



# Probiotic News

**The following article is written by Dr John A Jones, MA (Cantab.), MB, BS who has been a GP in Cambridgeshire for 20 years.**

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## Probiotics - Dispelling The Acid Myth

At birth, a baby's gut is sterile – yet within a few days a thriving bacterial flora has developed. How does this happen? Bacteria are ingested during passage through the birth canal and also during feeding and sucking on other objects. These organisms have to survive the joint hurdles of the stomach, with its hydrochloric acid, and the duodenum where bile enters via the common bile duct.

While many will not make it through, a proportion do, and it is these survivors which multiply to form the gut flora. Normally, there are over 400 different strains of organisms inhabiting our intestinal tract and co-habiting happily with us. In fact, as we have evolved, we have lost the ability to produce various compounds and now rely on our gut flora to produce them for us. Without this symbiotic relationship our health suffers and we are unable to be nutritionally complete.

During life, the composition of the gut flora changes considerably, as many of the organisms are not naturally resident and have to be continually replaced. These replacements come from bacteria on and in the food we eat. There is concern that, as we have increasingly cleaned and sterilised our food and environment, we have reduced the variety and numbers of organisms we ingest.

Nowadays we also eat less of the types of food that contain bacteria – fermented foods such as yoghurt, sauerkraut and kefir (a fermented milk product containing various *Lactobacilli* & other micro-organisms). A common yoghurt producer, *Lactobacillus bulgaricus*, was first identified in Bulgaria – a country where the population have both a long lifespan and high consumption of yoghurt and kefir.

Whilst our food has less and less of the normal environmental organisms, it is somewhat paradoxical that the organisms most likely to be in our food now are 'spoilage' organisms such as *Escherichia Coli* and *Clostridium difficile* which are often pathogenic.

These naturally occurring organisms are not enteric coated or otherwise protected and yet still manage to survive passage through the acidic conditions of the stomach to the alkaline environment of the intestine.

How do they do this? There are a number of important factors involved:-

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### **1. Stomach pH**

While the acidity (pH) of the stomach can be quite harsh at times – dropping to a pH of about 2 – at other times, such as at mealtimes it can rise to a pH of around 6. This may not sound a major change, but the pH scale is a logarithmic scale. Each 1 pH change means an increase in acidity of 10 times – so a pH of 2 is 10 times more acidic than a pH of 3, and 10,000 times more acidic than a pH of 6! A pH of 7 is 'neutral' and pH's between 7 and 14 are alkaline.

This is an important fact in respect to probiotics. Whilst even the hardiest of probiotics may only survive for a short time at pH 2 they have a much longer survival time at pH 5 or 6. Taking a probiotic with food is therefore the natural way, and will also give it the best chance of survival.

### **2. Transit Time**

When you eat, food is masticated in the mouth and mixed with alkaline saliva. This food bolus then passes into the stomach, where it mixes with the stomach juices and is churned around by the stomach muscle, much like in a washing machine. This liquid part of the mixture is called *chyme*, and 50% of this leaves the stomach 30 minutes after eating.

As probiotics are mixed uniformly with the *chyme* it also follows that within 30 minutes 50% of the probiotics will have passed out of the stomach, thus limiting the duration of acid exposure.

### **3. Probiotic Strength**

Bacterial survival is a numbers game. Even in the harshest environment, if you start with enough organisms, some will survive. It therefore follows that with probiotics, having a high strength will improve survival. For example a formulation of ten billion per gram ( $1 \times 10^{10}$ ) will have one hundred times more organisms than one of one hundred million ( $1 \times 10^8$ ). Conversely a probiotic strength of forty billion per gram ( $4 \times 10^{10}$ ) is only four times stronger than one of ten billion ( $1 \times 10^{10}$ ) per gram.

It is generally accepted, that at the point of consumption, a probiotic should have a concentration of at least  $1 \times 10^6$  organisms per gram and that a minimum of  $1 \times 10^8$  should be consumed daily for beneficial effects to be realised.

To take a worst case example using the above factors:-

*If you take a daily dose of two capsules, each containing two billion organisms, with meals and the organisms have only a 20% survival rate after 30 minutes at pH 6 then you will have eight hundred million survivors ( $8 \times 10^8$ ) passing through from the stomach into the intestine.*

Most probiotics have a much better survival rate at pH 6 – usually more than 70%, which would mean that over  $28 \times 10^8$  survive. Enteric coatings may increase this number even more but, as you can see, are not really necessary – historically the probiotics in nature that we have ingested with our food have never been enteric coated.

***Cambridge Bioceuticals Ltd are the manufacturers of Bio-Kult; the leading practitioner probiotic in the UK for Intervention, with over six years clinical use.***



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