Abstract: TIME SAVINGS FOR LIVER VOLUME GENERATION: COMPARISON OF MANUAL AND DEFORMABLE SEGMENTATION METHODS

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Purpose & Objectives
Manually tracing anatomical structures on CT scans is an arduous and time-consuming task for physicians. However, with the growing importance of CT volumetry in radiology this laborious task must be done. One particular area where time saving methods are needed is liver segmentation. Calculation of liver volumes is important for planning of Y90 microsphere treatments for liver cancer and also for liver transplantation. Our goal is to evaluate if MIM Software’s deformable segmentation method, Contour CoPilot, can provide comparable accuracy but require less time than traditional manual volume of interest (VOI) generation.

Methods & Materials
CT scans were evaluated retrospectively from 21 patients. The liver spanned 28-43 slices on each study. Manual tracing and CoPilot were used separately on each scan to create liver VOIs. The manual approach utilized a 2D brush to create/edit the VOIs. CoPilot, deformably propagated a VOI from one slice to the next with the observer making slight adjustments as needed. The resultant liver volumes and the average time to create these VOIs were compared from each method.

Results
The average time to generate the final liver VOI for the Manual method was 27.7 min/case (range 19.9 to 37.5 min) whereas CoPilot averaged 11.1 min/case (range 7.7 to 13.1 min), representing an average time savings of 61% (p = 2.3E-14). The VOIs generated by the two methods revealed negligible differences with a correlation coefficient of 0.99 and an average volume difference of 4.77ml +/- 7.6ml or 0.2% +/- 0.4%.

Conclusion
CoPilot provided significant time savings for creating liver VOIs with an average time savings of 61% while yielding similar volumes when compared to the manual approach. CoPilot has shown the potential to be a valuable tool for volumetry in radiology that can save time while maintaining accuracy when calculating liver volumes.

Table 1
Manual vs CoPilot

<table>
<thead>
<tr>
<th>Method</th>
<th>Average Time (min/case)</th>
<th>Range</th>
<th>Average Volume ± SD</th>
<th>Average Volume Difference</th>
<th>Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>27.7</td>
<td>19.9 - 37.5</td>
<td>1751 ± 451</td>
<td>4.77 ml ± 7.6 ml</td>
<td>.99</td>
</tr>
<tr>
<td>CoPilot</td>
<td>11.1</td>
<td>7.7 - 13.1</td>
<td>1756 ± 455</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

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References

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