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LS-1-P-2402 Smooth muscle cells of testicular venules show different responses to various transmitters, when compared with smooth muscle cells of arterioles; with special reference to intracellular calcium dynamics

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[Background/Aim] It has been well known that shape and distributions of smooth muscle cells (SMC) are different between artery/arterioles and vein/venules. The morphological differences of SMC can indicate different role in vivo, however, very few data has been available on physiolollical characters of SMC of vein/venule. Intracellular Ca^{2+} concentration ($[Ca^{2+}]_i$) plays an essential role in stimulus-response coupling in a great variety of tissue/cells, including vascular SMC. We observed $Ca^{2+}]_i$ dynamics of SMC of intact venules to clarify which transmitters can elicit any response of venules, and compered with those of SMC of arterioles. [Materials and Methods] Real-time confocal microscopy (Nikon RCM/Ab) was employed to study the alteration in $[Ca^{2+}]_i$. Venules and arterioles (external diameters <100 μm) were isolated from rats (Wistar, male), and loaded with a fluorescent Ca^{2+}-indicator, Indo-1. Ringer' solution containing various transmitters/modulators was perfused around the specimens. [Results] SMC of arterioles are fusiform in shape, while those of venules are polygonal. 5-Hydroxytryptamine (5-HT), ATP, and angiotensin II elicited an increase in $[Ca^{2+}]_i$ in most SMC of arterioles. The $[Ca^{2+}]_i$ increase and the following contraction were persistent. When noradrenaline (NorAd) was used as a stimulant, $[Ca^{2+}]_i$ increase was observed only in a portion of the SMC, and the response was relative transient. On the contrary, the$[Ca^{2+}]_i$ increase in SMC of venules during 5-HT or ATP stimulation was faint, but NorAd can induce an evident increase in SMC. Response to angiotensin II was also significant. The increase of SMC of venules was not inhibited, when extracellular Ca^{2+} was removed. Thapsigargin, inducing depletion of intracellular Ca^{2+} store, suppressed the response of SMC of venules to the transmitters. [Discussion] 5-HT and ATP has not been considered as “pressor substances”, even though both induced strong vasoconstriction of arterioles. This may mean that not only vasoconstriction of arterioles is a unique factor for increase of systemic pressure. However substances known as “pressor substances” induce SMC response of venules as well as arterioles. About 65% of whole blood was contained in vein/venules, therefore the reduction of vascular volume of venous system can play a pivotal role in increase of systemic blood pressure.