Outcomes of Patients With Esophageal Cancer Staged With [¹⁸F]Fluorodeoxyglucose Positron Emission Tomography (FDG-PET): Can Postchemoradiotherapy FDG-PET Predict the Utility of Resection?

Arta Monir Monjazeb, Greg Riedlinger, Mebea Aklilu, Kim R. Geisinger, Girish Mishra, Scott Isom, Paige Clark, Edward A. Levine, and A. William Blackstock

From Wake Forest University Health Sciences, Winston-Salem, NC.

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Corresponding author: A. William Blackstock, MD, Department of Radiation Oncology, Wake Forest University Health Sciences, Medical Center Blvd, Winston Salem, NC 27103; e-mail: ablackst@wfubmc.edu.

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ABSTRACT

Purpose

To determine whether [¹⁸F]fluorodeoxyglucose positron emission tomography (FDG-PET) can delineate patients with esophageal cancer who may not benefit from esophagectomy after chemoradiotherapy.

Patients and Methods

We reviewed records of 163 patients with histologically confirmed stage I to IVA esophageal cancer receiving chemoradiotherapy with or without resection with curative intent. All patients received surgical evaluation. Initial and postchemoradiotherapy FDG-PET scans and prognostic/treatment variables were analyzed. FDG-PET complete response (PET-CR) after chemoradiotherapy was defined as standardized uptake value $\leq$ 3.

Results

Eighty-eight patients received trimodality therapy and 75 received chemoradiotherapy. Surgery was deferred primarily due to medical inoperability or unresectable/metastatic disease after chemoradiotherapy. A total of 105 patients were evaluable for postchemoradiotherapy FDG-PET response. Thirty-one percent achieved a PET-CR. PET-CR predicted for improved outcomes for chemoradiotherapy (2-year overall survival, 71% v 11%, $P < .01$; 2-year freedom from local failure [LFF], 75% v 28%, $P < .01$), but not trimodality therapy. On multivariate analysis of patients treated with chemoradiotherapy, PET-CR is the strongest independent prognostic variable (survival hazard ratio [HR], 9.82, $P < .01$; LFF HR, 14.13, $P < .01$). PET-CR predicted for improved outcomes regardless of histology, although patients with adenocarcinoma achieved a PET-CR less often.

Conclusion

Patients treated with trimodality therapy found no benefit with PET-CR, likely because FDG-PET residual disease was resected. Definitive chemoradiotherapy patients achieving PET-CR had excellent outcomes equivalent to trimodality therapy despite poorer baseline characteristics. Patients who achieve a PET-CR may not benefit from added resection given their excellent outcomes without resection. These results should be validated in a prospective trial of FDG-PET-directed therapy for esophageal cancer.

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INTRODUCTION

Esophageal cancer remains among the most lethal malignancies,¹ and the best treatment strategy remains controversial.² In 2009, an estimated 16,470 Americans were diagnosed with esophageal cancer, and no significant improvement in the survival of these patients has been achieved over the past 20 years.¹

Concomitant chemoradiotherapy followed by esophagectomy is commonly used for managing lo-

cally advanced esophageal cancer. Most trials support the use of trimodality therapy over surgery alone for advanced disease,³⁻⁷ although these findings are not universal.⁸ The literature is less clear regarding whether the addition of surgery to chemoradiotherapy provides an advantage over definitive chemoradiotherapy (CRT). Two randomized trials demonstrate no survival benefit to esophagectomy for squamous cell carcinomas.^{9,10} Trials of CRT alone report survival rates of 25% to 40%,¹¹⁻¹³ which is similar to rates reported for trimodality

therapy.^{3,6,7,14} The mortality rate of esophagectomy at experienced centers is less than 5%¹⁵⁻¹⁸ but ranges from 9% to more than 12% after neoadjuvant chemoradiotherapy in some reports.^{3,9,10} The morbidity of esophagectomy after chemoradiotherapy can exceed 30% in these reports. Despite this, strategies forgoing resection may be inappropriate for many patients because local failure rates for CRT alone can exceed 50%,^{9,10,13} and there is evidence that resection after CRT improves local control.^{9,10} Given the uncertain benefit and added morbidity and mortality of surgical resection after CRT, and the high local failure rate after CRT alone, there is growing interest in developing criteria to identify patients who may safely defer surgery after CRT.

