Using artificial neural networks to determine the quality of a liver transplant

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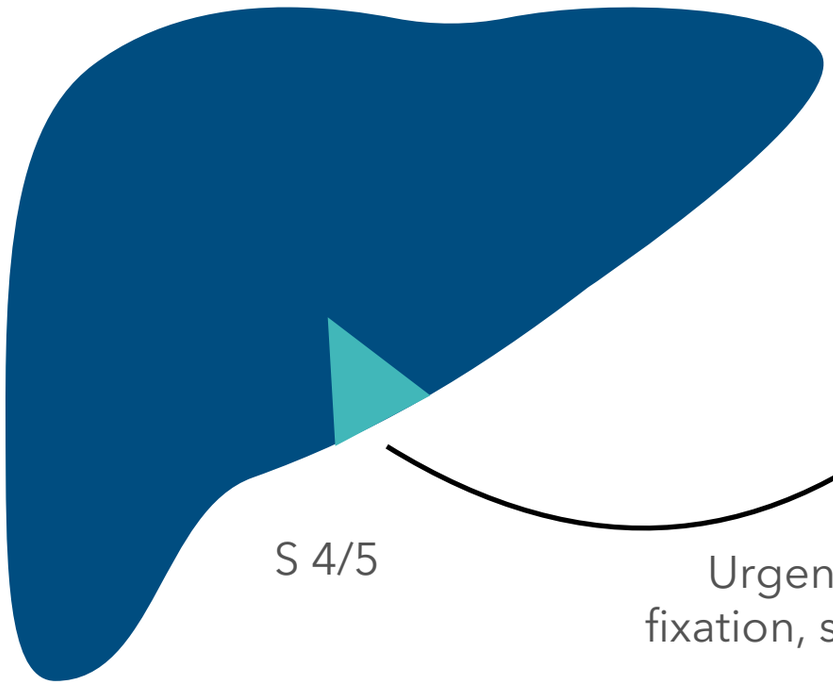
Biopsy results of
80 potential liver donors



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Urgent histological examination and
fixation, staining with HE and Sudan III dye

Digital optical
microscopy (x400)

Step 1.
Liver cells with large inclusions of
fat as a size of nucleus or
displacing it =
Macrosteatosis

Step 2.
Quantitative evaluation

Pre-trained CNN AI @ Tensor Flow

The results:
percentage of macrosteatosis

Comparison:
AI vs. experienced morphologists

Example of liver biopsy microscopy image after AI segmentation

COMPARED TO HUMAN ASSESSMENT

sensitivity - 96%
specificity - 95%

Result:
Macrosteatosis 1-2%

Conclusion

The developed interface
for recognizing morphological images
of the liver is a promising and effective tool
for determining the degree of macrosteatosis
and assessing the quality of the graft.
With further improvements, it should take
a confident place in clinical practice.

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