Title: Neural circuits underlying fluid homeostasis

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Abstract: Fluid homeostasis is essential for survival. Recent rodent studies have shown that the excitatory neurons within the lamina terminalis, composed of the subfornical organ (SFO), median preoptic nucleus (MnPO) and the vascular organ of the lamina terminalis (OVLT) induce drinking in water deprived states. However, the organization of the underlying circuit architecture is unknown. Using viral and electrophysiological circuit tracing techniques, we show that there are dense connections between specific subpopulations of the SFO, MnPO and OVLT. Furthermore, cell type specific acute inhibition and lesioning experiments revealed that there is a hierarchial organization of circuits within the lamina terminalis. With a chemogenetic approach, we show the necessity of a specific neural population for integrating and processing thirst signals from the lamina terminalis. Taken together, our results map out the primary thirst neural architecture and form the basis to study the computations underlying thirst.