

Dysfunctions of the Diffusional Membrane Pathways Mediated Hemichannels in Inherited and Acquired Human Diseases

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Abstract

Connexins and pannexins comprise two families of transmembrane proteins ubiquitously distributed in vertebrates. Most cell types express more than 1 connexin or pannexin. Members of the same protein family form homo- or hetero-hexamers termed hemichannels. Hemichannels are pathways for the transmembrane diffusional exchange of ions and small molecules. Several human genetic diseases are associated with connexin mutants that may form hemichannels with increased or reduced activity. Pro-inflammatory conditions of different duration and/or intensity can lead to acute or chronic increase in hemichannel activity. Non-lethal stimuli can lead to transient increases in hemichannel activity (required for normal autocrine and/or paracrine cell signaling that might lead to preconditioning responses), whereas lethal stimuli induce long lasting hemichannel-mediated membrane permeabilization that accelerate cell death. Thus, in addition to transporters that mediate active and facilitated transport, the plasma membrane of most cells contains diffusional transporters (hemichannels) that are essential for normal cell functioning; their malfunctioning can cause or worsen a pathological condition.

Keywords: Hemichannel, human.