TGF-?1 sensitizes TRPV1 through Cdk5 signaling in odontoblast-like cells

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Background: Odontoblasts are specialized cells that form dentin and they are believed to be sensors for tooth pain. Transforming growth factor-?1 (TGF-?1), a pro-inflammatory cytokine expressed early in odontoblasts, plays an important role in the immune response during tooth inflammation and infection. TGF-?1 is also known to participate in pain signaling by regulating cyclin-dependent kinase 5 (Cdk5) in nociceptive neurons of the trigeminal and dorsal root ganglia. However, the precise role of TGF-?1 in tooth pain signaling is not well characterized. The aim of our present study was to determine whether or not in odontoblasts Cdk5 is functionally active, if it is regulated by TGF-?1, and if it affects the downstream pain receptor, transient receptor potential vanilloid-1 (TRPV1).Results: We first determined that Cdk5 and p35 are indeed expressed in an odontoblast-enriched primary preparation from murine teeth. For the subsequent analysis, we used an odontoblast-like cell line (MDPC-2