Pressure stress delays the transient cyclooxygenase-2 expression by interleukin-1β stimulation in cultured human pulmonary artery smooth muscle cells.

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Pulmonary artery smooth muscle cells (PASMCs) play an important role in a sequence of events leading to the formation of pulmonary artery hypertension (PAH). Nevertheless, little is known about the direct effects of high pressure on the function and the intercellular signaling pathways of PASMCs. The aim of this study was to evaluate the effect of pressure stress which simulates PAH on interleukin-1β (IL-1β)-induced cyclooxygenase-2 (COX-2) expression in cultured human PASMCs. To investigate the effect of PAH on PASMCs, either 20 or 60 mmHg of an atmospheric pressure was given to PASMCs by a pressure-loading apparatus. Protein expression and phosphorylation were analyzed by Western blotting. IL-1β-induced the transient COX-2 protein expression peaking at 6 h in non-pressurized cells, whereas the COX-2 expression was delayed, peaking at 12 h, in the pressurized cells. The pressure stress also delayed the peak time of IL-1β-induced mitogen-activated protein kinases (MAPKs) phosphorylation, i.e., extracellular signal-regulated kinase, p38 MAPK, and c-jun N-terminal kinase. These results suggest that the pressure stress apparatus enable to simulate PAH, and delays in IL-1β-induced COX-2 expression occurs via late activation of MAPKs in PASMC.

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