

## MR visualization of ventral thalamic nuclei

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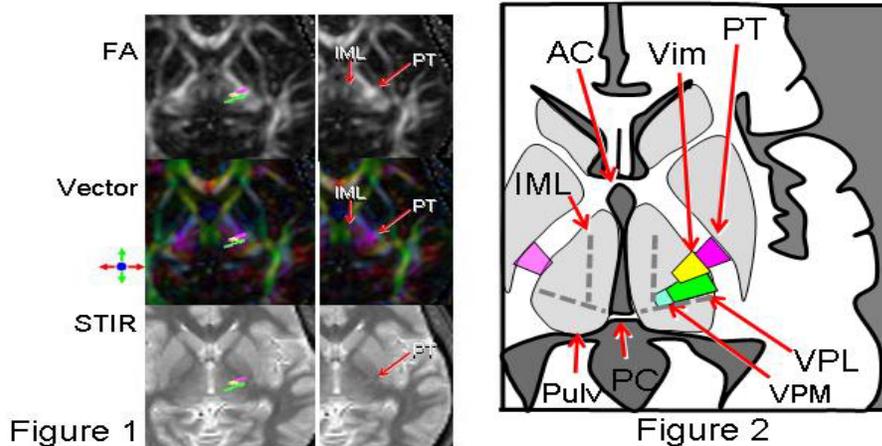
**Purpose** - To clarify the anatomical locations of the ventral thalamic nuclei, including the ventrointermediate (Vim) and ventroposterolateral (VPL) nuclei, on MR imaging.

**Materials and Methods** - Ten normal adult volunteers underwent MR imaging using a 1.5-Tesla whole body scanner. The subjects included five men and five women ranging in age from 23 to 38 years, with a mean age of 28 years. The subjects were imaged with short tau inversion recovery (STIR)-sequences (TR/TE/TI = 3200, 15, 120 ms) and diffusion tensor imaging (DTI) with a single-shot echo-planar imaging (EPI) technique (TR/TE = 6000/88 ms,  $b$ -value = 2000 sec/mm<sup>2</sup>)[1, 2]. Tractography of the cerebello-thalamo-cortical and spinothalamic pathways was used to identify the thalamic nuclei. Tractography of the pyramidal tract was used as a reference. The results were superimposed on the STIR image, fractional anisotropy (FA) map, and color-coded vector map [3].

**Results** - The Vim, VPL, and pyramidal tract were all in close contact at the level through the ventral thalamus. The Vim was bounded laterally by the pyramidal tract and medially by the internal medullary lamina (IML). The VPL was bounded anteriorly by the Vim, laterally by the internal capsule, and medially by the IML. The posterior boundary of the VPL was defined by a band of low FA that divided the VPL from the pulvinar.

A representative slice through the ventral thalamic nuclei is shown in Fig 1. The PT (purple), Vim (yellow), and VPL (green) of the left hemisphere are superimposed on the FA map, the color-coded vector map, and the STIR image. The IML is seen as an area of low FA dividing the medial group of thalamic nuclei from the ventral group. The internal medullary lamina (IML) is best appreciated on the color-coded vector map as a dark layer of low anisotropy between the medial nuclei with the green color (representing the anteroposterior direction) and the ventral groups with the purple color (representing the superolateral direction). Note that the Vim and VPL can be also identified on the STIR image as an area with diagonally oriented stripes of slight hyper- and hypointensities. Fig 2 is the schematic drawing of the ventral thalamic nuclei and the pyramidal tract at the level of the AC-PC plane.

**Conclusion** - The ventral thalamic nuclei can be reliably identified on MR imaging using reference structures such as the pyramidal tract and the IML.



### REFERENCES

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