# Segmenting the Substantia Nigra in Ultrasound Images for Early Parkinson Diagnosis

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CARS 2007

# Motivation

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- Symptoms do not occur until substantial parts of SN have been irreparably damaged.
- Neuroprotective drugs can shelter neurons in preclinical state.
- Early identification of individuals at risk (1% of pop.) needed.

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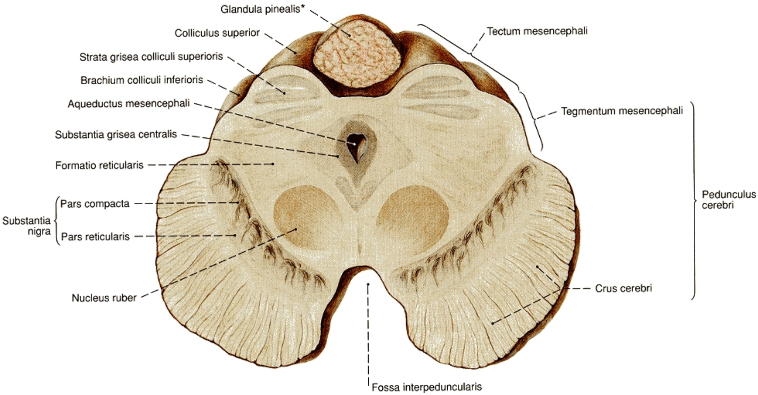

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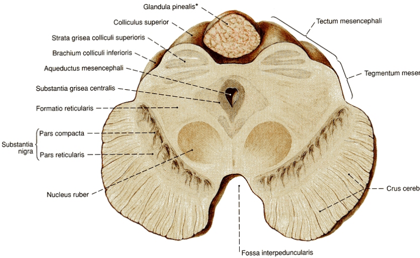

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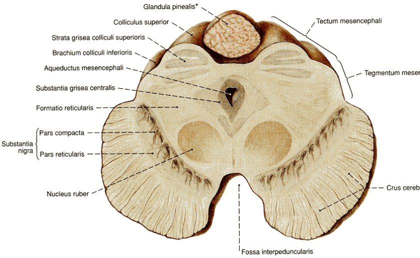

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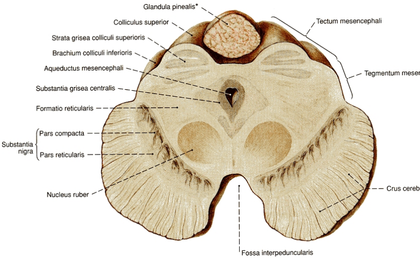

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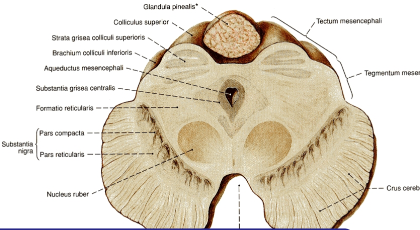


## Goal of this work

(Semi-)Automatic method to determine hyperchogenic SN region.

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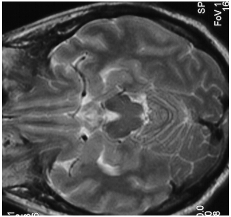

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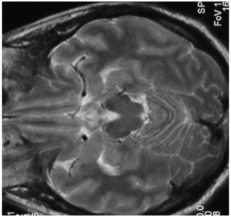

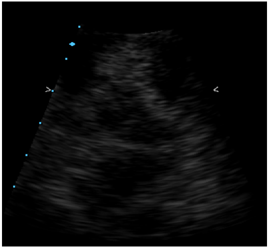

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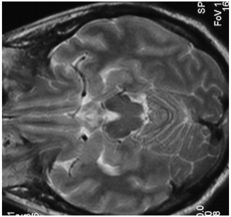
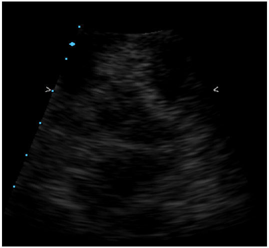
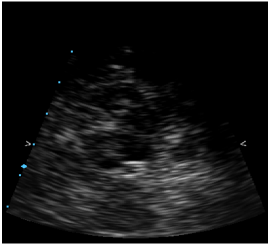
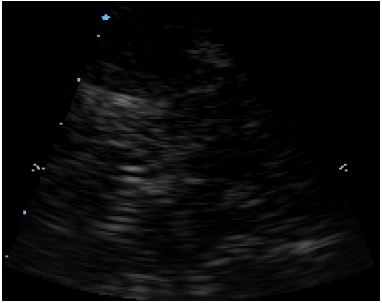






