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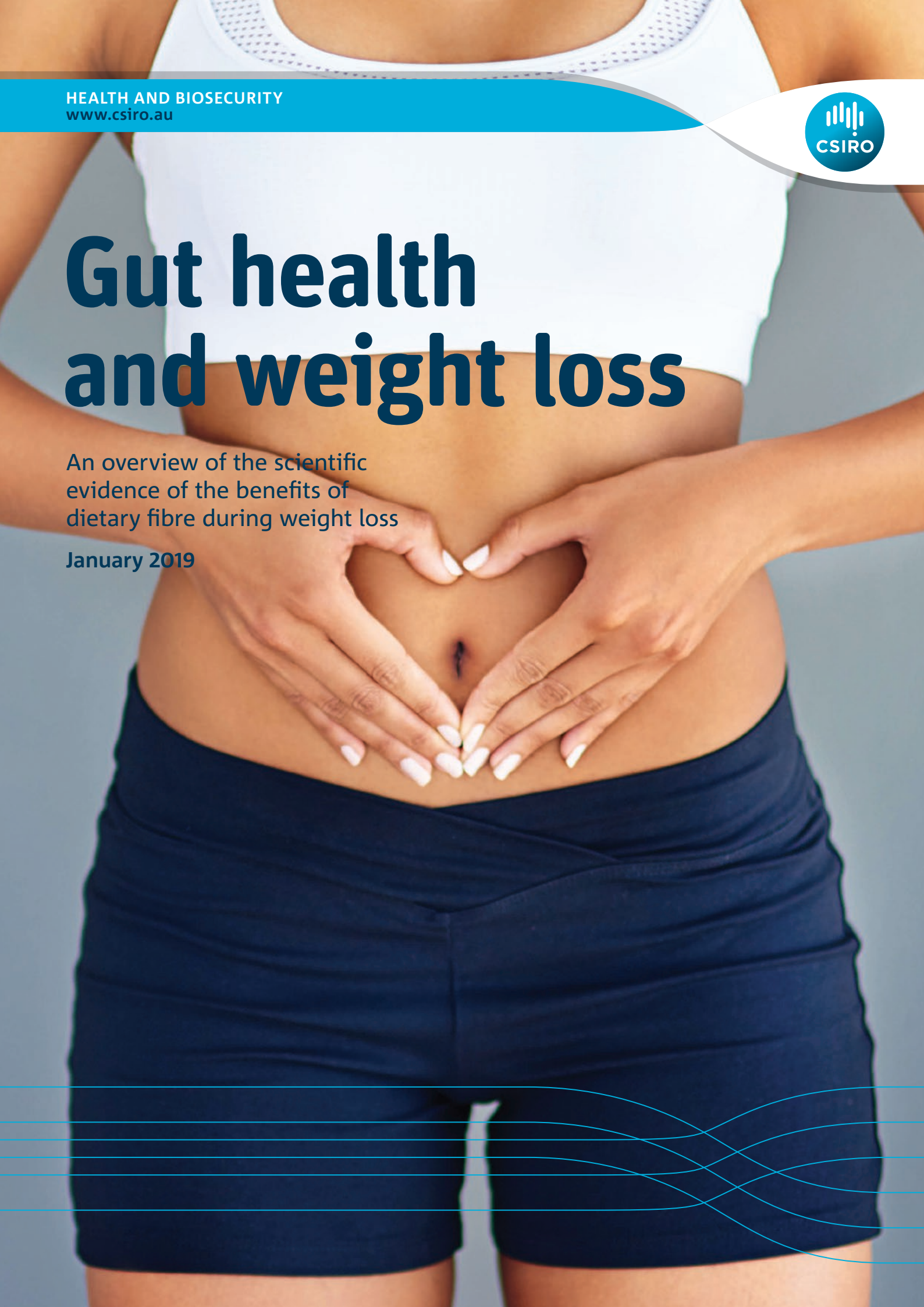

Gut health and weight loss

An overview of the scientific evidence of the benefits of dietary fibre during weight loss

January 2019

CITATION

Belobrajdic, D., Brownlee, I., Hendrie, G., Rebuli, M., Bird, T. (2018). Gut health and weight loss: An overview of the scientific evidence of the benefits of dietary fibre during weight loss. CSIRO, Australia.

