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Implementation of a Peltier-based cooling device for localized deep cortical deactivation during in vivo object recognition testing KYLE MARRA, Boston College, BRETT GRAHAM, SAMANTHA CAROUSO, DAVID COX[1], Rowland Institute — While the application of local cortical cooling has recently become a focus of neurological research, extended localized deactivation deep within brain structures is still unexplored. Using a wirelessly controlled thermoelectric (Peltier) device and water-based heat sink, we have achieved inactivating temperatures (<20 C) at greater depths (>8 mm) than previously reported. After implanting the device into Long Evans rats' basolateral amygdala (BLA), an inhibitory brain center that controls anxiety and fear, we ran an open field test during which anxiety-driven behavioral tendencies were observed to decrease during cooling, thus confirming the device's effect on behavior. Our device will next be implanted in the rats' temporal association cortex (TeA) and recordings from our signal-tracing multichannel microelectrodes will measure and compare activated and deactivated neuronal activity so as to isolate and study the TeA signals responsible for object recognition. Having already achieved a top performing computational face-recognition system, the lab will utilize this TeA activity data to generalize its computational efforts of face recognition to achieve general object recognition.

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