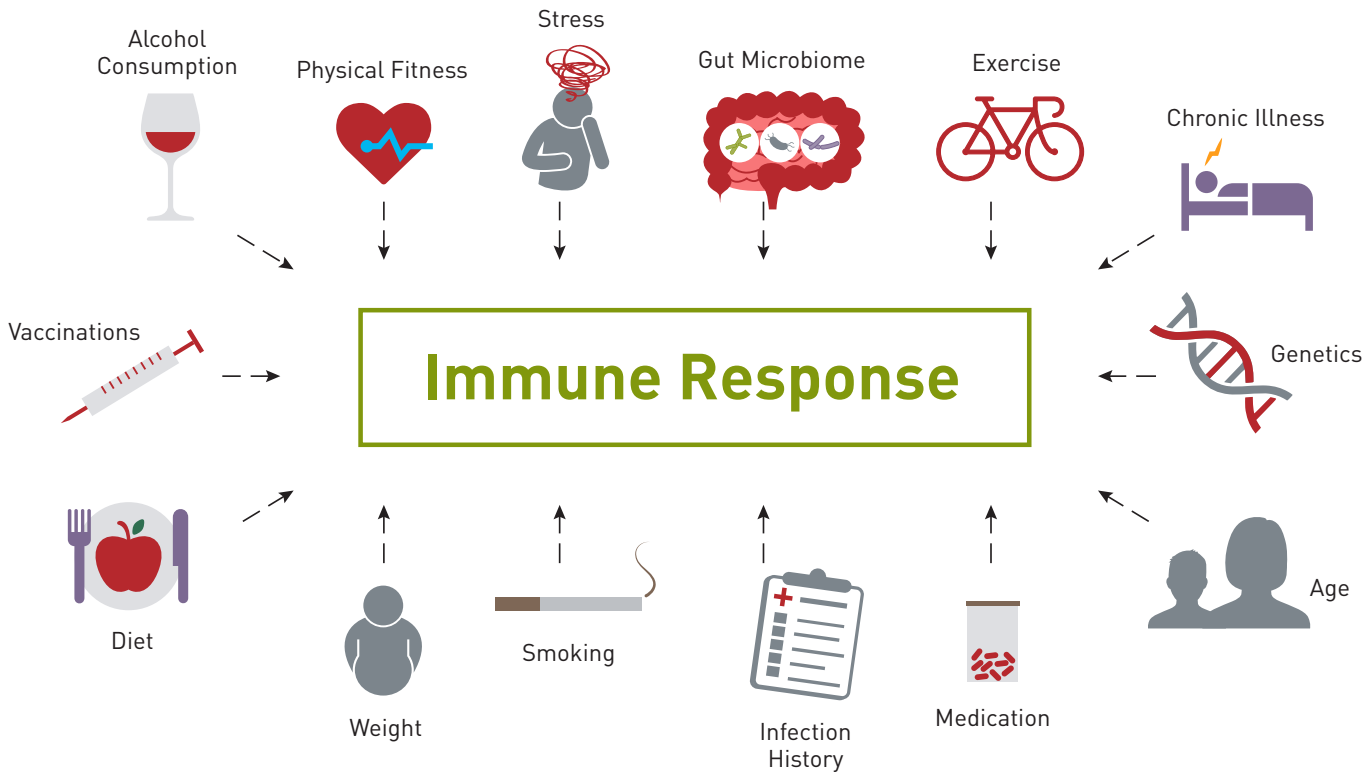




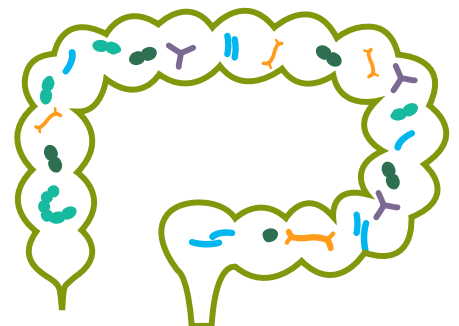
The immune system is complex

Many factors can affect the immune response:



Emerging data suggest some fibres may support immunity

PROMITOR® Soluble Fibre is shown to have a beneficial impact on the composition, growth and activity of microbiota, as well as on the gut barrier function and the production of short-chain fatty acids (SCFAs). It is therefore potentially beneficial for immune health.¹⁻³ Further research is needed to better understand the effect of fibres on specific aspects of the immune system and to explore the effect on clinical outcomes across the lifespan. Additional research is also needed before a claim regarding immunity benefits can be substantiated for PROMITOR®



Probiotics are live microorganisms which, when consumed in adequate amounts, confer a health benefit.⁴


