Color-coded maps

Color-coded maps use a range of colors to illustrate various ranges of data. This can be used across simple pins or sales territories where each color represents a simple value. For example, in a national sales territory, each individual state could be differentiated and highlighted by an individual color.

White matter tracts can be observed using tractograms generated from diffusion tensor imaging (DTI). However, the dependence of these white matter tract images on subjective variables, including how seed points are placed and the preferred level of fractional anisotropy, introduces interobserver inconsistency and potential lack of reliability. Schneider et al. proposed that color-coded maps (CCM) generated from DTI can be a preferred method for the visualization of important white matter tracts, circumventing bias in preoperative brain tumor resection planning.

DTI was acquired retrospectively in 25 patients with brain tumors. Lesions included 15 tumors of glial origin, 9 brain metastases, 2 meningiomas, and 1 cavernous angioma. Tractograms of the pyramidal tract and/or optic radiations, based on tumor location, was created by marking seed regions of interest using known anatomical locations. We compared the degree of tract involvement and white matter alteration between CCMs and tractograms. Neurological outcomes were obtained from chart reviews.

The pyramidal tract was evaluated in 20/25 patients, the visual tracts were evaluated in 10/25, and both tracts were evaluated in 5/25. In 19/25 studies, the same patterns of white matter alternations were found between the CCMs and tractograms. In the 6 patients where patterns differed, 2 tractograms were not useful in determining pattern alteration; in the remaining 4/6, no practical difference was seen in comparing the studies. Two patients were lost to follow-up. Thirteen patients were neurologically improved or remained intact after the intervention. In these, 10 of the 13 patients showed tumor-induced white matter tract displacement on CCM. Twelve patients had no improvement in their preoperative deficit. In 9 of these 12 patients, CCM showed white matter disruption.

CCMs provide a convenient, practical, and objective method of visualizing white matter tracts, obviating the need for potentially subjective and time-consuming tractography. CCMs are at least as reliable as tractograms in predicting neurological outcomes after neurosurgical intervention [1].

1)
Schneider JR, Raval AB, Black K, Schulder M. Diffusion Tensor Imaging Color-Coded Maps: An Alternative to Tractography. Stereotact Funct Neurosurg. 2021 Jan 18:1-10. doi: 10.1159/000512092. Epub ahead of print. PMID: 33461209.