

Diet & Bowel Health

Expert Roundtable Report



To further its commitment to improving the digestive health of Australians, Bürgen® Rye initiated an Expert Roundtable discussion, held at CSIRO (Food Futures Centre), Sydney on 12 October 2011. The aim of the full day meeting was to assess the current advice and provide evidence-based, practical and realistic recommendations to assist Australians in managing their digestive and bowel health. The expert participants included:

- Prof. Terry Bolin, The Gut Foundation
- Dr Tony Bird, Food Futures National Research Flagship, CSIRO Food and Nutritional Sciences.
- Ms Karen Inge, Dietitian, APD & Nutrition Consultant
- Dr Michael Conlon, Food Futures National Research Flagship, CSIRO Food and Nutritional Sciences.
- Dr Tony Helman, Chairman, Nutrition Advisory Group, RACGP and Editor in Chief, Arbor Clinical Nutrition Updates (Facilitator)



Bowel Health Issues in Australia

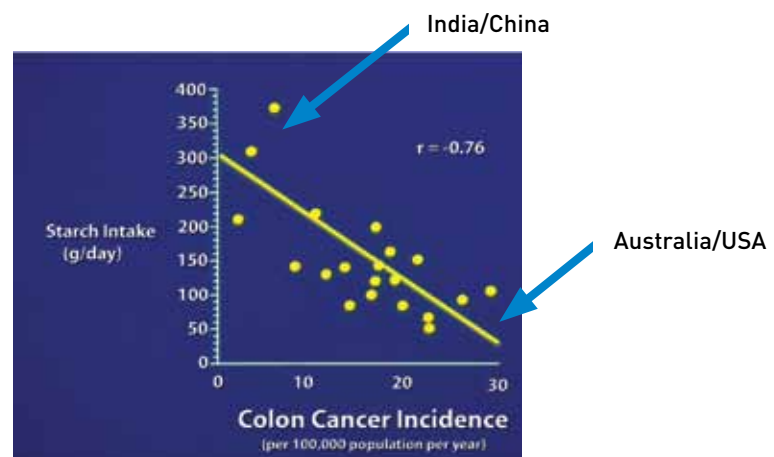
Prof Terry Bolin highlighted the most common internal cancer is colorectal cancer and that diet may well be an important factor in its genesis.

Digestive and bowel health is an important public health issue in Australia. We have an ageing population and increasing levels of digestive health problems, including colorectal cancer (CRC), Irritable Bowel Syndrome (IBS) and malabsorption and malnutrition.

Colorectal Cancer

Colorectal cancer remains the most common cancer in Australia with 30 new patients diagnosed every day. 4 out of 5 patients have no recognizable risk factors. Prof Terry Bolin stated that diet is important and it seems likely that fibre and particularly, resistant starch intake, influence the genesis of CRC. He referred to the low incidence of CRC in Africa and Asia where starch intake is high.

Figure 1: The association between starch intake (g/day) and colon cancer incidence¹.



About Colorectal Cancer:

- It kills 12 Australians each day, 80 Australians every week (more than 4,100 per annum). This national death toll leads the world
- Bowel cancer is the most common internal cancer affecting both men and women
- Rates of the disease in younger people have increased in the past 10 years – 67% increase in 40-44 year age group²
- Almost as many women die of bowel cancer as breast cancer
- Only one in four Australians are aware of the deadly impact of the disease
- Awareness is important as the disease is preventable and curable if detected early.

The role of dietary fibre in digestive health

Dr Tony Bird highlighted the public health focus for fibre needs to evolve from general basic advice for people to 'eat more fibre' to a stronger emphasis on specifically consuming a diverse range of fibres for maintaining digestive health.

Recent evidence suggests that different fibres act through different mechanisms and are more effective in combination than individually for promoting bowel health³.

Combination of Fibres			
	Soluble fibre	Insoluble fibre	Resistant starch
Function	Viscous fibres slow the time it takes for food to pass through the stomach and small intestine resulting in slower absorption of nutrients and lower cholesterol levels.	Exerts greatest influence on the large bowel - helps to normalize bowel function (shortens transit time, helps produce larger and softer stools and increases defecation frequency).	Starches that resist small intestinal breakdown are fermented by bacteria in the large bowel, producing short chain fatty acids (SCFA), which are important for colonic health.
Sources	Oats, barley, vegetables, lentils, beans (dried or canned), nuts, seeds, Bûrgen® Rye bread and fruit.	High fibre wheat based cereals, brown rice and pasta, millet, quinoa, bulgar wheat, wholemeal and rye breads, Bûrgen® Rye bread.	Legumes, whole grains (e.g rye), Bûrgen® Rye bread, cold cooked potatoes, rice and pasta and firm bananas.

Dr Bird highlighted a diet rich in a range of fibres can help prevent and manage common intestinal problems like constipation, haemorrhoids and diverticular disease. Careful use of dietary fibre (soluble or insoluble, based on the symptoms), can also help to manage irritable bowel syndrome (IBS) and inflammatory bowel disease^{4,5,6}.

NHMRC Nutrient Reference Values for Dietary Fibre*		
	Men aged 19+	Women aged 19+
Adequate Intake (AI)	30g/day	25g/day
	AIs include resistant starch, the first global official recommendation. The AI was set at the median dietary fibre intake for the population.	
Suggested Dietary Targets (SDTs)	38g/day	28g/day
	Levels based on upper level 90th centile of intake for reduction in coronary heart disease risk (not for CRC).	
Upper limit	Not set	Not set
	No evidence that high intake would produce substantial deleterious effects.	

(*NHMRC. Nutrient Reference Values for Australia and New Zealand. Canberra: Commonwealth of Australia, 2006)

"CSIRO clinical trials have provided more than 40g of fibre per day, yet there were no significant differences in abdominal discomfort between the high fibre and the low fibre groups", - Dr Tony Bird.

The Australian Paradox: Comparatively High Fibre Intakes, High Rates of Colorectal Cancer

Dietary fibre has a high level of consumer recognition and its importance for good health is well established and accepted⁷. Average fibre intakes of adults in Australia are for men ~27 g/d and for women ~21 g/d. These levels are high by international standards - almost twice that of the US & UK. "Our dietary fibre intake is approaching the NHMRC targets and has been at this level for the past two decades. Paradoxically, bowel cancer rates remain stubbornly high", stated Dr Tony Bird.

Fibre intakes are too low, particularly resistant starch intakes

Dr Bird is concerned that Australians are not consuming the right amount and combination of fibre, particularly resistant starch. Recommended resistant starch intakes should be around 20g a day, which is almost four times greater than a typical western diet currently provides⁸.

International comparative studies show stronger correlations between bowel cancer and starch (and thus resistant starch) intake than with dietary fibre¹.

The strong inverse association between starch and bowel cancer corresponds with the hypothesis that fermentation of resistant starch in the colon is a potential mechanism for bowel cancer prevention via the production of short chain fatty acids, in particular butyrate.

"Although dietary fibre intakes seem to be reaching targets, more than 60% of the population, do not consume adequate amounts of fibre, particularly young women and food avoiders (those who avoid carbohydrates, gluten, wheat and other grains)", - Dr Tony Bird.

Rye & Gastrointestinal Health

Dr Michael Conlon presented the results of a recent CSIRO study which examined the bowel health benefits of consuming BÜRGEN® Rye Bread and revealed the implications of a narrow definition for prebiotics.

Benefits of Rye:

- High fibre wholegrain and contains a diverse range of fibres
- Improves bowel function
- Effective stool bulking agent
- Increases butyrate production
- Promotes faecal excretion of potential toxins (for eg ammonia)
- Reduces faecal pH

Wholegrain rye is high in fibre and contains a diverse range of fibres such as arabinoxylans, fructans, beta-glucan and resistant starch. Many of these fibres are highly fermentable in the large bowel, making wholegrain rye beneficial for bowel health.

A new study by CSIRO⁹ adds to the growing body of evidence that rye is beneficial for bowel health. The study was a crossover design in which the effect of consuming 4 or 5 slices daily of either BÜRGEN® Rye or a white bread (control) respectively for four consecutive weeks was compared.

Bread Type in CSIRO Research Project	Resistant Starch g/100g	Total Dietary Fibre g/100g
Bürgen® Rye	4.7	8.4
Sunblest® White	0.9	3.7

Twenty healthy humans completed the study and there was no difference in abdominal discomfort when consuming the white bread or BÜRGEN® rye bread, which was self reported using a gastrointestinal quality of life index. BÜRGEN® Rye elicited a number of changes considered beneficial to bowel health:

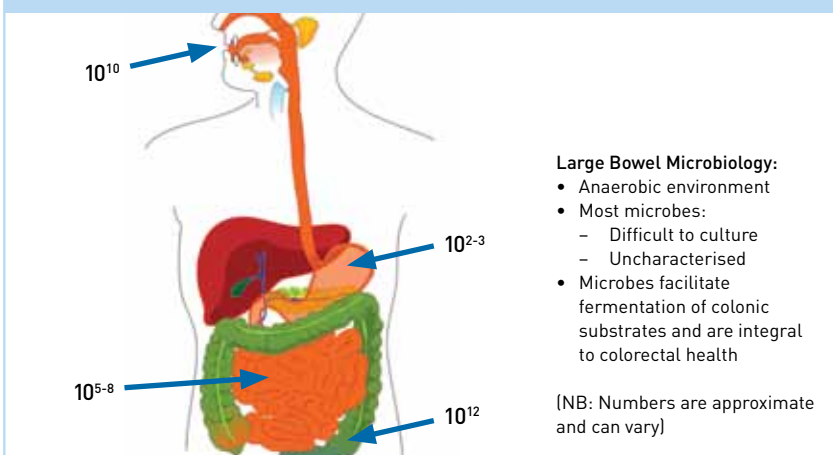
- increased faecal bulk and lowered faecal pH compared to white bread
- significantly increased levels of acetate, butyrate and total SCFA
- significantly increased faecal concentrations and excretion of ammonia (toxin)
- significantly increased numbers of *Faecalibacterium prausnitzii* and *Ruminococcus bromii*, which are potentially beneficial bacteria and may facilitate butyrate production.

This study supports previous research conducted by CSIRO showing that the consumption of rye foods (including BÜRGEN® Rye bread) improved markers of bowel and metabolic health in overweight middle-aged men¹⁰.

The role of gut microbiota in maintaining gastrointestinal health – current understanding and challenges

Dr Conlon discussed this evolving area of nutrition science. The gut microbiota ferment carbohydrates and proteins that reach the large bowel and can contribute to the benefits obtained from consumption of whole grains. Dietary fibres can increase microbial growth and mass in the large bowel (contributing to faecal bulking), dilute potentially toxic products such as ammonia, phenols and hydrogen sulphide that can result from protein fermentation and reduce their impact on gut tissues. Also, fibres which are fermented by the bacteria in the large bowel lead to the production of short chain fatty acids (SCFA), primarily acetate, butyrate and propionate, which have multiple beneficial effects on colonic tissues and lower luminal pH, providing an environment more conducive to growth of beneficial bacteria.

Gastrointestinal Tract Microbiology



“There are about 10 times as many bacteria in the large bowel as cells in our body”

Beneficial bacteria

Dr Conlon revealed “there is limited knowledge about the bacteria that live in the large bowel yet we do know there are approximately 10 times as many bacteria in the large bowel as cells in our body and we all have our own distinct gut

microbiota”. In clinical studies, improved gastrointestinal health may not translate to obvious changes in the gut microbiota. “Specific, possibly small, changes may go undetected,” he stated.

Are dietary fibres prebiotics?

A current definition of a prebiotic set by the International Scientific Association for Probiotics and Prebiotics is a “selectively fermented ingredient that results in specific changes in the composition and/or activity of the gastrointestinal microbiota, thus conferring benefit(s) upon host health”. In the recent study by CSIRO, BÜRGEN® Rye bread increased numbers of potentially helpful bacteria that facilitate carbohydrate fermentation and butyrate production (e.g *R.bromii* and *F.prausnitzii*) but did not increase lactobacilli and bifidobacteria. Dr Conlon believes that a focus on lactobacilli and bifidobacteria in defining a prebiotic is likely to be too narrow and possibly irrelevant to adult health.

The challenge – there is a current limited understanding of gut microbiota (types and activities) that limit our ability to determine which microorganisms should be used as markers of bowel or digestive health.

Consumer Insights

Karen Inge encouraged health professionals to look outside clinical guidelines when educating Australians on bowel and digestive issues. 'Beating the bloat' is the hot button in digestive wellbeing but is talking about it sexy?

Digestive health is a dominant health issue in consumers' minds now and in the future. Today's concerns are about 'feeling good' and dealing with flatulence, bloating, indigestion and constipation compared to future concerns, which are focused around more serious conditions such as stomach ulcers and gastritis. Interestingly, prevention of bowel cancer is not a 'top of mind' health issue.

Consumers recognise that diet is a key player in digestive health and have a high willingness to treat with food. Generally, consumers prefer to eat their way to health by increasing their intake of healthy foods rather than eating less of the foods that they like that may not be as healthy. (ADA Nutrition and you trends 2011)

"Consumers know 'fibre keeps you regular' but have limited awareness of the types of fibre and the health benefits".








Social research has found consumers switch off with words such as 'bowel' and 'constipation' preferring positive messages like 'helps to keep your digestive system healthy' or 'helps keep you regular'.

Karen recommended we get 'back to basics' and help consumers understand what is 'normal'. In a recent radio interview on digestive health, Karen pointed out the download of the Bristol stool chart on the radio stations website received more hits than any other news featured.

This clearly indicates people are after this type of information but too embarrassed to ask – we need to make this readily available.

The Bristol Stool Chart classifies the form of human stools into seven categories. Types 1 and 2 indicate constipation, with 4 and 5 being the "ideal stools", and 6–7 tending towards diarrhoea¹².

Bristol Stool Chart

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



Recommendations: Key Issues

The Panel discussion focused on current knowledge on fibre and bowel health and the practical implications of the roundtable presentations.

General Recommendations

- **Target high risk consumers:**
 - Restrictive Eaters – particularly those on low carb or high protein diets
 - Food Avoiders – those on Gluten Free or Wheat-Free Diets (self-prescribed and medically diagnosed)
 - Older Australians
 - People with Coeliac Disease
 - Breakfast skippers
- **Address misconceptions and misunderstandings:**
 - Educate on combination of fibres, recommended levels and rich sources – with a focus on increasing intakes of resistant starch and wholegrains
 - Wheat and gluten avoiders – educate on the importance of fibre in maintaining bowel health
 - Normal gut and bowel function – Bristol Stool Chart (indicates 7 types of stools with Type 4 and 5 being most optimal). This could be a useful communication tool to educate people on normal bowel health and to assist in assessing the type of fibre intake important for improving bowel habits (such as, how to get from a 1 to a 4).
 - There is a need for evidence-based information and practical tips on the combination of fibres in managing digestive and bowel health. These communication materials would be useful resources for Dietitians, GPs, Practice Nurses and Gastroenterologists and easily accessible online.

Health Professional Recommendations

- Inform health professionals on 'new news' related to combination of dietary fibres for bowel health and the need to focus on increasing resistant starch intake.
- Encourage the use of the Bristol Stool Chart as a marker of good bowel health and to monitor dietary changes (e.g. moving from a '1 or 2' to a '4 or 5')
- Detailed and informative messages addressing key issues for 'at risk groups', and gastrointestinal diseases are required for consumers and patients.
- Advise patients to make gradual changes to their dietary fibre intake and to drink enough water. For example, gradually over a week change to a high fibre breakfast cereal and then in week 2, change to a wholegrain bread like Rye bread.
- Practical consumer-friendly guidelines on how to meet recommended fibre intakes from a variety of sources need to be developed.