Prebiotics are substrates that are selectively used by host microorganisms conferring a health benefit.⁵





The gut microbiome is composed of the microorganisms (bacteria, viruses, protozoa and fungi) and their genetic material present in the gastrointestinal tract.⁶



Gastrointestinal tract and immune health


 First line of defence for food-borne pathogens


 Mucus protects cells and may initiate immune response

 Microbes interact with host and play an important role in health

Dietary fibre and immune health

Prebiotic dietary fibres may play a potential role in immune health by:

 supporting the production of short-chain fatty acids (SCFAs), which can increase immune cell activity⁷

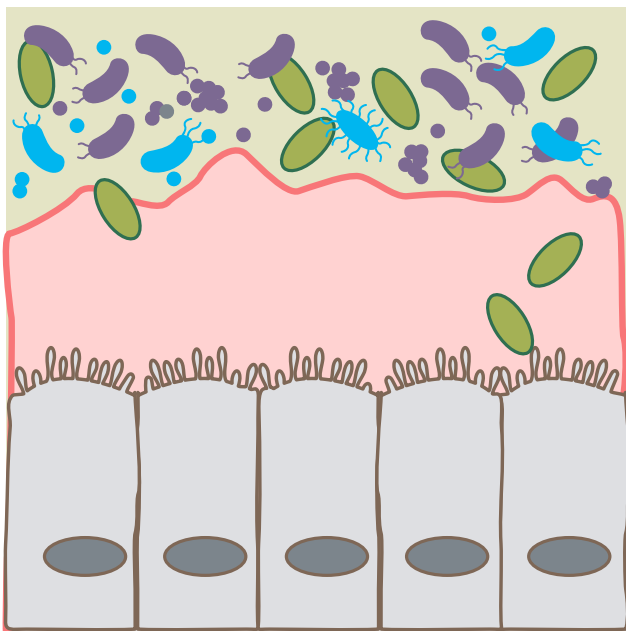
 increasing bacteria that promote activation of immune cells⁸

 preserving gastrointestinal wall cells and mucus⁹

Dietary fibre and gut barrier

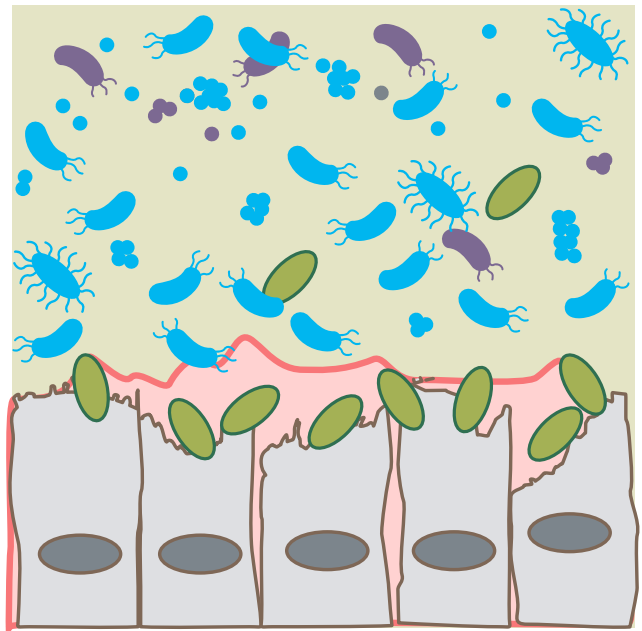
Deficits in dietary fibre intake can lead to degradation of the colon gut barrier, and result in increased susceptibility to pathogens¹⁰

Gut barrier with a fibre-rich diet*

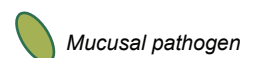
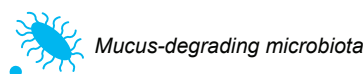
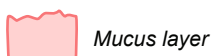


