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The Role of Syndecan-4 and Underlying Mechanisms in Dorsal Root Ganglion Mechanotransduction Using Controlled Polydimethylsiloxane Substrate Stiffness

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Backgrounds:

Mechanotransduction, the mechanical stimuli are transformed into a biological response, organize the physiological processes, such as senses of touch, hearing, makes a essential contribution to homeostasis. The syndecans are one of the adhesion receptor families that modulate the adhesion and as organizers of the extracellular matrix (ECM), there are four types of the syndecan family in mammals, and the syndecan-4 (S4) can signal to cause focal-adhesion formation and migration by increasing protein kinase Cα (PKCα) activation. In previous study, PKCα and focal adhesion kinase (FAK) are regulated by syndecan-4, but the mechanism and role of S4 in DRG neurons remain obscure.

Materials and Methods:

We harvested the DRG neurons from mice, and culturing DRGs on controlled polydimethylsiloxane (PDMS) substrates (PDMS ratio of base to curing agent of 35:1) coating with ECM, poly-lysine and fibronectin to investigate the mechanotransduction of DRG neurons. Use the Immunofluorescent microscopy, image analysis and western blotting to compared with poly-lysine glass group, fibronectin glass groups and each PDMS groups.

Results:

The neuron density, neurite length and neurite branch among different groups showed significant increase in fibronectin glass group. And the western blotting data showed that PKCα significant increase in the fibronectin groups, and the FAK-397 also expression in the fn groups.

Conclusion:

We suggested that fibronectin may participate in DRG neuron density, neurite branch and length through fibronectin SDC-4 interaction. And fibronectin SDC-4 interaction then to activate PKCα in DRG neurons.