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ACKNOWLEDGEMENTS

This work was undertaken by CSIRO Nutrition and Health Program in response to a request from SP Health to support innovation in the Total Wellbeing Diet Online. This activity was co-funded by CSIRO and SP Health.

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Executive summary

Half the nation experiences poor gut health

At least 50% of Australian adults experience unpleasant gut symptoms such as bloating, gas and constipation, and 1 in 7 experience distressing symptoms.

Obesity and poor gut health can go hand in hand

People who are overweight or obese are more likely to experience symptoms of poor gut health. Weight loss achieved through a healthy balanced diet can help improve gut function.

High fibre diets are the key to improving gut health

Fibre is a core component of a healthy, balanced diet and its benefits for preventing and managing many common gut related disorders is well established. Fibre can also help to lower cholesterol and improve glycaemic control.

Australians fall significantly short of fibre targets

Australians currently eat 23g fibre a day and 83% don't meet the suggested dietary target for health. Most adults would need to boost intake by at least 30% to meet the suggested target of 28-38g fibre a day, which is recommended for good gut function and optimal health and wellbeing.

High quality diets are the key to healthy weight loss

Healthy weight loss and a healthier gut can be achieved when a high protein, low GI diet is combined with high fibre, like in the CSIRO Total Wellbeing Diet. This powerful combination aids fat loss, helps control appetite and supports a healthy gut.

Evidence for gut health fad foods is limited

There is strong evidence to support the role of high fibre, whole foods in gut health (e.g. wholegrains, fruit, vegetables, legumes), however, evidence is limited for fad foods such as probiotics. There is no evidence to support the gut health benefits of kombucha.

Obesity linked to poor gut health

1 in 7
experience distressing gut health symptoms

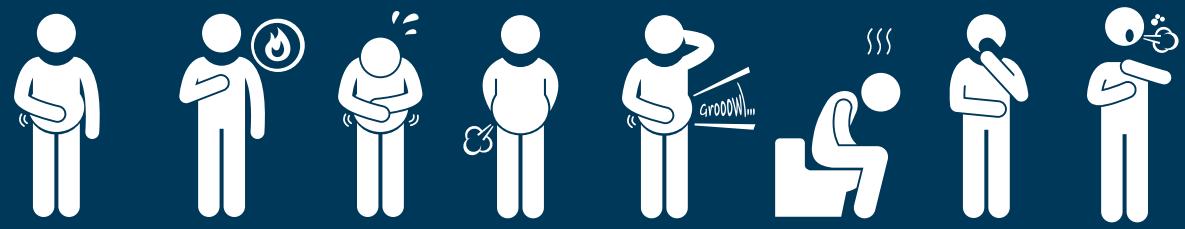
Obesity and gut problems go hand-in-hand

People who are overweight or obese are more likely to experience poor gut health

HEALTHY WEIGHT LOSS

Fibre on its own is not the solution for weight loss but combined with a higher protein and low GI diet, it can help control appetite and boost fat loss.

Some symptoms of poor gut health



BLOATED STOMACH | FREQUENT HEARTBURN | ABDOMINAL PAIN | EXCESSIVE FLATULENCE | GROWLING STOMACH | CONSTIPATION / DIARRHOEA | FREQUENT NAUSEA | EXCESSIVE BURPING

30-40g
FIBRE

AIM FOR HIGHER DIETARY FIBRE FOR GOOD GUT HEALTH

83%
AUSTRALIANS DO NOT EAT THE SUGGESTED AMOUNT OF FIBRE

Background

The importance of a healthy gut

FAST FACTS

The gut plays an essential role in health and wellbeing

Poor diet can upset the gut microbiome

50% of Australians experience gut symptoms

Obese individuals experience more gut symptoms than those of normal weight

The gut: the gateway to health

The gut is a major gateway to the rest of the body but it plays more than just a supporting role in health and wellbeing – it is vital for keeping other body systems functioning optimally.

Aside from digesting food and assimilating essential nutrients, energy and water, it actively prevents potentially harmful substances, antigens and pathogens from entering the rest of the body and protects itself from damage through rapid regeneration and protective secretions. It also connects with other organs, including the brain, via the vascular, neural, endocrine pathways and networks, and has major input into the control of metabolism of extra-intestinal tissues, inflammatory responses and immune system function.

As well as digesting food, the stomach is also responsible for helping to let you know when to start or stop eating. For example, the nerves in the stomach wall are sensitive to stretch stimuli. As the stomach fills up with food and fluid, the nerves send signals to the brain telling you to stop eating. It is important to tune into your gut when you eat, so that you are more aware of signals from your stomach when it becomes full.

