

Indications for Nuclear Imaging in Epithelioid Sarcoma – An Analysis of the SEER Registry

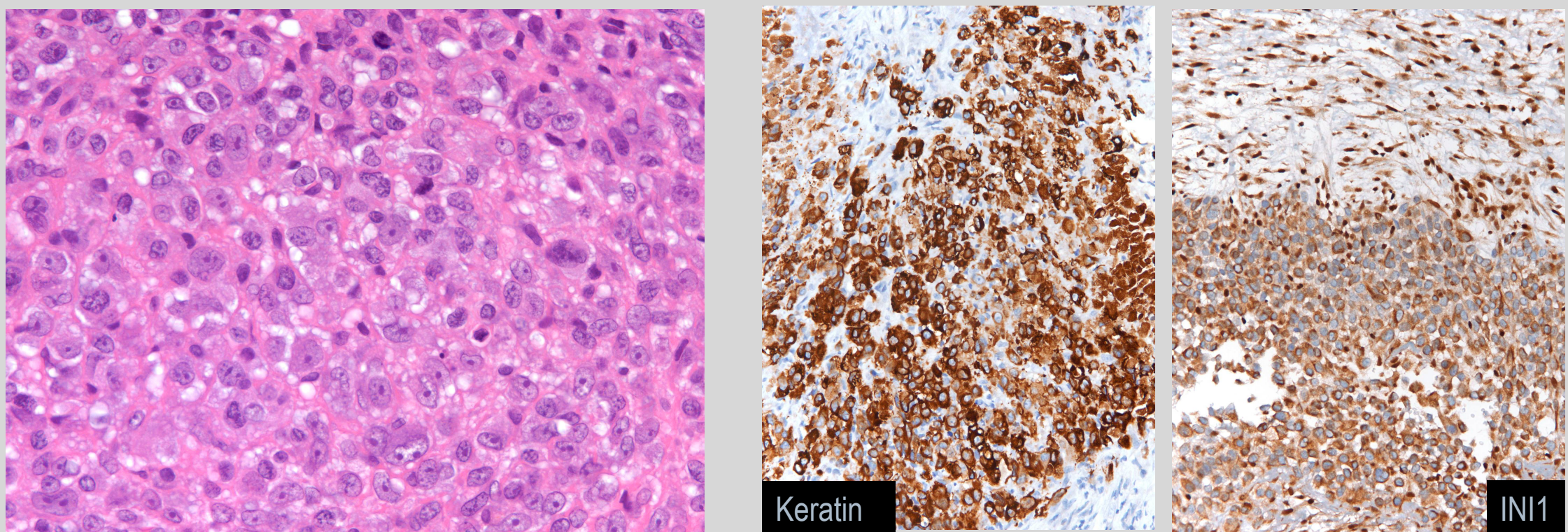
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Introduction

- Nuclear imaging, especially PET, has been widely adopted, though its role in staging and surveillance imaging in Epithelioid Sarcoma (ES) cases remains largely undefined
- ES is a mesenchymal tumor that affects patients of all ages²
- ES is a high-grade cancer that commonly metastasizes to regional lymph nodes, lung, bone, brain, and the scalp^{1, 4}
- ES has an overall risk of metastasis at presentation of 53%³
- Metastatic disease is associated with worse outcomes
- Treatment of ES may involve radiation, chemotherapy, and surgery



Aim

- To better define potential indications for the use of nuclear imaging in the staging of Epithelioid Sarcoma, by evaluating a patient's risk for metastasis based on presenting characteristics.

Methods

- Using the Surveillance, Epidemiology, and End Results (SEER) database provided by the National Cancer Institute (NCI), we identified a cohort of 565 patients with primary epithelioid sarcoma from 2004 to 2015
- Histologic subtype of ES was determined using the International Classification of Disease for Oncology
- Our primary outcome was presence of detectable metastatic disease at presentation
- We identified patients as having localized, regional, and distant metastatic disease, and defined non-metastatic disease as having localized or regional disease.
- We analyzed our cohort according to the following patient characteristics: age, sex, race, and history of cancer
- We analyzed our cohort according to the following tumor characteristics: size and primary location at presentation
- We analyzed our cohort according to the following socioeconomic factors based on each patients county of residence: median family income, poverty status, and level of education

