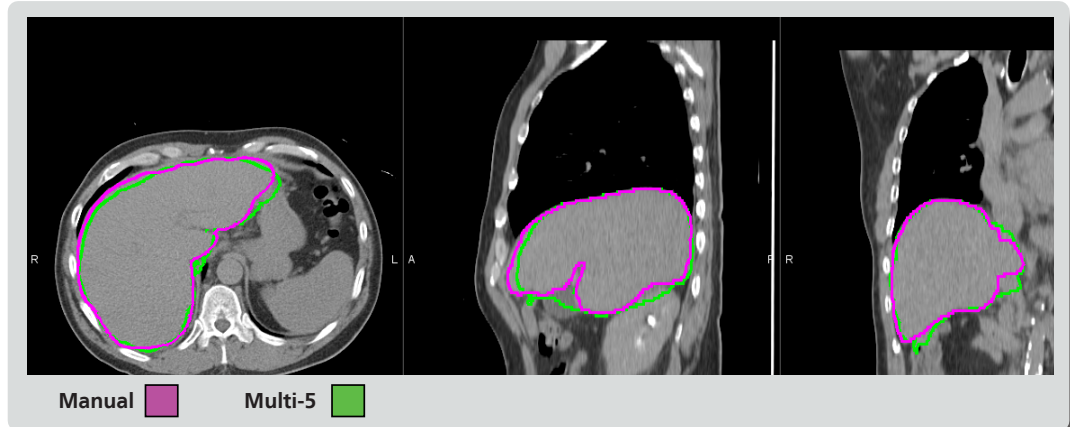


## Purpose & Objectives

Generating liver volumes of interest (VOIs) is important for both therapy and surgical planning. Manual segmentation approaches are time consuming. In this study we evaluated a multi-atlas segmentation method as a time savings approach for liver VOI generation.

**Figure 1**  
*Patient Image*



*Patient with atlas segmentation results using 5 atlas matches vs manually segmented liver contours*

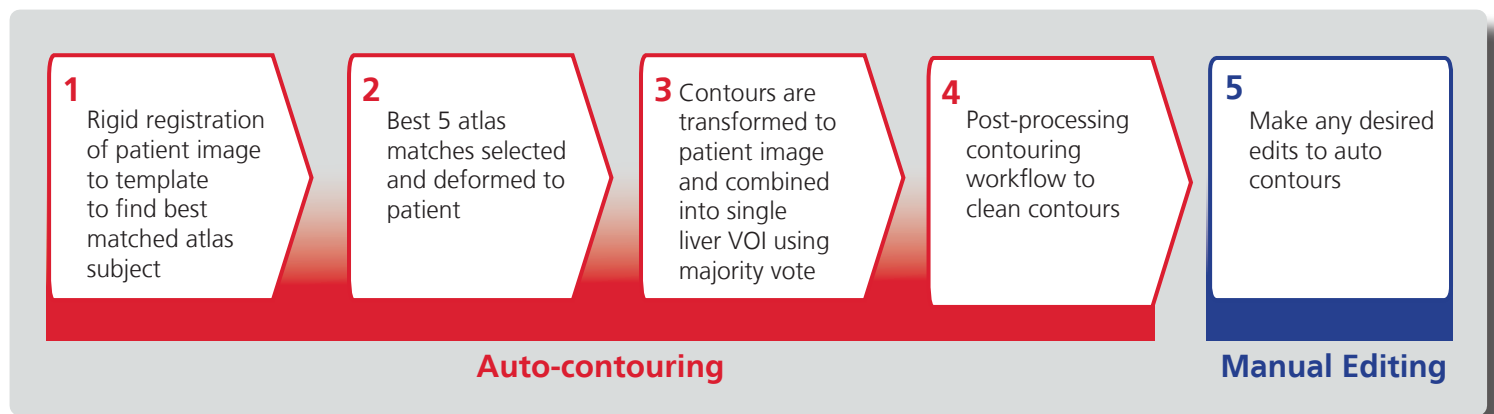
## Methods & Materials

Forty subjects with CT scans and pre-defined liver VOIs were made into an atlas library. A leave-one-out analysis was used for 10 subjects to evaluate the accuracy of a multi-atlas approach. The five best atlas matches were automatically found for each test subject and the VOIs from each were deformed to the test subject. The five VOIs were combined using majority vote into a single auto liver VOI. The Dice Similarity Coefficient (DSC) was calculated between the auto VOI and the manual VOI for each subject. Times to correct the auto VOIs into final VOIs were recorded and compared to previously determined average manual segmentation times.

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**Figure 2**

## Atlas-Based Segmentation Workflow



## Results

The average DSC for auto VOIs was 0.97 +/- 0.01. Time to edit the auto liver VOIs was 10.8 minutes +/- 4 minutes per subject compared to 34.8 +/- 8 minutes for manual VOI generation found previously for livers of this size. This represents a 70% reduction in segmentation time.

## Conclusion

A multi-atlas approach was found to provide significant time savings for liver VOI generation with an average time savings of 70% over manual segmentation. The multi-atlas method has the potential to be a valuable tool in aiding therapy and surgical planning.