Potassium Channels in the Uterine Vasculature: Role in Healthy and Complicated Pregnancies

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Abstract

A progressive increase in maternal uterine and placental blood flow must occur during pregnancy to sustain the development of the fetus. Changes in maternal vasculature enable an increased uterine blood flow, placental nutrient and oxygen exchange, and subsequent fetal development. K^+ channels are important modulators of vascular function, promoting vasodilation, inducing cell proliferation, and regulating cell signaling. Different types of K^+ channels, such as Ca^{2+}-activated, ATP-sensitive, and voltage-gated, have been implicated in the adaptation of maternal vasculature during pregnancy. Conversely, K^+ channel dysfunction has been associated with vascular-related complications of pregnancy, including intrauterine growth restriction and pre-eclampsia. In this article, we provide an updated and comprehensive literature review that highlights the relevance of K^+ channels as regulators of uterine vascular reactivity and their potential as therapeutic targets.

Keywords: BKCa channel; KATP channel; Kv channel; endothelial cells; gestational diabetes mellitus; intrauterine growth restriction; potassium channels; pre-eclampsia; pregnancy; pregnancy-induced hypertension; smooth muscle cells; uterine artery; uterine artery remodeling; uteroplacental circulation; vasodilation.