The stomach helps to tell your brain when to start and stop eating. Yo-yo dieting can impact signals from the stomach, affecting long-term weight management.

The stomach also releases a hormone called ghrelin, which among other things, stimulates appetite by telling your brain that it is time for food. When you start eating, the amount of ghrelin is reduced, helping to signal satiety (the feeling of fullness attained during a meal) and to tell your brain to stop eating. Yo-yo dieting may produce chronically elevated circulating levels of ghrelin leading to increased hunger and appetite [1,2]. Obviously, this could interfere with weight loss, and it will make such efforts harder and increase the likelihood of weight regain. Following a balanced diet that is sustainable in the longer term is vital for achieving meaningful weight loss.

The gut also releases other hormones in response to nutrients, such as dietary fibre and protein, which may suppress appetite and increase satiety.

The gut microbiota

The human gut is colonised by microorganisms for our entire life. Most of these microorganisms are bacteria (and archaea), but viruses, yeasts and other fungi are also present. The greatest number and variety occur in the large intestine. The collective term for all microbes that exist in a single ecosystem (such as the large intestine) is 'microbiota'. While the combination of the hundreds of different microorganisms is reasonably stable over time, environmental factors, particularly our diet has a major influence on the composition and metabolic activity of the gut microbiota, and interactions with its host (meaning the body).

The majority of microbes in the large intestine utilise carbohydrates that escape digestion in the upper gut – that is, they utilise dietary fibre. The microbes ferment these carbohydrates to short chain fatty acids (SCFA) and other metabolites. SCFA have local and systemic beneficial actions related to improved health. For example, they are an energy source for intestinal cells, they act as anti-inflammatory mediators, or they exclude organisms that are pathogenic, and may help to regulate blood sugar level.

A poor diet, especially one low in fibre and rich in protein and fat, upsets the gut's delicate microbial balance (i.e. moves it towards 'dysbiosis'), reducing the abundance and diversity of beneficial bacterial populations and increasing numbers of potentially harmful ones. There is evidence that disrupting the balance of gut microbiota leads to the development and progression of obesity, and some of its comorbidities. Being overweight or obese, and gaining weight has been associated with changes in intestinal microbiota population structures. There is also evidence linking a dysbiotic microbiota with increased dietary energy harvest. However, to date, there are only a few rigorous studies in humans and the results contradictory. The dysbiosis may simply reflect an unhealthy diet and lifestyle that favours weight gain and is counterproductive for weight loss. Therefore, it is still not clear if changes in colonic microbiota composition and activity are a cause or consequence of obesity.

Importance of a healthy gut

Keeping the gut healthy is important for weight loss and weight maintenance because of the role it plays in digestion, nutrient absorption, and appetite regulation. The typical Australian diet can compromise gut function and health, in particular because of its low fibre content and lack of fibre diversity. Australians' diets are also commonly rich in fat and protein, which in the context of low fibre intake, impacts on the health of the large bowel through changes to the composition and metabolic activity of the gut microbiome.

Gut diseases and disorders are prevalent in the Australian community. Diet-related ailments such as constipation, diarrhoea, abdominal discomfort, irritable bowel syndrome and diverticular disease are common. Furthermore, an unhealthy gut is increasingly implicated in the initiation, progression and exacerbation of many common systemic health problems, including obesity and its comorbidities, notably type 2 diabetes and cardiovascular disease.

Every year, 50% of Australians experience gut health problems, and 1 in 7 Australian adults experience distressing gut health symptoms which they tend to manage themselves through the elimination of key foods or food groups [3]. Most gut conditions affect people every day and can significantly impact on an individual's quality of life.

Overweight or obese people are more likely to experience poor gut health

People who are overweight or obese are more likely to experience heartburn, acid regurgitation [4,5], increased bloating, increased stool frequency, diarrhoea, and upper abdominal pain than people with a healthy weight BMI.

A recent review of scientific literature found that being obese leads to an increased risk of gastrointestinal problems such as gastroesophageal reflux disease, erosive oesophagitis, gastric cancer, diarrhoea, diverticular disease, polyps, and gallstones [6].

Following a healthy diet to lose weight may alleviate gastrointestinal problems. But preventing weight gain is equally important. The European Prospective Investigation into Cancer (EPIC) found that for every kilogram of weight gain per year in adulthood, there was a 60% higher risk of colon cancer [7].

