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TRPV1 channel: an active player in heating-induced neurodifferentiation?

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Abstract:

The exposition to thermal stimulation (41,5°C), performed by bulk heating or near infrared laser (NIR) irradiation of Prussian Blue nanoparticles (PBNs), allowed us to induce neuronal morphological and functional differentiation of F-11 neuroblastoma cells.

To understand the mechanism underlying this differentiation, we started from the assumption that the Transient Receptor Potential Vanilloid 1 (TRPV1) channel might be involved. This channel, that activates in the same range of temperature, is also triggered by reactive oxygen species, arachidonic acid and agonists such as capsaicin, which is contained in the chili peppers.

Immunocytochemical analysis we have recently performed has shown its expression in F-11 cells. Since TRPV1 is permeable to Ca^{2+} influx, we focused our attention on the Ca^{2+} signals that can be generated by its activation. Thus, we analyzed the capsaicin-induced intracellular Ca^{2+} increase by measuring fluorescence signals.

Preliminary experiments confirmed that the recorded signals were sustained by TRPV1 channels since they were inhibited by capsazepine, their selective antagonist.

These results suggest that TRPV1 might be one of the responsible for the activation of the pathway that induces the neuronal differentiation caused by heating.

Our future purpose is to silence the TRPV1 gene to try to counteract the induction of neuronal differentiation.