



Sci. Signal., 20 April 2010
Vol. **3**, Issue 118, p. ec122
[DOI: 10.1126/scisignal.3118ec122]

EDITORS' CHOICE

Development

Receptor and Channel Pair

L. Bryan Ray

Science, *Science Signaling*, AAAS, Washington, DC 20005, USA

Cheng *et al.* report that the TRPV3 [transient receptor potential (TRP) vanilloid 3] calcium channel, previously linked to detection of changes in ambient temperature, functions in mouse skin cells in a complex with the epidermal growth factor receptor (EGFR) tyrosine kinase to regulate proper formation of skin and hair. The authors discovered the connection because knockout mice lacking TRPV3 that they created had wavy hair and curly whiskers, a phenotype also caused by mutations that prevent signaling by transforming growth factor- α (TGF- α) and epidermal growth factor (EGF). TGF- α and EGF have important roles in both the proliferation and differentiation of skin cells. In young mice lacking TRPV3, the amount of TGF- α mRNA was reduced, and the amount of active (phosphorylated) EGFR (the receptor for both EGF and TGF- α) was also reduced. TRPV3 can also influence TGF- α signaling by increasing the intracellular concentration of free calcium, which increases the production and release of TGF- α and EGF. In the other direction, receptor tyrosine kinases can also influence TRP channel function, and treatment of keratinocytes in culture with TGF- α sensitized the response of TRPV3 to agonists that enhance its conductance. Pharmacological inhibitors of EGFR or of phospholipase C or extracellular signal-regulated kinases (ERKs) reduced the effect of TGF- α . Coimmunoprecipitation of TRPV3 with EGFR was detected in samples from transgenic mice expressing a fusion protein of TRPV3 with green fluorescent protein. The authors point out that physical and functional interaction could be characteristic of other TRP channels and receptor tyrosine kinases and that TRPV3 may be a therapeutic target for treatments aimed at control of hair growth or of abnormal skin cells associated with skin cancer or dermatological diseases.

X. Cheng, J. Jin, L. Hu, D. Shen, X.-p. Dong, M. A. Samie, J. Knoff, B. Eisinger, M.-i. Liu, S. M. Huang, M. J. Caterina, P. Dempsey, L. E. Michael, A. A. Dlugosz, N. C. Andrews, D. E. Clapham, H. Xu, TRP channel regulates EGFR signaling in hair morphogenesis and skin barrier formation. *Cell* **141**, 331–343 (2010). [[Online Journal](#)]

Citation: L. B. Ray, Receptor and Channel Pair. *Sci. Signal.* **3**, ec122 (2010).