April 2019.

To find out more and participate in the survey, visit: www.surveymonkey.com/r/3FLK57L

MAKE IT HAPPEN

MAKE IT HAPPEN

Introducing the Radiation Oncology Safety Education and Information System (ROSEIS) platform

Interview with Mary Coffey, Chair of the ESTRO Radiation Oncology Safety and Quality Committee (ROSQC)

ROSEIS

MARY COFFEY

What is the concept of the ROSEIS platform?

The concept of the ROSEIS in the beginning was to encourage reporting to an anonymous international platform to increase learning from incidents and near incidents. History has shown that the same incidents frequently occur in many different centres and therefore the aim was to try to reduce the number of incidents, or at least, to reduce their impact by sharing this information and learning from the experience of others.

How was the project initiated? Why was it needed?

The radiation oncology safety and quality committee initiated the project based on international experience and developments in the area of risk management and learning from incidents and near incidents globally. It was considered necessary to support the ESTRO membership in meeting the legal requirement of Directive 2013/59/EURATOM. Article 63 of this Directive requires radiotherapy clinics / centres to 'minimise the probability and magnitude of accidental and unintended exposures of individuals […] to study the risks, to record and analyse accidental and unintended exposures and to disseminate information'.

For whom has it been developed?

The ROSEIS platform has been developed for the radiotherapy community and, in particular, ESTRO members. The aim is also to increase the dataset to support greater learning for the wider community.

How can it support radiotherapy professionals in their practice?

ROESIS can support radiotherapy professionals in their practice by enabling wider sharing and learning from the experience of others with respect to incidents and near incidents that occur daily in all our practices. It will encourage acknowledgement of near incidents and minor incidents through the process of reporting, learning and analysis both locally and throughout the ESTRO community. It will also be useful for centres that have not yet developed their own reporting and learning system as it can also be used as a local platform.

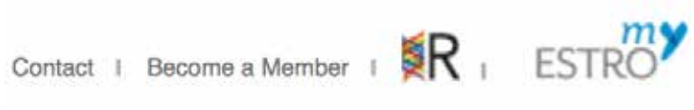
What are the future developments?

All information on incidents or near incidents is anonymous and no patient or clinic / centre-related detail is accessible outside the local setting. Increasing the safety of radiotherapy is central to best practice. Sharing knowledge and information on incidents and near incidents with the wider community promotes a greater awareness of risks and how they can be minimised. The ROSEIS platform will contribute to this wider sharing and learning and has the potential to become an important tool in promoting safer radiotherapy practice. The long-term aim is to liaise with other reporting and learning systems internationally and to analyse data to identify common trends or high-risk areas and to disseminate information based on the findings to the wider community. ▼

The success of the project is dependent on the input from the ESTRO membership initially and we would encourage centres / clinics to share their information in order to promote and improve safer practice across the community.

How can I access the platform?

ESTRO members will be able to access the system by logging onto the ESTRO website and clicking on the ROSEIS link. This will allow you to view anonymised reports that have been submitted. To register to use the system and to report incidents and near incidents, members must contact: roseis@estro.org at the ESTRO office who will arrange access and ensure that anonymity is secured.



JOIN WORLD CANCER RESEARCH DAY

24 September 2018

Support this global initiative to raise awareness of cancer research

This year, Monday 24 September is World Cancer Research Day (WCRD). WCRD is a global initiative supported by the main cancer research organisations worldwide, with the purpose of increasing social awareness and knowledge about the value and impact of cancer research efforts.

WCRD is based on the World Declaration for Research on Cancer, which calls for the active involvement of citizens, enterprises, institutions and leaders in diverse areas and activities to join efforts to promote research in order to reduce the number of people who develop cancer, and to improve survival rates and the quality of life of cancer patients.

Join this movement. Join World Cancer Research Day.
Sign the World Declaration for Research on Cancer at
www.worldcancerresearchday.com

WORLD CANCER RESEARCH DAY
September 24th

CONFERENCES

FORTHCOMING CONFERENCES

ESTRO EVENTS

CONGRESSES

ESTRO meets Asia
7-9 December 2018
Singapore

7th ICHNO - International Congress on Innovative Approaches in Head and Neck Oncology
14-16 March 2019
Barcelona, Spain

ESTRO 38 - Targeting optimal care, together
26-30 April 2019
Milan, Italy

WORKSHOPS

2nd ESTRO Physics Workshop - Science in Development
26-27 October 2018
Malaga, Spain