# Segmentation method outline

- Semi-automatic approach



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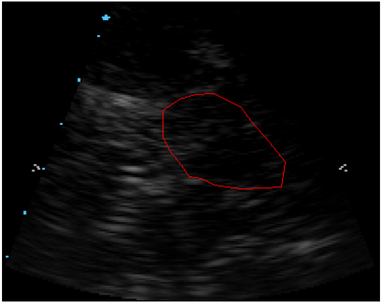

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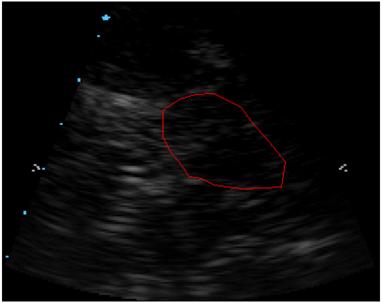
2. Preprocessing of brain stem region



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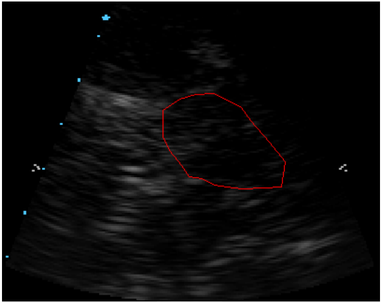

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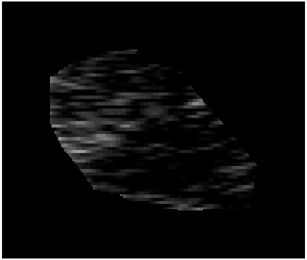

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   - Brain stem ROI may contain bright pixels from surroundings.

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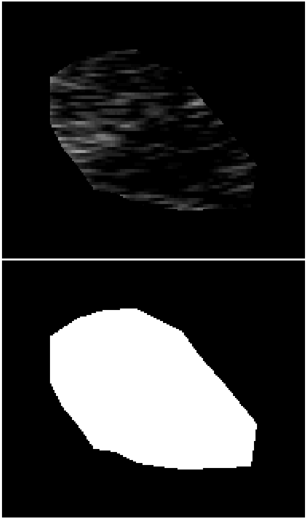

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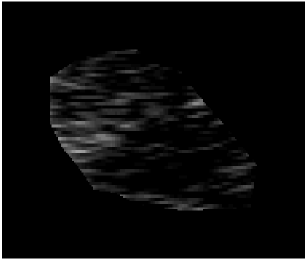

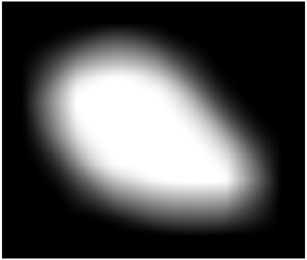

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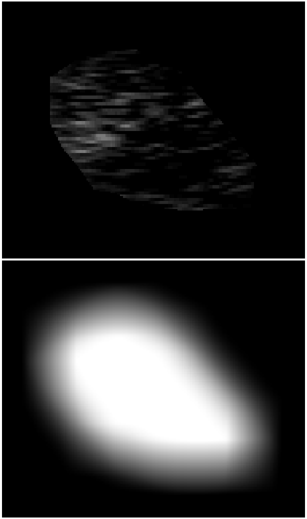

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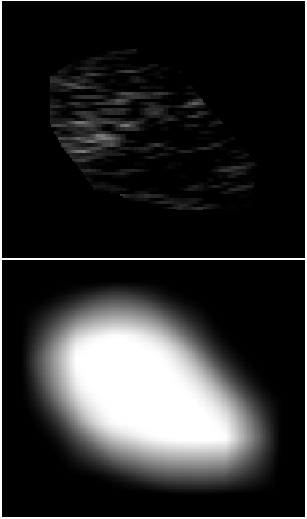

