

## Gut reactions: could our microbiome hold the key to our health?

Over the past few years, research into the human microbiome and potential links to human health and disease has exploded into popular science.

The bacterial cells that reside in our gut outnumber human cells 100 to 1 – we are more bacteria than human! So it's not a leap to suggest these microbes play a role in our health and wellbeing.

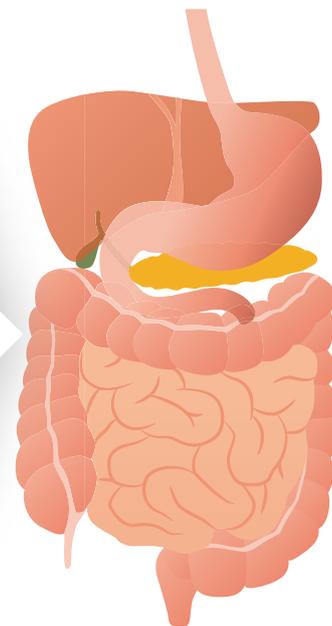
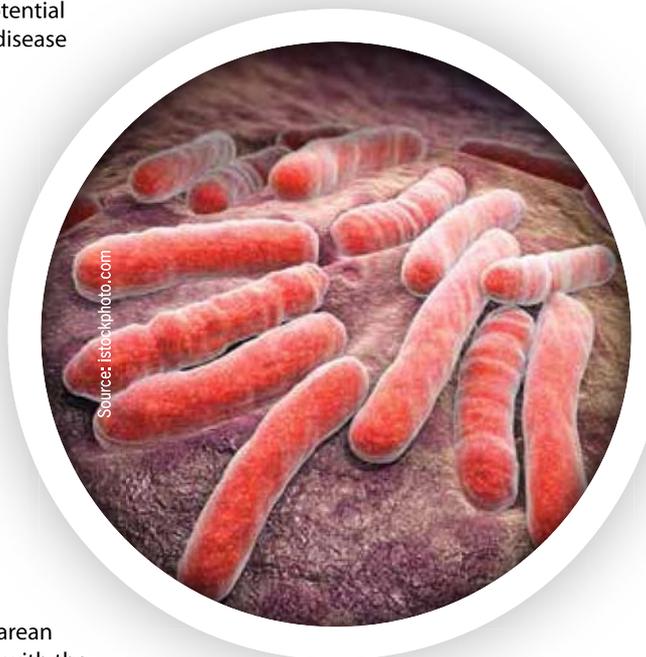
From the moment we're born, our microbiome, passed on from our mothers during birth, is thought to be essential for both our short- and long-term health, with vaginal microbiota primed to coat the baby as it passes through the birth canal just before birth. In fact, a number of studies have shown a difference in the microbial communities of caesarean born versus vaginal born babies,<sup>1-3</sup> with the increase in C-sections being linked to rising rates of conditions such as obesity, asthma and allergies.<sup>4,5</sup> The thinking here is that C-section-delivered babies don't get exposed to their mother's birth canal bacteria and in turn don't always go on to develop their 'healthy' microflora.

It has long been accepted that the bacteria in our gut help aid digestion and can cause gastrointestinal grief when thrown out of balance (e.g. when taking antibiotics). But our gut microbiota is thought to play an even more important role, with researchers suggesting a gut-brain axis, whereby the microbes are able to communicate with the brain and in turn modulate brain physiology and behaviour.<sup>6</sup> Scientists believe this has implications for numerous diseases and conditions. A prime example of this is the emerging correlation between people suffering gastrointestinal disorders, such as irritable bowel syndrome (IBS), and anxiety and depression.<sup>6</sup>

What's more, our gut microbiota is thought to influence a range of other conditions, from Parkinson's disease (also linked to chronic depression)<sup>7</sup> to obesity and weight maintenance,<sup>8</sup> childhood autoimmune diseases<sup>1-5</sup> and even some forms of cancer.<sup>9</sup>

Although some of the conclusions from this varied research should be taken with a grain of salt, the one consensus from these studies is that a dysbiosis of your natural microflora could trigger any number of adverse, sometimes even dire, consequences for your health.

We know that the passing of maternal microbiota on to offspring is a phenomenon that occurs throughout the animal kingdom.



So this begs the question: does the microbiome of other animals, mammals in particular, play a role in their health? According to a number of studies in a range of animals, yes, it does.

Numerous studies have shown that gastrointestinal microbiota profiles of diseased dogs (e.g. dogs with diarrhoea, IBS) differ from those of healthy dogs. Cats and dogs with IBS show similar changes in their gut microbiota to humans with IBS – a significant reduction in species richness and an increase in specific bacterial phyla.<sup>10,11</sup>

And, just as with humans, the gut microbiome of animals can be influenced and even altered by diet. A recent study reported the effect of protein-to-carbohydrate ratios on the body condition and gut microbiota composition of lean and obese dogs.<sup>12</sup> Changes in microbiota were observed in dogs fed diets with varying protein-to-carbohydrate ratios and these changes were more pronounced in obese dogs compared with lean dogs. Similarly, Standardbred horses fed a high-energy forage-only diet had a significantly different and more stable microbial composition than horses fed a traditional forage-concentrate diet.<sup>13</sup>

There is a plethora of research on the gut microbiome and its effect on human and animal health. The more we learn about the different ways in which gut microbiota can affect host health and wellbeing, the more complex this story becomes. Our growing understanding and appreciation of the gut microbiome, however, is helping to shed light on some of the most debilitating human and animal conditions and opening up new possibilities and

targets for treatment. Perhaps we are not too far from the day when a simple recalibration of our gut microbiota will keep us fighting fit.

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