Introduction

- Checkpoint inhibitors combined with chemotherapy provide a modest benefit in extensive stage SCLC patients.
- Robust biomarkers predicting therapy response do not exist.
- Non-invasive imaging predictors identifying patients likely to respond to chemo-immunotherapy would enable personalized management of SCLC.
- Radiomic features capture image heterogeneity and structure and are studied in multiple cancers including immunotherapy-treated tumors.

**Hypothesis:** Radiomic features extracted from pre-treatment CT are associated with patient survival following Chemo-Immunotherapy

Methods

- N=31 patients treated with atezolizumab, carboplatin, and etoposide.
- 5 slices from pre-treatment CT centered on carina.
- Random forest (RF) for binary mortality classification.
- Baseline model using clinical variables (Table 1).
- Cox and Kaplan Meier analysis for survival.
- High and low risk survival groups identified via binary survival probability from RF.

Table 1: Clinical Features Studied for Patients

<table>
<thead>
<tr>
<th>Patient Characteristics</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median Follow-up</td>
<td>343 days</td>
</tr>
<tr>
<td>Median Age</td>
<td>67 (range=46-85)</td>
</tr>
<tr>
<td>Race</td>
<td>24 white, 7 black</td>
</tr>
<tr>
<td>Sex</td>
<td>18 female, 13 male</td>
</tr>
<tr>
<td>Liver Metastases Present at Diagnosis</td>
<td>9 patients</td>
</tr>
</tbody>
</table>

Table 2: Survival Classification Results

<table>
<thead>
<tr>
<th>Clinical Features</th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>AUC</th>
<th>C-index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinical Features</td>
<td>0.81</td>
<td>0.30</td>
<td>0.56</td>
<td>0.64</td>
</tr>
<tr>
<td>Radiomic Features</td>
<td>0.76</td>
<td>0.70</td>
<td>0.77</td>
<td>0.70</td>
</tr>
</tbody>
</table>

Discussion and Conclusion

- Pre-treatment radiomics can predict patient mortality in SCLC.
- A radiomic feature-based RF classifier can identify patient groups with statistically significant difference in survival.
- Prediction of survival from pre-treatment images can provide insight into which patients are candidates for chemo-immunotherapy.

Future Directions

- Determine whether combining clinical and radiomic features improves performance.
- Larger N can further elucidate relationship between radiomic features and survival for SCLC patients.

References


Acknowledgements

The reported research was partly supported by NIH 1R21CA258493-01A1, NIGMS T32GM008444, and the OVPR and IEDM seed grants at Stony Brook University. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.