The prognostic utility of ^{18}F-FDG-PET metabolic tumor response after chemoradiotherapy for locally advanced head and neck cancer

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To the Editor,

As the selective use of ^{18}F-Fluorodeoxyglucose (FDG) positron emission tomography (PET) in the diagnosis and treatment of advanced stage malignant disease has gained general acceptance at our institution, it becomes increasingly important to utilize this newer form of imaging towards understanding the effects of conventional chemoradiotherapy (CRT). Published studies [1–4] reveal that few data exist on the prognosis associated with the metabolic tumor response shown by FDG-PET after CRT in individuals with locally advanced head and neck carcinoma (LAHNC). It is in this context that we retrospectively reviewed our single institution's experience of people treated by CRT for LAHNC.

Forty-seven consecutive patients with pre- and post-treatment FDG-PET scans, treated between September 2003 to June 2011 and who were not lost to follow-up (Table I), were identified. Post-therapy FDG-PET was usually performed 2–3 months after completion of combined therapy; interpretation of FDG-PET images by the visual analysis using a two-point scale was either a positive or negative scan. The technique of combined therapy is similar to that mentioned in our previous report [5]. Thirty-nine patients (83%) exhibited complete resolution of tumor and eight individuals (17%) had incomplete or absent responses. At a median follow-up of 36 months, the overall locoregional failure and distant metastasis rates were 17%. The two-year, overall survival rates in individuals with complete and incomplete disappearance of the neoplasms were 92% and 57%, respectively ($p = 0.02$); the corresponding two-year, disease-free survival rates were 97% and 25% ($p < 0.01$). After adjusting for patient age, primary and regional disease stage, site and volume of the neoplasm, number of chemotherapy drugs used, and the presence or absence of comorbidity, tumor response was the only significant independent predictor of prognosis.

Table I. Patient, tumor and treatment characteristics.

Feature	No	%
Total	47	100
Age at diagnosis (years)		
Median	56	
Range	35–83	
Non-elderly (< 65 years)	42	89
Tumor stage[a]		
T1-T2	12	25
T3-T4	35	75
Nodal stage[a]		
N0–1	10	21
N2–3	37	79
Tumor site		
Oropharynx	23	49
Other[b]	24	51
Tumor volume[c]		
< 57 cm^3	18	49
≥ 57 cm^3	19	51
Other illness[d]		
Absent	15	32
Present	32	68
Radiotherapy dose[e] (Gy)		
Mean	70/50	
Range	60–70/50	
Chemotherapy[f]		
1 drug	30	64
2 drugs	17	36
Follow-up (months)		
Median	36	
Range	8–130	

[a]American Joint Committee on Cancer staging system; [b]Oral cavity, nasopharynx, hypopharynx, larynx, unknown site; [c]Tumor volume determination using the formula $\pi/6$ (width) (length) (height); 37 evaluable patients; [d]Hypertension, diabetes mellitus, asthma, congestive heart failure, atrial fibrillation, glaucoma, ulcerative colitis; [e]Radiation dose to the primary tumor bed-upper neck/lower neck; [f]Cisplatin or Cetuximab; Cisplatin and 5-Fluorouracil.

The evidence regarding the prognostic significance of metabolic tumor responses demonstrated by FDG-PET in LAHNC is scarce. Several reports [1,2,4] about such post-treatment negative and positive scans, unfortunately, were not correlated with patient survival. Our findings appear to be in accord with those from the literature. In order to better understand the value of FDG-PET computed tomography in the assessment of treatment response and prediction of outcomes after CRT for LAHNC, Passero et al. [3] analyzed their 53-patient experience. Observations from their investigation included: 1) Complete response was documented by FDG-PET in 27 cases (53%); 2) The two-year, progression-free survival rates for people with a complete response and without total disappearance of tumor were 93% and 48%, respectively, $p = 0.0002$. The limitations of the present study include: 1) Its retrospective design and the small sample; 2) A selection bias of patients who were deemed fit enough to benefit from CRT. We believe that the observations from this review can only add to the sparse literature about the prognostic relevance of FDG-PET noted treatment responses. Gupta et al. [6], in a meta-analysis of studies regarding the diagnostic merit of FDG-PET (CT) in the determination of treatment response, remarked that the negative predictive value of an after-therapy negative FDG-PET scan is exceptionally high and such finding is highly suggestive of absence of viable disease. In conclusion, FDG-PET imaging, aside from demonstrating metabolic tumor response, is also useful for its prognostic predictive potential. Nonetheless, outcome research requires more attention/validation in this evidence-based era.

Declaration of interest: The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

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