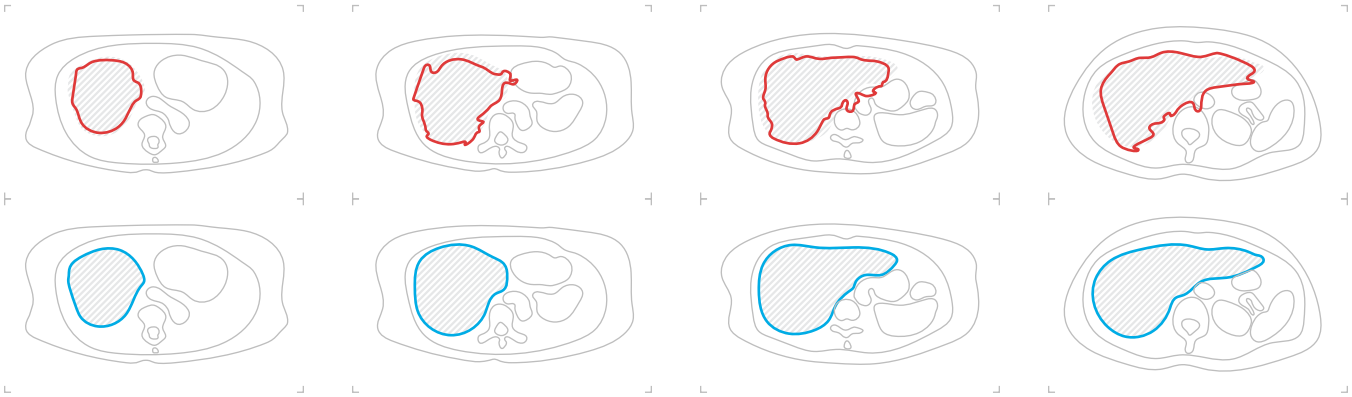

Atlas-Based vs. AI Auto-Contouring in Clinical Practice

What real-world results can you expect from AI auto-contouring? What about more complex cases?

Auto-contouring driven by artificial intelligence (AI) is here to stay. While some clinicians have embraced the technology, others remain skeptical about its ability to provide accurate results in clinical practice. How do traditional, atlas-based contouring methods directly compare with AI-based contour methods like Contour ProtégéAI®?

Here are three actual patient cases—ranging from simple to complex—that compare and contrast conventional atlas-based contouring with newer AI-based approaches.

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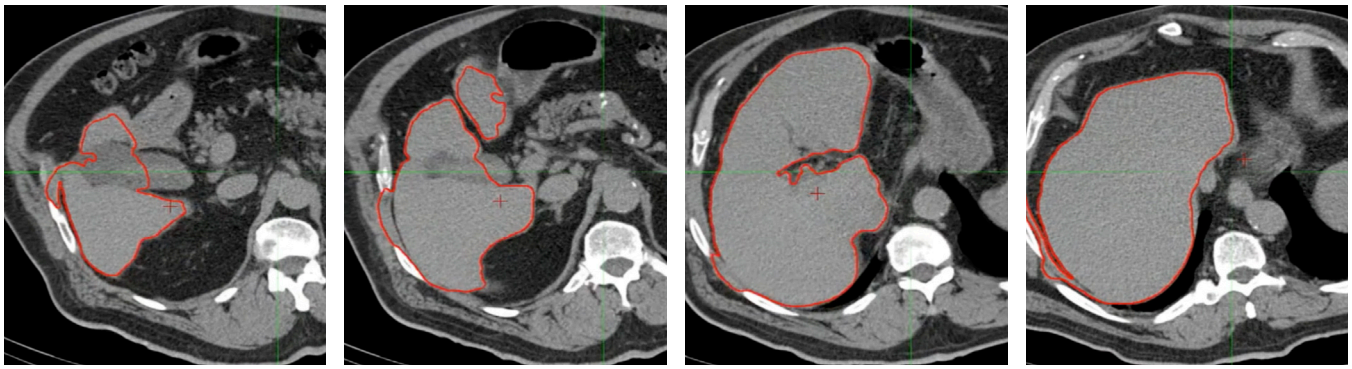
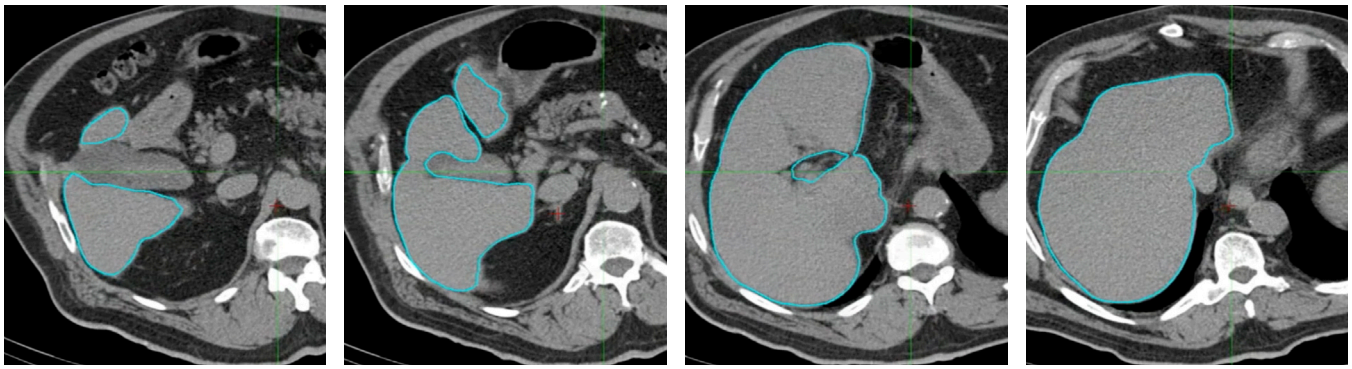
High-Quality Contrast Liver CT