Intact mucus layer and barrier function

Gut barrier with a fibre-poor diet



Microbiota eroded mucus layer and barrier dysfunction



*figures adapted from Desai MS et al. Cell. 2016; 167(5):1339-1353

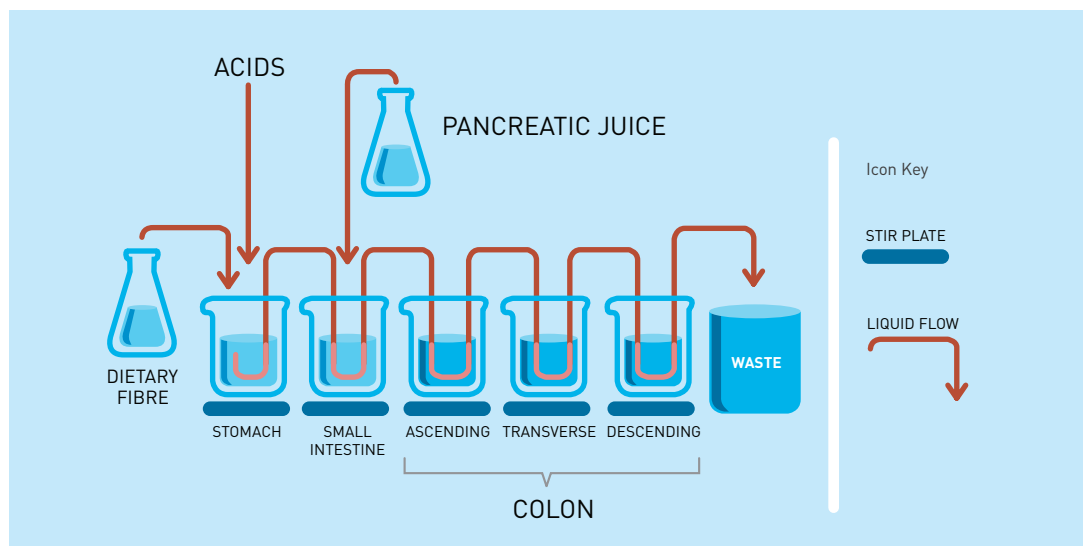
PROMITOR® Demonstrated

In vitro studies:

Gastrointestinal tract simulations, including using the Simulator of Human Intestinal Microbial Ecosystem (SHIME),¹¹ have demonstrated that PROMITOR® Soluble Fibre:

-  increases the number of bifidobacteria and some lactobacillus species, including at the luminal and mucosal level^{12,13}
-  increases total short-chain fatty acids in the ascending, transverse and descending colon¹⁴
-  improves gut barrier integrity¹¹
-  increases butyrate, which serves as a primary source of fuel for the cells that line the colon¹⁴

Simulator of the Human Intestinal Microbial Ecosystem (SHIME)



Clinical trials demonstrate that PROMITOR® Soluble Fibre supports the growth of beneficial bacteria:

A one log increase in *Bifidobacterium spp.* was observed after the consumption of 21g/day of soluble corn fibre for 3 weeks in adult males.¹⁵



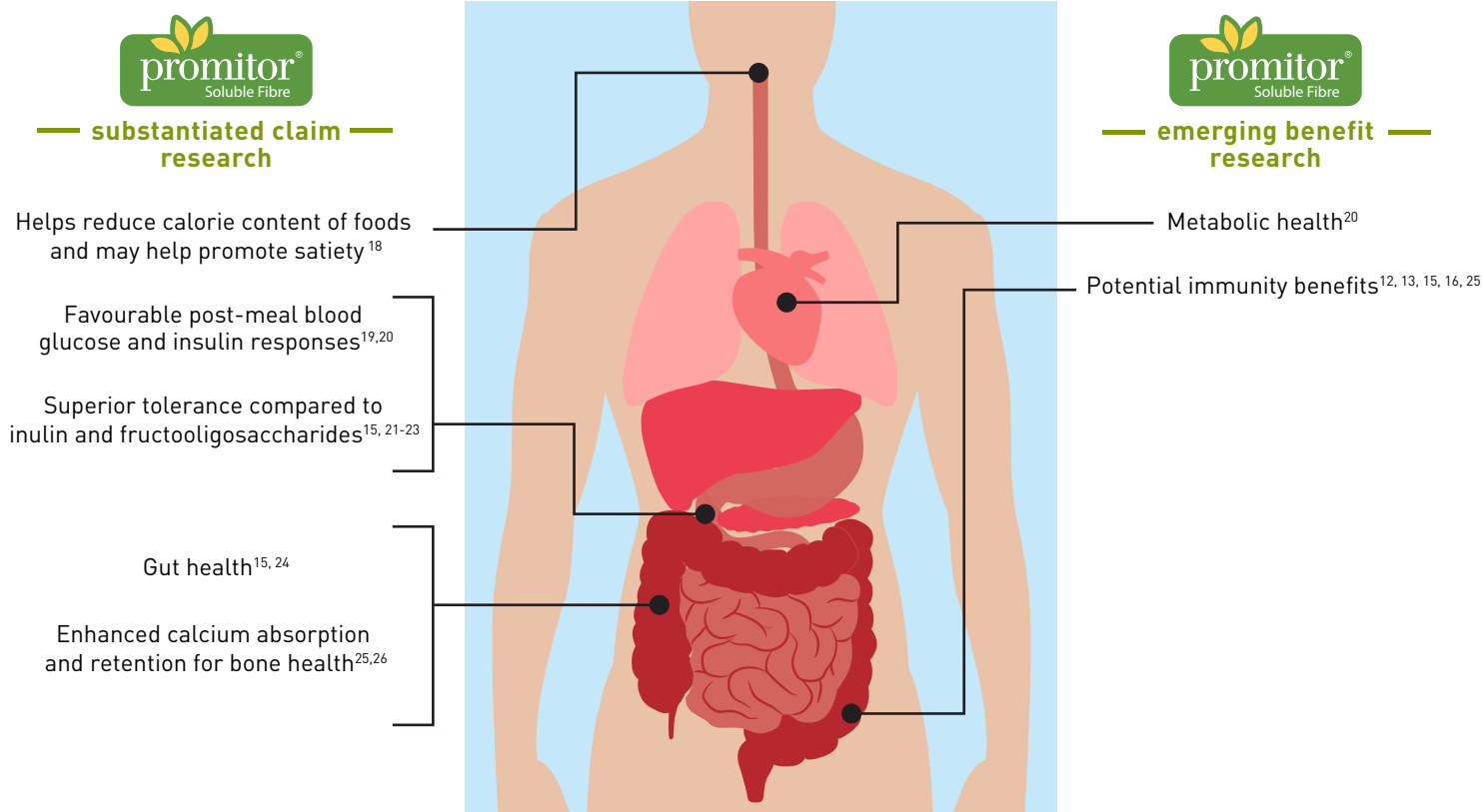
An increase in bacteroides, butyricococcus, oscillibacter and dialister, which correlated with an increase in calcium absorption, was observed in 24 adolescents after 12g/day of soluble corn fibre was consumed for 3 weeks.¹⁶



