

Response rate and diagnostic accuracy of early PET-CT during neo-adjuvant therapies in oesophageal adenocarcinoma: a systematic review and meta-analysis

Kieran Foley¹, Jacqueline Jeffries², Clare Hannon³, Bernadette Coles¹, Kevin Bradley⁴, and Elizabeth Smyth³

¹Velindre Cancer Centre

²National Imaging Academy Wales (NIAW)

³Cambridge University Hospitals NHS Foundation Trust

⁴Wales Diagnostic and Research Positron Emission Tomography Imaging Centre (PETIC)

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Abstract

Purpose Only 25% of oesophageal adenocarcinoma (OAC) patients have a pathological response to neo-adjuvant therapy (NAT) before oesophagectomy. Early response assessment using PET imaging may help guide management of these patients. We performed a systematic review and meta-analysis to synthesise the evidence detailing response rate and diagnostic accuracy of early PET-CT assessment. **Methods** We systematically searched several databases including MEDLINE and Embase. Studies with mixed cohorts of histology, tumour location, and a repeat PET-CT assessment after more than one cycle of NAT were excluded. Reference standard was pathological response, defined by Becker or Mandard classifications. Primary outcome was metabolic response rate after one cycle of NAT defined by a reduction in maximum standardised uptake value (SUVmax) of 35%. Secondary outcome was diagnostic accuracy of treatment response prediction, defined as the sensitivity and specificity of early PET-CT using this threshold. Quality of evidence was also assessed. Random-effects meta-analysis pooled response rates and diagnostic accuracy. This study was registered with PROSPERO (CRD42019147034). **Results** Overall, 1341 articles were screened, and six studies were eligible for analysis. These studies reported data for 518 patients (aged 27-78 years; 452 [87.3%] were male) between 2005-2020. Pooled sensitivity of early metabolic response to predict pathological response was 77.2% (95%CI 53.2%-100%). Significant heterogeneity existed between studies ($I^2=80.6%$ (95%CI 38.9%-93.8%), $p=0.006$). Pooled specificity was 75.0% (95%CI 68.2%-82.5%), however no significant heterogeneity between studies existed ($I^2=0.0%$ (95%CI 0.0%-67.4%), $p=0.73$). **Conclusion** High-quality evidence is lacking, and few studies met the inclusion criteria of this systematic review. The sensitivity of PET using a SUVmax reduction threshold of 35% was suboptimal and varied widely. However, specificity was consistent across studies with a pooled value of 75.0%, suggesting early PET assessment is a better predictor of treatment resistance than of pathological response. Further research is required to define optimal PET-guided treatment decisions in OAC.

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Short Title: Early PET-CT in oesophageal adenocarcinoma

Kieran G Foley^{1*}, Jacqueline Jeffries², Clare Hannon³, Bernadette Coles¹, Kevin M Bradley⁴, Elizabeth Smyth³

1 Velindre Cancer Centre, Cardiff, UK

2 National Imaging Academy of Wales (NIAW), Pencoed, UK

3 Cambridge University Hospitals NHS Foundation Trust, Cambridge, UK

4 Wales Diagnostic and Research Positron Emission Tomography Imaging Centre, Cardiff University, UK

* corresponding author

Dr Kieran Foley, Velindre Cancer Centre, Velindre Road, Cardiff, CF14 2TL

Email: Kieran.Foley@wales.nhs.uk

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