along the mandible. Differences between Accuros XB results with 12 or 16 bits reconstructions are statistically significant (Student's T test, p = 0.05). Therefore, the use of extended HU ranges helps address the effect of metal objects inside a patient.

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Poster Session : P13

X-ray microscopy, investigation into tomographic soft tissue imaging at a micron scale

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When looking at the implementation of x-ray microscopy for the diagnosis of most cancers, the nucleus and surrounding structures of the cell need to be discernible. This is far beyond the capabilities of most x-ray equipment in terms of limiting spatial resolution and the necessary output to resolve soft tissue structures at that scale. Phase contrast Imaging(PCI) methods can be utilised to improve low contrast detectability. PCI is a relatively new range of techniques that measures the phase shift induced by the sample to produce an image. This results in a soft tissue image signal at certain photon energies that can be thousands of times higher than absorption, greatly reducing the required exposure. Even with this reduction a high output source is still required. Typically to achieve such high resolution and output a synchrotron source would be used. Given the excessive cost of synchrotrons it is not a practical x-ray source in a clinical environment. Recently developed alternative sources such as Plasma wakefield accelerators could be used. They utilise a petawatt laser pulse, which ionise specific gases to create a "bubble" of high gradient charge deferential to accelerate an electron bunch of sub micron diameter to high energy levels. The electron bunch can then be oscillated through undulators to generate the required x-rays. This presentation will discuss the initial work done through a collaboration between UHG, NUIG and Diamond Synchrotron on the potential of a novel PCI method and also discuss future planned work with the Central Laser Facility.

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Poster Session : 14

TomoTherapy® System repositioning accuracy according to treatment localization

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We analyzed the Image-guided radiotherapy method used by the TomoTherapy® System (Accuray Corp.) for patient repositioning in clinical routine. The TomoTherapy® System computes X, Y, Z and roll displacements to match the reference CT, on which the dosimetry has been performed, with the pre-treatment MV CT. The accuracy of the repositioning method has been studied according to the treatment localization. For this, a database of 18774 treatment sessions, performed during 2 consecutive years (2016–2017 period) has been used. The database includes the X, Y, Z and roll displacements proposed by TomoTherapy® System as well as the manual correction of these proposals applied by the radiation therapist. This manual correction aims to further improve the repositioning based on the clinical situation and depends on the structures surrounding the target tumor tissue. The statistical analysis performed on the database aims to define reference repositioning values to be used as security and guiding tool for the manual adjustment implemented by the radiation therapist. This tool will participate not only to notify potential repositioning errors but also to further improve patient positioning for optimal treatment.

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Poster Session : P15

Ultrasound elastography: A novel user-independent quasi-static method

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Quasi-static ultrasound elastography is a popular clinical ultrasound modality which can give measures of the relative stiffness of a region of interest [1]. Tumours have been well documented to have different mechanical properties than the surrounding healthy tissue [2]. Ultrasound elastography techniques take advantage of this contrast to create stiffness maps of soft tissue called elastograms, with these, the tumours can be easily distinguished from the healthy tissue [1]. Current quasi-static methods require the user to manually palpate the region of interest with the ultrasound probe, which can lead to user-user variability when imaging [3]. We propose a novel, user-independent method where external palpation is provided by means of a stepper motor via the perineum. A tissue-mimicking agar phantom of the prostate was created and imaged using a transrectal probe. An elastography algorithm was then developed using MATLAB and inclusions of varying stiffness and sizes were successfully delineated from the surrounding soft tissue. References: Bamber, J., Cosgrove, D., Dietrich, C., Fromageau, J., Bojunga, J., Calliada, F et al. (2013). EFSUMB Guidelines and Recommendations on the Clinical Use of Ultrasound Elastography. Part 1: Basic Principles and Technology. Ultraschall in der Medizin - European Journal of Ultrasound, 34(02), pp.169-184. Hoyt, K., Castaneda, B., Zhang, M., Nigwekar, P., di Sant'Agnese, P., Joseph, J et al. (2008). Tissue elasticity properties as biomarkers for prostate cancer. Cancer Biomarkers, 4(4-5), pp.213-225. Varghese T. (2009). Quasi-Static Ultrasound Elastography. Ultrasound Clinics, 4(3), 323-338.

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Poster Session : P16

The fabrication and validation of patient specific Maxillo-facial prostheses using 3D printing

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Personalised medicine aims to optimise patient outcome by tailoring treatments and interventions to the individual. While this approach can offer a number of benefits, it can be accompanied by significant overheads in terms of resources. Prostheses exist in order to restore and replicate normal functions and appearance of the body but if these are not individually tailored to the patient then a true restoration cannot be achieved. Traditionally a labour intensive pro-