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Impact of perineuronal nets on Cocaine-induced plasticity in the medial prefrontal cortex

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Abstract

Specialized aggregations of the extracellular matrix surround fast-spiking, parvalbumin-containing GABAergic interneurons in structures called *perineuronal nets* (PNNs). She recently found that destruction of PNNs with Ch-ABC treatment in the medial prefrontal cortex (mPFC) blunts the acquisition and subsequent cocaine-primed reinstatement of cocaine-conditioned place preference (CPP). Here they further determined the contribution of mPFC PNNs on reinstatement of cocaine seeking in the CPP task. Rats were trained for cocaine CPP followed by extinction and, 3 days prior to an early test for reinstatement, rats were given Ch-ABC in the mPFC. Early cocaine-primed reinstatement was not affected by Ch-ABC. Rats were given additional extinction training and a late cocaine-primed reinstatement. Late cocaine-primed reinstatement was blocked, suggesting three possible explanations: memory reactivation during the early cocaine-primed reinstatement, the additional extinction training between early and late reinstatements, or the interval of time between Ch-ABC treatment and late reinstatement. The latter two possibilities had no effect on cocaine-primed late reinstatement. However, removal of PNNs prior to cocaine-primed early reinstatement (without additional extinction training) attenuated late reinstatement, suggesting that Ch-ABC may suppress the reconsolidation of a cocaine-associated memory. The number and intensity of PNNs within the mPFC were attenuated at the early reinstatement time but were partially restored by the late reinstatement time. In addition, the number of puncta labeled with synapsin-1 on WFA-containing cells was nearly doubled at the late reinstatement time. These findings suggested that removal of PNNs within the mPFC may alter plasticity within cocaine-associated memory circuits to alter cocaine-seeking behavior.

Biography

Barbara A. Sorg received her Ph.D. in 1987 in biochemistry from the University of Maryland. Dr. Sorg is currently a Professor in Integrative Physiology and Neuroscience at Washington State University. She is the Director of the WSU Alcohol and Drug Abuse Program and Co-director of the WSU Translational Addiction Research Program.

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