6th GEC-ESTRO Workshop - Performing Optimal Brachytherapy
29-30 November 2018
Brussels, Belgium

ESTRO MEETS ASIA 2018

7-9 December 2018
Singapore

DEADLINES

Late registration:
5 November 2018

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RADIOTHERAPY
& ONCOLOGY

ESTRO meets Asia

In figures

1ST
EDITION

4
MONTHS TO GO!

403
PARTICIPANTS
REGISTERED SO FAR

29
COMPANIES

34
COUNTRIES REPRESENTED

289
SUBMITTED ABSTRACTS

42
SESSIONS

61
CONTRIBUTORS

ESTRO meets Asia

Interview with Professor Vincenzo Valentini and Professor Shyam K. Shrivastava, Chairs of 'ESTRO meets Asia'

VINCENZO VALENTINI

SHYAM K. SHRIVASTAVA

"The congress is a compelling platform to share and to support the shaping and growth of the radiation oncology discipline"

Which professions in the radiation oncology community are invited to participate in the first 'ESTRO meets Asia' congress?

The meeting will be relevant to any professional who is engaged in sharing, shaping and supporting the growth of radiation oncology in Asia and Oceania. Such a broad audience reflects the diversity and richness of our discipline and this will be one of the main strengths of the congress.

What do you think are the strongest assets of the congress?

We believe the congress relies on its multidisciplinarity and its internationality, which contribute to the collegial aspect I have just mentioned. But I would definitely add, as one of the strongest assets, the synergy with our Asian and Australian colleagues, which is of key importance in the set-up of the meeting. This synergy was clearly expressed through the international profiles of the advisory committee, where a mix of clinicians, radiation therapists and medical physicists were represented and who came from such diverse parts of the globe as Japan, India and Australia, as well as Belgium, Germany, Ireland and Italy. We worked very closely together to tailor a scientific programme that would serve the objective of the meeting: to present to participants all the different perspectives in radiation oncology practice, and, ultimately, to highlight the multi-dimensional aspect of the growth of radiotherapy in Asia.

Why would you say that participating in this conference is key for an audience coming from Asia, Australia and New Zealand as well as for European professionals?

It's key for professionals from Asia and Oceania to attend the 'ESTRO meets Asia' congress, mainly because they can build solid scientific and educational networks and they can compare notes and best practices with colleagues from Europe and beyond. As for European ▼

professionals, the congress is an opportunity to discover Asian innovations and breakthroughs in the field and to expand networks.

A total of 287 abstracts have been submitted for the event, which is quite a success for a first event, particularly as it takes place so far from the location of ESTRO's main audience. What would explain this enthusiasm?

It was indeed outstanding. We didn't expect to receive so many abstracts. We believe this success is due to the congress being perceived as a compelling platform to share, shape and support the growth of radiation oncology and of professionals in the field.

Do you already have an idea for the take-home message from the congress?

Let's join forces to achieve state-of-the-art radiation oncology in Asia and Oceania. We also imagine that we will address our partners on the importance of keeping an open dialogue with each other, to proactively contribute and agree on a shared vision.

Is the first 'ESTRO meets Asia' congress meant to be the first one of a long series?

Certainly! The first positive signals of this congress show that ESTRO is likely to become a solid scientific contributor within the Asian and Australian continents in line with the congress' ultimate objective, which is to share, shape and support the growth of radiation oncology in Asia. Organising meetings in Asia will contribute to growing the discipline there and to building strong and effective networks with our Asian and Australian partners. The 'ESTRO meets Asia' congress will also foster collaboration on agreed terms, with the Asian organisation FARO (Federation of Asian Organisations for Radiation Oncology) for our mutual benefit.

ESTRO meets Asia

Interview with the chairs of the Medical Physics and Radiation Therapist Programme Committee

MICHELLE LEECH

NATALKA SUCHOWERSKA

"The concept behind the programme is one of collegiality and shared experience"

Can you tell us about the medical physicists and radiation therapists' (RTT) programme at the 'ESTRO meets Asia' conference?

The concept behind the programme is one of collegiality and shared experience. Panel discussions on a range of current topics will enable the sharing of experiences, practices and approaches to problem-solving in radiation therapy across the Asia-Pacific region and Europe. There is so much that we can learn from each other. For this first 'ESTRO meets Asia' conference, the topics we have selected have a focus on everyday clinical practice: moving from 2D to intensity-modulated radiation therapy (IMRT), to dose planning and verification, image-guided radiation therapy (IGRT) and treatment verification, quality management and brachytherapy.

