Background

The liver is the predominant organ of involvement in patients with metastatic uveal melanoma so liver-directed therapies are paramount. Selective internal radiation therapy (SIRT) with Yttrium-90 (Y-90) microspheres has demonstrated efficacy as a salvage therapy for patients with limited metastasis of uveal melanoma who progress after standard therapies. FDG PET/CT can provide both volumetric and metabolic information and may predict the biologic aggressiveness of a tumor. PET/CT parameters have been found to be both predictive and prognostic in patients with liver metastases from other solid tumors, but has not been evaluated in patients with uveal melanoma and liver-dominant disease.

Objective

To evaluate the predictive value of PET/CT parameters, including total glycolic lesion glycolysis (TGL), metabolic tumor volume (MTV) and maximum standard uptake value (SUVmax) in patients with liver metastases from uveal melanoma undergoing Y-90 SIRT. Primary endpoints were inhepatic progression free survival (PFS) and overall survival (OS).

Methods

After IRB approval, PET/CT studies of 69 consecutive pts who underwent Y-90 SIRT between May 2007 and November 2011 were analyzed. Thirty nine pts and 20 pts had pre- and post-SIRT PET/CT available for analysis, respectively. Best radiographic response of hepatic metastases was determined on CT or MRI studies obtained every 3 mos. after treatment using RECIST. Unicist and backwards, stepwise multivariate analyses were performed to determine variables predictive for PFS and OS.

Results

Patient and treatment characteristics: 39 pts received 77 radioembolization treatments with a median activity of 0.56 GBq per treatment (range 0.10-1.33). Median age was 63 years and median KPS was 90%. The liver was the only site of metastatic disease in 13 pts (33%). Twenty four pts (60%) and 32 (80%) had previously undergone TACE and immunoe-obolization procedures, respectively. Evaluation of pre-treatment PET/CT demonstrated: median MTV 66 cc (range 4-1154), median TGL 303 (range 12-5733) and median SUVmax 6.8 (range 2.2-15.6).

Table 1. Cox Proportional Hazard Analysis of Potential Predictive Factors Influencing OS and PFS for 39 patients with pre-treatment PET

<table>
<thead>
<tr>
<th>Variable</th>
<th>Univariate Analysis</th>
<th>Multivariate Analysis</th>
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<td>SUV</td>
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<td>0.0002</td>
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<tr>
<td>TGA&lt;0.01</td>
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Progression Free Survival:

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<td>MTV&lt;100 cc</td>
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<td>TGA&lt;0.01</td>
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Response to treatment, progression and survival: Analysis of best tumor response showed partial response in 4 pts (10%), stable disease in 18 pts (45%) and progression in the remaining 14 (35%) within 3 mos. following SIRT. Two patients had complete metabolic response on PET/CT following SIRT. After median follow up of 9.0 mos. (range 1-48.5), 31 pts (78%) had progression of hepatic disease at a median of 5.0 mos. (range 1-40 mos.) following SIRT. Median overall survival after SIRT was 9.5 months (range 1.0-49.3 months).

Conclusions

MTVpre and TGA<0.01 were predictive of survival following SIRT and may be marker for tumor aggressiveness. Similarly, MTV<100 cc and TGA<0.01 were predictive for intra-hepatic PFS following SIRT. MTV and TGA are dependent upon both tumor volume and metabolism and appear to be better predictive variables for PFS and OS than SUVmax alone. These values may be useful as criteria for patient selection for treatment with Y-90 SIRT in patients with liver metastases from uveal melanoma.

References