

## Potassium Channels Couple to 1,25(OH)<sub>2</sub> Vitamin D<sub>3</sub> Rapid Responses and Secretion in Immature Sertoli Cells

Danusa Menegaz<sup>1,2</sup>, Carlos Ramiro Trejes Dornelles<sup>1,2</sup>, Fernanda Carvalho Cavalari<sup>1,2</sup>, Renata Gonçalves<sup>1</sup>, and Fátima Regina Mena Barreto Silva<sup>1,2\*</sup>

<sup>1</sup>Department of Biochemistry Biological Sciences Center, Federal University of Santa Catarina, University Campus, Trindade, Postal Code 5069, Florianópolis, SC, Brazil

<sup>2</sup>Nucleus of Cell Bioelectricity (NUBIOCEL) Biological Sciences Center, Federal University of Santa Catarina, University Campus, Trindade, Postal Code 5069, Florianópolis, SC, Brazil

**Corresponding author:** Silva. FRMB, Department of Biochemistry, Center for Biological Sciences, Federal University of Santa Catarina, Florianópolis, SC, Brazil; Tel: +554837216912; Fax: +55-4837219672; E-mail: mena.barreto@ufsc.br

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### Letter to Editor

The well-known effect of the active form of vitamin D<sub>3</sub>, 1,25(OH)<sub>2</sub> vitamin D<sub>3</sub> (1,25-D<sub>3</sub>), on calcium metabolism, cell proliferation and differentiation is mediated by genomic and nongenomic action [1,2]. The wide 1,25-D<sub>3</sub> receptors distribution and the expression of 1 $\alpha$ -hydroxylase in the male reproductive tract reinforces a pivotal role of this hormone for the active and complete spermatogenesis [3-5].

The Sertoli cell in the seminiferous tubules provides structural and nutritional support for the healthy development of germ cells [6]. The secretory functions of Sertoli cell depend on the activation of ionic channels which are regulated by 1,25-D<sub>3</sub> rapid responses to induce exocytosis of a fluid rich in ions, proteins and growth factors critical for male fertility [7,8]. Studies carried out by our group over the last years have revealed important aspects regarding the effects of 1,25-D<sub>3</sub> stimulation of calcium influx by different ionic channels and signal transduction pathways, including cross talk by second messengers modulating the channel activities [9].

The electrophysiological properties of Sertoli cells indicate that the precise control of the electrochemical gradient is involved in the maintenance of the secretory process [7,9]. The addition of high K<sup>+</sup> in the extracellular media caused a strong depolarization of Sertoli cells followed by repolarization with the efflux of potassium ions through the voltage-gated K<sup>+</sup> channels. In the presence of 1,25-D<sub>3</sub>, the efflux of K<sup>+</sup> ions was recorded after 10 minutes of incubation and it was blocked by TEA, indicating a secretory activity of Sertoli cell through the Ca<sup>2+</sup> conventional secretory pathway.

Our new data shows the stimulatory effect of 1,25-D<sub>3</sub> on whole-cell K<sup>+</sup> currents inhibited by tetraethylammonium, TEA, a broad-spectrum blocker of potassium channels indicating a repolarization of the Sertoli cell after stimulus. Stimulus-secretion coupling in Sertoli cells involves multiple ionic channels that regulate the plasma membrane potential,

intracellular calcium and secretion. Repolarization of the membrane potential is mediated by several K<sup>+</sup>-selective ionic channel proteins such as ATP sensitive potassium channel (KATP), voltage-gated channels (Kv), and Ca<sup>2+</sup>-activated K<sup>+</sup> channels (KCa).

In summary, our results demonstrate for the first time that nongenomic 1,25-D<sub>3</sub> potentiation of potassium currents couple to exocytosis in primary culture of Sertoli cells. This effect appears to involve Ca<sup>2+</sup> influx leading to K<sup>+</sup> efflux and repolarization. We conclude that the steroid hormone 1,25-D<sub>3</sub> appears to play a functional role in male fertility via stimulation of Sertoli cell secretory activities in the testis.

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