How did you go about selecting the speakers for the programme?

We received advice on selecting speakers from scientific advisory groups for both RTT and Medical Physics from both regions. We took care to ensure equal representation of speakers from the Asia-Pacific region and from Europe to ensure the true sharing of experience.

In total, 287 abstracts have been submitted to the conference – a real success for a first event, especially one held so far from ESTRO's main audience. What explains this enthusiasm?

ESTRO membership in the Asia-Pacific region has been steadily increasing. For RTTs, we have a specific membership option, called the RTT Alliance in which national societies can get ESTRO membership on behalf of their members. From the Asia-Pacific region, the national societies for both India and Bangladesh have taken advantage of this membership option and this has positively influenced the large proportion of abstracts that we have received from RTT colleagues in India for this programme.

For medical physics, several countries in the Asia Pacific region have strong and active ▼

teams, leading innovation in clinical practice. Others may be working under constrained circumstances but they find novel solutions to enable the delivery of safe and effective treatment. Many of the submitted abstracts reflect the need to share practices and innovations, the need for peer review and, potentially, to foster collaborations between parallel clinical practices, working together for a better outcome for our patients.

What are the main topics tackled in the abstracts submitted for the RTT and medical physics programme?

The accepted abstracts follow the selected topics of the programme, an overview of which will be provided by the invited speakers. One special session for proffered papers has been dedicated to a broad range of interesting topics to promote discussion. These include topics for RTTs on auto-contouring for education, and for physics on 3D printing, gel dosimetry and innovative dosimeters.

Is the professional practice of RTTs and medical physicists different in Europe and Asia?
Will the meeting help to shed some light on these differences?

We know already that the professional practice of RTTs and medical physicists varies widely within Europe. The Asia-Pacific region is no different. So there are likely to be lots of interesting ideas to share. This conference will offer many opportunities for discussion, but the key reason why RTTs and medical physicists from both regions will benefit from attending this conference is that it assembles radiation therapy experts from across two large regions of the world, creating a platform conducive to the true sharing of experience and the cross fertilisation of ideas. Ultimately, this will lead to a better outcome for all cancer patients.

Singapore city guide

ESTRO ASIA 2018

Late registration rate deadline:
5 November 2018

view the Scientific programme

7TH ICHNO

International Congress on innovative approaches in

HEAD & NECK ONCOLOGY

14-16 March 2019
Barcelona, Spain

DEADLINES

Abstract submission:
15 October 2018

Early registration:
6 November 2018

WWW.ESTRO.ORG

#ICHNO

ESTRO European Society for RADIOTHERAPY & ONCOLOGY

EHNS www.ehns.org

ESMO GOOD SCIENCE BETTER MEDICINE BEST PRACTICE

7th ICHNO

Interview with Dr Pierre Blanchard, Chair of the Scientific Advisory Committee for Radiation Oncology

PIERRE BLANCHARD

"Most European key opinion leaders in head and neck oncology will be present at the meeting, which will ensure high level talks"

Can you tell us what to expect from the scientific programme?

The meeting will be very multidisciplinary and will cover innovative research as well as pragmatic issues in surgery, radiation oncology and medical oncology for head and neck cancer patients. It will include proffered papers sessions, as well as six keynotes, four symposia, two debates and interactive tumour boards. Advances in pathology and also survivorship will be important features of the meeting. The approach we have tried to follow is to propose state-of-the-art lectures but with the aim of providing useful information not only for researchers, but also for the daily care of our patients. As an example, we have scheduled sessions on the practical issues with the 8th TNM classification and its clinical implementation, and on the implementation of the AHNS survivorship guidelines, along with top-level talks on the molecular and immune landscape of head and neck cancers.

What are the sessions you are looking forward to the most?

I am looking forward to the sessions on the immune landscape and immunotherapy alone or in combination with radiotherapy as this is a major development in our field; I'm also looking forward to hearing about the technical developments in surgery and the integration of imaging in radiotherapy. It is too early to know the content of the proffered papers sessions, but they always provide very innovative material and interesting sessions. Lastly, I love debates, and the two debates that are currently scheduled should be very attractive. The first one will discuss whether radiomics will change clinical practice (Philippe Lambin versus Vincent Grégoire) and the second one on whether immunotherapy will replace chemotherapy (Sandrine Faivre versus Kevin Harrington). These are important questions in daily routine, and having them presented by such experts and avid debaters will be a highlight of the meeting. ▼

Do you already know the profile of some of the speakers?
Most European key opinion leaders in head and neck oncology will be present at the meeting, which will ensure high level talks as well as interactive sessions with questions and debates. All fields will be represented. Radiation and medical oncology speakers from North America are also on the programme.

