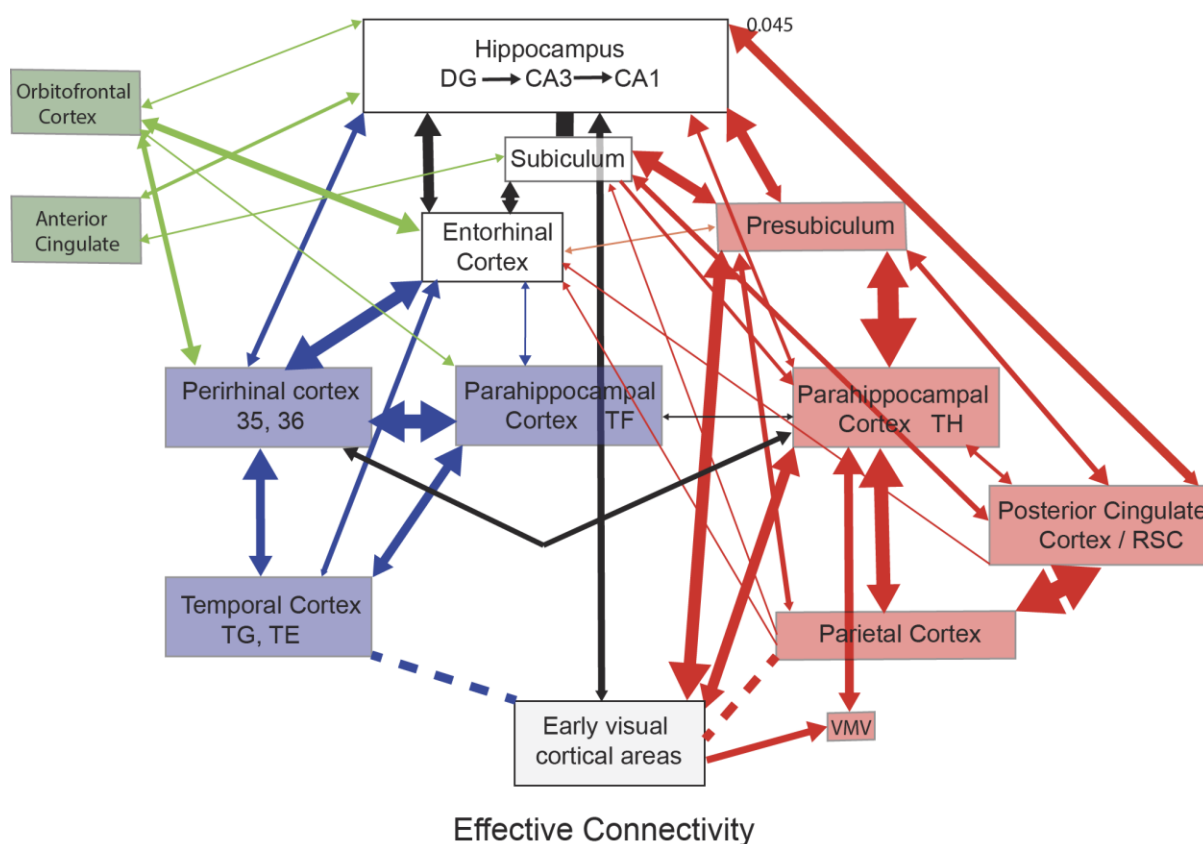


The effective connectivity of the human hippocampal memory system

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Effective connectivity of the human hippocampal system. The width of the arrows and the size of the arrowheads reflects the strength of the effective connectivity.

Summary: Effective connectivity measurements in the human hippocampal memory system based on the resting-state BOLD signal were made in 172 participants in the Human Connectome Project to reveal the directionality and strength of the connectivity. A ventral ‘what’ hippocampal stream involves the temporal lobe cortex, perirhinal and parahippocampal TF cortex, and entorhinal cortex. A dorsal ‘where’ hippocampal stream connects parietal cortex with posterior and retrosplenial cingulate cortex, and with parahippocampal TH cortex, which in turn project to the presubiculum, which connects to the hippocampus. A third stream involves the orbitofrontal and ventromedial-prefrontal cortex with effective connectivity with the hippocampal, entorhinal and perirhinal cortex. There is generally stronger forward connectivity to the hippocampus than backwards. Thus separate ‘what’, ‘where’ and ‘reward’ streams can converge in the hippocampus, from which backprojections return to the sources. However, unlike the simple dual stream hippocampal model, there is a third stream related to reward value; there is some cross-connectivity between these systems before the hippocampus is reached; and the hippocampus has some effective connectivity with earlier stages of processing than the entorhinal cortex and presubiculum. These findings complement diffusion tractography and provide a foundation for new concepts on the operation of the human hippocampal memory system.

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