# Polycystin 1

Polycystin 1 (often abbreviated to PC1) is a protein that in humans is encoded by the PKD1 gene. Mutations of PKD1 are associated with most cases of autosomal dominant polycystic kidney disease, a severe hereditary disorder of the kidneys characterised by the development of renal cysts and severe kidney dysfunction.

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Mechanical forces are capable of triggering biological responses in bone cells and regulate osteoblastogenesis in cranial sutures, leading to premature closure. The mechanosensitive proteins polycystin-1 (PC1) and polycystin-2 (PC2) have been documented to play an important role in craniofacial proliferation and development.

Katsianou et al. investigated the contribution of PC1 to the pathogenesis of nonsyndromic craniosynostosis and the associated molecular mechanisms. Protein expression of PC1 and PC2 was detected in bone fragments derived from craniosynostosis patients via immunohistochemistry. To explore the modulatory role of PC1 in primary cranial suture cells, we further abrogated the function of PC1 extracellular mechanosensing domain using a specific anti-PC1 IgPKD1 antibody. Effect of IgPKD1 treatment was evaluated with cell proliferation and migration assays. Activation of PI3K/AKT/mTOR pathway components was further detected via Western blot in primary cranial suture cells following IgPKD1 treatment. PC1 and PC2 are expressed in human tissues of craniosynostosis. PC1 functional inhibition resulted in elevated proliferation and migration of primary cranial suture cells. PC1 inhibition also induced activation of AKT, exhibiting elevated phospho (p)-AKT (Ser473) levels, but not 4EBP1 or p70S6K activation. Our findings indicate that PC1 may act as a mechanosensing molecule in cranial sutures by modulating osteoblastic cell proliferation and migration through the PC1/AKT/mTORC2 cascade with a potential impact on the development of nonsyndromic craniosynostosis [1)].

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Katsianou MA, Papavassiliou KA, Gargalionis AN, Agrogiannis G, Korkolopoulou P, Panagopoulos D, Themistocleous MS, Piperi C, Basdra EK, Papavassiliou AG. Polycystin-1 regulates cell proliferation and migration through AKT/mTORC2 pathway in a human craniosynostosis cell model. J Cell Mol Med. 2022 Mar 13. doi: 10.1111/jcmm.17266. Epub ahead of print. PMID: 35285136.