

Touchy-feely protein sensors

Discoveries of how cells detect temperature and touch at a molecular level explain how these stimuli are converted into nerve signals, enabling us to perceive and interact with the world around us

1. Tactile stimuli

Skin Stimulus

Epidermis

3. PIEZO protein

Nerve fibre

Blades curve out, creating bowl shape

Calcium ion-conducting pore is closed

4. Tactile stimulus

Ca^{2+} ions

Blades flatten out and open central pore

Ions flow to nerve fibre...

...electrical signal sent to brain

Dermis

Merkel cell

2. Ion channel

Protein connects Merkel cell to nerve fibre

Nerve fibre

5. Temperature-sensitive proteins

Researchers use capsaicin component of chilli peppers and menthol to discover two proteins that respond to heat and cold

TRPV1 Capsaicin- and heat-activated ion channel responds to temperatures above 40°C – close to pain threshold

TRPM8 Similar protein activated by temperatures below 28°C – cold threshold

