NOTCH signaling morphological changes cell shape cytoskeleton

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Notch signaling plays a crucial role in regulating cell morphology and cytoskeleton organization, which is essential for various cellular processes, including differentiation, migration, and tissue development (Brigaud et al. 2015). Notch signaling can induce morphological changes in cells by regulating the actin cytoskeleton, adherens junctions, and cell-shaping mechanisms (Brigaud et al. 2015). For instance, Notch signaling can control cell-autonomously the formation of actin filaments and the localization of activated Myosin II, indicating that internal forces are generated and used to remodel adherens junctions and promote cytoskeleton rearrangement (Brigaud et al. 2015).

Notch signaling can also affect cell shape by regulating the expression of tight junction and adhesion molecules. For example, the protein level of Notch1 is elevated in intrahepatic cholangiocarcinoma (ICC) tissues, and Notch1 overexpression promotes migration and Rac1 activation in human ICC-9810 cells (Zhou et al. 2013). Notch signaling can also regulate the expression of celsr2, an atypical cadherin, which is involved in cell-matrix adhesion and Sdf1 (Cxcl12a) mediated migration (Kozlovskaja-Gumbrienė et al. 2017).

Furthermore, Notch signaling can induce morphological changes in cells by regulating the cytoskeleton organization. For example, Notch signaling can control cell shape changes

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and actin cytoskeletal dynamics in vascular smooth muscle cells, leading to an increase in actin stress fibers and steady-state levels of polymerized actin (Domenga et al. 2004). Notch signaling can also regulate the expression of E-cadherin and F-actin near the cellular membrane, indicating a cortical actin cytoskeleton (Czerwonka et al. 2023).

However, Notch signaling can also have opposite effects on cell shape and cytoskeleton organization. For example, Notch signaling can suppress v-Src-induced transformation of neural cells by restoring TGF-β-mediated differentiation, which can lead to a decrease in cell morphology and cytoskeleton organization (Amarir et al. 2010). Additionally, Notch signaling can regulate the expression of cgnb, a tight-junction associated protein, which can affect cell shape and cytoskeleton organization (Kozlovskaja-Gumbrienė et al. 2017).

In summary, Notch signaling plays a complex role in regulating cell morphology and cytoskeleton organization, and its effects can vary depending on the cellular context and the specific signaling pathways involved (Brigaud et al. 2015).

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