The abstract submission deadline is on 13 October 2018. Which topic do you think will be the most popular, and why?
I expect we will have submissions on the current hot topics of the moment; for example, immunotherapy, prognostic and predictive biomarkers and their ability to guide treatment decisions, HPV-related tumours, the expanding role of minimally invasive surgery in oropharyngeal cancer and beyond, and the prediction and minimisation of acute and late toxicities, among many others.

Why is ICHNO a 'must attend' event for anyone with an interest in head and neck oncology?
I think that head and neck oncology is a truly multidisciplinary field. We all rely on each other and on the team to achieve excellence in patient care. ICHNO embodies that vision and helps bring together surgeons, radiation and medical oncologists, but also pathologists, biologists, physicists, speech and language therapists and patients. It is from these smaller, focused meetings that new ideas emerge that are potentially practice-changing.

Every specialist, clinician or researcher with a focus on head and neck oncology should attend the meeting. We all need to raise the debate, spread the word in the real world and on social media in pursuit of our common goals to improve cure rates for head and neck cancers and to reduce acute and late treatment-related morbidity.

Abstract submission:
13 October 2018

More information:
www.estro.org/congresses-meetings

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 from:
27 March 2019

WWW.ESTRO.ORG

#ESTRO38

ESTRO
European SocieTy for
RADIOTHERAPY
& ONCOLOGY

WELCOME LETTER

On behalf of the Scientific Advisory Group, it is our honour and pleasure to invite you to ESTRO 38, the annual congress of ESTRO that will take place 26-30 April 2019 in Milan, Italy.

ESTRO 38 will offer to us all, as professionals of oncology, the chance to share knowledge, practice and advances in the field, within the ever warm and dynamic environment of the ESTRO meetings.

'Targeting optimal care, together' will be the theme of ESTRO 38 and through these few, however impactful words, the scientific and organising committees would like to put a spotlight on the multiprofessional and multidisciplinary aspect of our specialty. The theme also represents our strength: we are all working towards a common goal for improved patient outcomes, and this will be expressed throughout the scientific programme.

UMBERTO RICARDI

Targeting: the concept is inherent to the radiation oncology specialty, and certainly well in line with the modern concept of precision medicine.

Optimal care: the value and the cost of radiotherapy are an inseparable part of the equation for optimal treatment. Although the clinical outcome of our patients is the priority in our daily practice, this cannot happen without common efforts to improve the access to treatment for all cancer patients.

Together: the radiation oncology community is a mosaic of various stakeholders: medical and scientific communities, industry, national societies as well as oncology organisations, institutes, patients and advocates. We all join forces.

The interdisciplinary component of the scientific programme will include sessions on the following topics:

- Artificial intelligence in radiation oncology: role and potential
- Radio-immunotherapy
- Adaptive radiotherapy (ART) guided by early response (adapting the adaptive!)
- Adaptive radiotherapy (ART): reactive or proactive?
- MR machines and treatment adaptation
- Clinical trials for particle therapy: which ones to run and how?
- The DNA damage response with radiotherapy
- Radiotherapy biomarkers: a confluence of imaging, genetics and pathology
- Cardiac substructures and toxicity
- Predictive models of toxicity and big data, big open issues
- The role of hypofractionation in current radiotherapy and its impact in planning radiotherapy services
- Palliation in radiotherapy - How much is enough?
- Are adolescents and young adults (AYA) a specific patients' population?
- Plan of the day. General gains of performing
- Re-irradiation for breast cancer
- Extreme hypofractionation in the treatment of localised prostate cancer
- Radiotherapy in bladder cancer: standard of care and future perspectives
- Which is the best technique for the delivery of APBI?
- From discovery to cure
- Dose painting - what is the reality?
- Inflammatory environmental factors and radiation response

- Functional imaging in radiotherapy: from biology to guidance
- Role of ablative treatments in oligometastatic disease.

With symposia, proffered papers sessions and debates, ESTRO 38 will offer ample opportunities to learn about cutting-edge research from leading scientists.

