# Connexins in astrocyte migration

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Astrocytes have long been considered the supportive cells of the central nervous system, but during the last decades, they have gained much more attention because of their active participation in the modulation of neuronal function. For example, after brain damage, astrocytes become reactive and undergo characteristic morphological and molecular changes, such as hypertrophy and increase in the expression of glial fibrillary acidic protein (GFAP), in a process known as astrogliosis. After severe damage, astrocytes migrate to the lesion site and proliferate, which leads to the formation of a glial scar. At this scar-forming stage, astrocytes secrete many factors, such as extracellular matrix proteins, cytokines, growth factors and chondroitin sulfate proteoglycans, stop migrating, and the process is irreversible. Although reactive gliosis is a normal physiological response that can protect brain cells from further damage, it also has detrimental effects on neuronal survival, by creating a hostile and non-permissive environment for axonal repair. The transformation of astrocytes from reactive to scar-forming astrocytes highlights migration as a relevant regulator of glial scar formation, and further emphasizes the importance of efficient communication between astrocytes in order to orchestrate cell migration. The coordination between astrocytes occurs mainly through Connexin (Cx) channels, in the form of direct cell-cell contact (gap junctions, GJs) or contact between the extracellular matrix and the astrocytes (hemichannels, HCs). Reactive astrocytes increase the expression levels of several proteins involved in astrocyte migration, such as avb3 Integrin, Syndecan-4 proteoglycan, the purinergic receptor P2X7, Pannexin1, and Cx43 HCs. Evidence has indicated that Cx43 HCs play a role in regulating astrocyte migration through the release of small molecules to the extracellular space, which then activate receptors in the same or adjacent cells to continue the signaling cascades required for astrocyte migration. In this review, we

describe the communication of astrocytes through Cxs, the role of Cxs in inflammation and astrocyte migration, and discuss the molecular mechanisms that regulate Cx43 HCs, which may provide a therapeutic window of opportunity to control astrogliosis and the progression of neurodegenerative diseases.



Connexin 43

Gap junctions

Hemichannels

Inflammation

Reactive astrocytes

Scar-forming astrocytes

connexin 43

gap junction protein

amyotrophic lateral sclerosis

astrocyte

astrocytosis

calcium transport

cell communication

cell component

cell migration

gap junction

glioma

hemichannel

human

inflammation

multiple sclerosis

nonhuman

protein expression

Review