

## We are 90% bacteria

Each of us is composed of 10 times as many bacterial cells than human cells<sup>1</sup>. Only a few of these are harmful. The vast majority are beneficial, carrying out a wide range of essential functions. Over 70% of these bacteria reside in the large intestine, which is not just a conduit for waste but a large fermenting vat. The large intestine is packed full of as many as 100 trillion of, predominantly beneficial, bacteria, about 2 Kg in weight<sup>2</sup>. This vast colonic biomass, which has now come to be known as the colonic microbiome, carries out a wide range of functions, among which the following might be considered the most important:

#### They:

- salvage the starches, proteins and sugars that have not been absorbed higher up in the small intestine, converting them into short chain fatty acids. These are not only a nutrient source for the cells lining the intestine, but can be utilised as an extra source of energy. This process also produces gases (hydrogen, methane and carbon dioxide) that may distend the gut and cause symptoms of pain and bloating in a sensitive gut
- break down toxic substances taken in with food
- manufacture vitamins K, Biotin, Folate and B12, which assist in blood clotting and other important cellular functions

- can bind to sites on the layer of cells lining the gut and provide a barrier preventing penetration by toxins and the adhesion and infiltration by harmful bacteria. This 'contra-biotic' effect will inhibit the sensitization of the gut and will most likely prevent the symptoms of IBS
- assist the development of the gut immune system, enabling it to recognize and defend against harmful organisms
- produce antibacterial substances that keep pathogenic species in check.

### What may compromise the colonic bacteria

Maintenance of the colonic integrity and health requires a healthy population of beneficial bacteria. This can be compromised in the following situations:

- an attack of food poisoning or gastroenteritis
- any other cause of diarrhoea, which may flush out the colon and deplete beneficial bacterial species
- antibiotics active against a broad spectrum of organisms
- stress may also alter bowel function, compromise immune surveillance and deplete the healthy colonic flora
- ageing
- a diet that excludes or severely restricts poorly absorbed sugars or starches.
  For example, a low FODMAP diet, can deplete beneficial bifido-bacteria species
- a diet rich in fat or alcohol may deplete healthy colonic bacteria, encourage harmful species and irritate the lining of the gut.

When the healthy intestinal flora is depleted, the colon may fail to salvage starches and proteins and this may result in unpleasant symptoms of diarrhoea and abdominal discomfort. Depletion of the microbiome may also prevent harmful pathogenic species attaching to and irritating the lining of the colon.

The numbers of beneficial bacteria have been reported to be reduced and less variable in people diagnosed with IBS. This could be due to a previous attack of gastroenteritis, antibiotics, alterations in the diet, and a consequence of diarrhoea and abnormally rapid gut transit.

## **Probiotics**

Probiotics contain beneficial bacteria designed to restore the equilibrium of the intestinal bacterial flora, or to prevent the flora getting out of balance. They include a variety of different species, which can be grown in culture and survive storage in aerobic media.

Probiotics were originally thought to replenish the number of beneficial bacteria found in the colons of people with IBS. There is, however, no evidence that probiotics seed the colon; the short term benefit observed in some trials does not last after treatment when probiotics is withdrawn. It is possible instead that the passage of probiotics through the gut may cause a temporary reduction in inflammation. But, there has always been doubt as to whether all probiotics can survive the acid medium of the stomach or are even live when they are consumed; causing some scientists to suggest that they may work by carrying biologically active cell wall constituents into the gut.

Probiotics are available in the form of tablets or capsules, or as 'functional foods', such as bio-yoghurts, milk and fruity drinks.

Not all manufacturers have validated that their probiotics can survive passage through the stomach and retain the potential to change the composition of bacteria in the colon.

Finding the right types of bacteria and the right delivery system to survive storage and passage through the stomach has involved a large amount of scientific research, but even those products that satisfy those requirements need to be consumed every day.

# Do probiotics work?

The evidence for taking probiotics to treat IBS has been comprehensively reviewed along with practice guidelines in a recent document published by a team from The British Dietetic Association<sup>3</sup>. It concludes that although the weight of evidence might suggest that as a concept, probiotics might be effective in managing IBS, the evidence for using specific probiotics to improve IBS symptoms is inadequate. This is probably because of variation in the symptoms of IBS and the bacterial composition of the different probiotics.

