

Prominin-2 expression increases protrusions, decreases caveolae and inhibits cdc42 dependent fluid phase endocytosis

Raman Deep Singh

Mayo Clinic College of Medicine, USA

Membrane protrusions play important roles in biological processes such as cell adhesion, wound healing, migration, and sensing of the external environment. Cell protrusions are subtype of membrane micro domains composed of cholesterol and sphingolipids, and can be disrupted by cholesterol depletion. Prominins are pent span membrane proteins that bind cholesterol and localize to plasma membrane (PM) protrusions. Prominin-1 is of great interest as a marker for stem and cancer cells, while Prominin-2 (Prom2) is reportedly restricted to epithelial cells and therefore, aim of this study was to characterize the effects of Prom-2 expression on PM micro domain organization. Prom2 expression in HSF and CHO cells caused extensive Prom2-positive protrusions that co-localized with lipid raft markers. Prom2 expression significantly decreased caveolae at the PM, reduced caveolar endocytosis and increased caveolin-1 phosphorylation. Prom2 expression also inhibited Cdc42-dependent fluid phase endocytosis via decreased Cdc42 activation. Effects on endocytosis were reversed by addition of cholesterol. Knockdown of caveolin-1 by siRNA restored Cdc42 dependent fluid phase endocytosis in Prom2-expressing cells. Prom2 protrusions primarily localize to lipid rafts and recruit cholesterol into protrusions and away from caveolae, leading to increased phosphorylation of caveolin-1, which inhibits Cdc42-dependent endocytosis. This study provides a new insight for the role for prominins in the regulation of PM lipid organization.

Takhter.Ramandeep@mayo.edu