

## Fractional diffusion in the brain

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The brain extracellular space is a complex medium where diffusion of substances is impeded by the tissue texture. Diffusion in porous media, such as biological tissues, is characterized by deviation from Fick's diffusion laws. The transient behavior of such a system can be approximated by an infinite branching network, i.e. a fractance, in the Laplace domain. In this framework, the underlying physical process is modeled as a continuous time random walks using the mathematical apparatus of fractional calculus. Notably, the distribution of waiting times, has heavy tails distributed as a Mittag-Leffler function and can be approximated by an inverse fractional power law. Hence, the effective diffusion phenomenon depends on the duration of the measurement. The present contribution explores space-time fractional reaction-diffusion system describing an extended source of diffusing species and first-order degradation process in a large neighboring compartment. The process results in a steady state distribution, which can be further used to interpret phenomena as cell migration or delivery of substances.