We have previously demonstrated in prospective studies that [¹⁸F]fluorodeoxyglucose positron emission tomography (FDG-PET) can predict for both pathologic response and outcomes in locally advanced esophageal cancer,^{19,20} findings that are corroborated by a number of other studies.²¹⁻²³ In this study we examine FDG-PET–staged patients with esophageal cancer treated with CRT or trimodality therapy to determine how FDG-PET staging affects outcomes and whether FDG-PET can delineate a group of patients who may not benefit from esophagectomy after definitive CRT.

PATIENTS AND METHODS

We reviewed the records of 163 patients with histologically confirmed stage I to IVA esophageal cancer (American Joint Committee on Cancer sixth edition) receiving chemoradiotherapy with or without resection with curative intent at Wake Forest University Comprehensive Cancer Center between January 2000 and June 2008. Approval from the institutional review board was obtained before study initiation. Local failure was defined as failure occurring within the radiotherapy portals (ie, primary and regional nodes).

Treatment

Radiotherapy was planned using a three-dimensional conformal technique in all patients and delivered with megavoltage linear accelerators to a median dose of 50.4 Gy. Treatment fields consisted of anterior-posterior: posterior-anterior initial fields followed by off-cord oblique boost fields or a four-field box technique. Chemotherapy included fluorouracil (FU) 1,000 mg/m² and platinum in 90% of patients. Other regimens used included carboplatin/taxol, FU alone, and capecitabine. All patients received surgical evaluation. Esophagectomy was generally performed 4 to 6 weeks after CRT by transhiatal or transthoracic technique at the discretion of the treating surgeon.

PET

Pretreatment FDG-PET scans were performed before CRT. Post-treatment FDG-PET scans were performed after completion of CRT and before resection. Patients received 15 to 20 mCi of [¹⁸F]FDG after 4 hours of fasting, and imaging was performed 1 hour after injection. Attenuation correction was performed using low-dose computed tomography. FDG-PET images were interpreted by an experienced nuclear radiologist and correlated with computed tomography. Quantitative analysis was performed using standardized uptake values (SUVs) and calculated as the maximum value 1 hour after injection. FDG-PET complete response after CRT (PET-CR) was defined before data analysis as SUV ≤ 3 (to allow for mild hypermetabolic activity, which may represent post-treatment esophagitis).

Scoring Pathologic Response to CRT

Pathologic examination of all surgical resection specimens was performed. Our five-tier method of scoring pathologic response has been previously described.²⁰ Briefly, specimens were classified as complete response (no residual tumor), microscopic residual (microscopic residual with questionable viability), partial response (downstaging of pretreatment TNM staging), stable disease (no change in staging), or progressive disease (upstaging). For the purposes of this study, patients experiencing a complete response or micro-

scopic residual were termed significant responders and were compared with the other three groups.

Statistical Analysis

Outcomes were defined from the date of diagnosis. Local control and overall survival (OS) curves were produced using Kaplan-Meier methods. Cox regression analysis was used to develop the univariate and multivariate models describing the association of the independent variables with OS and local control. Independent variables analyzed included sex, age, race, Eastern Cooperative Oncology Group (ECOG) performance status, stage, histology, chemotherapy regimen, radiotherapy dose, and FDG-PET response. Generalized estimating equations were used to describe the relationship between FDG-PET response and the independent variables. Data were analyzed using GraphPad Prism software (GraphPad Software, San Diego, CA) and SAS software version 9.2 (SAS Institute, Cary, NC).

