Rising Dragons

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The research story

There were two pretty dragons Hydra and Medusa who were known in ancient times as the best friends around. Once they had a small tiff with each claiming to be more beautiful and colorful. The left one is Hydra and the right one is Medusa. Can you tell who's more beautiful? So how did Hydra and Medusa come into being? Yes! That's correct! From stem cells moving stochastically in the brain and getting directional cues from tissue structure. A histological section of a mouse brain stained with a white matter recognizing agent was imaged and Structure Tensor Analysis (STA) was performed on it. STA generates the dominant eigenvector and coherency of a particular tissue pixel indicating the directionality and the degree of anisotropy of that pixel. White matter tracts have directional information and higher coherency. If seeds are initialized in the white matter (corpus callosum) then they move along the dominant eigenvector. The goal is to evaluate the migration characteristics of stem cells in the brain to optimize cellular therapies.

The image

The left half of the image is a mirror image of the right half to make it look cool. So both Hydra and Medusa were actually clones! The individual tracks of the initialized seeds are shown in different colors. The region with a high density of paths is where the seeds were initialized. STA was performed in ImageJ and the ellipses (orange) and the dominant eigenvector directions (lines) are shown.

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F. Matthäus et al. (eds.), *The Art of Theoretical Biology*, https://doi.org/10.1007/978-3-030-33471-0_7