Title

Wnt-5a/Ca2+ pathway modulates endogenous current and oocyte structure of Xenopus laevis

Abstract

Wnt signaling plays an essential role in cellular processes like development, maturation, and function maintenance. Xenopus laevis oocytes are a suitable model to study not only the development but also the function of different receptors expressed in their membranes, like those receptors expressed in the central nervous system (CNS) including Frizzled 7. Here, using frog oocytes and recordings of endogenous membrane currents in a two-electrode path configuration along with morphological observations, we evaluated the role of the non-canonical Wnt-5a ligand in oocytes. We found that acute application of Wnt-5a generated changes in endogenous calcium-dependent currents, entry oscillatory current, the membrane's outward current, and induced membrane depolarization. The incubation of oocytes with Wnt-5a caused a reduction of the membrane potential, potassium outward current, and protected the ATP current in the epithelium/theca removed (ETR) model. The oocytes exposed to Wnt-5a showed increased viability and an increase in the percentage of the germinal vesicle breakdown (GVBD), at a higher level than the control with progesterone. Altogether, our results suggest that Wnt-5a modulates different aspects of oocyte structure and generates calcium-dependent endogenous current alteration and GVDB process with a change in membrane potential at different concentrations and times of the exposition. These results help to understand the cellular effect of Wnt-5a and present the use of Xenopus oocytes to explore the mechanism that could impact the activation of Wnt signaling.

Authors

Parodi J.; Mira R.G.; Martinez-Torres A.; Inestrosa N.C.

Author full names

Parodi, Jorge (7004406658); Mira, Rodrigo G. (57194723835); Martinez-Torres, Ataulfo (6603836285); Inestrosa, Nibaldo C. (7006944395)

Author(s) ID

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Affiliations

Departmento de Análisis de Datos, Facultad de Ciencias Sociales, Universidad Autónoma de Chile, Temuco, Chile; Departamento de Biología Celular y Molecular, Facultad de Ciencias Biológicas, Pontificia Universidad Católica de Chile, Santiago, Chile; Centro de Excelencia en Biomedicina de Magallanes (CEBIMA), Escuela de Medicina, Universidad de Magallanes, Punta Arenas, Chile; Laboratorio de Neurobiología Molecular y Celular, Departamento de Neurobiología Celular y Molecular, Instituto de Neurobiología, UNAM, Campus Juriquilla-Querétaro, Mexico

Authors with affiliations

Parodi J., Departmento de Análisis de Datos, Facultad de Ciencias Sociales, Universidad Autónoma de Chile, Temuco, Chile, Departamento de Biología Celular y Molecular, Facultad de Ciencias Biológicas, Pontificia Universidad Católica de Chile, Santiago, Chile; Mira R.G., Centro de Excelencia en Biomedicina de Magallanes (CEBIMA), Escuela de Medicina, Universidad de Magallanes, Punta Arenas, Chile; Martinez-Torres A., Laboratorio de Neurobiología Molecular y Celular, Departamento

de Neurobiología Celular y Molecular, Instituto de Neurobiología, UNAM, Campus Juriquilla-Querétaro, Mexico; Inestrosa N.C., Departamento de Biología Celular y Molecular, Facultad de Ciencias Biológicas, Pontificia Universidad Católica de Chile, Santiago, Chile, Centro de Excelencia en Biomedicina de Magallanes (CEBIMA), Escuela de Medicina, Universidad de Magallanes, Punta Arenas, Chile

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Correspondence Address

N.C. Inestrosa; Centro de Excelencia en Biomedicina de Magallanes (CEBIMA), Escuela de Medicina, Universidad de Magallanes, Punta Arenas, Chile; email: ninestrosa@bio.puc.cl

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