RESULTS

Patient and treatment characteristics are outlined in Table 1. The median follow-up was 30 months for living patients. Eighty-eight patients received trimodality therapy, whereas 75 patients received CRT alone. Reasons for deferring surgery were medically inoperable status (50%), identification of unresectable/metastatic disease after neoadjuvant chemotherapy (36%), patient refusal (9%), or other/not recorded (5%). Patients treated with CRT had significantly more adverse prognostic features than did patients receiving trimodality therapy (Table 1). One hundred forty-three patients received FDG-PET staging, and 105 patients (55 trimodality, 50 CRT alone) were evaluable for post-CRT FDG-PET response. Failures were confirmed pathologically (53%) or by progressive findings on serial imaging/clinical studies including esophagogastroduodenoscopy, FDG-PET, computed tomography, and bone scan (47%).

The median and 2-year survival for the entire cohort was 16.6 months and 39%, respectively (Fig 1A). Median freedom from local failure (LFF) had not been reached (Fig 1B), and median freedom from distant metastases was 29.7 months (Fig 1C). Trimodality patients had significantly better OS (median, 23.1 v 13.9 months; $P < .01$), LFF (median, not reached v 24.5 months; $P < .01$), and freedom from distant metastases (median, 41.7 v 12.3 months; $P = .02$) than patients treated with CRT alone (Fig 1).

Of 105 patients evaluable for post-CRT FDG-PET response, 31% had a PET-CR. For the entire cohort, PET-CR was predictive of survival (PET-CR v no PET-CR, median 29.7 v 15.9 months, $P < .01$, Fig 2A) and LFF (median, not reached v 38.8 months; $P = .01$; Fig 2B). For patients treated with trimodality therapy, 14 patients (25%) achieved a PET-CR, but this was not correlated with outcomes (Appendix Fig A1, online only). For patients treated with CRT alone, median and 2-year survival for the 38% of patients (19 patients) achieving PET-CR versus those with no PET-CR was 38 months versus 11 months and 71% versus 11%, respectively ($P < .01$, Fig 3A). LFF was also significantly better in patients achieving a PET-CR (median, not reached v 10 months; 2-year LFF, 75% v 28%; $P < .01$). Patients achieving a PET-CR after definitive CRT had excellent outcomes, with survival (Fig 4A) and LFF (Fig 4B) equivalent to that of patients receiving trimodality therapy.

For patients treated with CRT, there were no statistically significant differences in age, sex, race, ECOG performance status, stage, chemotherapy regimen, or radiotherapy doses between those achieving a PET-CR and those who did not (Appendix Table A1, online

Table 1. Patient and Treatment Characteristics (full cohort)

Characteristic	Cohort		Trimodality		CRT		<i>P</i> * (trimodality v CRT)
	No.	%	No.	%	No.	%	
Patients	163	100	88	54	75	46	
Age, years							.051
Mean	60		58		62		
SD	11		10		11		
Range	31-88		31-78		37-88		
Male sex	131	80	74	84	57	76	.195
Race							.032
White	132	81	77	88	55	74	
Other	30	19	11	13	19	26	
ECOG performance status							< .001
0	64	41	48	57	16	22	
1	75	47	31	37	44	59	
2	19	12	5	6	14	19	
Stage							.015
I or II	59	37	36	42	23	31	
III	79	49	44	51	35	47	
IV	23	14	6	7	17	23	
Histology							< .001
Adenocarcinoma	122	75	78	89	44	59	
Squamous cell	41	25	10	11	31	41	
Chemotherapy							.448
Platinum + FU	126	77	66	75	60	80	
Other	37	23	22	25	15	20	
XRT dose (Gy)							.241
Median	50.4		50.4		50.4		
< 50	36	28	15	22	21	34	
50-51	57	44	31	46	26	43	
≥ 51	36	28	22	32	14	23	

Abbreviations: CRT, chemoradiotherapy; SD, standard deviation; ECOG, Eastern Cooperative Oncology Group; FU, fluorouracil; XRT, radiotherapy.

**P* values are produced using a χ^2 test for categorical variables and a *t* test for age.

only). However, there were fewer adenocarcinomas among patients achieving a PET-CR (37% v 71%; *P* = .02). Univariate and multivariate analyses were performed to determine whether PET-CR is an independent prognostic variable in patients treated with CRT alone (Table 2). On multivariate analysis, PET-CR was correlated significantly with survival (hazard ratio, 9.82) and LFF (hazard ratio, 14.13).

