Method: Within SWWCC, patients who received > 45Gy radiotherapy for upper gastro-oesophageal cancers between January 2016 and August 2020 were analysed to assess splenic mean dose. Pancreatic cancers were included from January to August 2020.

Results: Of the 117 patients identified, 65 had received a mean dose to the spleen > 10Gy (55%). Only 1 of the 12 pancreatic cases identified were found to have a mean dose > 10Gy (8.3%). No patients received a mean dose > 40Gy. Work is ongoing to contact all patients identified, and initiate appropriate prophylactic lifelong antibiotics and vaccinations as per post-splenectomy local trust guidelines (4) (excluding patients with life expectancy < 3 months). Prospectively, hyposplenism is now included as a potential risk in standard consent. A radiotherapy induced hyposplenism pathway is under development to ensure all patients at risk are identified, counselled and treated as above in collaboration with our physics department, radiotherapy review treatment radiographers, clinical nurse specialists and general practitioner colleagues.

Conclusion: This project has identified the importance of identifying this cohort of patients as a high proportion of these patients are at potential risks of the complications of hyposplenism.

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Proffered papers: Breast

SP04.1   Audit of Recall Rate in High Risk MRI breast screening

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Introduction: BRCA gene mutation carriers and women who have had previous thoracic radiotherapy are classified as very high risk of developing breast cancer and are entitled to annual screening with MRI +/- mammogram over age 30. Further assessment is recommended for MRI detected indeterminate or suspicious masses ≥5mm, or non-mass enhancement ≥10mm. The minimum standard for recall rate is <10% with an expected standard of <7%. Nationally this has been difficult to achieve so this audit aimed to review recall rates and outcomes in a single breast screening unit.

Method: All high-risk screening MRIs conducted between January 2014 and September 2019 were reviewed including classification, type of follow up imaging and any biopsy results.

Results: There were 283 screening episodes between January 2014 and September 2019. Nineteen patients were recalled for assessment (12 prevalent screens, 7 incident screens), for an overall recall rate of 6.7%. The recall rate per year varied from 3% to 9% with no discernible trend. Five cancers were diagnosed (cancer detection rate 17.6/1,000; PPV for recall 26%). On retrospective review of recalls, 3 were deemed unnecessary. All 3 were before a protocol change to include subtraction images; in one case there was misinterpretation of diffusion weighted imaging.

Conclusion: In a centre with a small number of experienced MRI reporters and a rigorous protocol, it is possible to meet the expected recall rate standard. Diffusion weighted imaging is invaluable for increased specificity, especially in prevalent screens.

SP04.3   A service evaluation of a newly introduced KV-MV pair imaging protocol for five fraction breast treatments.

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NHS Tayside

Background: Publication of the FAST FORWARD trial and the impending consequences of the Covid epidemic resulted in the need to implement an alternative breast pathway locally. The dose and fractionation regime to be adopted was 26Gy in 5#. Due to the higher fractional dose it was felt that existing imaging verification methods, in beam MV imaging only, would be insufficient to ensure set-up accuracy.

Method: A new daily treatment KV-MV pair imaging strategy was devised and implemented to support the new dose and fractionation regime. The first 30 patients referred were evaluated on the basis of displacements and lung depth. The following local imaging tolerances were applied to each daily image: 10mm for displacements on initial online

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match, 5mm displacements a the second online match which was incorporated due to departmental technique and 5mm tolerances for the MV in beam imaging.

Results: Results indicate that out of a cohort of 30 patients, only two had discrepancies of >10mm on the initial imaging, one patient >5mm on the second online match, and six had >5mm on the in-beam images, which were concluded to be random errors owing to relaxation or patient movement.

Conclusion: Findings indicate that an initial KV-MV image pair combined with the MV in beam images is sufficient to ensure correct isocentre verification and thus the delivery of accurate treatment. This evaluation demonstrates that the second online match confirming initial displacements was not required and thus can be ceased for dose optimisation, saving time and unnecessary radiation exposure.

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SP04.4   Does yearly mammographic surveillance put a large group of younger breast cancer patients at further risk?

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[1]Northern Devon Healthcare NHS Trust; [2]University of Keele

Background and Objectives: National and international guidelines require women diagnosed with breast cancer at an early age to undergo numerous annual mammograms beyond diagnosis until screening age. This despite younger women having dense breast tissue with reduced mammographic sensitivity for detection of abnormalities, and the lifetime risk for developing radiation-induced cancer being highest in younger women. A current UK trial (Mammo-50) investigates targeted surveillance for patients over 50 years, but there is no known trial seeking change for younger women.

Ultimately: Could there be a targeted approach for follow-up of younger age women breast cancer groups? This study aims to investigate how many younger women are affected by non-targeted screening.

