



## The FODMAP concept. What role does Gluten play?

The focus of FODMAPs (Fermentable Oligo, Di, Monosaccharides and Polyols) are the food ingredients, especially of plant origin, such as wheat. However, it is likely that the Gluten Sensitivity has a different cause.

In this issue of the Forum we focus on the low FODMAP diet for the management of Irritable Bowel Syndrome (IBS). In previous issues we have uncovered the links between IBS and gluten sensitivity. A number of current reports provide evidence of symptom resolution for some IBS sufferers while following a gluten free diet. Research has indicated that anti-gliadin antibodies are present in approximately 12% of the general population, versus 17% of IBS patients in whom celiac disease has been excluded.<sup>1,2</sup> Positive response to the FODMAP diet can be predicted by the presence of intestinal antibodies (to gluten)<sup>3</sup> and the presence of HLA DQ2 or DQ8 genotypes<sup>4</sup> has been reported in a sub group of IBS patients, without celiac histology and with diarrhea predominant symptoms. The low FODMAP diet restricts the intake of fermentable, poorly absorbed, short chain carbohydrates (fermentable oligosaccharides, disaccharides, monosaccharides and polyols)

such as fructans, present in wheat, on the basis that they provoke gastrointestinal symptoms in IBS patients through mechanisms that interplay with gut microbiota, gas production and gut fermentation. The success of this approach has led some researchers in the field to ponder the question of whether gluten is the only cause of symptoms in IBS patients

reporting sensitivity to wheat, or whether other components of the wheat grain may be responsible for inducing symptoms. The multifactorial nature of IBS etiology would suggest that the answer to this dilemma is complex and the explanations for a positive symptom response on a wheat free diet may vary between individuals.

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# FODMAP



## FODMAPs: is the evidence stacking up?

A diet low in short-chain fermentable carbohydrates (FODMAPs) is fast becoming an accepted dietary treatment for irritable bowel syndrome (IBS) and other functional bowel disorders due to its powerful effect on reducing gastrointestinal symptoms.<sup>1</sup>



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Miranda Lomer is a Consultant Dietitian with over 20 years of experience in gastroenterology. She has published widely in the dietary management of functional gastrointestinal disorders and inflammatory bowel diseases. She has led the successful development and implementation of a patient pathway and a dietetic training programme for FODMAP education in the UK.

The concept that certain individual carbohydrates, e.g. lactose, fructose and sorbitol induce IBS-like symptoms in susceptible individuals is not new, however grouping short-chain fermentable carbohydrates together and reducing their overall dietary intake is novel.<sup>2</sup> The low FODMAP diet originated in Australia and was successfully introduced to the UK five years ago.

### What are FODMAPs and where do they occur?

The term FODMAP is an acronym for **f**ermentable **o**ligosaccharides, **d**isaccharides, **m**onosaccharides **a**nd **p**olyols. Oligosaccharides include fructans and galacto-oligosaccharides which are chains of varying length of either fructose or galactose units, respectively, with a glucose terminal end. Fructans include inulin (DP 2-60), oligofructose (DP 2-8) and fructo-oligosaccharides (DP <10)<sup>3</sup> and dietary sources include wheat, onion and garlic. Galacto-oligosaccharides include raffinose and

stachyose and typical dietary sources are beans and legumes. **Oligosaccharide absorption in the gastrointestinal tract is very limited (less than 5%)** due to humans lacking the enzymes that are able to break down the glycosidic bonds.<sup>4,5</sup>

**Lactose** is a disaccharide that is hydrolysed in the jejunum by a  $\beta$ -galactosidase enzyme called lactase. Lactase expression is at its peak just after birth, however it starts to decline after the first few months of life in up to 70% of humans. In some susceptible individuals, a dose of greater than 4 g of lactose can be malabsorbed and lead to IBS-like symptoms.<sup>6</sup>

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For approximately **70%** of the global population, lactase activity decreases after the first few months of life.

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**Lactose** naturally occurs in mammalian milk and is often added to manufactured foods to improve taste and texture and to pharmaceutical agents as a bulking agent.

The monosaccharide **fructose** is absorbed across the intestinal membrane by facultative transport pathways, two of which are reasonably well understood. The first transporter is GLUT5, which is specific to fructose but there is a limit to the absorption capacity. The second is a hexose transporter called GLUT2 which co-transporters glucose and fructose.<sup>7</sup> An equal amount of fructose and glucose is optimal for fructose absorption, however, fructose malabsorption is not uncommon and is observed in 30-60% of people.<sup>8</sup> Fructose is found naturally in fruit and honey and fructose ingredients are increasingly used in the food industry to enhance taste and texture in food products.

**Polyols** are sugar alcohols (e.g. sorbitol, mannitol, xylitol) and are passively absorbed along the small intestine at a variable rate depending on their molecular size, the intestinal pore size, organic disease and small intestinal transit time.<sup>1</sup> Malabsorption of a 10g dose of sorbitol has been reported in 60-70% of people.<sup>9</sup>

Lactose, fructose and polyols have the potential to become FODMAPs when they are malabsorbed.

### Mechanisms of symptom generation

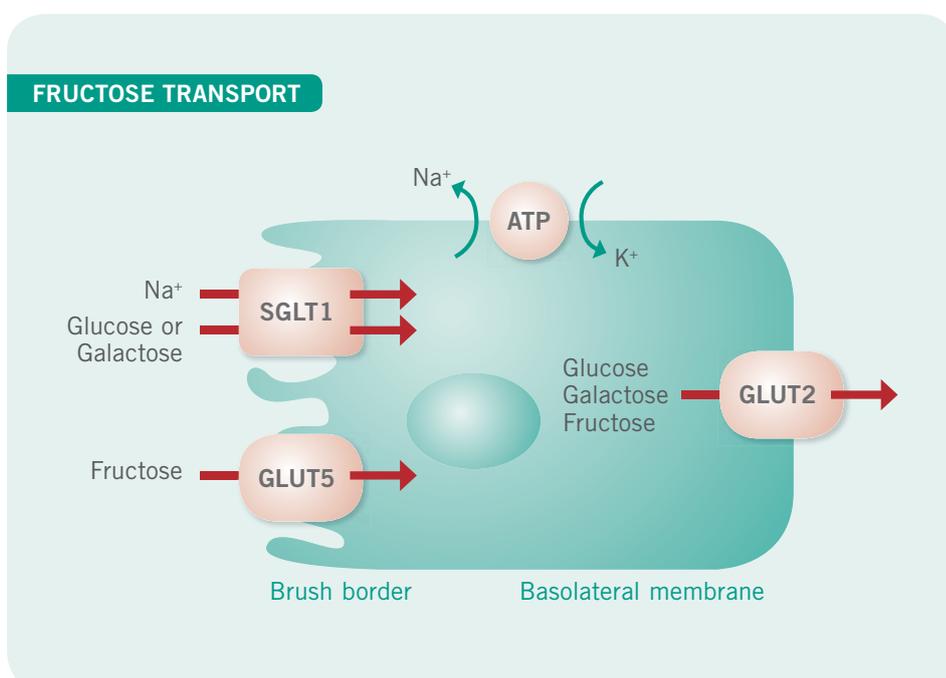
There are two well described mechanisms that FODMAPs exert in the gastrointestinal tract that can lead to IBS-like symptoms in susceptible individuals.

### Osmotic activity

Malabsorption of short-chain carbohydrates renders them as osmotically active in the gastrointestinal lumen. In patients with an ileostomy, a high FODMAP diet produced approximately **20% more total ileal effluent, water and dry weight** when compared to a low FODMAP diet.<sup>10</sup> Furthermore, in healthy subjects, mannitol or fructose lead to a **ten-fold increased small intestinal water content** on magnetic resonance imaging (MRI) when compared with glucose or a combination of equal quantities of glucose and fructose.<sup>11,12</sup> An increase in small intestinal water content may lead to luminal distension, abdominal pain, borborygmi and eventual diarrhea in susceptible individuals.

Fructose malabsorption affects approximately 30–60% of the general population.

About **60–70%** of the general population has malabsorption of 10 gms of sorbitol.<sup>9</sup>



Improvement in **85%**  
of all IBS vomiting caused by  
giving Low FODMAP diet



### Colonic fermentation

When FODMAPs reach the colon they are readily fermented by the colonic microbiota producing gas e.g. hydrogen. In patients with visceral hypersensitivity, increased gas production can lead to symptoms of abdominal distension and abdominal pain. Hydrogen breath tests are useful to measure colonic gas production following specific carbohydrate doses. Several studies have indeed reported increased hydrogen production in healthy volunteers and patients with IBS following consumption of individual or combinations of FODMAPs.<sup>12,13</sup> Furthermore, patients with IBS reported increased gastrointestinal symptoms on a high FODMAP diet.<sup>13</sup>

### Clinical evidence

Despite all this high quality data, does the low FODMAP diet improve symptoms of IBS in clinical practice? The evidence base for uncontrolled and more recently controlled

studies on the efficacy of the low FODMAP diet is increasing. A retrospective assessment of patients with fructose malabsorption who had adhered to a low FODMAP diet showed that 85% had improvement for all IBS symptoms.<sup>14</sup> This study was followed by a FODMAP challenge cross-over feeding study by the same group. Patients who had previously had success with the low FODMAP diet were challenged with increasing doses of fructose and/or fructans and glucose as a control while following a low FODMAP diet where the majority of food was provided for the duration of the study. Symptoms were assessed during each challenge and showed that fructose and/or fructans significantly induced overall and individual (bloating, abdominal pain and flatulence) IBS symptoms. In addition this study demonstrated a dose response to fructose and/or fructans with increasing symptoms at higher doses.<sup>15</sup>

A non-randomised controlled trial compared IBS symptoms at follow-up in patients who had been treated with a low FODMAP diet or as the control, standard dietary advice based on the NICE guidelines (National Institute for Health and Care Excellence).<sup>16</sup> This study demonstrated that 76% of patients who had been given low FODMAP advice had an improvement in overall symptoms compared to **54% in the standard dietary advice group.**<sup>17</sup> However, major limitations of this study were that it was not randomised and only recorded symptoms at follow-up.

Three randomised controlled trials (RCTs) assessing a low FODMAP diet in IBS have been completed. The first was a cross-over feeding study comparing 4 days of a low and a high FODMAP diet. This study showed that symptoms were much lower on the low FODMAP diet.<sup>13</sup> The next RCT, another



**76%** of patients, where a low FODMAP diet was prescribed, there was a general improvement of their symptoms

feeding study, had a cross-over design and showed that overall symptoms, abdominal pain, bloating and flatulence were all significantly lower after 3 weeks of a low FODMAP diet when compared to a high FODMAP diet.<sup>18</sup> The problem with feeding studies is that they do not reflect normal every day challenges faced when choosing food on a restrictive diet. The last RCT to date compared 4 weeks of a low FODMAP diet with a habitual diet. Both groups received dietary advice from a specialist dietitian and showed that **symptoms were adequately controlled in 68% of patients following the low FODMAP diet compared to only 23% in the control group.**<sup>19</sup>

## Safety

A low FODMAP diet restricts a wide variety of foods from some starchy cereal grains, fruit and vegetables, milk and milk products and processed foods containing any high FODMAP ingredients. Alternative foods are a key component of patient education and even under strict advice from a dietitian, it has been shown that nutrient intakes, calcium in particular, can be compromised on a low FODMAP diet.<sup>19</sup> Diet has a dramatic effect on the composition of the gastrointestinal microbiota and patients with IBS have been reported to have dysbiosis. The prebiotic effects of some carbohydrates (e.g. fructo-oligosaccharides and galacto-oligosaccharides) is well established, so reducing their intake as part of a low FODMAP diet is of potential concern. Indeed, a significant decrease in the concentration of luminal bifidobacteria after 4 weeks of a low FODMAP diet has been observed.<sup>19</sup> However, whether this reduction is problematic in the short or long term is currently unknown but warrants further investigation.



## Clinical practice

**The evidence clearly supports using a low FODMAP diet** in clinical practice, however, research only supports its use as a dietitian-led intervention. Dietitians need to have the expertise in the low FODMAP approach to be able to effectively educate patients and use appropriate outcomes to measure symptom response.<sup>20</sup> Furthermore, **strict FODMAP restriction is advised only over a short period of up to 8 weeks**, following which, FODMAP reintroduction to individual tolerance

in relation to gastrointestinal symptoms is recommended to increase dietary variety, ensure nutritional adequacy and have as minimal impact on the gastrointestinal microbiota.

### INFO

#### SCHÄR PRODUKTS

that can be used in a Low FODMAP Diet: Pastas, Classic White and Multigrain Bread, Ciabatta, Crispbread, breadsticks



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# Useful FODMAP resources

Australia is one of the pioneers in the field FODMAP's.  
Check the exciting information and possibilities presented here.

## THE MONASH UNIVERSITY LOW FODMAP DIET

The research team at Monash University developed the low-FODMAP diet to control gastrointestinal symptoms associated with Irritable Bowel Syndrome (IBS). The Monash University website provides a wealth of information about the low-FODMAP diet including education and training, public lectures, resources, research and recipe books.

→ [www.med.monash.edu/cecs/gastro/fodmap/](http://www.med.monash.edu/cecs/gastro/fodmap/)



## MONASH UNIVERSITY LOW-FODMAP APP



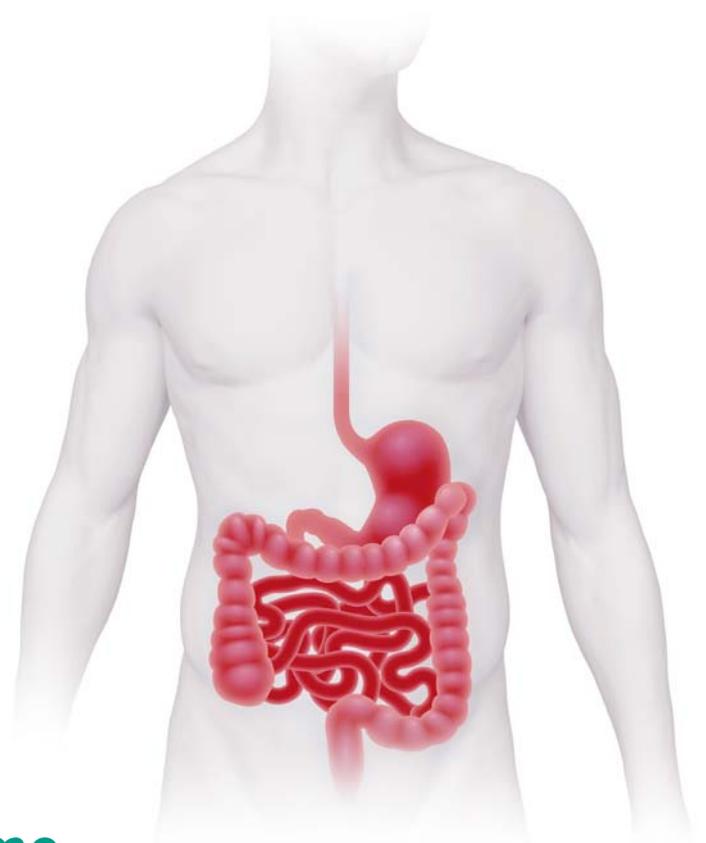
Researchers at Monash University have developed a low-FODMAP app to assist dietitians and patients with dietary management of the low-FODMAP diet. The app which is available on iPhone and Android includes the following:

- Background information about FODMAPs
- A food guide detailing the FODMAP content for hundreds of foods
- A full recipe book including 79 nutritious recipes with professional photography
- A shopping list for organizing low FODMAP purchases
- A one week challenge to trial and monitor a strict FODMAP diet, with a function to view detailed graphs of symptoms over the week

→ [www.med.monash.edu/cecs/gastro/fodmap/app-faq.html](http://www.med.monash.edu/cecs/gastro/fodmap/app-faq.html)

→ iPhone: [www.itunes.apple.com/gb/app/monash-university-low-fodmap/id586149216?mt=8](https://www.itunes.apple.com/gb/app/monash-university-low-fodmap/id586149216?mt=8)

→ Android: [www.play.google.com/store/apps/details?id=com.monashuniversity.fodmap](https://www.play.google.com/store/apps/details?id=com.monashuniversity.fodmap)



## The Low FODMAP Diet for Irritable Bowel Syndrome

IBS is a chronic and debilitating functional gastrointestinal disorder with research suggesting that it effects at least 10% of the UK, European and US population.<sup>1,2</sup>



### MARIANNE WILLIAMS, BSC HONS, RD, MSC ALLERGY

Marianne Williams is a IBS and allergy specialist dietitian who works for Somerset Partnership NHS Trust. Her focus on innovation has led to the formation of a new professional role within the NHS, the 'Specialist Community Gastroenterology Dietitian', and the creation of the first UK 'Dietetic-Led Primary Care Gastroenterology Clinic'. This award winning service has an over 75% success rate using a range of specialist evidence based dietary interventions for adult patients with IBS and gastrointestinal allergy with over 63% of positive responders using the highly successful Low FODMAP diet. The clinic is saving considerable money for the NHS by preventing non-red flag referrals into secondary care and by providing an effective alternative pathway for both primary and secondary care clinicians.

Most IBS treatment is managed in primary care<sup>3</sup> with 1 in 12 consultations with a general practitioner (GP) being based around gastrointestinal problems and 46% of these being diagnosed with IBS.<sup>3</sup> However, GPs have little knowledge of the diagnostic criteria for IBS and often inappropriately refer for specialist consultations and/or prescribe a number of drugs.<sup>4,5</sup> Spiegel's research suggested that despite clear Rome criteria for the diagnosis of IBS, over 70% of community practitioners still incorrectly treat IBS as a 'diagnosis by exclusion'.<sup>6</sup>

In excess of 2.34 million people in the UK seek advice from their GP for IBS<sup>4,5</sup> and around 20% of these will be referred on to secondary gastroenterology care and 9% for surgical intervention, which constitutes a significant health care cost.<sup>3</sup> Indeed, in 2011 an audit of secondary care gastroenterology out patients in two district hospitals found that 14.3% of patients were being inappropriately

referred for investigations: these patients had no red flags, a suspected diagnosis of IBS, were under the age of 45 and were costing in excess of £129,000 (> \$217,300 US) per annum in secondary care consultations and investigations. The financial costs can be increased substantially when one considers that 47% of this group had already undergone previous secondary care investigations for IBS symptoms in the 'revolving door' of diagnosis and ineffective treatment.<sup>7</sup>

The 2008 'IBS Costing Report Implementing NICE Guidance' noted that significant savings could be made with a reduction in inappropriate secondary care input and an **increased**

#### INFO

#### "RED FLAGS"

indicate that it is necessary to look for another initial cause.

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Between **25 to 45 million** people in the US are affected by IBS. That is approximately 10-15% of the US population. 20 to 40% of all visits to a gastroenterologist are due to IBS

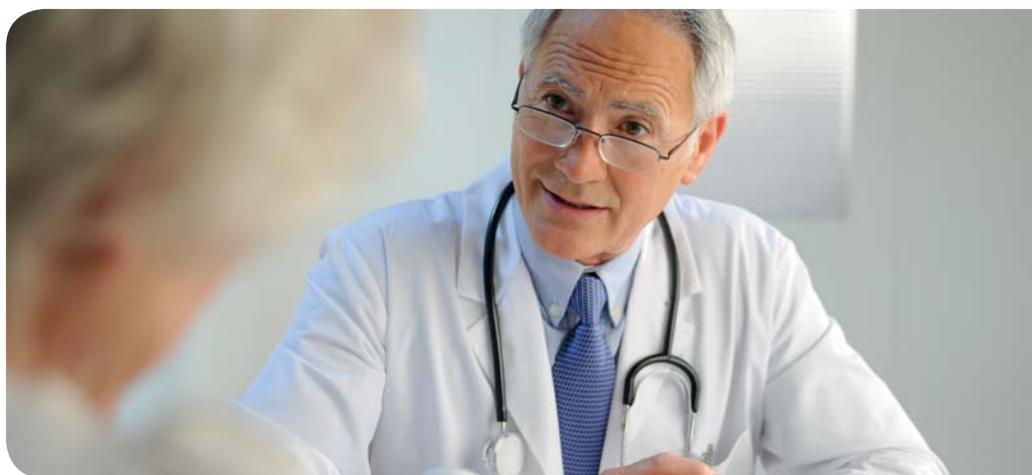
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**focus on diet** as a first line treatment option for IBS.<sup>5</sup> Yet, even up to 2007 there seemed to be limited evidence for the involvement of diet in IBS treatment.<sup>8</sup> However, subsequent documents have given more credibility to the dietary approach and in 2010 The British Dietetic Association produced a professional consensus statement into the dietetic management of IBS.<sup>1</sup>

In fact in the UK, we first started to hear about a new revolutionary diet for irritable bowel syndrome (IBS) in 2009 when a team from Guys & St Thomas' NHS Foundation Trust and Kings College London began investigating Australian research into the Low Fermentable Carbohydrate Diet, also known as the 'Low FODMAP Diet'.

### Studies about Low-FODMAP Diet

The diet was developed by a team from Monash University in Melbourne, Australia, and started to gain prominence following publication of research in 2008 showing that dietary fermentable carbohydrates (FODMAPs) did indeed act as symptom triggers in IBS patients.<sup>9</sup> Since then there have been three randomized controlled trials each of which has shown a **clear benefit of using the Low FODMAP diet**.<sup>10-12</sup> and this data, along with three prospective uncontrolled trials<sup>13-15</sup> and two further retrospective trials<sup>16,17</sup> has led to fermentable carbohydrate restriction becoming an important consideration for future national and international guidelines with in



IBS treatment. Research repeatedly indicates that patients using this diet report a marked improvement in bloating, flatulence, abdominal pain, urgency and altered stool output, with up to 70% of patients reporting benefit.<sup>2</sup> Indeed, in 2010 the Low FODMAP diet entered the UK British Dietetic Association IBS Guidelines<sup>18</sup> and in 2011 the diet was adopted by the Australian National Therapeutic Guidelines.<sup>19</sup>

#### INFO

#### FODMAP

The term 'FODMAP' is an acronym derived from a list of foods that have a visible physiological effect on patients with IBS: **F**ermentable, **O**ligosaccharides, **D**isaccharides, **M**onosaccharides And **P**olyols.

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In 2010, the low-FODMAP diet was incorporated into the British Dietetic Association's IBS guidelines<sup>18</sup>, and in 2011 the diet was introduced into the Australian national treatment guidelines.<sup>19</sup> In the US the FODMAP diet has been used by many practitioners for individuals with IBS. The clinical effectiveness is currently under investigation.

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**Where can FODMAPs be found?**

FODMAPs appear in a range of foods including wheat, certain fruit and vegetables and some milk-based products. In Western Europe oligo-saccharides such as 'fructans' and the mono-saccharide, 'fructose', are the most common FODMAPs in the diet, with wheat thought to be the largest contributor of fructans in the UK.<sup>20</sup>

**Disaccharides**  
Lactose

**Milk, custard, pudding, ice cream and yogurt**



**Monosaccharides**  
Free fructose (fructose in addition to glucose)

**Apples, pears, mangos, cherries, watermelons, asparagus, sugar snap peas, honey, glucose-fructose syrup (high-fructose corn syrup, HFCS)**



**Oligosaccharides**  
Fructans, galacto-oligosaccharides

**Wheat, barley, rye, onions, leeks, the white part of a spring onion, garlic, shallots, artichoke, beetroot, fennel, peas, chicory, pistachios, cashew nuts, beans, lentils and chickpeas**



**Polyols**  
Sorbitol, mannitol, maltitol, xylitol

**Apples, pears, apricots, cherries, plums, watermelons, mushrooms, cauliflower, sugar-free chewing gum/mints/candy**



Data taken from Shepherd SJ, Lomer MCE, Gibson PR, Rome Foundation Working Group: Short-chain carbohydrates and functional gastrointestinal disorders; Am J Gastroenterol; 2013, 108: 707-717

#### Fructan content of some foodstuffs

	Fructan content in g/100 g
Leeks	3.0–10.0
Asparagus	1.4–4.1
Onions	1.1–10.1
Wheat flour	1.0–4.0
Pasta	1.0–4.0
White bread	0.7–2.8

The mechanisms by which these fermentable carbohydrates provoke gut symptoms are due to **two underlying physiological processes**: first, these carbohydrates are indigestible and subsequently fermented by the bacteria in the colon which leads to gas production. This gas can alter the luminal environment and cause visceral hypersensitivity in those who are susceptible to gut pain.<sup>11</sup> Second, there is an osmotic effect whereby fermentable carbohydrates increase water delivery to the proximal colon leading to altered bowel movements.<sup>21</sup>

### The low-FODMAP diet differentiates between three phases

Following the diagnosis of a functional bowel disorder within a typical primary care setting, the implementation of the low FODMAP approach consists of 3 main stages (see figure 1).

Prior to the first exclusion phase, hydrogen breath tests may be used to test for the presence of fructose and lactose malabsorption. The results may allow for a less restrictive diet if the FODMAPs fructose and/or lactose are found to be well tolerated. The **first phase** involves complete removal of FODMAP-

containing foods for a period of 8 weeks under the advice and supervision of a suitably qualified Dietitian, trained in the low FODMAP approach.

Following the 8 week exclusion phase, a thorough dietetic review of symptoms and food diaries will guide the **reintroduction phase**. Depending on symptoms, advice will be provided on the appropriate order and quantity of reintroduction of FODMAP-containing foods.

The **long-term self-management** of symptoms is managed by consuming FODMAP foods to tolerance. The ability to empower patients to take control of their own gut symptoms in the long term and the subsequent de-clinicalization of their condition is viewed as a great advantage of the low FODMAP approach.

### Other applications

Research has followed<sup>22</sup> which shows that the diet is not only useful in IBS, but that it could also be helpful in ameliorating the functional gut symptoms in other conditions such as inflammatory bowel disease.<sup>16</sup> Potential benefits in enteral feeding diarrhea<sup>23,24</sup> and reducing stool frequency in high output ileostomy or in ileal pouch patients, is also reported although more data is required.<sup>25</sup>

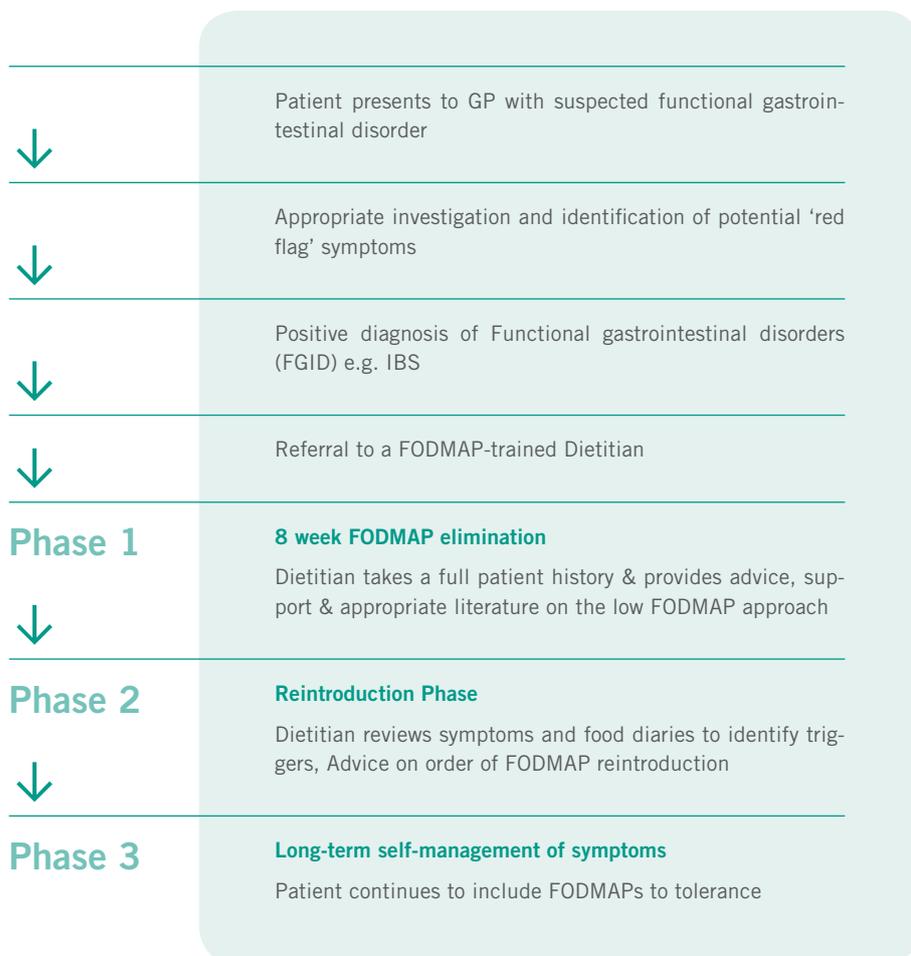
### Benefits of FODMAPs

While the benefits of this diet are now well documented, the significance of fermentable carbohydrate withdrawal on the health and nutritional status of the patient and whether there are any long term implications is still not clear. Indeed, fermentable carbohydrates help to increase stool bulk, enhance calcium absorption, modulate immune function and

the long-term, self-monitoring treatment of symptoms in the third phase is based on the absorption of FODMAP's containing foods to your tolerance



## The low-FODMAP approach in practice



help to encourage the growth and functioning of some beneficial microbial groups such as bifidobacteria. Therefore, more studies are needed in this area.<sup>2</sup>

## Conclusion

Historically IBS patients have been both expensive and difficult to treat, costing the UK in excess of £45.6 million (> 76.5 Million US Dollars) in 2003.<sup>26</sup> Indeed, IBS patients incur 51% more total costs per year than a non IBS control group.<sup>27</sup> However, the Low FODMAP diet finally gives a viable alternative therapy for this chronic and debilitating condition and should be seriously considered as a treatment option for any intractable IBS patients.



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## Female patient with irritable bowel syndrome: a case study.

The following case study is based on a common patient profile using epidemiological data and the following references and any similarity to individual cases is purely coincidental.



### JULIE THOMPSON

is a HCPC Clinical Lead Dietitian working in the NHS and private practice. She has an interest in gastroenterology and has experience in treatment of food intolerances and dietary treatment of conditions such as irritable bowel syndrome (IBS), Crohn's disease, colitis and coeliac disease. She is an executive on the board of The IBS Network, the UK charity for people with IBS and has experience in treatment of irritable bowel syndrome with diet, including being trained to use The Low FODMAP dietary approach to reduce functional bowel symptoms. She has written for the Guardian, Sainsbury's Magazine, Network Health Dietitians Magazine and GUT Reaction.

Mrs Smith is 46 and in 1997 had an episode of traveller's diarrhea while on vacation. She was referred by her GP to the gastroenterologist for investigation in 1998 after presenting with weight loss, diarrhea and abdominal pain. Her tissue transglutaminase (IgA tTG) celiac screen was negative and small bowel biopsy was normal while consuming a gluten containing diet for at least six weeks. She had no bowel infection or parasitic infestation. Her inflammatory markers and fecal calprotectin test (showing bowel inflammation), which were tested more recently, were normal. Her colonoscopy, SeHCAT test, fecal elastase and lactose breath test were also normal. She has no history of eczema, asthma or atopy and had no previous abdominal surgery.

She was discharged to primary care after extensive work up with a **diagnosis of IBS-D** and prescribed Loperamide Hydrochloride and Mebeverine Hydrochloride for symptomatic control, she used these occasionally. She is a frequent user of primary care services and found the process of reaching a diagnosis caused anxiety at the time and was both frustrating and unhelpful for her.

On her last visit to her GP, Mrs Smith informed the GP that she had tried the **Low FODMAP diet** after researching it on the internet. While she felt her symptoms had improved to a small degree, the information she downloaded on the diet was often inconsistent and confusing. She therefore requested a referral to a FODMAP trained dietitian to try the diet in a more systematic manner. On initial assessment by the specialist dietitian, Mrs Smith was given an explanation of IBS-D as a functional gut disorder and the role of gastroenterology and the Rome III criteria

### The Bristol stool scale

	Bristol stool types
Type 1	Separate hard lumps, like nuts (hard to pass)
Type 2	Sausage-shaped but lumpy
Type 3	Like a sausage but with cracks on the surface
Type 4	Like a sausage or snake, smooth and soft
Type 5	Soft blobs with clear-cut edges
Type 6	Fluffy pieces with ragged edges, a mushy stool
Type 7	Watery, no solid pieces. Entirely liquid.





in the positive diagnosis of IBS and asked if she was happy to discuss her symptoms. Her symptoms were assessed using a symptom assessment tool based on the gastrointestinal symptom rating scale (GSRS, Svedlund et al., 1988), the Bristol stool chart and a global symptom question (see symptom chart) her current medical, family and social history were queried; weight, weight history, diet and any foods avoided were also queried and discussed. She was prescribed 2 months exclusion of high FODMAP foods except lactose, which was not problematic.

On review she reported it took approximately six weeks for her symptoms to improve significantly and she was following the diet well. Initially she was reluctant to go ahead with re-introduction as she had satisfactory symptom relief, but decided to when it was explained that it might not be all FODMAP containing foods that would result in symptoms and having more variety would be helpful to manage her diet. After the re-introduction process she found fructans and fructose problematic and was excluding these foods from her diet, but her diet was otherwise varied and nutritionally balanced and she was ultimately discharged from care.

### Symptom chart

Symptom	On initial examination	On examination after the diet
Abdominal pain	Severe	None
Bloating	Severe	None
Flatulence	Severe	Minor
Sudden urge to empty bowels	Medium	None
Incomplete emptying	None	None
Abdominal sounds	Medium	None
Acid reflux	Medium	None
Reflux or burping	None	None
Nausea	None	None
Tiredness	Severe	Minor
General symptom evaluation	Severe	None
Stools (Bristol)	Type 6 (sometimes Type 7)	Type 3 to 4
Frequency of emptying the bowels	3 to 6 times daily	Once daily

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## News

### Webinar on Gluten-related disorders is a huge success!

Thanks to our expert speakers Dr Alessio Fasano and Pam Cureton over 3400 individuals signed up for the free one hour continuing education credit webinar on Wednesday May 28, 2014. The webinar covered the clinical, epidemiological and diagnostic characteristics of celiac disease, wheat allergy, and gluten sensitivity. Clinical practice points of testing, and dietary management were among other topics covered in the discussion. If you missed the live session, you can access the recorded session through the following link:

<https://ce.todaysdietitian.com/GlutenDisorders>

### Welcome Package Program

While the Dr Schar Institute is a virtual institute we also provide many real life resources and materials for you and your patients. One of our most acclaimed resources is our Welcome package program. The Welcome Package is designed to make the transition to a gluten-free lifestyle easy. Our kit includes a sample of one of our shelf stable breads, pasta, a sweet treat, a kitchen magnet with tips to avoid cross contamination, a coupon, and educational materials. It also includes a DVD from our YouTube series "Better Without". The series provides tips and information on the gluten-free diet, shopping, dining out, as well as travel.



All the information you patient needs to successfully live a healthy, happy gluten-free life. You can sign up for the free program here <http://www.drschaer-institute.com/us/register-as-a-new-user/>

### Recent studies listed on [www.drschaer-institute.com/us](http://www.drschaer-institute.com/us)

As a nutritionist, doctor or expert on gluten-free nutrition, it is important to be up to date on the most recent developments and findings in your area of expertise. On our Dr. Schär

Institute Website under the "Clinical Library" heading, you can find an overview of everything that you need to know about the current status of research in the area of "celiac disease,

gluten sensitivity and gluten-free nutrition". Here are the latest abstracts and studies you find online:

#### STUDIES

- Serological Assessment for Celiac Disease in IgA Deficient Adults
- Persistent Mucosal Damage and risk of fracture in celiac disease 16.01.2014
- Incidence and Prevalence of Celiac Disease and Dermatitis Herpetiformis in the UK Over Two Decades: Population-Based Study 01.05.2014
- Follow-up of pediatric celiac disease: value of antibodies in predicting mucosal healing, a prospective cohort study 13.02.2014
- Psyllium as a substitute for gluten in pastas 14.03.2014
- Celiac Disease or Non-Celiac Gluten Sensitivity? An Approach to Clinical Differential Diagnosis 01.05.2014
- Characterization of Adults With a Self-Diagnosis of Nonceliac Gluten Sensitivity 16.04.2014
- A Diet Low in FODMAPs Reduces Symptoms of Irritable Bowel Syndrome 31.01.2014
- Effect of gluten free diet on immune response to gliadin in patients with non-celiac gluten sensitivity 13.02.2014

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Text: zweiblick, Dr. Schär Professionals  
Translation: eurocom translation services