A strong educational platform will also feature worldwide experts who will give pre-meeting courses, teaching lectures, contouring workshops and multidisciplinary tumour boards during five days.

The Young Scientists Track has now become a not to be missed event within the congress with a one-day programme tailored to the young audience. On the agenda are: lectures, symposia and networking opportunities.

ESTRO's annual congresses feature the largest exhibition in radiation oncology in Europe with an increasing number of exhibitors year after year. Be there and get a chance to meet all the industry leaders showcasing the latest developments in the radiotherapy and oncology fields.

Finally, I'm proud to be part of a society that places quality at the heart of all its scientific activities. The state-of-the-art science presented by worldwide participants at the ESTRO annual congresses impresses me each year. Today I'm inviting you to take note of the abstract deadline: submit your work by 22 October 2018 and be part of this outstanding scientific programme.

We look forward to welcoming you in elegant and majestic Milan, where we hope you will join us to make ESTRO 38 a memorable event for the radiation oncology community.

With warm regards,

Umberto Ricardi
ESTRO 38 Chair

Abstract submission:
22 October 2018 (23:59 HRS CET)

More information:
www.estro.org/congresses-meetings

ESTRO
PHYSICS
workshop

Science in development

26-27 October 2018 | Malaga, Spain

WORKSHOP TOPICS

- Strategies for patient specific QA pre-treatment or *in vivo*
- Predictive models of toxicity in RT
- Improving range accuracy in particle therapy
- Realtime and adaptive management of anatomical variations
- Quantitative imaging for treatment planning

REGISTRATION:
Early, extented to 12 September 2018
Late, 18 October 2018

Please note that as the month of October is still 'high season' in Malaga, hotels may book up very quickly.

www.estro.org

#ESTROPW2

6

GEC - ESTRO workshop

Performing optimal brachytherapy

29-30 November 2018
Brussels, Belgium

REGISTRATION OPENS
Early June 2018

DEADLINES
Early registration:
29 September 2018

Late registration:
13 November 2018

No desk registration.

www.estro.org

#GECESTROW6

CONFERENCES

FORTHCOMING CONFERENCES

ENDORSED BY ESTRO

2nd International Workshop Ultra high-dose rate flash radiation therapy ▶▶

12-13 September 2018

Lausanne, Switzerland

XVI annual Tata Memorial Hospital radiotherapy practicum: Image-guided radiotherapy – a radiation therapist's perspective ▶▶

15-16 September 2018

Mumbai, India

ImmunoRad International Conference ▶▶

20-22 September 2018

Paris, France

BRAVO symposium ▶▶

17 November 2018

Brussels, Belgium

2ND INTERNATIONAL WORKSHOP

Ultra high-dose rate flash radiation therapy

12-13 September 2018
Paternot auditorium
Agora Cancer Center
Lausanne, Switzerland

www.chuv.ch/fr

This workshop is dedicated to Flash ultra-high-dose-rate irradiation, a highly innovative and promising radiation therapy approach. The workshop will feature testimony from international groups currently using the Flash approach. As well as benefitting from these insights, participants will be able to network with pioneers in the field, developing their understanding of how Flash works and accelerating its transfer into clinical practice.

- Physics and dosimetry, physico-chemistry of FLASH-RT
- Biological response after FLASH-proton exposure
- Biological response after Microbeam RT-synchrotron
- Biological response after FLASH-RT
- Very High Energy Electron approaches
- FLASH-RT Clinical Transfer

Registration required by email:
marie-catherine.vozenin@chuv.ch
sarah.Jorge-Lourenco@chuv.ch

A registration fee of CHF 50 will be required from the participants. This will be payable on site.

XVI ANNUAL TATA MEMORIAL HOSPITAL RADIOTHERAPY PRACTICUM:

Image-guided radiotherapy – a radiation therapist's perspective

15-16 September 2018
Mumbai, India

Image-guided radiotherapy (IGRT) has become an integral part of modern radiotherapy treatment, and has the potential to improve the accuracy of radiation contouring, planning and delivery. In doing so, it can improve the therapeutic ratio and lead to the development of motion management and adaptive radiotherapy techniques. There is a great interest in the application of IGRT to different cancers sites, particularly in relation to head and neck, thoracic and pelvic malignancies.

