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**Mesoscopic inter-areal connectivity of marmoset cortex: comparison with mouse and macaque monkey**

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**Abstract:**
The human brain is >3,000 larger than the mouse brain. Yet, key elements of their basic neural architecture are conserved. Understanding how variations in brain morphology relate to measures of structural connectivity is essential to allow an understanding of how the brain processes information, and gives rise to cognitive functions, in different species.Recent tract tracing studies in macaque and mouse [1-3] have revealed conserved cortical network properties. Here we provide an intermediate point of comparison between these two mammals by analyzing the first collective database of the weighted and directed cortico-cortical connectivity obtained from >75 retrograde tracer injections in the cerebral cortex of the common marmoset (Callithrix jacchus), a small (~350g) monkey. In addition, a consensus of cortical areas between macaque and marmoset is proposed, which allows direct comparisons of the connectivity profiles between homologous cortical areas (or groups of areas) in these two primate species.We found that the obtained inter-areal connectivity matrix is dense, similar to results in macaque and mouse. The connection weights are heterogeneous, as they span over five orders of magnitude and are log-normally distributed. Additionally, similar to macaque and mouse, the interareal distances are normally distributed and the inter-areal connection probability decays with wiring distance as well as with the functional similarity distance between two cortical areas. Moreover, all three species show similar three-motif distribution, clique distribution, and have a dense core structure.A key network property found in macaque and mouse is that the probability of axons of a given length decays exponentially, the so-called exponential distance rule, which can predict many structural connectivity properties [4,5]. We found that this rule stands also for the marmoset and that the decay rate scales with brain size with a power law, from which the decay factor for the human brain can be predicted.

Our consistently collected tract-tracing data provide the cornerstone for future studies of the network characteristics of the brain in marmosets, as well as for comparative studies involving other mammalian species. Our results suggest conserved properties of the connectivity matrix across mammals, while allowing estimates of quantitative parameters that may result in different information processing and cognitive characteristics.

[1] Markov et al. Cereb Cortex 24:17-36 (2014)[2] Oh et al. Nature 508:207-214 (2014)[3] Zingg et al. Cell 156:1096-1111 (2014)[4] Ercsey-Ravasz et al. Neuron 80:184-197 (2013)[5] Horvát et al. PLoS Biol 14(7):e1002512 (2016)

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