Differential recruitment of mechanisms for myogenic responses according to luminal pressure and arterial types

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Mechanosensitive nonselective cation channels (NSC (ms)), protein kinase C (PKC), and Rho kinase (ROCK) are suggested as underlying mechanisms for the myogenic contractile response (MR) to luminal pressure (P (l um)). Here we compared relative contributions from these mechanisms using pharmacological inhibitors in rabbit middle cerebral (RbCA), rat middle cerebral (RtCA), rat femoral (RtFA), and rat mesenteric (RtMA) small arteries. Inner diameters of pressurized arteries under various P (lum) were video-analyzed. 4,4'-diisothiocyanatostilbene-2,2'-disulfonic acid (DIDS) was used as a blocker of NSC (ms). In general, RbCA and RtCA showed higher P (l um) sensitivity of MR than RtFA and RtMA. Ten micromolars of DIDS commonly decreased MRs more effectively at low P (l um) (40-60 mmHg) in all tested arteries except RtCA. In RbCA, PKC inhibitors (100 nM of Go6976 or Go6983) decreased the MR at relatively high P (l um) (80-100 mmHg) whereas ROCK inhibitor (Y-27632) showed a P (l um)-independent inhibition. In RtMA and RtCA, PKC inhibitors (Go6976 and Go6983) had no significant effect whereas Y-27632 generally inhibited the MR. In RtFA, neither PKC inhibitor nor Y-27632 alone affected MRs. Interestingly, in the presence of 10 mM DIDS, Go6983 and Y-27632 decreased the MR of RtFA. In RtMA, it was notable that the MR decreased spontaneously on repeated protocol of P (l um) increase, and the 'run-down' could be effective reversed by maxi-K (+) channel blocker (tetraethylammonium or iberiotoxin). In summary, our study shows the variability of MRs according to the arterial types in terms of their pressure sensitivity and underlying mechanisms that are recruited according to P (l um).