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2. SN enhancement
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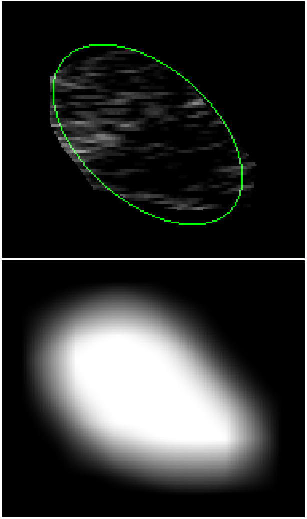

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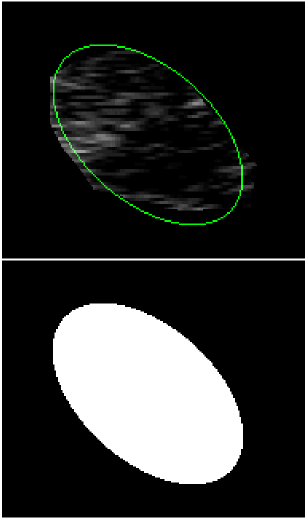

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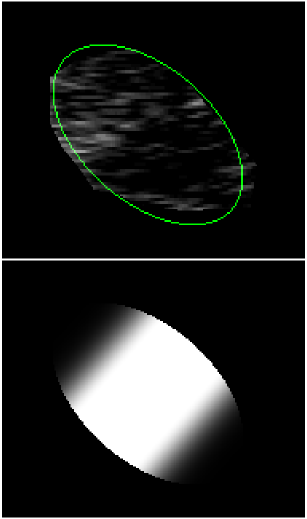

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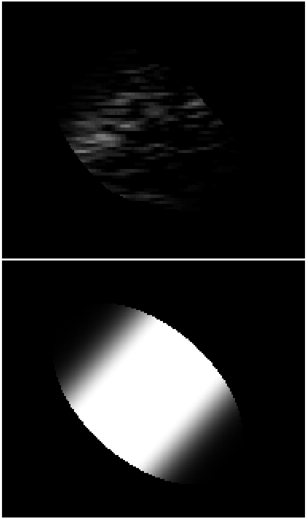

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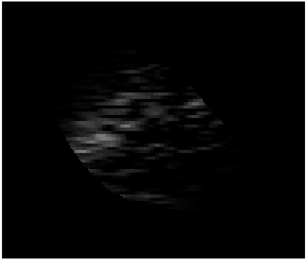

- SN is brightest spot in preprocessed image.

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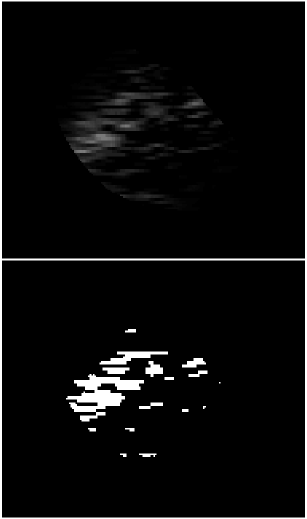

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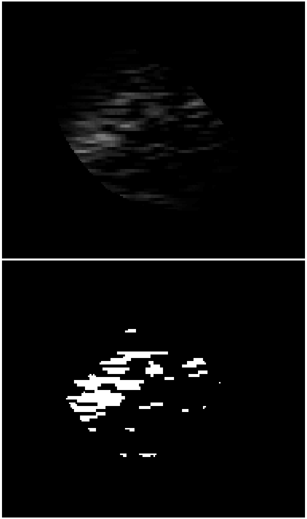

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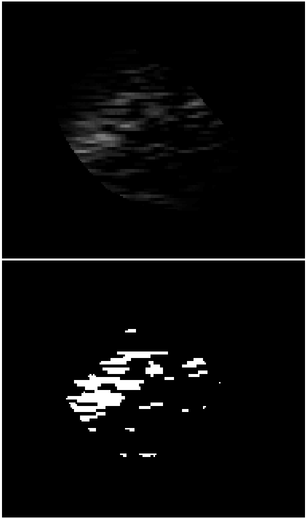

