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Quantitative techniques in MRI: applications

Magnetic Resonance (MR) Imaging is a powerful noninvasive diagnostic technique based on the interaction of the nuclear spins in the biological medium with external magnetic fields. MR signal is affected by several physical properties or phenomena including nuclear relaxation times (T1, T2, T1rho), nuclear density, magnetic susceptibility, diffusion, perfusion, etc. However, MR images are typically used in qualitative or semi-qualitative way, where the pixel intensity is a relative value weighted in some of these properties. In the last twenty years, the researchers have developed several tools to extract quantitative maps from the MR images with important clinical and research applications.
In this mini-course, we must talk about the main principles involving some quantitative tools: relaxation times, susceptibility, diffusion, chemical shift and perfusion. Medical applications will be reviewed and discussed to illustrate the potential of quantitative imaging.

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