Methods: Younger women under 45 years who have undergone more than 5 years of annual mammograms are investigated for: grade of cancer diagnosis, breast tissue density, whether original cancer was mammographically occult, number of mammograms since diagnosis, and whether discharged from annual surveillance (including reason).

Results: UK-wide results suggests 9% of new breast cancers were diagnosed in women below 44years in 2014-2016. Sensitivity of surveillance mammography for detection of recurrence was 64-67% with a specificity from 85-97%, while sensitivity was reduced in patients with increased mammographic breast density to ~30%. This study seeks to determine the current accuracy of these figures.

Conclusions: Early results suggest that this is a rising population of breast cancer patients. The ultimate aim of the study is to determine whether a more suitable mammographic surveillance can be determined for this group of younger.

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SP04.5   Determining the accuracy of PerFraction™ for detecting clinically relevant changes for breast patients

Daniel Egleston; Rhydian Caines; Carl Rowbottom
The Clatterbridge Cancer Centre

Background: Surgical intervention and effects of radiotherapy for breast cancer patients may cause the breast to swell (Seppälä et al., 2019), while setup to orthogonal kV images for radiotherapy can leave some residual setup error (Feng

et al., 2015). Both effects can reduce dose to target volumes or increase the dose to organs at risk. PerFRACTION™ (Sun Nuclear Corporation) is a commercial software package for performing autonomous in-vivo 2D EPID-based transit dosimetry (Sun Nuclear Corporation, 2017). The aim of this study is to determine how accurately PerFRACTION™ can identify clinically relevant changes caused by breast swelling and shifts in patient setup.

Methods: An anthropomorphic phantom was used to simulate breast swelling margins and setup shift. 18 breast radiotherapy plans were created and delivered following local protocols. 2D gamma analysis results calculated by PerFRACTION™ were assessed by ROC (receiver-operator characteristic) analysis (Bojechko and Ford, 2015), to quantify the test performance and select optimal gamma analysis criteria and gamma passing thresholds for in-vivo protocols.

Results: PerFRACTION™ detected clinically relevant breast swelling (>10 mm, $p < 0.001$) but was unable to detect setup shifts > 5 mm in any cardinal direction. An optimised protocol is derived from the ROC analysis to identify breast swelling, setting gamma analysis criteria of 3%/3 mm and a gamma passing rate threshold of 86.7%.

Conclusion: Results show promising accuracy using PerFRACTION™ to identify clinically relevant breast swelling. As a phantom cannot perfectly imitate the complexity of a real patient, further work is planned to measure performance in a patient cohort.

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SP04.6 Identification of discrimination parameters for diagnosing breast cancer using Raman spectroscopy

Gourav Kumar Jain; Arun Chougule; Rajni Verma
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Background: The present study focuses on identifying the features and parameters of Raman spectroscopy for diagnosing cancer in human breast surgical samples.

Method: The collection of specimens of the human breast including tumor and normal tissue was conducted under a protocol approved by the institutional ethical committee. Thirty five clinically unprocessed, fresh human breast surgical samples (20 cancerous and 15 normal tissues) were obtained. Confocal spontaneous Raman spectroscopy in reflection mode was performed using incident excitation laser monochromatic beam of 532 nm.

Results: There were 17 identifiable peaks. Most of the positive bands seen around 751, 841, 979, 1147, 1168, 1415, 1558, 1594, 1938, 2109, 2333, 2449, 2705, 2889, 3154, 3243, 3295 cm--1 can be assigned to different vibrational modes of proteins and lipids. The differences observed between spectral profiles of cancerous tissues are less pronounced compared with normal breast tissues. However, notable spectroscopic differences exist in both the absolute and relative intensities of the peaks in the spectra. The wavenumber range 830 --1938 cm--1 spectral region provided several identifiable peaks and the Raman region corresponding to protein vibrations. The Raman fingerprint region 2800 --3200 cm--1 provided the best discrimination. The absolute and relative Raman intensity is very high in cancerous breast tissue in this spectral region. The Raman fingerprint region provided information on the complex interactions between multiple bonds including carbon-hydrogen stretching in lipids resulted in broad peaks.

Conclusion: The Raman spectra were recorded and analyzed for the human normal breast and cancer tissues.

Proffered papers: Neuro and head and neck

SP05.1 Evaluation of a remote blended-learning neuroradiology teaching programme during the COVID-19 pandemic

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Background: Maintaining an effective registrar teaching programme is essential for training outcomes, but traditional methods are constrained by the COVID-19 pandemic, particularly social distancing and remote working. We evaluate a remote video-conference based teaching programme with web-based individual case viewing.

Method: 16-seminar teaching programme implemented to address the educational needs of specialist trainees in their Neuroradiology attachment (10 trainees). Each consisted of trainee-led didactic presentation followed by review of relevant trainer-selected cases. Post-intervention qualitative survey assessed pre- and post-programme satisfaction with the subject matter, as well as preferences between two platforms for case sharing. Perceived advantages and