Mechano-electrical transduction refers to the process by which mechanical forces are converted into electrical signals in cells or tissues, such as in sensory cells in the ear or in muscles. This is achieved through the activation of mechanosensitive ion channels, which allow ions to flow across the cell membrane and generate an electrical current.

The mechano-electrical transduction (MET) channel of the inner ear receptor cells, termed hair cells, is a protein complex that enables our senses of hearing and balance. Hair cell MET requires an elaborate interplay of multiple proteins that form the MET channel. One of the MET complex components is the transmembrane protein LHFPL5, which is required for hair cell MET and hearing. LHFPL5 is thought to form a multi-protein complex with other MET channel proteins, such as PCDH15, TMIE, and TMC1. Despite localizing to the plasma membrane of stereocilia, the mechanosensing organelles of hair cells, LHFPL5 requires its binding partner within the MET complex, PCDH15, to localize to the stereocilia tips in hair cells and to the plasma membrane in heterologous cells. Using the Aquaporin 3-tGFP reporter (AGR) for plasma membrane localization, Soler et al from the University Hospital Cleveland Medical Center, found that a region within extracellular loop 1, which interacts with PCDH15, precludes the trafficking of AGR reporter to the plasma membrane in heterologous cell lines. Our results suggest that the presence of protein partners may mask endoplasmic reticulum retention regions or enable the proper folding and trafficking of the MET complex components, to facilitate the expression of the MET complex at the stereocilia membrane [1].

1)
Soler DC, Ballesteros A, Sloan AE, McCormick TS, Stepanyan R. Multiple plasma membrane reporters discern LHFPL5 region that blocks trafficking to the plasma membrane. Sci Rep. 2023 Feb 13;13(1):2528. doi: 10.1038/s41598-023-28045-w. PMID: 36781873.