For 55 patients receiving trimodality therapy and evaluable for FDG-PET response, an analysis was performed to determine whether PET-CR predicted for pathologic response. Patients achieving a PET-CR had a significant pathologic response in 53% of their esophagectomy specimens versus only 33% for patients with less than a PET-CR, but this difference was not statistically significant (*P* = .18).

Univariate and multivariate analyses were performed to determine the influence of prognostic variables on achieving a PET-CR (Appendix Table A2, online only). Tumor histology was the only significant variable identified. Patients with adenocarcinoma were less likely to achieve a PET-CR (24%) than patients with squamous histology (58%; *P* < .01). Patients with adenocarcinoma still had improved outcomes if a PET-CR was achieved (Appendix Fig A2, online only). In patients treated with CRT, PET-CR portended improved outcomes for squamous histology (median OS, 43 v 8 months, *P* < .01, Appendix Fig A2A; median LFF, 41 v 12 months, *P* = .02, Appendix Fig A2B) and adenocarcinoma (median OS, 31 v 11 months, *P* = .08, Appendix Fig A2A; median LFF, not reached v 5 months, *P* = .02, Appendix Fig A2B).

DISCUSSION

The optimal management of patients with advanced esophageal cancer is controversial. One of the unresolved issues is whether the benefit of esophagectomy after chemoradiotherapy outweighs the toxicities.

The mortality of esophagectomy after chemoradiotherapy is considerable (9% to 13% in reported trials^{3,7,9,10,24}), although the largest contemporary surgical series reports lower rates,¹⁷ and a recent Cancer and Leukemia Group B (CALGB) trial reported no operative mortality in 24 patients, and the median postoperative hospital stay was only 11.5 days.⁵ The survival benefit of surgical resection after CRT is equivocal. Two randomized trials have demonstrated equivalent survival for patients receiving trimodality therapy or CRT alone,^{9,10} but patients on these trials had predominately squamous histology and the treatment regimens differed from most commonly used strategies in the United States. It should be noted that in the trial by Bedenne et al,⁹ only patients with a response to chemoradiotherapy were randomly assigned to further CRT or resection. Although the benefit of surgical resection after CRT is equivocal in terms of OS, there is clear benefit in terms of local control. In randomized trials, the local recurrence rate for patients treated with CRT is dismal, ranging from 40% to 60%,^{9-11,13} and there is a statistically significant improvement in local control with resection.^{9,10}

Fig 1. Kaplan-Meier analyses of (A) overall survival, (B) freedom from local failure (LFF), and (C) freedom from distant metastases (DMF) for the entire cohort, patients treated with trimodality therapy, and patients treated with definitive chemoradiotherapy (CRT). Trimodality patients had significantly better outcomes in terms of overall survival (median, 23.1 v 13.9 months; 1 year, 71% v 53%; 2 year, 48% v 28%, $P = .005$), LFF (median, not reached v 24.5 months; 1 year, 91% v 58%; 2 year, 75% v 50%, $P = .002$), and DMF (median, 41.7 v 12.3 months; 1 year, 75% v 52%; 2 year, 55% v 48%, $P = .02$) than patients treated with CRT alone. P values represent differences between patients treated with trimodality and chemoradiotherapy and were obtained using log-rank statistics.

Fig 2. Kaplan-Meier analyses of (A) overall survival and (B) freedom from local failure (LFF) for the entire cohort based on whether patients achieved an [^{18}F]fluorodeoxyglucose positron emission tomography complete response (PET CR) or not (< PET CR). Patients achieving a PET CR had improved survival (median, 29.7 v 15.9 months; 1 year, 79% v 66%; 2 year, 63% v 34%, $P = .005$) and LFF (median, not reached v 38.8 months; 1 year, 89% v 69%; 2 year, 76% v 58%, $P = .012$). P values were obtained using log-rank statistics.