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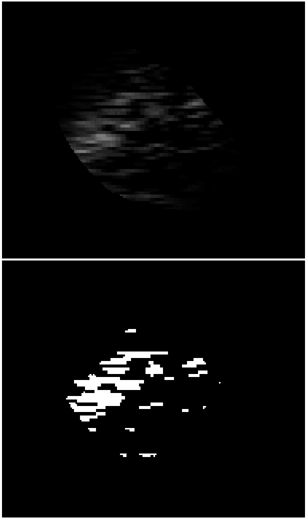
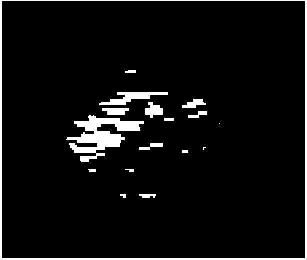


- SN is brightest spot in preprocessed image.
- Threshold image with heuristically determined threshold.
- Binary image with speckle noise effects:
  1. SN is interrupted by black spots.
  2. Small bright spots outside SN remain.

# SN Segmentation (2)



- Dilate image with horizontal line to remove speckle noise.

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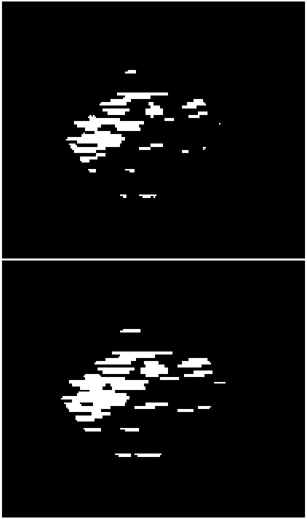

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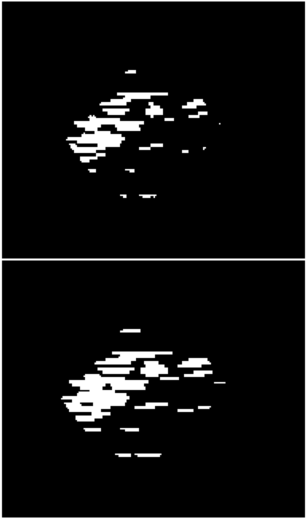

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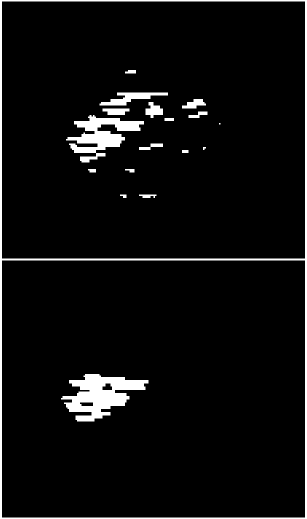

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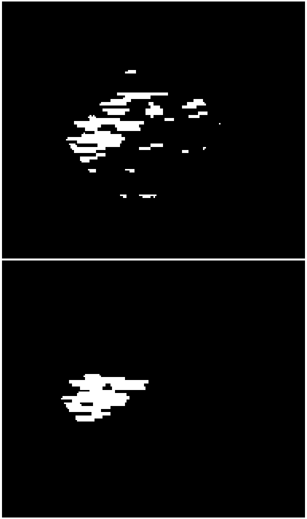

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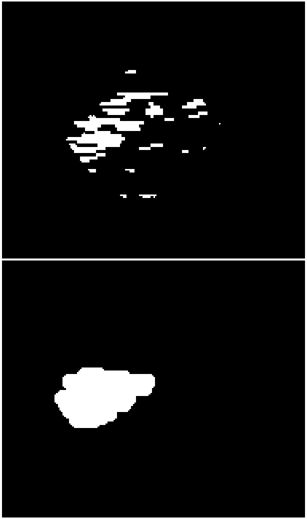

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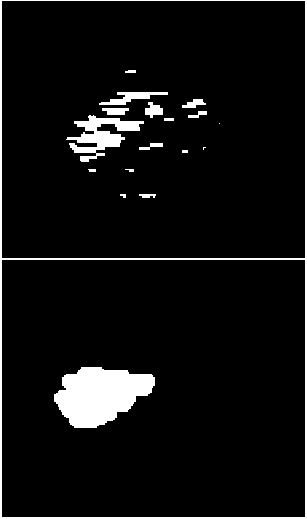

