Vibrio parahaemolyticus induces inflammation-associated fluid accumulation via activation of the cystic fibrosis transmembrane conductance regulator

Abstract

Vibrio parahaemolyticus is a foodborne bacterium that causes acute gastroenteritis through the consumption of contaminated, raw, or undercooked seafood. Cystic fibrosis transmembrane conductance regulator (CFTR) is a well-characterized chloride channel that regulates several other ion channels and transporters to maintain water homeostasis in the gut lumen. Also, CFTR is a main target of bacterial infection-associated diarrhea. Hence, the aim of this study was to clarify the contribution of CFTR in V. parahaemolyticus-induced diarrhea in a mouse model of intestinal loop fluid accumulation, with CFTR inhibitors and a CFTR knockout model. The results indicated that CFTR plays a critical role in fluid accumulation in response to V. parahaemolyticus infection. We also investigated the inflammatory association in CFTR-mediated V. parahaemolyticus-induced fluid secretion with cyclooxygenase inhibitors and found that fluid accumulation was decreased by inhibition of cyclooxygenase 2 produced by neutrophils. These findings suggest that V. parahaemolyticus-inducing infiltration and activation of neutrophils also participated in CFTR mediated fluid secretion. This study reveals an important relationship between V. parahaemolyticus-induced diarrhea and inflammation in a mouse model. J. Med. Invest. 68 : 59-70, February, 2021