A human intervention study with healthy elderly adults (aged 60-80) who consumed 12g/day of soluble core fibre with or without probiotic *Lactobacilli rhamnosus* for three weeks, showed that all treatments (fibre alone or with probiotics) provided significant changes in gut microbiota, while a placebo did not.¹⁷



Health benefits of PROMITOR® Soluble Fibre



References

1. Aziz N, Bonavida B For Immunopathol Dis Therap. 2016; 7(1-2):41-55.
2. Ríos-Covián D, et al. Front Microbiol. 2016; 17 (7):185.
3. Desai MS, et al. Cell. 2016; 167(5):1339-53.
4. Vester Boler BM, et al. Br J Nutr. 2011;1 06:1864-71.
5. Sanders L, et al. FASEB J. 2008; 22:lb761.
6. Stewart ML, et al. Ann Nutr Metabol. 2010; 56:91-98.
7. Housez B, et al. J Hum Nutr Diet. 2012. doi:10.1111/j.1365-277X.2012.01252.x.
8. Timm DA, et al. J Nutr. 2013; 143:473-478.
9. Maathuis A, et al. J Am Coll Nutr. 2009; 28:657-6.
10. Titoria P, et al. Confidential Collaborative Project In House Final Report No. 120368. Leatherhead Food International. March 2007.
11. Whisner CM, et al. Br J Nutr. 2014; 12:446-56.
12. Whisner CM, et al. J Nutr. 2016; 146:1298-306.
13. Weaver CM, et al. J Agri Food Chem. 2010; 58:8952-8957.
14. Jakeman SA, et al. Am J Clin Nutr. 2016; 104:837-43.
15. Kendall C, et al. J Am Coll Nutr. 2008; 27:711-8.
16. Konings E, et al. Br J Nutr. 2013; Jul 23:1-11.
17. Molly K, et al. Appl. Microbiol. Biotechnol. 1993; 39(2):254-258.
18. Marzorati M, et al. 6th International Dietary Fibre Conference; France, 2015.
19. Costabile A, et al. Front Immunol. 2017; 8:1443.
20. Slavin J. Nutrients. 2013; 5(4):1417-1435.
21. Saavedra JM, et al. Br. J. Nutr. 2002,=; 87:S241-S246.
22. Koh A, et al. Cell. 2016; 165 (6):1332-1345.
23. Hill C, et al. NRGastro. 2014; 11:506-514.
24. Gibson GR, et al. NRGastro. 2017; 14:491-502.
25. Gail AM, et al. (2018) Gut Microbiome. In M.L. Corrigan, K. Roberts & E. Steiger (Eds.) Adult Short Bowel Syndrome. (pp 45-54). Academic Press.

PROMITOR® Soluble Fibre is an FDA-accepted fibre that is manufactured from corn. **PROMITOR® Soluble Fibre** can be used to increase the fibre content of a variety of foods and beverages and to reduce sugar and calorie content. In addition, emerging research indicates that it may support gut health, which may result in immune health benefits as part of a balanced diet and a healthy lifestyle.



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