How does being overweight or obese affect gut health?

Consuming a poor quality, high fat diet on a regular basis will increase the amount of fat that the small intestine can absorb. It will also increase the efficiency of the body at transporting and storing dietary fat in adipose tissue. This adaption of the small intestine to absorb fat does not necessarily mean more energy is absorbed from one meal. What it might mean is that energy is absorbed faster, leading to a feeling of fullness for a shorter period of time, and consuming more food overall [8].

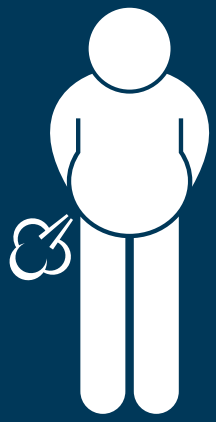
Also, the small intestine of an obese person is more efficient at absorbing glucose into the blood stream. Repeated, prolonged and/or excess glucose in the blood leads to higher levels of insulin in the blood, and an increased risk of type 2 diabetes [9]. Overweight and obese individuals may need higher intakes of fermentable fibres such as resistant starch to offset the adverse effects of poor quality diets, especially those diets rich in fat.

Some symptoms of poor gut health

BLOATED STOMACH

FREQUENT HEARTBURN

ABDOMINAL PAIN



EXCESSIVE FLATULENCE

GROWLING STOMACH

CONSTIPATION / DIARRHOEA

FREQUENT NAUSEA

EXCESSIVE BURPING

OVERWEIGHT OR OBESE PEOPLE ARE MORE LIKELY TO SUFFER GUT SYMPTOMS

Dietary fibre

The key to improving gut health

FAST FACTS

A diverse range of fibres is needed for gut health

Most Australians don't get enough fibre, or enough fibre diversity

Australians need to increase their fibre from core foods and reduce their intake of discretionary foods

Dietary fibre explained

Dietary fibres are essentially non-digestible carbohydrates that are found in edible plant foods. They are resistant to digestion in the small intestine, and are also potentially fermentable, either partially or completely, in the colon.

Fibre comprises a diverse group of molecules that differ in chemical composition and structure. Fibre can also be classified according to its solubility in water, and according to its fermentability. Because different types of fibres vary greatly in their physiological properties, their effects on the gut microbiota and capacity to promote health and protect against disease also differs by fibre type.

Dietary fibre does not just keep the digestive system healthy, it also has the capacity to aid laxation, reduce blood cholesterol and lower blood glucose.

Soluble fibre

Viscous soluble fibre includes pectin and gums and is mainly found in plant cell walls. Intake of some soluble fibres lowers LDL cholesterol levels and can also help with constipation. Dietary sources of soluble fibre include oats, barley, psyllium husks, and lentils.

Insoluble fibre

Insoluble fibre includes cellulose, hemicellulose and lignin, which make up the framework of plant cell walls. One of the major roles of insoluble fibre is to bulk up stools and prevent constipation. Greater intestinal mass reduces intraluminal pressure, quickens transit time in the gut, increases defecation frequency and promotes regularity.

Common sources of insoluble fibre include wholegrain bread and cereal products, wheat bran, rice bran, the skin of fruit and vegetables, nuts, seeds.

Readily fermentable fibre

The health benefits of fermented fibres are mediated mainly by the products of their fermentation by the large bowel microbiota. Dietary fibre is the major metabolic fuel for the gut microbiota, and fermentable fibre plays a crucial role in building and maintaining a diverse, resilient and healthy gut microbiota. This results in an effective gut barrier, healthy gut mucosa, and lowered risk of chronic bowel diseases.

Sources of easily fermented fibre include Jerusalem artichoke, legumes, leeks, onion, garlic, and bananas.

Resistant starch

Resistant starch is the part of starchy food that escapes digestion and absorption in the small bowel. It is a type of fibre and a particularly important substrate for the beneficial microbiota in the large bowel.

The health benefits of resistant starch are mediated mainly through the products of its microbial fermentation, in particular the short chain fatty acids (SCFA). These microbial metabolites are vital for normal bowel function and for maintaining the integrity and health of the bowel wall. They afford protection against DNA damage caused by unhealthy diets, and the level of protection is correlated strongly with the amount of SCFA in the bowel, especially that of butyrate. SCFA have also been shown to influence metabolism of tissues beyond the gut, including adipose tissue. An expanding body of research underscores the potential of resistant starch in preventing and slowing the progression of many common diet-related diseases.