Given the uncertain survival benefit and the morbidity and mortality of surgical resection after CRT and the high local failure rate if surgery is omitted, there is growing interest in developing criteria to identify patients who may safely defer surgery after CRT. Several studies link pathologic response to CRT with clinical outcomes.²⁵⁻²⁹ These studies use the esophagectomy specimen to determine pathologic response, which makes this method moot in an algorithm to determine which patients may safely defer surgery. Unfortunately, endoscopic biopsy has not been shown to be a useful predictor of outcomes after CRT.^{25,30-32}

We have previously demonstrated prospectively that FDG-PET may have value for predicting pathologic response²⁰ and outcomes¹⁹

Fig 3. Kaplan-Meier analyses of (A) overall survival and (B) freedom from local failure (LFF) for patients treated with definitive chemoradiotherapy based on whether patients achieved an [^{18}F]fluorodeoxyglucose positron emission tomography complete response (PET CR) or not (< PET CR). Patients achieving a PET CR had improved survival (median, 38 months v 11 months; 1 year, 89% v 44%; 2 year, 71% v 11%, $P < .001$) and LFF (median, not reached v 10 months; 1 year, 89% v 44%; 2 year, 75% v 28%, $P < .001$). P values were obtained using log-rank statistics.

in locally advanced esophageal cancer. Several studies corroborate these findings in regard to pathologic response^{21,23,33-35} and survival,^{23,34-38} but others conflict.³⁹⁻⁴² The variability of reports is due in part to the variety of FDG-PET criteria, timing, techniques, and end points used and the small numbers of patients in some studies. These reports reflect the growing interest in using FDG-PET to direct esophageal cancer therapy. There are data from a prospective randomized trial indicating that imaging response is the most important independent prognostic factor in esophageal cancer,¹⁰ and the feasibility of using FDG-PET-directed therapy for esophageal cancer has been validated in a prospective trial.⁴³

Fig 4. Comparison of (A) overall survival and (B) freedom from local failure (LFF) in patients treated with trimodality therapy versus those treated with definitive chemoradiotherapy (CRT) and achieving an [^{18}F]fluorodeoxyglucose positron emission tomography complete response (PET CR). Patients treated with CRT PET CR had outcomes equivalent to those of trimodality therapy in terms of overall survival (trimodality v CRT PET CR, median, 23 v 38 months; 1 year, 71% v 89%; 2 year, 48% v 71%, $P = .150$) and LFF (median, not reached v not reached; 1 year, 91% v 89%; 2 year, 75% v 75%, $P = .920$). P values were obtained using log-rank statistics.

In this study, we examine FDG-PET-staged patients with esophageal cancer treated with CRT or trimodality therapy to determine how FDG-PET staging affects outcomes and whether post-CRT FDG-PET scans can delineate a group of patients who may not benefit from esophagectomy after CRT. This represents one of the largest published series of post-CRT FDG-PET evaluation for esophageal carcinoma.

For the entire cohort, median survival was 16.6 months (Fig 1A), which agrees with other reports, but the LFF (61% at 3 years, Fig 1B) was higher than expected.^{3,7,10,13} This discrepancy may be due to the use of FDG-PET staging/treatment planning, which may improve the

Table 2. Impact of Baseline Characteristics and Treatment Variables on Outcomes in Patients Treated With Chemoradiotherapy Alone

Characteristic	No.	Overall Survival				LFF			
		Univariate Analysis		Multivariate Analysis (n = 41)		Univariate Analysis		Multivariate Analysis (n = 41)	
		HR	P	HR	P	HR	P	HR	P
Sex	75		.802				.852		
Female		1.08		*		1.08		*	
Male (ref)									
Race	74		.643				.279		
Black		1.15		*		0.61		*	
White (ref)									
ECOG performance status	74		.670		.008		.438		.099
0		0.86		1.17		1.26		0.36	
1		0.75		0.27		0.74		0.16	
2 (ref)									
Stage	75		.335		.048		.106		.020
I or II		0.64		0.20		1.33		1.52	
III		0.98		0.23		2.57		8.58	
IV (ref)									
Pathology	72		.116		.718		.028		.501
Adenocarcinoma		1.52		0.83		2.33		0.67	
Other (ref)									
PET-CR	50		< .001		< .001		.001		< .001
No		5.48		9.82		6.13		14.13	
Yes (ref)									
Chemotherapy	75		.953				.283		
Other		1.02		*		1.56		*	
FU + platinum (ref)									
XRT dose (Gy)	75		.291		.089		.637		.306
< 50		1.84		2.68		1.10		1.02	
50-51		1.34		1.06		0.71		0.42	
≥ 51 (ref)									

