

Expression of short-chain fatty acid receptor GPR41 in the human colon

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Short-chain fatty acids (SCFAs), including acetate, propionate and butyrate, are the most commonly found anions found in the monogastric mammalian large intestine, and are known to have a variety of physiological and pathophysiological effects on the gastrointestinal tract. We investigated the protein and mRNA expression levels of GPR41, a possible G protein coupled receptor for SCFA, using Western blot analysis and reverse transcriptase-polymerase chain reaction. We found that GPR41 protein and mRNA are expressed in human colonic mucosa. Immunohistochemistry for GPR41 showed that mucosal GPR41 protein is localized in cytoplasm of enterocytes and enteroendocrine cells. Moreover, GPR41-immunoreactive endocrine cells contained peptide YY but not serotonin or GPR43. The cellular population of GPR41 (0.01 ± 0.01 cells / crypt) was much smaller than that of GPR43 (0.33 ± 0.01 cells / crypt) in the human colon. However, the potency order of SCFA-induced phasic contraction of colonic smooth muscle that we previously reported is consistent with GPR41 (propionate \geq butyrate $>$ acetate) but not GPR43 (propionate = butyrate = acetate). Therefore, the present study suggests that GPR41 expressed in human colonic mucosa may function as a sensor for luminal SCFAs.