

Resource Summary Report

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Mapping and Counting High-Intensity Perineuronal Nets in the Somatosensory Cortex

DOI:10.17504/protocols.io.bcf8itrw

Type: Protocol

Proper Citation

Dana Layo, Billy Y.B. Lau, Keerthi Krishnan 2020. Mapping and Counting High-Intensity Perineuronal Nets in the Somatosensory Cortex. protocols.io
[dx.doi.org/10.17504/protocols.io.bcf8itrw](https://doi.org/10.17504/protocols.io.bcf8itrw)

Protocol Information

URL: <https://dx.doi.org/10.17504/protocols.io.bcf8itrw>

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Summary: The purpose of this protocol is to outline the process by which we count high-intensity perineuronal nets (PNNs) in whole brain analysis. Specifically, high-intensity PNNs within the primary somatosensory cortex of adult mouse brain sections cut in a sagittal orientation. This protocol accompanies the paper “Lateralized expression of cortical perineuronal nets during maternal experience is dependent on MECP2” (<https://doi.org/10.1101/787267>). First, we align a digital map from the Franklin & Paxinos Mouse Brain Atlas onto individual brain sections. We then explain the process by which the S1 and its subregions are outlined based on this atlas overlay. Finally, we outline the process of counting high-intensity PNNs within these regions. High-intensity PNNs are thought to be more mature structures due to a larger accumulation of the proteoglycans that make-up the structures^{1–3}. We look at PNNs as a marker for changes in experience-dependent plasticity within the brain, where it can inhibit plasticity or solidify the changes that occurred in response to an experience. Video tutorial accompanying this protocol: [https://www.youtube.com/watch?v=...](#) Different regions of the mouse brain have differing densities of PNNs. Adult somatosensory cortex has the highest density based on what we have observed. This protocol can also be used to count all PNNs, just skip the contrast step (7.2) in PNN analysis. Citations 1. Slaker, M. L., Harkness, J. H. & Sorg, B. A. A standardized and automated method of perineuronal net analysis using Wisteria floribunda agglutinin staining intensity. *IBRO reports* 1, 54–60 (2016). 2. Carulli, D. et al. Composition of perineuronal nets in the adult rat cerebellum and the cellular origin of their components. *The Journal of Comparative Neurology* 494, 559–577 (2006). 3. Foscari, S. et al. Experience-Dependent Plasticity and Modulation of Growth Regulatory Molecules at Central Synapses. *PLoS ONE* 6, e16666 (2011).

Associated Publications: Lau BYB, Layo DE, Emery B, Everett M, Kumar A, Stevenson P, Reynolds KG, Cherosky A, Bowyer SH, Roth S, Fisher DG, McCord RP, Krishnan K, Lateralized Expression of Cortical Perineuronal Nets during Maternal Experience is Dependent on MECP2. eNeuro 7(3). doi: [10.1523/ENEURO.0500-19.2020](https://doi.org/10.1523/ENEURO.0500-19.2020)

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External URL: <https://doi.org/10.1101/787267>

Version: 2

Publication Date: 2020

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Record Creation Time: 20210329T220531+0000

Record Last Update: 20210329T220958+0000

Data and Source Information

Source: