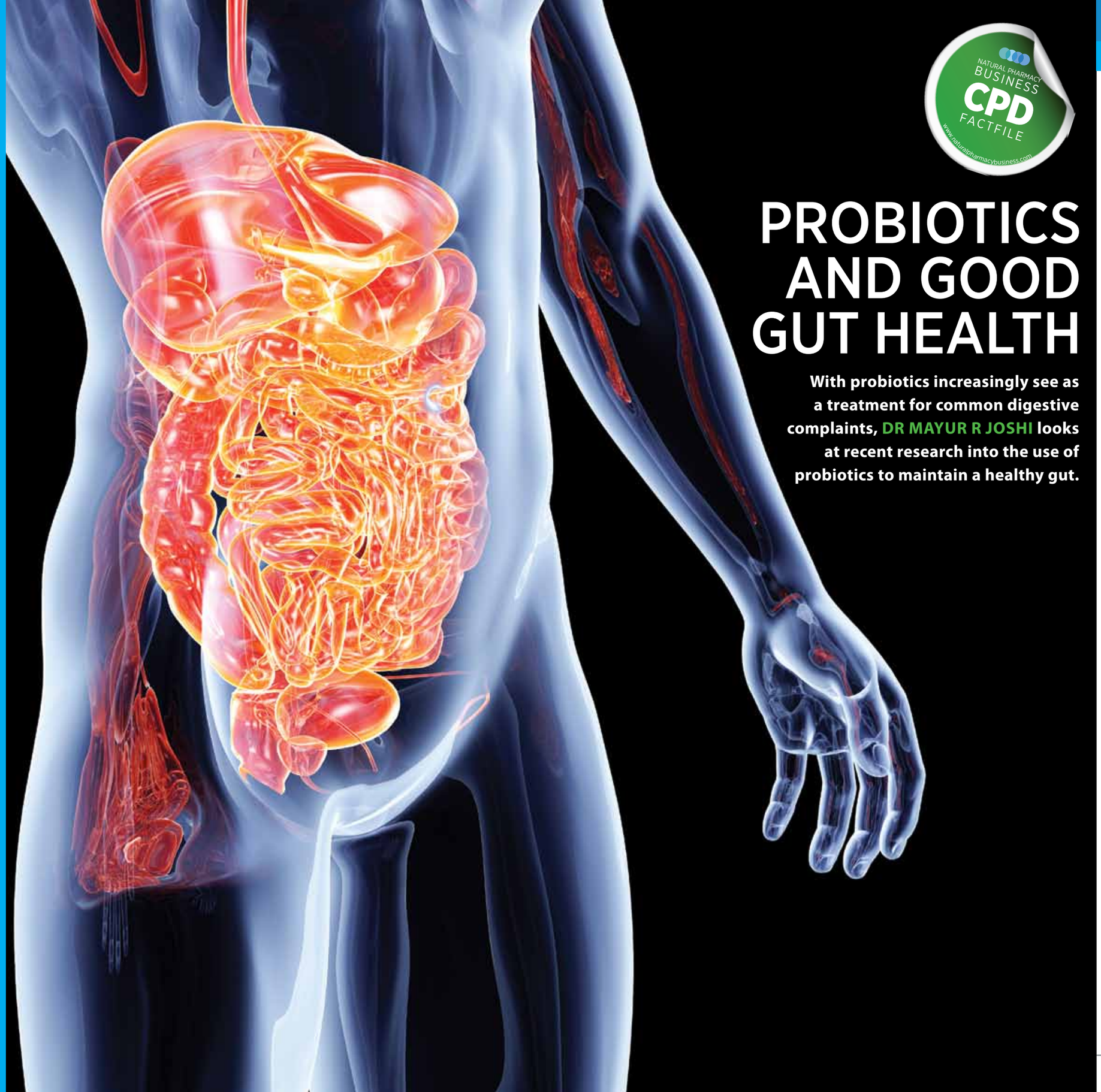

PROBIOTICS AND GOOD GUT HEALTH

With probiotics increasingly see as a treatment for common digestive complaints, DR MAYUR R JOSHI looks at recent research into the use of probiotics to maintain a healthy gut.

"HUMAN GUT BIOLOGY AND METABOLISM IS NOT ONLY INFLUENCED BY THE HUMAN GENOME, BUT BY A CORE GUT MICROBIOME THAT EXISTS WITHIN THE HUMAN GUT, AT LEAST AT A GENOMIC OR METABOLIC LEVEL, AND THIS IS FUNDAMENTAL TO THE MAINTENANCE OF HEALTH, THE DEVELOPMENT OF DISEASE AND HUMAN METABOLIC PROCESSES."[1]

The critical role of the intestinal microflora is continually highlighted by ongoing research and the roles of various bacterial communities found along the human intestinal tract have been well established in the maintenance of health and the proliferation of disease. Their influence on human physiology is quickly being cemented and this understanding of the gut microbiota is increasingly becoming important in the development of personalised treatment strategies. The use of probiotics to selectively influence the microbiome in order to affect health and disease is inevitably gaining pace.

The World Health Organisation defines probiotics as "live micro-organisms that, when administered in adequate amounts, confer a health benefit on the host"[2]. Whilst this definition still applies, the boundaries between probiotics as a food supplement and medicines are blurring, allowing for the evolution of terms such as 'pharmabiotics'. This evolution reflects the volume of research being carried out in the probiotic industry and the increasingly sophisticated processes involved in the development of products containing live bacteria. This applies to products developed for both general gut health and for specific conditions.

Whilst research is being carried out in a number of different areas such as dermatology, oral health and urogenital health, the focus of this CPD will be on the applications of probiotics in gut health.

PROPERTIES OF PROBIOTICS

Probiotics work through a number of different mechanisms, which can broadly be subdivided under four headings:

1. Modification of the gut microflora: through competitive exclusion, production of antimicrobial peptides and inhibition of growth and adhesion, probiotics are able to reduce numbers of pathogens whilst establishing themselves in the gut flora.

2. Improving gut function: beneficial microbes are able to improve the integrity of the bowel wall, increase mucus production and in turn aid the barrier function of the bowel as well as motility.

3. Immunomodulatory effects: probiotics are able to communicate with the Gut Associated Lymphoid Tissue (GALT) and through this interaction they can affect numerous cell types associated with both the innate and adaptive immune response. They have been shown to be effective in allergic disease and other autoimmune related disorders.

4. Metabolic effects: probiotics have been shown to have effects on a number of metabolic pathways resulting in benefits seen in

metabolic syndrome, diabetes and Non-Alcoholic Fatty Liver Disease (NAFLD).

It is important to note that not all probiotic bacteria will exhibit all of the above effects and as such combinations or mixtures of multiple strains of bacteria are increasingly being recommended for their general beneficial effects across a number of conditions. Single strain products seem to be more useful when targeting specific properties of the bacteria and consequently are deemed more suitable for specific conditions.

TIME OUT ACTIVITY A

We have briefly covered some of the properties of the bacteria above but the technical properties of specific probiotics are equally as important. Think about the desirable properties wanted in a probiotic from a technical point of view:

Technical aspects: numbers of strains (multi strain more beneficial than single strain), stability in storage (some products do not guarantee bacterial counts for the entirety of the shelf life but only at time of manufacture), dosing (usually 1 billion is a good starting dose and anything above 10 billion is likely to be unnecessary), acid stability (ability to pass through the stomach acid intact).

CLINICAL APPLICATIONS

As mentioned above, probiotics have shown benefit in a number of clinical areas but continue to primarily be used in gut health. Below we describe some of the evidence in common gut-related problems where probiotics have shown good beneficial effects. This evidence does not mean that all probiotics will show benefit in all of these conditions and care must, therefore, be taken when choosing a probiotic product.

FUNCTIONAL GASTROINTESTINAL SYMPTOMS

A functional bowel disorder (FBD) is a functional gastrointestinal disorder with symptoms attributable to the mid or lower gastrointestinal tract[3]. Functional bowel disorders and functional abdominal pain are common and are very detrimental to the quality of life of sufferers. There is no organic cause and therefore these patients are diagnosed through their symptom profiles. For this reason they can be very difficult to manage.