Results

Table 1. Patient and Tumor Characteristics of Patients with Non-metastatic and Metastatic Epithelioid Sarcoma

Variable	Non-met n = 419	Met n = 146	p value
Age at Diagnosis (%)			0.001
0-14 years	24 (5.7)	6 (4.1)	
15-29 years	82 (19.6)	22 (15.1)	
30-59 years	206 (49.2)	54 (37.0)	
> 59 years	107 (25.5)	64 (43.8)	
Sex n (%) male	223 (53.2)	84 (57.5)	0.421
Race¹ n (%)			0.285
White	344 (82.7)	113 (77.4)	
Black	43 (10.3)	22 (15.1)	
Other	29 (7.0)	11 (7.5)	
History of Cancer n (%) yes	58 (13.8)	21 (14.4)	0.981
Population \leq 20,000² (%)	24 (5.7)	7 (4.8)	0.843
Education³ % (mean (SD))	14.56% (5.98%)	14.61% (6.30%)	0.938
Poverty Status⁴ % (mean (SD))	15.03% (4.91%)	14.88% (6.07%)	0.768
Median Family Income⁵ (mean (SD))	\$71,306 (\$16,452)	\$73,295 (\$17,896)	0.219
Tumor Size⁶ n (%)			<0.001
\leq 25 mm	88 (26.1)	8 (8.8)	
26-50mm	88 (26.1)	16 (17.6)	
51-75mm	67 (19.9)	15 (16.5)	
76-100mm	39 (11.6)	21 (23.1)	
> 100 mm	55 (16.3)	31 (34.1)	
Primary Tumor Site n (%)			<0.001
Extremity	217 (52.7)	41 (31.3)	
Axial	142 (34.5)	49 (37.4)	
Head/Neck	29 (7.0)	8 (6.1)	
Viscera	24 (5.8)	33 (25.2)	

¹Asian, Pacific Islander, American Indians, Alaska Natives, and Unknown

²Setting based on Rural-Urban Continuum Code 2013

³Percent of persons over 25 years old with less than 12 years of education, United States Census 2013

⁴Percent below Federal Poverty Level, United States Census 2013

⁵Median family income, United States Census 2013

⁶Tumor size missing for 178 (28.6%) cases

Table 2. Odds Ratio (OR), 95% Confidence Interval (95% CI), and p Value for Metastatic Disease at Presentation per Patient and Tumor Specific Variables

Variable	OR n = 419	95% CI n = 146	p value
Age at Diagnosis			
0-14 years	1.00 (Ref)	-	-
15-29 years	0.66	0.15 - 2.81	0.580
30-59 years	0.72	0.19 - 2.62	0.621
> 59 years	1.82	0.48 - 6.7	0.370
Male Sex	1.30	0.75 - 2.24	0.343
Race¹			
White	1.00 (Ref)	-	-
Black	1.70	0.80 - 3.61	0.162
Other	0.57	0.17 - 1.87	0.359
History of Cancer	0.80	0.37 - 1.73	0.574
Population \leq 20,000²	0.72	0.19 - 2.74	0.638
Education³	1.00	0.99 - 1.00	0.483
Poverty Level⁴	1.00	0.99 - 1.00	0.488
Median Family Income⁵	1.00	0.99 - 1.00	0.189
Tumor Size			
\leq 25 mm	1.00 (Ref)	-	-
26-50mm	1.34	0.49 - 3.69	0.563
51-75mm	1.79	0.64 - 5.03	0.262
76-100mm	4.52	1.64 - 12.44	0.003
> 100 mm	4.62	1.79 - 11.96	0.001
Primary Tumor Site			
Extremity	1.00 (Ref)	-	-
Axial	1.32	0.71 - 2.45	0.374
Head/Neck	1.97	0.62- 6.30	0.248
Viscera	2.88	1.21 - 6.85	0.016

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²Setting based on Rural-Urban Continuum Code 2013

