Distribution of CCL21 in damaged neurons

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After neuronal damage or injury, microglia are the first cells that become activated which makes them the resident immune cells of the brain. After activation microglia retract their long processes and begin to migrate in an amoeboid form to the site of injury. Depending on the type of signals microglia receive, they can either respond in a destructive or a neuroprotective manner. However, the nature of this signalling and the substances involved remain unclear.
A likely candidate for the signalling between damaged neurons and microglia is the chemokine CCL21. Recent experiments have shown that in damaged neurons CCL21-expression is rapidly upregulated and that CCL21 is able to activate microglia (Biber et al., 2001).
Microglial activation also occurs at sites that are distant from the actual lesion site, indicating that an activating signal is transported to the sites of glial activation. In order to investigate whether CCL21 is involved in this distant glial activation, the processing of CCL21 in damaged neurons was investigated using a variety of techniques including immunohistochemical analysis and electron microscopy. These experiments show that CCL21 is packed in vesicles and transported throughout the neuronal cell body, into the axons of the neurons and are present in synaptic structures both pre- and post synaptically. The finding that CCL21 is transported axonally allows damaged neurons to activate and recruit microglia at large distances from the cell body.

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