While IGRT is now available at an increasing number of centres across India, its routine use is limited by the uncertainties in the understanding of workflow and challenges in the methods of implementation. Radiation therapists (RTTs) play a crucial role at various steps when image guidance is integrated with the radiotherapy treatment process. There is, however, a large gap in the systematic training of RTTs for these modern radiotherapy applications throughout India.

The Department of Radiation Oncology and Medical Physics at the Tata Memorial Centre, Mumbai, India, is hosting the XVI TMH Annual Radiotherapy Practicum from 15-16 September 2018. This year's course is endorsed by ESTRO. This will be the first time an exclusively hands-on training course for RTTs has been held in India.

Recognising the financial challenges faced by RTTs, the registration fee has been kept low to ensure good participation. The fees are:

- INR 1,000 per person (for applicants from India and South Asian Association for Regional Cooperation (SAARC) countries);
- $200 (for applicants from other countries).

The course is limited to 60 participants. Applicants with IGRT facilities at their centre will be preferred.

Interested candidates should apply by sending their pre-registration form by email to: tmhpracticum@gmail.com

The deadline for returning the form is 30 June 2018. Forms are available at our website: https://tmc.gov.in/m_events/Events/EventDetail?id=999&type=6&pg_tp=conf

The course will provide an invaluable opportunity for RTTs to develop their understanding of the practical aspects of IGRT with the help of expert international and national faculty.

ImmunoRad International Conference

20-22 September 2018
Paris, France

The third edition of the ImmunoRad International Conference will take place in the Centre de Recherche des Cordeliers, Paris, France, from 20-22 September 2018. It is organised by Gustave Roussy and Weill Cornell Medicine, in partnership with *The Lancet Oncology*, the conference's media partner.

The ImmunoRad conference brings together radiation and medical oncologists as well as radiobiologists and immunologists to plan the next generation of strategies for tackling cancer. Exploiting the vaccination-like properties of radiation coupled to immuno-modulators has resulted in promising clinical efficacy leading to new hope for managing metastatic malignancies. In addition, recent treatment approaches combining immunotherapy with radiotherapy have been shown to modify the tumour microenvironment, triggering a long-lasting effect with eradication of distant metastases outside the radiation field (the so called 'abscopal' effect); this is currently opening new therapeutic avenues for the treatment of hard-to-treat disseminated cancers. Against this background, the ImmunoRad conference has been designed to focus on efficient combination strategies, their associated molecular mode of actions and optimal responsive patient selection.

Scientific presentations, brainstorming and networking, sessions devoted to innate sensors, macrophages, T cells, oncolytic viruses and microbiota will shed light on mechanisms regulating anti-cancer immune responses over the two and a half days of the meeting.

Importantly, there will also be presentations on technological developments associated with radiomics, mathematical modelling and biomarker discoveries.

The conference will be held in the beautiful and historic Latin Quarter in Paris, and will be chaired by Professors Eric Deutsch and Silvia Formenti. As well as featuring presentations from key European and US opinion leaders working in the field, the conference will offer networking opportunities for pre-clinical specialists and clinical investigators fostering new clinical transfer opportunities.

To register and see the programme, visit: www.immunorad.fr

Here are six other reasons for you to join the conference:

- The Society for Immunotherapy of Cancer-sponsored primer session on the basics of cancer immunology and immunotherapy is accredited for continuing medical education (CME)
- The conference will cover the latest radiotherapy / immunotherapy combinations from the basics to their clinical application
- It will feature innovative clinical trial designs
- Keynotes presentations will be given by Laurence Zitvogel (microbiome), Guido Kroemer (immunological cell death), Ralph Weichselbaum (oligometastasis), William McBride (imunogenicity) and George Coukos (microenvironment)
- There will be networking and satellite meetings with opportunities to hear from key opinion leaders in immuno-radiotherapy
- The poster session includes travel grants for the best submitted abstracts and a €1,000 prize for the best poster.

BRAVO symposium

17 November 2018
Brussels, Belgium

"Fighting breast cancer with innovative radiotherapy… is it for everyone?"

Every year, breast cancer affects about 1.7 million patients worldwide. Today, it is a highly curable disease for the majority of people. Radiotherapy plays an essential role in the treatment of breast cancer. The addition of radiotherapy leads to a clear reduction in the risk of local relapse and for every four local relapses prevented, one breast cancer death can be prevented. However, this benefit comes at a cost: with older radiotherapy techniques, side effects like impaired cosmetic outcome, cardiac injury and secondary cancers in the lung and contralateral breast were reported. Innovative radiotherapy techniques enable us to improve the dose delivery to the breast and lymph nodes, but also allow better sparing of the adjacent normal tissues, such as the heart, lungs, oesophagus, thyroid and contralateral breast. Making these new technologies available to all patients is very important since the majority of breast cancer patients live for decades after their treatment. High-quality treatment should, therefore, not only focus on curing the disease, but also on reducing late side effects and improving quality of life of long-term survivors.