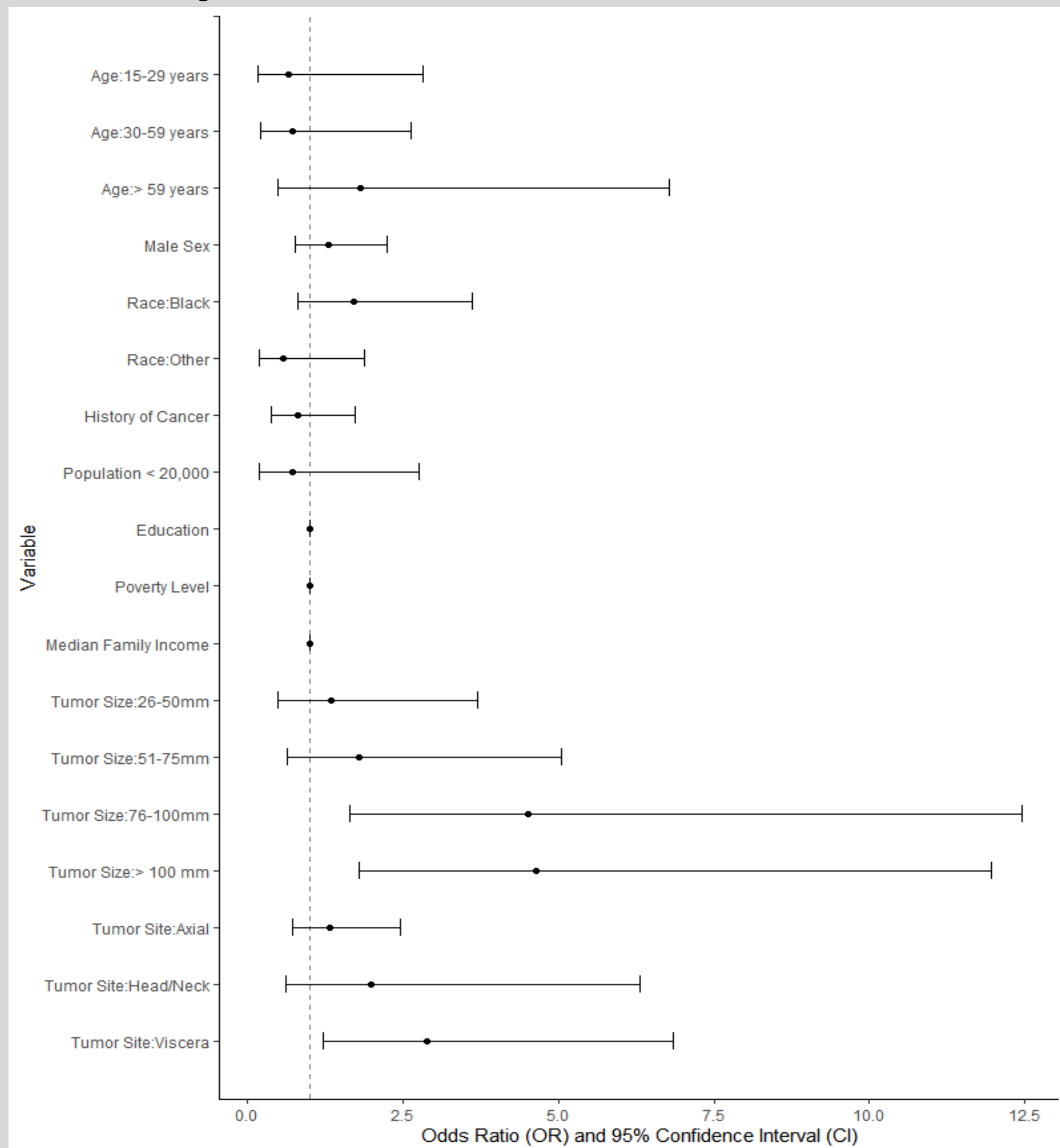
³Percent of persons over 25 years old with less than 12 years of education, United States Census

2013

⁴Percent below Federal Poverty Level, United States Census 2013

⁵Median family income, United States Census 2013

Figure 1. Forest Plot of Odds Ratios (OR) and 95% Confidence Intervals (CI) From the Multivariate Regression Model