Abbreviations: LFF, freedom from local failure; HR, hazard ratio; ECOG, Eastern Cooperative Oncology Group; PET-CR, [¹⁸F]fluorodeoxyglucose positron emission tomography complete response; FU, fluorouracil; XRT, radiotherapy.

*Variable not included in multivariate analysis.

delivery of local therapy,⁴⁴⁻⁴⁷ or our stringent definition of failures, requiring pathologic proof or progressive findings on serial studies. Outcomes for patients receiving trimodality therapy were also quite favorable in comparison with historic controls.^{3,6,7,10} Initial FDG-PET staging, as used in this study, can improve outcomes by excluding patients with occult metastatic disease.¹⁹ Furthermore, in this study, 17% of patients developed metastatic/unresectable disease post-CRT (primarily found on FDG-PET scans) and were excluded from surgery (they comprise 36% of the definitive CRT group). This suggests that post-CRT FDG-PET imaging is warranted before esophagectomy. Thus pre- and post-CRT FDG-PET excluded many patients with advanced disease from the trimodality cohort who may have been included in other studies. For this reason it is not surprising that the outcomes of patients receiving trimodality therapy were superior to those receiving CRT. Patients treated with CRT were primarily those deemed to be poor surgical candidates, comprising a less fit, more advanced population. This is supported by the inferior prognostic characteristics of this cohort (Table 1). It would thus be inappropriate to suggest superiority of trimodality therapy to CRT based on this study.

Of 105 patients evaluable for post-CRT FDG-PET response, 31% had a PET-CR. Which FDG-PET criteria best predict for outcomes is

unresolved, and many studies model criteria to fit the data. We defined PET-CR before data analysis as $SUV_{max\ 1-hour} \leq 3$. The mean duration between completion of CRT and the FDG-PET scan was 45 days. One weaknesses of this study is the lack of mandate regarding the timing of the post-CRT FDG-PET study. Variability in the time between completion of CRT and FDG-PET scan could affect the degree of FDG-PET response.

For the entire cohort, outcomes were significantly better for patients achieving a PET-CR (Fig 2). The survival and LFF benefit to achieving a PET-CR seems to be limited to patients treated with CRT alone (Fig 3 and Appendix Fig A1). The lack of correlation between outcomes and PET-CR for trimodality patients may be due to two factors. Patients found to have distant disease on post-CRT FDG-PET did not go on to receive surgery, thus excluding a poor-performing group of less than PET-CR patients from the trimodality group and limiting the significance of FDG-PET response to the presence or absence of local disease. Second, any residual local metabolically active disease was resected, making the presence or absence of local residual disease less important than in patients not receiving surgery. The inconsistencies in the literature regarding the predictive value of FDG-PET response may be due in part to a greater importance of achieving a PET-CR in CRT patients versus trimodality patients.

PET-CR was found to be the strongest independent predictor of outcomes in patients treated with CRT alone. On multivariate analysis, PET-CR, ECOG performance status, and stage were found to be independent prognostic variables for survival, and PET-CR and stage were independent predictors of LFF (Table 2). Interestingly, outcomes of patients treated with CRT and achieving a PET-CR were outstanding and equivalent to that of patients receiving trimodality therapy (Fig 4), despite having significantly worse baseline characteristics (Table 1). If the benefit of esophagectomy after CRT is local control, then patients achieving a PET-CR after CRT may find little benefit from resection because their local control is excellent (71% at 2 years) and equivalent to that of trimodality patients.