Not enough research has been conducted on any one product or any particular IBS symptom to come to any product specific recommendations for use in clinical practice. It is rather a case of some of the products may help some of the people some of the time. Not only is there variation among people, their symptoms and their colonic microflora, there is also enormous variability in the different products in terms of:

- the dose
- the strain
- species and mixture of bacteria, (multistrain),
- the dosage form (capsule or liquid)
- the carrier (yoghurt, fruit juice, fermented barley)
- the shelf life of live products
- whether the bacteria survive passage through the stomach, (and indeed whether that matters).

'Despite the sheer number of clinical trials showing that probiotics may be useful in treating IBS, there is insufficient data on any one substance to recommend it as an effective product.'

Many products are supported by a substantial volume of patient testimony, and while that must always be acknowledged, the magnitude of the placebo effect is very large in trials of treatment in IBS, especially for products that attract so much media interest. The notion of taking the good bacteria to get rid of the bad chimes with the public consciousness. We all need to believe that something will relieve our symptoms, and that belief may be the most important therapy.

The following is a list of products that have some evidence of efficacy as a treatment for IBS. On theoretical grounds, it might be best to choose a multi-strain product that survives passage through the stomach, though single strain products that may not survive gastric passage can also work. Some of the nutrient means used to deliver the probiotic in symbiotic preparations may contain FODMAPs, but in most cases, the amounts are low and should not cause a problem in people on a low FODMAP diet. Indeed one recent paper suggests that combining probiotics with a low FODMAP diet may help to prevent the depletion of beneficial bacteria observed with that diet<sup>4</sup>.

#### Probiotics

Alflorex	capsule	Yakult	liquid
Bioflora	capsule	Actimel	liquid
Lab 4	capsule	Orchard Maid	liquid
Duolac	capsule	Biocare	capsule
VSL#3	liquid	Multibionta	
		multivitamin tablet	

#### **Symbiotics**

Symprove liquid Proviva liquid

# Prebiotics

Prebiotics are poorly absorbed complex sugars that provide a nutrient medium for the growth of beneficial bacteria. Most fermentable oligosaccharides, the major components of FODMAPs, are prebiotics but these tend to make symptoms of IBS worse by generating large volumes of gas. There is only one commercial prebiotic that has shown benefit for patients with IBS<sup>5</sup>. This is Bimuno, an artificially synthesized transgalacto-oligosccharide that stimulates the production of bifidobacteria species, and at low doses, is claimed not to generate gas.

## **Symbiotics**

In theory, taking prebiotics might improve the viability and efficacy of probiotics. Some products are therefore marketed together with a prebiotic. These are known as symbiotics. Proviva contains a probiotic mixed with oats and fruit juice. Symprove, is a mixture of bacterial probiotics in a nutrient medium of fermented barley. Research indicates that the bacteria survive passage through the stomach in high numbers. One large scale trial in IBS has shown impressive results<sup>6</sup>.

#### Summary

Probiotics are harmless and natural, and have the potential to restore the normal healthy intestinal flora and protect the integrity of the gut. The evidence suggests that some products can help some patients some of the time. However, there is such a variation in the bacterial composition of the products and the doses, which when combined with the variation in IBS symptoms, means that no firm recommendations can be made for any one product at this time. Therefore, until research laboratories can work together, share information and develop a concerted policy on probiotic development, conclusions are likely to remain promising but vague.

# So should you try probiotics or not?

The National Institute of Clinical Excellence (NICE), has advised that 'People with IBS who choose to try probiotics should be advised to take the product for at least four weeks while monitoring the effect. Probiotics should be taken at the dose recommended by the manufacturer'7. This is hardly a ringing endorsement. The European Food Standards Agency have taken a harder line. They have prohibited companies marketing probiotics from making any health claims. Nevertheless, probiotics certainly work for some people and they may work for you. If you find one product effective you may need to continue to take it regularly for as long as seems necessary, as there is no evidence that the bacteria survive and populate the large bowel long-term. If it is not effective, you could try another product.

Probiotics don't work for everybody, so it would seem prudent not to try any more than three different probiotics. The addition of a prebiotic would seem to offer the possibility of enhancing and extending the effect of probiotics but it has not yet been established whether this strategy offers significant benefit over probiotics alone.

'It is still not certain whether probiotics will be useful for managing IBS in the long term, though they continue to seem promising'

#### About this factsheet

This Factsheet was written by specialist IBS Dietitian, **Julie Thompson** and medical adviser, **Dr Nick Read** in June 2016. It is published by The IBS Network as a service to those with Irritable Bowel Syndrome, and their healthcare professionals. The IBS Network is the national charity supporting people living with Irritable Bowel Syndrome.

# **Probiotics, Prebiotics** and Symbiotics



#### **Further Reading**

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