Atlas-Based Contour

Our first patient has a high-quality CT for treatment planning of their liver case.

Using a contrast CT, the atlas-based method has axial slices that look fairly clean and well-contoured for this patient. The contours leaked out into the chest wall and around the gallbladder on some slices, but this approach has good results overall.



Contour ProtégéAI

The segmentation is remarkably more precise using Contour ProtégéAI for the same patient. Minor edge touchup is needed, but the results are more accurate than the atlas-based approach and require little to no editing.

The Result

The atlas-based approach gave a reasonably accurate result for a high-quality contrast CT.

With Contour ProtégéAI, almost every slice is accurately contoured and ready for use.

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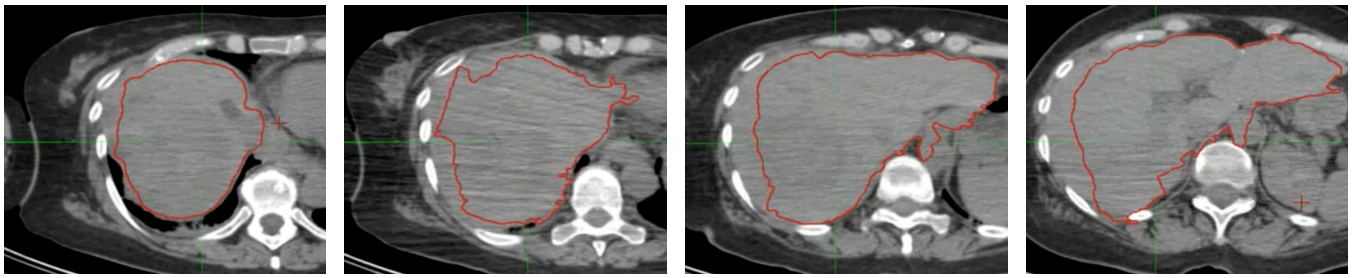
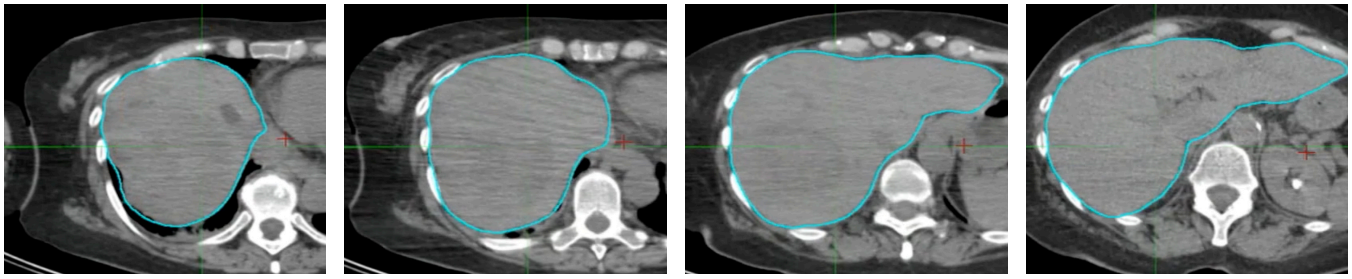
Y90 Therapy Patient on a Non-Contrast Liver CT with an Artifact on Slices



Atlas-Based Contour

Now let's take a look at a more complicated case. It's another liver case, but this patient has colorectal cancer that metastasized into the liver. There is a lower-quality, non-contrast CT, and a few image slices have an artifact present.