In this study, patients achieving a PET-CR experienced significant pathologic response in 53% of their esophagectomy specimens, as compared with only 33% for patients with less than a PET-CR ($P = .18$). No correlation between pathologic response and outcomes was observed ($P = .152$ for OS, $P = .268$ for LFF). We previously reported prospective data suggesting that pathologic response may not be the best surrogate for outcomes in esophageal cancer,⁴⁸ and we believe the correlation of PET-CR with outcomes is a more clinically relevant end point.

Tumor histology was the only variable significantly associated with achieving PET-CR (Appendix Table A2). Fifty-eight percent of patients with squamous histology achieved a PET-CR, more than twice the rate for patients with adenocarcinoma. This explains the lower rates of adenocarcinoma histology among patients achieving a PET-CR (Appendix Table A1). The lower response rates of adenocarcinomas to chemoradiotherapy is supported by other series.⁴⁹⁻⁵¹ This highlights the potential danger of deferring esophagectomy in esophageal adenocarcinoma extrapolating from studies with predominately squamous histology.^{9,10} Although patients with adenocarcinoma were less likely to achieve a PET-CR, they still benefit if a PET-CR was achieved (Appendix Fig A2). For patients with adenocarcinoma treated with CRT, PET-CR conferred a 20-month survival improvement ($P = .08$) and a significant LFF improvement. Likewise, for patients with squamous histology, PET-CR portended significant survival and LFF improvement.

In conclusion, post-CRT FDG-PET scans may identify two groups of patients with esophageal cancer who may not benefit from resection after chemoradiotherapy. First, it may exclude one in six patients who developed distant metastases or unresectable disease during chemoradiotherapy. A second, more controversial group is patients who achieve a complete FDG-PET response to chemoradiotherapy. Survival and local control rates for these patients treated with CRT alone were equivalent to those of patients undergoing trimodal-

ity therapy, despite inferior baseline characteristics. Our results should be interpreted with caution and are not sufficient to change routine clinical practices. Prospective multi-institutional studies such as Radiation Therapy Oncology Group RTOG-0246 and CALGB 80302, which use post-CRT FDG-PET staging, should help better define the role of FDG-PET in patient selection for esophagectomy after chemoradiotherapy. If prospective trials confirm that FDG-PET response is highly predictive of local control and survival, then a prospective randomized trial evaluating a treatment algorithm that uses or defers surgery based on FDG-PET response to CRT may be warranted.

AUTHORS' DISCLOSURES OF POTENTIAL CONFLICTS OF INTEREST

Although all authors completed the disclosure declaration, the following author(s) indicated a financial or other interest that is relevant to the subject matter under consideration in this article. Certain relationships marked with a "U" are those for which no compensation was received; those relationships marked with a "C" were compensated. For a detailed description of the disclosure categories, or for more information about ASCO's conflict of interest policy, please refer to the Author Disclosure Declaration and the Disclosures of Potential Conflicts of Interest section in Information for Contributors.

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AUTHOR CONTRIBUTIONS

Conception and design: Arta Monir Monjazez, Edward A. Levine, A. William Blackstock

Provision of study materials or patients: Arta Monir Monjazez, Mebea Aklilu, Kim R. Geisinger, Edward A. Levine, A. William Blackstock

Collection and assembly of data: Arta Monir Monjazez, Greg Riedlinger

Data analysis and interpretation: Arta Monir Monjazez, Greg Riedlinger, Girish Mishra, Scott Isom, Paige Clark, Edward A. Levine, A. William Blackstock

Manuscript writing: Arta Monir Monjazez, Greg Riedlinger, Mebea Aklilu, Kim R. Geisinger, Girish Mishra, Scott Isom, Paige Clark, Edward A. Levine, A. William Blackstock

Final approval of manuscript: Arta Monir Monjazez, Greg Riedlinger, Mebea Aklilu, Kim R. Geisinger, Girish Mishra, Scott Isom, Paige Clark, Edward A. Levine, A. William Blackstock

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