Irritable Bowel Syndrome (IBS) is a common functional bowel disorder (prevalence estimated at up to 11% worldwide) which has a multifactorial aetiology with genetic, environmental and psychological factors all playing a role. Recent microbiological research has established that the microflora of IBS sufferers differs significantly from those who do not suffer from IBS[4]. This change in the microbiotal makeup of IBS sufferers has been suggested as one causative pathway in the development of symptoms and consequently probiotics have been researched as a potential therapy for these patients.

A recent meta-analysis and systematic review analysed the results of 15 clinical trials (which were deemed of good enough quality to be included) with a total of 1793 patients[5]. The trials all compared the effects of a probiotic supplement against a placebo and all subtypes of IBS were included in the review. The researchers concluded that probiotics are effective at reducing abdominal pain and symptom severity scores in IBS sufferers.

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TIME OUT ACTIVITY B

In your own practice, speak to IBS sufferers to gain more of an understanding of the types of symptoms that they can develop. There is a wide variety of symptoms that can affect their day to day lives but hopefully you should find that one is more dominant than all others. It is important to understand that despite the different sub-classifications of IBS there is still a single predominant symptom that causes most distress.

The main symptom found in IBS is abdominal pain or discomfort and research has shown that an improvement in this symptom results in a significant improvement in overall symptom severity scores and quality of life scoring. It is for this reason that the EMEA guidelines suggest that the primary outcome in any research into medications for IBS should be abdominal pain. With this in mind you can appreciate the significance of review papers in IBS such as the one mentioned above.

DIARRHOEAL DISEASE

Diarrhoea is an extremely common symptom and is commonly caused by an infective pathogen. Cases of gastroenteritis, antibiotic associated diarrhoea, and traveller's diarrhoea all tend to be as a result of overgrowth of pathogenic, diarrhoea-causing organisms. This overgrowth results in an imbalance within the gut microflora that can be protected against and redressed with the use of probiotics.

Several probiotic formulations have been shown to have benefit in diarrhoeal conditions. The duration and severity of antibiotic associated diarrhoea, travellers' diarrhoea and gastroenteritis symptoms have been shown to be improved with the use of various probiotic formulations[6, 7, 8]. This is true for both adult and paediatric patients.

OTHER GI SYMPTOMS

IBS-type symptoms are common throughout the general population and even without a formal diagnosis the vast majority of people will suffer from functional abdominal symptoms such as pain, constipation, diarrhoea, bloating and flatus at some point in their lives. Research in probiotics suggests that they can help to improve all of these symptoms even if not associated with a formal diagnosis of IBS[9, 10, 11, 12].

FINAL THOUGHTS

The case for using probiotics to help manage common gastrointestinal complaints is growing and at this stage the discussion does not centre around whether they show benefit but on which specific probiotics are beneficial in specific situations. The difficulty with the research is that even different strains of the same bacterial species will have variability in their specific properties. This makes the generalisability of research difficult. Research is now focusing on strain-specific trials to ascertain benefit in specific situations and in addition which specific mixtures are beneficial. However, due to the lack of generalisability, no probiotic product has evidence across every clinical situation. As such, when choosing a probiotic supplement for general gut health, a multi-strain mixture is likely to be of most benefit due to the multiple properties of the bacteria. Care must also be taken to look for probiotic products that are produced to the highest standards ensuring that the bacteria are able to exert their beneficial effects.

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TIME OUT ACTIVITY C

Take the opportunity to have a look at the various commercially available probiotics and the formulations they come in. What are the advantages and disadvantages of using them? Do these differ for adults and children? In particular, pay attention to the types of formulation, manufacturing standards used, and additives. Even the types of packaging (capsules, sachets etc) will impact on the practical benefits of using the product.

Dosing (some products require specific dosing measurements by weight), storage requirements (many require refrigeration which is obviously not practical when travelling, for example), formulation type (some come in liquid form, again a practical limitation if travelling), sugar and flavourings (some formulations contain high sugar levels, comparable even to fizzy drinks in some cases) and manufacturing (products are available that are produced at pharmaceutical standards of manufacturing).

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