Auto-Contouring in Residency: Cutting Corners or Creating Confidence?

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In the field of radiation oncology, the use of artificial intelligence (AI) for auto-contours is quickly becoming mainstream in settings from academics to private practice. A vast array of auto-contouring technologies is available, from cloud-based to deep-learning platforms.

Most contouring software programs that radiation oncologists use have options built into their capabilities that include auto-contouring organs at risk (OAR) or recognizing and defining target volumes. One survey found that about half of radiation oncologists are using auto-contouring for OAR at least half of the time, while only about 3% use it for target volumes.[1]

There are many benefits of auto-contouring. One study found that it improves efficiency by reducing overall contouring time by as much as 20% to 40%, allowing physicians to spend more time on other important clinical tasks.[2] Additionally, auto-contouring could help standardize contouring throughout an institution, and potentially throughout the field of radiation oncology, which could benefit future research efforts.

The drawbacks of auto-contouring mainly include issues with accuracy, as most auto-contours still require editing by a physician, which is time-consuming.

How does this affect radiation oncology residents and our education?

A survey from one institution suggests that residents and faculty disagree on whether auto-contouring affects the understanding of OARs.[3] In this example, faculty reported that some of the auto-contours they reviewed were incorrect, and they were unclear as to whether residents were aware of the mistakes. Additionally, they felt that the lack of repetition of OAR contouring hindered residents' review of CT anatomy.

Residents in the survey believed that auto-contouring improved their understanding of anatomy and positively impacted their education.[3] They noted that although the auto-contours were not perfect and required review, the time saved on manual contouring improved their quality of life and their ability to spend time on other educational activities.

However, both groups agreed that auto-contouring had a positive impact on clinic workflow and the overall education of residents.[3]

Anecdotally, the use of auto-contouring varies by residency program, with some allowing unrestricted use and others prohibiting it entirely. Some programs require PGY2 residents to contour manually, in the hope that they will master the technique before using auto-contouring as an aid to increase speed and efficiency in practice.

My institution has no specific rules against using auto-contouring, but my attendings and some co-residents recommended that I freehand the OAR contours each time I started a new disease site for the first few plans, then compare my results with the AI-generated contours. I followed this advice, and I think it was an effective way to learn anatomy without having to spend hours manually contouring, for example, every slice of the lung.

I have found there is a mixed use of auto-contouring among my co-residents. It is frequently

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used to contour large, solid organs such as the liver and lungs, but manual contouring is standard practice for organs like the bowel and esophagus, where auto-contouring is not as reliable.

For some cases, we use an MR-based linac that does not have auto-contouring software. When we are planning cases on that machine, it is necessary to manually draw all OARs—thus, the knowledge and understanding of organs without the help of AI is still essential.

I view auto-contouring as a tool to provide guidance when treating a new anatomical area, to be used in conjunction with traditional contouring atlases. I find that after a few cases that have similar OARs, auto-contouring frees up time to tackle general treatment paradigms or research more complex cases.

Yet I do wonder whether I have become too reliant on these tools, and if I am truly confident identifying all critical structures without AI assistance. This conflict underscores a larger point: while AI is an incredibly useful aid, it is no substitute for a solid understanding of anatomy. It is still essential to study guidelines, review literature, and know nodal station boundaries thoroughly.

Auto-contouring is here to stay, and it will likely continue to evolve and improve. Used thoughtfully, it is a powerful educational and clinical tool. But as residents, we must ensure that it complements, not compromises, our training.

References

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