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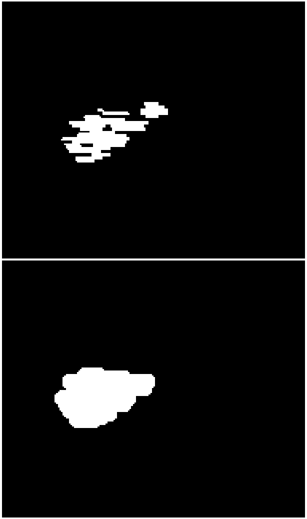

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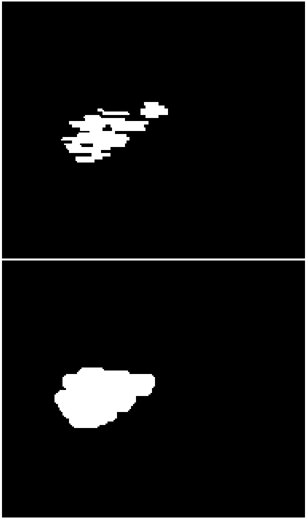

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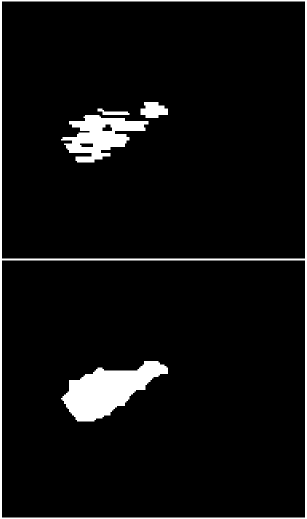

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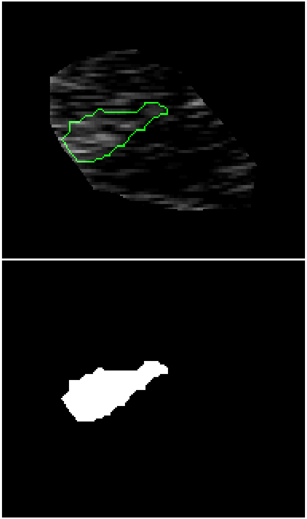

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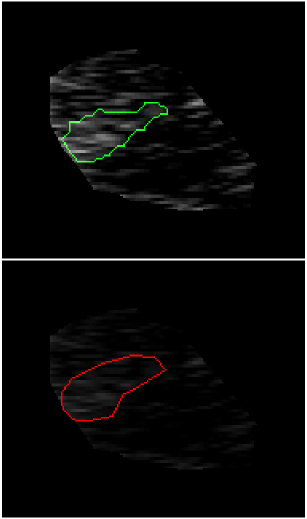

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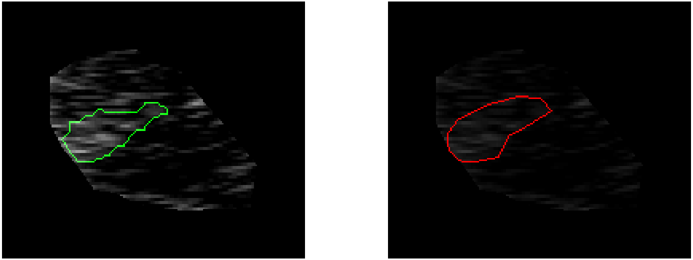
- Different from CT or MRI results.
- Preliminary results comparing automatic and manual segmentation are very promising.
- Method has to be validated in a clinical study.

# Conclusion



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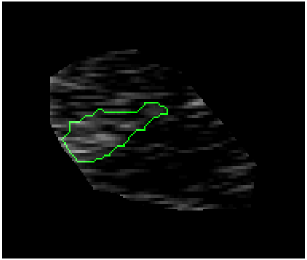

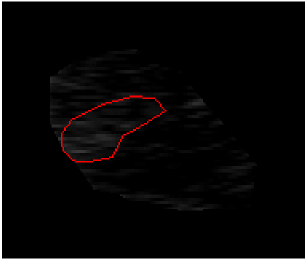

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Thank you for your attention!