

Group name: Sensory Transduction and Nociception
IP name: Felix Viana, Ana Gomis and Elvira de la Peña
Group web: <http://painchannels.com/index.php/index>

Title of the MRP/TFM:

Dissecting the role of Piezo2 channels in mechanical nociceptors

Summary of the Project:

In a recent study from our laboratory, we demonstrated that the mechanosensitive channel Piezo2 plays a fundamental role in the function of MRGPRD+ nociceptor neurons and in their contribution to hypersensitivity under neuropathic injury conditions. We also observed that deletion of Piezo2 in these neurons alters the distribution of their terminals innervating the skin. To further understand the contribution of Piezo2 to mechanosensitivity and the cutaneous distribution of MRGPRD+ nociceptors, it is important to describe the expression of this channel in skin nerve endings. However, as with many membrane proteins, the use of antibodies does not provide a reliable detection method.

Recently, it has been reported that the fluorescent dye FM 1-43 can selectively label sensory neurons in which Piezo2 is functionally active¹. Using this tool, the student will investigate whether all MRGPRD+ neurons innervating the skin express functional Piezo2 at their terminals, or whether only a specific subpopulation shows Piezo2 activity, and whether this corresponds to the terminals whose distribution is altered upon channel genetic deletion.

The specific objectives of the project are:

- To confirm that FM 1-43 can be used to identify nerve terminals with Piezo2 activity in sensory neurons innervating the skin.
- To identify MRGPRD+ nociceptors in the skin that exhibit Piezo2 activity using FM 1-43.
- To determine whether the distribution of MRGPRD+ nociceptor terminals labelled with FM 1-43 corresponds to those whose distribution is altered upon Piezo2 deletion.

To begin the project, the student must either hold certification in animal handling or be in the process of completing the TBS

¹Villarino et al., 2023, Neuron 111, 2488–2501, doi.org/10.1016/j.neuron.2023.05.015

Methods and technology involved in the MRP/TFM Project:

Intraperitoneal injection of FM 1-43 in mice
Application of mechanical stimuli to the mouse paw
Dissection, sectioning and processing of glabrous skin from the mouse paw
Confocal microscopy imaging
Image analysis and interpretation of results

Member/s of the lab who will act as tutor/co-tutor of the project (if different from the group IP; PhD required to be tutor / co-tutor): Jorge Fernández Trillo

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