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 iBEK 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 GLCM3/11-4Correlation, GLCM3/6-1ClusterProminence, GLCM25/135-7Correlation 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

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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 elongation are 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:

EP-1927 Mechanistic modelling of RT damage to microvasculature and of its effect on tumour microenvironment
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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 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 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 (X² = 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 into two groups based on the prognostic score.