Almost every slice of the atlas-based contours needs editing. While generally shaped to the liver and close to the correct location, a substantial amount of smoothing and editing is required to maintain accuracy.



Contour ProtégéAI

Let's contrast this again to the Contour ProtégéAI segmentations. You can see a smooth contour that is accurate on the edges. A few slices need cleaning up around the gallbladder, but Contour ProtégéAI did an excellent job of accurately handling the overall contours.

The Result

Every slice created with atlas-based contouring needs editing in this instance, requiring a significant time commitment. When running Contour ProtégéAI, the difference between AI auto-contouring and atlas-based contouring is significant.

The Contour ProtégéAI contouring algorithms handled homogeneous structures with less image contrast in a more difficult case. And with more robust results.

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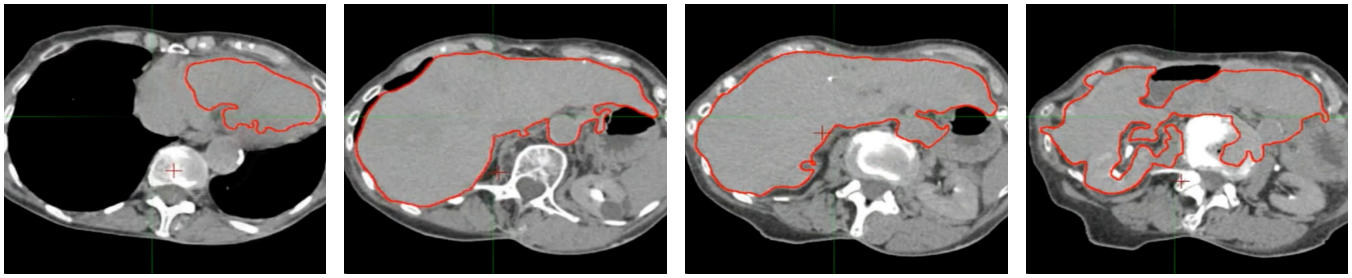
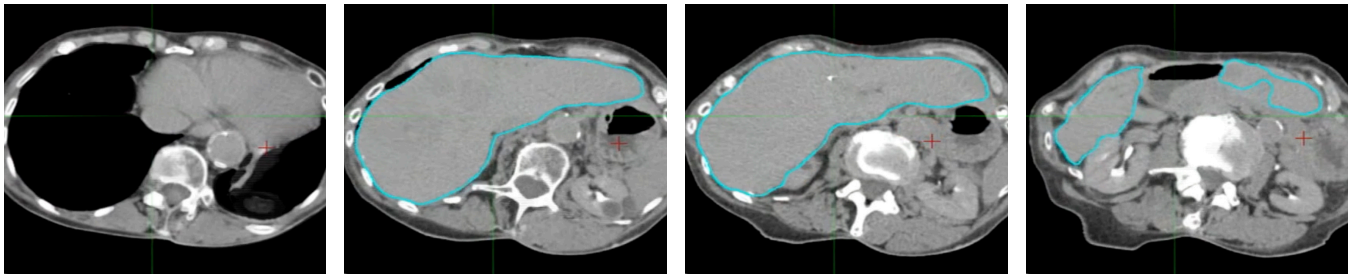
Low-Contrast CT on a Patient with a Small Body Size and an Enlarged Liver



Atlas-Based Contour

In our most challenging case, the patient has advanced disease progression and weighs under 100 pounds. The liver is quite enlarged, and there is insufficient contrast on the planning CT, creating an overall poor result for auto-segmentation.

The atlas-based contouring results are unusable. The segmentation reaches the heart and extends beyond the liver into the kidney and bowel. It's a situation where the contours must be discarded, and the process completely restarted.



Contour ProtégéAI

This patient case seems like one where even AI auto-contouring wouldn't be effective, but the contours drawn by Contour ProtégéAI accurately delineate the appropriate structures on every slice. Even with a few places needing touch-ups, the AI-based method saves significant time for a complicated case such as this one.

The Result

There isn't a close-match atlas subject to use in this instance, and the atlas-based results are inaccurate and unusable. For this example, contouring from scratch would be more practical, which would require a significant dedication of time.

However, the auto-segmented example using Contour ProtégéAI handled this complex case well, requiring minimal editing after review.

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Conclusion

In all three cases, the AI auto-contouring in Contour ProtégéAI delivered better results than the atlas-based contouring method. The distinction between the two methods was most prominent in the more complex cases.

With demonstrated accuracy and time savings, Contour ProtégéAI is a practical auto-segmentation tool for the real world.

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