Research recommendations

- Specific guidelines on the mix of fibres for preventive health are required.
- Current consumption data on fibre intakes including resistant starch is required for Australian adults.
- Up-to-date food composition database including the types of fibre in foods is required.
- Official dietary fibre and resistant starch recommendations need to be reviewed as the current adequate intakes (25-30g/day) reflect the current low intakes of resistant starch in the Australian population. Recommendations for specific target groups may be necessary, e.g. by age, lifestage, gender, pre-and post-menopause and race.
- Explore implications of food avoidance and fad diets on fibre intakes and bowel health.
- More research to confirm non-invasive biomarkers of bowel health – which type of fibre or bacteria is important for maintaining bowel health.
- Is there an upper intake limit of fibre isolates that could be problematic? More information on within and between individual responses to dietary fibres.



Panel Discussion: Getting the focus back on fibre and bowel health – what needs to be done?

All participating experts agreed on the need to clear up the current confusion about diet and bowel health and communicate positive evidence-based messages about the beneficial role of fibre-rich grain foods and the combination of fibres needed for bowel health.

Key messages

- Combinations of dietary fibre are essential for bowel health - there are three major types of fibre and it is important to consume all types of fibre from a wide variety of foods.
- International comparative studies show stronger correlations between bowel cancer and resistant starch intake than with dietary fibre.
- Australian fibre intakes have been increasing over the last twenty years, yet colorectal cancer rates remain stubbornly high.
- At least 60% of Australians are not getting enough fibre and the majority are not getting enough diversity in fibre intake, especially resistant starch.
- Median values are not appropriate as a basis for Adequate Intake (AI) recommendations where the population consumes low levels of resistant starch and has a high incidence of chronic disease. Reliable contemporary fibre intake data are required and official AI recommendations need to be reviewed (as per current review of NRVs).
- Rye is a high fibre wholegrain and contains a diverse range of fibres, including resistant starch. Recent research conducted by CSIRO on Burgen® Rye bread adds to the growing body of evidence that rye is beneficial for bowel and digestive health.
- There is a current limited understanding of gut microbiota, therefore research outcomes should be focused on improved bowel function as opposed to an increase in specific bacteria (bifidobacteria and lactobacilli).

- Consumers need to be better informed about digestive and bowel health. Misconceptions about grain foods need to be addressed and communications need to be targeted to 'at risk' groups (e.g. dieters, food avoiders (gluten-free or wheat-free) and older Australians).
- Consumers need to know what's normal in terms of bowel function and what to aim for e.g. a '4' on Bristol Stool Chart.
- 'Not all fibre is created equal'. Health professionals need to address current misconceptions about fibre-rich grain foods in the diet as they are essential for providing the optimal combination of fibres for digestive and bowel health.



Foods with Moderate to High Resistant Starch Content – Aim for 20g resistant starch per day for bowel health

Food	Serving Size	Resistant Starch (g)
Oatmeal	1 cup, cooked	0.5g ¹
Barley, pearl	¾ cup, cooked	2.8g ¹
Burgen® Rye Bread	2 slices, 100g	4.7g ²
Pasta, cold (in salad)	1 cup	1.4g ¹
Lentils	¾ cup, cooked	5.0g ¹
Potato, cold (in salad)	1-2" diameter	1.0g ¹
Navy beans	½ cup, cooked	3.8g ¹

References: ¹ Murphy M, Environ International Corporation . Birkett A, Barndt R. Preliminary estimates of resistant starch in the United States, 2006. ² Conlon M & Bird T. Study on the Prebiotic Potential of Burgen® Rye. 2011: in press]



For patient resources and facts sheets visit www.burgen.com.au/healthcareprofessional

Burgen is committed to providing health professionals and all Australians with specially developed information, publications and resources to keep you up-to-date on the role of Burgen bread in health and wellbeing.

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