Megalo-type isomaltosaccharides are an enzymatically synthesized foodstuff produced by transglucosylation from maltodextrin, and they contain a mid-chain length polymer of D-glucose with α-1,6-glycoside linkages. The injection of a solution of megalo-type isomaltosaccharides (1–4%(w/v), average DP = 12.6), but not oligo-type isomaltosaccharides (average DP = 3.3), into the intestinal lumen dose-dependently reduced the transport rates of tight junction permeable markers in a ligated loop of the anesthetized rat jejunum. Application of the megalosaccharide also suppressed the transport of tight junction markers and enhanced transepithelial electrical resistance (TEER) in Caco-2 cell monolayers. Cholesterol sequestration by methyl-β-cyclodextrin in the Caco-2 monolayers abolished the effect of megalosaccharide. Treatment with anti-caveolin-1 and a caveolae inhibitor, but not clathrin-dependent endocytosis and macropinocytosis inhibitors, suppressed the increase in TEER. These results indicate that isomaltosaccharides promote the barrier function of tight junctions in the intestinal epithelium in a chain-length dependent manner and that caveolae play a role in the effect.

Megalo-type isomaltosaccahride interact s to caveolae components, and initiates signals to the tight junction for enhancing barrier function of the intestinal epithelium.