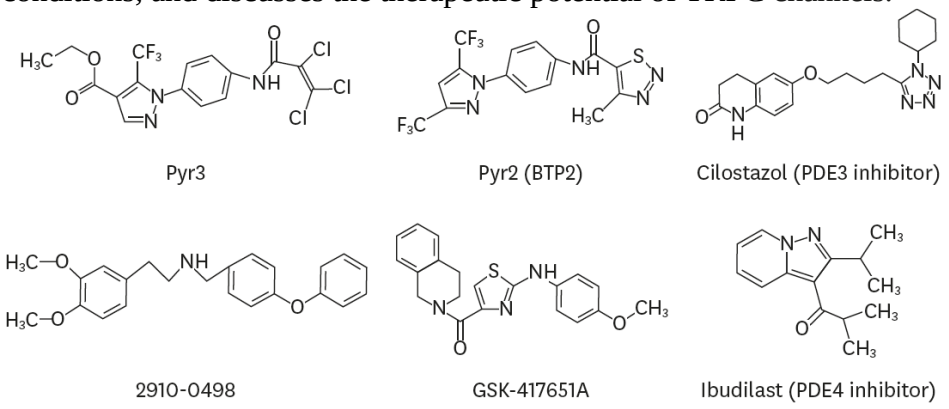
Canonical transient receptor potential channels and vascular smooth muscle cell plasticity

Vascular smooth muscle cells (VSMCs) play a pivotal role in the stability and tonic regulation of vascular homeostasis. VSMCs can switch back and forth between highly proliferative (synthetic) and fully differentiated (contractile) phenotypes in response to changes in the vessel environment. Abnormal phenotypic switching of VSMCs is a distinctive characteristic of vascular disorders, including atherosclerosis, pulmonary hypertension, stroke, and peripheral artery disease; however, how the control of VSMC phenotypic switching is dysregulated under pathological conditions remains obscure. Canonical transient receptor potential (TRPC) channels have attracted attention as a key regulator of pathological phenotype switching in VSMCs. Several TRPC subfamily member proteins—especially TRPC1 and TRPC6—are upregulated in pathological VSMCs, and pharmacological inhibition of TRPC channel activity has been reported to improve hypertensive vascular remodeling in rodents. This review summarizes the current understanding of the role of TRPC channels in cardiovascular plasticity, including our recent finding that TRPC6 participates in aberrant VSMC phenotype switching under ischemic conditions, and discusses the therapeutic potential of TRPC channels.



Name	TRPC3	TRPC6	TRPC3-Nox2	Treatment (mouse, rat)
Pyr3	+++	-	++	Cardiac remodeling, inflammantion
Pyr2	++	++	-	Hypertension, PAH, cardiac hypertrophy[60]
Cilostazol	+	++	-	Ang II-induced vasoconstriction[51], PAD
2910-0498	+++	++	-	Hypoxia-induced vasoconstriction[99]
GSK-417651A	+++	++	-	Increased blood pressure[100]
Ibudilast	-	-	++	Dox-induced cardiac atrophy

Figure 1. Schematic presentation of Protein A-immobilized surface through a crosslinking, glutaraldehyde

Reference:

Nishida M, Tanaka T, Mangmool S, Nishiyama K, Nishimura A. Canonical transient receptor potential channels and vascular smooth muscle cell plasticity. J Lipid Atheroscler. 2020;9(1):124-39.

ความเชื่อมโยงกับเป้าหมายการพัฒนาอย่างยั่งยืน (SDGs) 17 ประการ

เป้าหมายที่ 3: การมีสุขภาพและความเป็นอยู่ที่ดี (Good health and well-being)