

Merkel cells revealed as secret behind sensation of light touch

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Scientists have proved experimentally what has been suspected since the discovery of Merkel cells in the skin over a century ago: the sense of light touch that is critical for hand dexterity would not be possible without these cells.

In a presentation at the American Society for Cell Biology 49th Annual Meeting, Dec. 5-9, 2009 in San Diego, Ellen Lumpkin, Ph.D., of Baylor College of Medicine in Houston will report how a new knockout mouse lacking Merkel [cells](#) enabled her research lab to demonstrate that these cells are required for the appropriate sensory coding of the light touch needed to distinguish shapes and textures.

In the knockout mouse, the researchers measured the responses of all classes of touch receptors innervating the animal's skin. "Although we saw no changes in touch receptors that respond to noxious touch, we observed a complete loss of a particular type of light-touch receptor," said Lumpkin, whose research team included scientists at the University of Virginia, Charlottesville, as well as Baylor.

"The sense of touch provides a constant stream information to our brains about the objects that surround us," said Lumpkin. "For example, touch receptors in our hands allow us to recognize shapes, feel textures and grasp objects with high fidelity. Thus, touch is critical for our hand dexterity. It enables countless daily tasks ranging from the mundane, such as typing an email, to the essential, such as drinking a glass of water."

Prior to the knockout mouse model, scientists failed to show experimentally that Merkel cells were anything more than associated with light touch.

As part of the study, the Lumpkin lab first isolated Merkel cells in normal animals and recorded neural impulses from touch receptors in their skin. By applying force to isolated Merkel cells, the researchers showed that these cells were inherently touch-sensitive.

They also identified genes that allowed Merkel cells to convey neural signals to sensory neurons.

This evidence suggested, but did not prove, that Merkel cells were capable of serving as touch receptor cells. The newly identified genes, though, hinted at the basis of light touch. The identification of the genes also allowed the scientists to produce the knockout mouse lacking Merkel cells and subsequently to prove that these cells are responsible for the sense of light touch.

Merkel cells, which can turn malignant and form the skin tumor known as Merkel cell carcinoma, were discovered in 1875 by the German anatomist Friedrich Merkel.

Source: American Society for Cell Biology

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