All starchy foods contain resistant starch but the richest dietary sources include chickpeas, red kidney beans, navy beans and other legumes, cooked and cooled potatoes and pasta, and underripe bananas.

Food sources of different fibre types

SOLUBLE FIBRE

OATS

BARLEY

PSYLLIUM HUSKS

LENTILS

INSOLUBLE FIBRE

WHOLEGRAIN BREAD

CEREAL PRODUCTS

WHEAT BRAN
AND RICE BRAN

NUTS AND SEEDS

READILY FERMENTABLE FIBRE

JERUSALEM ARTICHOKE

LEGUMES

LEEKS

ONION

RESISTANT STARCH

CHICKPEAS

RED KIDNEY BEANS

COOKED AND
COOLED POTATOES

UNDER-RIPE BANANAS

Fibre diversity: a combination of fibres is best

Combinations of fibres, for example resistant starch and soluble fibres, can have synergistic actions and so may be more effective than individual fibres alone in maintaining normal bowel function and promoting a healthy gut.

Because the mechanisms of fibre types differ, a varied plant-based diet that supplies different types of fibre, including resistant starches, from mainly fibre-rich whole foods, notably wholegrains, fruits and vegetables, and legumes, will maximise the health benefits that fibre potentially offers.

Foods naturally high in fibre are also usually low in fat and salt, and concentrated in nutrients and things such as antioxidants, that can also help support health and wellbeing. Dietary fibre also includes many phytochemicals that are often interconnected with non-digestible carbohydrates in plant cell walls. Fibre 'co-passengers' are believed to play a role in systemic disease protection [10]. Their bioavailability in the small bowel is low but recent research suggests that they may improve health through their interactions with the gut microbiota. The integrity of this structure is also likely to affect how easily nutrients are digested and absorbed in the gut.

Eating a range of plant foods such as wholegrains, fruit, vegetables and legumes is the best way to achieve fibre diversity.

Fibre intake and recommendations in Australia

In general, Australians do not eat enough fibre which puts them at increased risk of gut disorders and other health problems. Fibre diversity is also lacking in the Australian diet because we tend not to have a lot of variety in the plant foods we eat.

National nutrition surveys provide estimates on the total amount of dietary fibre the population consumes but not always the different types of fibre. We have conducted secondary analysis of the National Nutrition and Physical Activity Survey which was conducted as part of the 2011-13 Australian Health Survey to examine the total fibre intake and common food sources of fibre in the typical Australian diet.

Other CSIRO research has shown that Australians eat very little resistant starch. Most people eat 5 grams or less of resistant starch each day. This reflects the poorer quality carbohydrate choices in our diet such as highly refined and extensively processed foods. CSIRO recommends that adults consume 3-4 times this amount. Overweight and obese individuals may need even higher intakes of resistant starch to overcome high fat, poor quality diets.

Recommendations for fibre intake in Australia

The Nutrient Reference Values for Australia and New Zealand set population level benchmarks for nutrient intakes based on the best available evidence.

There are two targets for fibre intake:

1. **An adequate intake target:** which is defined as an adequate intake based on the appearance or disappearance of gastrointestinal function and adequate laxation.
2. **A Suggested Dietary Target:** which is defined as an adequate intake to reduce chronic disease risk, on the basis of an inverse association between fibre intake and disease incidence.

TABLE 1. **NUTRIENT REFERENCE VALUE BENCHMARKS FOR FIBRE INTAKE**

BENCHMARKS	MALES	FEMALES
Adequate Intake	30 grams	25 grams
Suggested Dietary Target	38 grams	28 grams

How much fibre do Australians consume?

The 2011-13 Australian National Nutrition and Physical Activity survey suggests that, on average, adult males consume 24.7 grams of fibre per day, and females consume 21.2g of fibre per day.

The daily fibre intakes for the majority of Australian adults falls below the recommended benchmarks. These data suggest that 71.5% of adults do not meet the adequate intake target for fibre and 82.6% do not meet the suggested dietary target.

Key food sources of fibre in the average Australian diet

Almost 35% of adults' fibre intake (Table 3) comes from grain-based foods including:

- Bread and rolls which contribute 13.9% of total fibre intake;
- Breakfast cereal which contribute 10.5%;
- