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**3D auto-segmentation of vascular structures and hepatic sectional parenchyme of living liver donors using computed tomographic angiography:
A deep learning model for automatic 3D volumetry**

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Introduction: Precise volumetric assessment of living liver donors for liver transplantation is important for the safety of the donors and recipients. In this study we developed a automatic segmentation model for vascular structure and sectional anatomy of the liver parenchyme

Methods: Living liver donors who underwent computed tomographic angiography for preoperative evaluation during the period of May 2022 to December 2022 and underwent 3D reconstruction were included to the study. For setting the ground truth, segmentation of portal vein, hepatic vein, and liver parenchyme divided by four sections and Spigelian lobe were performed by biomedical artists. 3D residual U-net model was used for the deep learning model. 10 to 1-fold validation was performed and dice score was calculated.

Results: During the period, a total of 120 donors underwent 3D reconstruction of the liver anatomy. For deep learning, 109 cases were selected training while 11 cases were selected for validation. Dice score of right lobe (0.94 ± 0.01), left lobe (0.91 ± 0.02), right posterior (0.88 ± 0.04), right anterior (0.89 ± 0.03), left medial (0.86 ± 0.03), left lateral (0.90 ± 0.03) and Spigelian lobe (0.77 ± 0.10) showed high accuracy. On the other hand, hepatic vein (0.72 ± 0.10) and portal vein (0.62 ± 0.12) showed lower accuracy compared to sectional anatomy of the liver parenchyme.

Conclusion: Autosegmentation model of living liver donors showed high accuracy especially for sectional anatomy. With more volume for deep learning model, automatic volumetric assessment can be achieved for liver transplantation centers