CT Tumoral Heterogeneity as a Prognostic Marker in Primary Esophageal Cancer Following Neoadjuvant Chemotherapy

C. Yip¹,², F. Davnall², R. Kozarski³, D.B. Landau¹,², G.J.R. Cook², P. Ross¹, R. Mason⁴, J. Lagergren⁴, V. Goh²,⁵

¹Department of Oncology, Guy’s and St Thomas’ NHS Foundation Trust
²Division of Imaging Sciences & Biomedical Engineering, King’s College London
³CliCR, University of Hertfordshire
⁴Department of Upper Gastrointestinal & General Surgery, Guy’s & St Thomas’ NHS Foundation Trust
⁵Department of Radiology, Guy’s & St Thomas’ NHS Foundation Trust
Background

• Esophageal cancer associated with poor outcome
• Preoperative chemotherapy +/- radiotherapy used to improve survival
• Need to improve treatment response assessment in this group
Texture analysis

- Specific software to look at CT/MRI/PET images in great detail which cannot be appreciated by human eye
- Relationship between pixels within an image
- May indicate biological variation within tumors
Aims

• Investigate the use of texture analysis as a prognostic marker in patients treated with preoperative chemotherapy for esophageal cancer
Image analysis

• Mean grey-level intensity (MGI)
• Kurtosis
• Skewness
• $SD_{\text{histogram}}$ ($SD_H$)
• Uniformity
• Entropy

Unfiltered & filtered: 1.0, 1.5, 2.0 & 2.5
Results

• 31 patients
• All had pre-treatment & post-treatment contrast-enhanced CT
• Entropy decreases & uniformity increases after chemotherapy
Results

Changes in skewness after chemotherapy, pre-treatment $SD_H$ & post-treatment MGI were associated with survival.
Conclusions

• Exploratory study
• Warrants further investigation in prospective setting