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# Human gut symbiont Roseburia hominis promotes and regulates innate immunity

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## Abstract

© 2017 Patterson, Mulder, Travis, Lan, Cerf-Bensussan, Gaboriau-Routhiau, Garden, Logan, Delday, Coutts, Monnais, Ferraria, Inoue, Grant and Aminov. Objective: Roseburia hominis is a flagellated gut anaerobic bacterium belonging to the Lachnospiraceae family within the Firmicutes phylum. A significant decrease of R. hominis colonization in the gut of ulcerative colitis patients has recently been demonstrated. In this work, we have investigated the mechanisms of R. hominis-host cross talk using both murine and in vitro models. Design: The complete genome sequence of R. hominis A2-183 was determined. C3H/HeN germ-free mice were mono-colonized with R. hominis, and the host-microbe interaction was studied using histology, transcriptome analyses and FACS. Further investigations were performed in vitro and using the TLR5KO and DSS-colitis murine models. Results: In the bacterium, R. hominis, host gut colonization upregulated genes involved in conjugation/mobilization, metabolism, motility, and chemotaxis. In the host cells, bacterial colonization upregulated genes related to antimicrobial peptides, gut barrier function, toll-like receptors (TLR) signaling, and T cell biology. CD4 + CD25 + FoxP3 + T cell numbers increased in the lamina propria of both mono-associated and conventional mice treated with R. hominis. Treatment with the R. hominis bacterium provided protection against DSS-induced colitis. The role of flagellin in host-bacterium interaction was also investigated. Conclusion: Mono-association of mice with R. hominis bacteria results in specific bidirectional gene expression patterns. A set of genes thought to be important for host colonization are induced in R. hominis, while the host cells respond by strengthening gut barrier function and enhancing Treg population expansion, possibly via TLR5-flagellin signaling. Our data reveal the immunomodulatory properties of R. hominis that could be useful for the control and treatment of gut inflammation.

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## Keywords

Flagellin, Immune tolerance, Inflammatory bowel disease, Roseburia, T lymphocytes, TLR5

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