Against this background, the Belgian Radiation oncology Awareness and Visibility Organisation (BRAVO) is hosting a symposium on innovative radiotherapy techniques for breast cancer. National and international opinion leaders will stress the advantages of modern radiotherapy and the importance of making these technologies available to all patients. In addition, the patient's point of view will be illuminated in a patient testimonial and a presentation by the Belgian breast cancer organisation Think-Pink.

FIND OUT MORE:
www.bravo-radiotherapie.be

REGISTER:
www.eventbrite.com/e/bravo-symposium-2018-tickets

CALENDAR OF EVENTS

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

12-13 SEPTEMBER 2018 | LAUSANNE, SWITZERLAND

2nd international workshop on ultra high dose rate

www.chuv.ch

ESTRO ENDORSED EVENT

15-16 SEPTEMBER 2018 | MUMBAI, INDIA

XVI TMH Annual Radiotherapy Practicum

tmc.gov.in/m_events/Events

ESTRO ENDORSED EVENT

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

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

20-22 SEPTEMBER 2018 | PADUA, ITALY

14th Meet the Professor Advanced International Breast Cancer Course

meettheprofessor.accmed.org

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

4-6 OCTOBER 2018 | FLORENCE, ITALY

3rd Symposium on Stereotactic Body Radiation Therapy: From physics to clinic

www.symposium.it/en

ESTRO ENDORSED EVENT

8-10 OCTOBER 2018 | ROME, ITALY

28th Residential Course on Modern Radiotherapy and unconventional treatments fractionations, volumes and new drugs roma.unicatt.it/20180503_-_28_Course_program.pdf

roma.unicatt.it/2018-28-residential-course-modern-radiotherapy-and-unconventional-treatments-fractionations

ESTRO ENDORSED EVENT

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

2-4 NOVEMBER 2018 | RIMINI, ITALY

XXVIII National Congress AIRO 22 NOVEMBER 2018

https://www.airo2018.com

ESTRO ENDORSED EVENT

17 NOVEMBER 2018 | BRUSSELS, BELGIUM

BRAVO symposium 2018: Fighting breast cancer with innovative radiotherapy

www.bravo-radiotherapie.be/fr/bravo-symposium

ESTRO ENDORSED EVENT

22 NOVEMBER 2018| POZNAN, POLAND

Young Scientists Forum 2018

www.wco.pl/ysf2018/en

ESTRO ENDORSED EVENT

22-24 NOVEMBER 2018 | POZNAN, POLAND

Interdisciplinary oncology - time for modern solutions

www.onkologia2018.pl

ESTRO ENDORSED EVENT

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

8-9 DECEMBER 2018 | SHANGHAI, CHINA

The 3rd World Precision Medicine (China) Summit

wpmcs.com.cn

ESTRO ENDORSED EVENT

09-12 DECEMBER 2018 |MAASTRICHT, THE NETHERLANDS

Big data imaging

bigdata4imaging.info

ESTRO ENDORSED EVENT

14-15 DECEMBER, 2018 | ROME, ITALY

Sixth Annual UPMC International Symposium on Stereotactic Radiosurgery and Stereotactic Body Radiotherapy

www.estro.org/binaries

ESTRO ENDORSED 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

14-16 NOVEMBER, 2019 | LISBON, PORTUGAL

ABC5

www.abc-lisbon.org

ESTRO ENDORSED EVENT

CREDITS

ESTRO
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DEADLINES FOR SUBMISSION OF ARTICLES IN 2018 AND 2019
January-February 2019 > 2 November 2018
March-April 2019 > 2 January 2019
May-June 2019 > 2 March 2019
July-August 2019 > 2 May 2019
September-October 2019 > 2 July 2019
November-December 2019 > 2 September 2019

If you want to submit articles for publication, please contact the editor: cecile.hardon@estro.org

For advertising, please contact: valerie.cremades@estro.org

ARCHIVE
Latest issues of the newsletter can be found on the ESTRO website under www.estro.org/about and older issues are accessible on DOVE, from the home page of www.estro.org.

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