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Cerebral chemoarchitecture shares organizational traits with brain structure and function

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Chemoarchitecture, the heterogeneous distribution of neurotransmitter transporter and receptor molecules, is a relevant component of structure–function relationships in the human brain. Here, we studied the organization of the receptome, a measure of interareal chemoarchitectural similarity, derived from positron-emission tomography imaging studies of 19 different neurotransmitter transporters and receptors. Nonlinear dimensionality reduction revealed three main spatial gradients of cortical chemoarchitectural similarity –a centro-temporal gradient, an occipito-frontal gradient, and a temporo-occipital gradient. In subcortical nuclei, chemoarchitectural similarity distinguished functional communities and delineated a striato-thalamic axis. Overall, the cortical receptome shared key organizational traits with functional and structural brain anatomy, with node-level correspondence to functional, microstructural, and diffusion MRI-based measures decreasing along a primary-to-transmodal axis. Relative to primary and paralimbic regions, unimodal and heteromodal regions showed higher receptomic diversification, possibly supporting functional flexibility.

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