Material and Methods
The T1-weighted MRI sequences of OPSCC patients treated between 2008 and 2016 were retrospectively selected. The extraction of radiomic features was performed using the IBEX software, and hierarchical clustering was applied to reduce features redundancy. The association of each radiomic feature with grading, HPV status and loco-regional recurrence within 2 years, considered as main endpoints, was assessed by univariate analysis and then corrected for multiple testing. Statistical analysis was performed with SAS/STAT® software
Results
Thirty eligible cases were identified. For each patient, 1286 radiomic features were extracted, subsequently grouped into 16 clusters. Higher grading (G3 vs. G1/G2) was associated with higher values of *GLCM3/0-1MaxProbability* and lower values of *GLCM25/135-1ClusterShade* (p=0.03 and 0.04, respectively). Positive HPV status was associated with higher values of *GLCM3/11-4Contrast*, *GLCM3/6-1ClusterProminence*, *GLCM25/180-1InformationMeasureCorr2* (p=0.03, 0.02 and 0.04, respectively) and lower values of *GLCM3/11-4Correlation* and *GLCM3/11-7Correlation* (p=0.04 and 0.01, respectively). Loco-regional recurrence within 2 years was associated with higher values of *GLCM3/4-7Correlation* (p=0.04) and lower values of *GLCM3/2-1InformationMeasureCorr1* (p=0.04). Results lost statistical significance after correction for multiple testing.
Conclusion
MRI-based radiomics in OPSCC for the prediction of tumour phenotype and treatment response is a feasible and promising approach. Larger collaborative studies are warranted in order to increase the statistical power and to obtain robust and validated results.

EP-1926 Radiomics in rectal cancer: prognostic significance of 3D features extracted from diagnostic MRI
C. Piazzese[1], P. Whybra[1], E. Qasem[2], D. Harris[2], R. Gtaes[3], K. Foley[4], E. Spezi[1]
[1]Cardiff University, School of Engineering, Cardiff, United Kingdom ; [2]Singleton Hospital, Department of Surgery, Swansea, United Kingdom ; [3]Singleton Hospital, Medical Physics, Swansea, United Kingdom ; [4]Cardiff University, School of Medicine, Cardiff, United Kingdom

Purpose or Objective
Many radiomic studies have successfully demonstrated the potential value of PET and CT image features to predict patient outcomes. MRI can be susceptible to greater technical heterogeneity during its acquisition but, compared to PET and CT, relatively few studies have assessed the added value of MRI radiomics. In this work, we aimed at assessing the prognostic value of 3D textural features extracted from MR images of patients with locally advanced rectal cancer (LARC).
Material and Methods
A cohort of 29 patients with LARC were investigated in this study. All patients underwent anatomical T2 MRI examination before preoperative chemoradiotherapy (CRT) and were followed up for at least 98 months. All MRI scans were processed using the CERR package[1]and a range of radiomics features developed in-house and compliant with the IBSI initiative[2]. The voxels within the tumour region with intensities outside the range $\mu \pm 3\sigma$ were rejected and the intensity range obtained was then quantized to 6 bits. Radiomic features were automatically extracted using in-house developed image and data analysis software[3]. Pearson coefficient was computed and used to rank the features so to retain the 25 most variant ones. Each feature was then compared to the remaining ones and if the Pearson correlation coefficient was outside the range [-0.4, 0.4] the feature with the highest rank was removed. Aprognostic model (Cox regression) was developed by using filtered features and clinical characteristics. The calculated median prognostic score was used to separate patients into two groups and differences in overall survival (OS) were evaluated.
Results
A total of 138 3D imaging features were computed for each patient. Six uncorrelated features were used to construct a Cox regression model together with 3 clinical variables (age, pre-treatment tumour stage and tumour regression grade). The model identified 1 feature (morphologic elongation) that was significantly associated with OS (p-value < 0.05, HR = 0.004, 95% CI = 0 - 1.17). There was a significant difference (X^2= 8.485, df = 1, p-value < 0.05) in OS according to the median prognostic score (Figure 1).

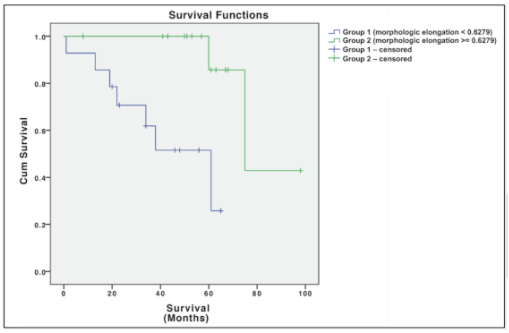

Figure 1. Kaplan-Meier plot of the patients separated in two groups based on the prognostic score.

Conclusion
MRI radiomics could provide additional information in LARC patients before preoperative CRT. Although based on a relatively small sample size, these preliminary results show that morphologic elongationare correlated with OS. Further work is needed to test the stability of MRI radiomic features and validate their predictive potential in larger cohorts of patients with LARC.
References:
1. Deasy JO et al. CERR: a computational environment for radiotherapy research. Med Phys. 2003 May;30(5):979-85.
2. Zwanenburg A et al. Image biomarker standardisation initiative, https://arxiv.org/abs/1612.07003v7
3. Gwynne S et al. Toward semi-automated assessment of target volume delineation in radiotherapy trials: the SCOPE 1 pretrial test case. Int J Radiat Oncol Biol Phys. 2012 Nov 15;84(4):1037-42.

EP-1927 Mechanistic modelling of RT damage to microvasculature and of its effect on tumour microenvironment
A. Cicchetti[1], F. Laurino[2], E. Pascucci[2], T. Rancati[1], P. Zunino[2]
[1]Fondazione IRCCS Istituto Nazionale dei Tumori, Prostate cancer program, Milan, Italy ; [2]Politecnico di Milano, MOX - Department of Mathematics, Milan, Italy

Purpose or Objective
There is evidence that radiotherapy affects the morphology and the function of small vessels, such as capillaries, of healthy and neoplastic tissues exposed to radiation. However, the underlying mechanisms of this effect are still poorly understood. Here, we present a mathematical model for the tumor microenvironment, with the unique ability to describe (i) realistic vasculature; (ii) capillary flow with non-Newtonian blood rheology and capillary leakage; (iii) coupling of capillary flow and interstitial flow; (iv) capillary deformation and occlusion; (v) mass, heat and particle transport. This model embraces enough of the fundamental physics regulating the tumor microenvironment such that it is