Litebamine, a phenanthrene alkaloid from the wood of Litsea cubeba, inhibits rat smooth muscle cell adhesion and migration on collagen.

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Abstract

Smooth muscle cells (SMCs) play an important role in the development of atherosclerosis and restenosis after angioplasty and coronary bypass grafting. The pathogenesis of these vascular diseases includes the abnormal production of extracellular matrix (ECM) proteins by SMCs and their interactions with this newly synthesized and preexisting ECM. Litebamine, a natural phenanthrene alkaloid from the wood of Litsea cubeba, has been shown to inhibit platelet aggregation and thromboxane B(2) formation, suggesting its antithrombotic activity. In the present study we examined litebamine effects on vascular SMC adhesion and migration. Our results indicated that litebamine inhibited rat aortic SMCs (RASMCs) and A10 thoracic SMCs adhesion to collagen but not to other matrix proteins, suggesting its specificity on collagen. This inhibition was possibly resulted from that litebamine attenuated immobilized collagen-induced focal adhesion kinase (FAK) phosphorylation and actin cytoskeleton reorganization in RASMCs, as determined by Western blotting and immunofluorescence microscopy. In a functional study, litebamine also inhibited platelet-derived growth factor (PDGF)-induced RASMC migration but did not affect PDGF-induced matrix metalloproteinases (MMPs) secretion. Strikingly, among the tested kinases involved in PDGF-induced migration, only PDGF-induced phosphatidylinositol-3 kinase (PI-3K) activation was inhibited by litebamine. Taken together, we demonstrated here that litebamine can functionally inhibit vascular SMC adhesion and migration and elucidated its possible mechanisms of action. As SMC adhesion and migration are critical events in disease-related vascular remodeling, this compound may have beneficial effects in preventing cardiovascular diseases.