Age Reference Group: 0-14 years

Race Reference Group: White

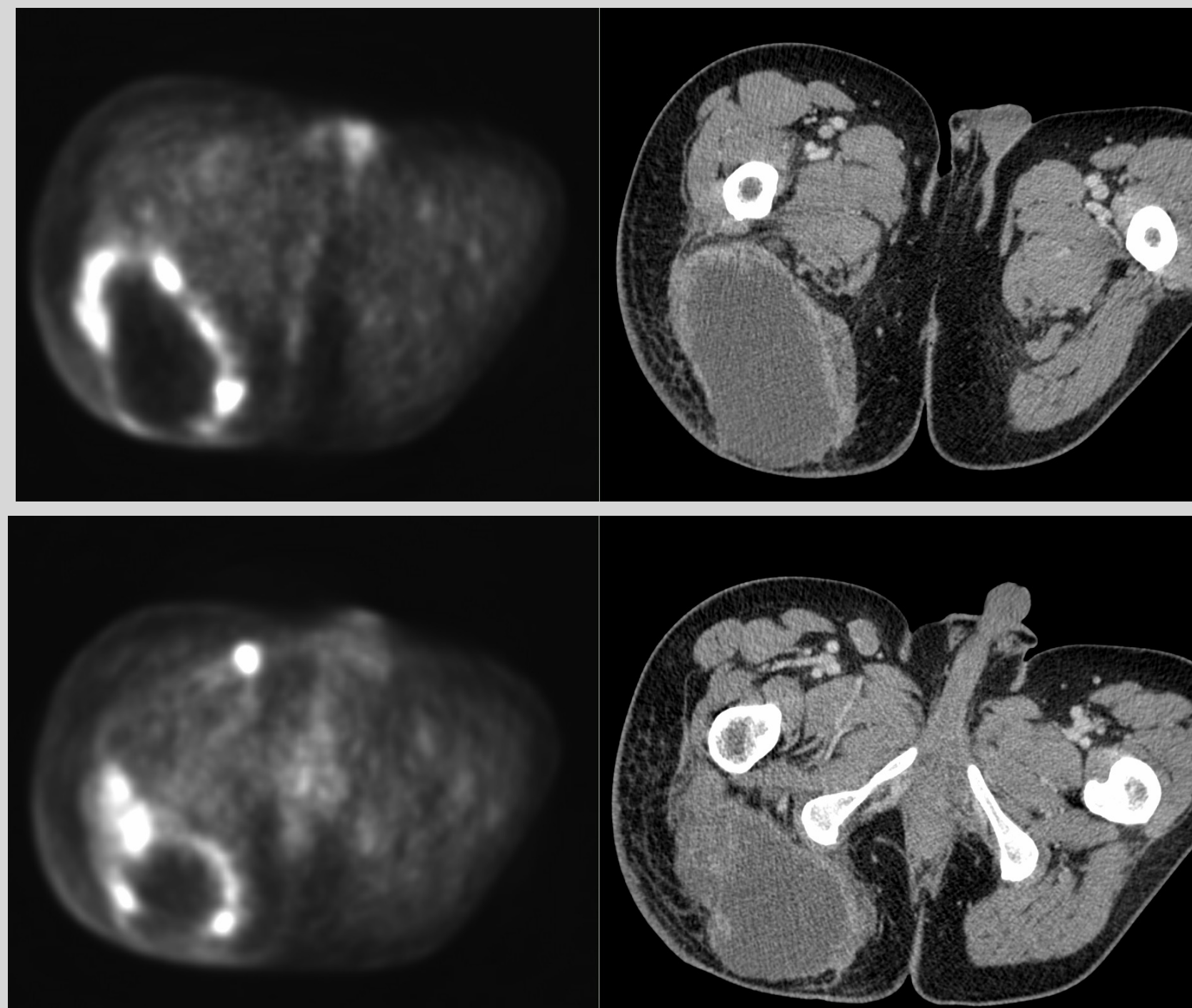
Tumor Size Reference Group: \leq 25 mm

Tumor Site Reference Group: Extremity

Conclusion

- Tumor size and primary tumor site are significantly associated with a greater risk of detectable metastatic ES at presentation.
- Other factors evaluated did not correlate with metastatic ES at presentation

Our findings suggest that patients who present with tumors greater than 76 mm and/or those with visceral primary tumors, should prompt a more thorough imaging workup to evaluate for metastatic disease.



Epithelioid sarcoma of the right gluteal muscle

Limitations

- A small subset of patients was excluded due to a lack of staging data.
- The SEER database categorizes location of tumors as localized, regional, or distant. Regional localization could not be further evaluated, and due to this, we included regional tumors as non-metastatic disease.
- Socioeconomic variables were gathered at the county level, which may not accurately represent the lived realities of the patients included.

Work Cited

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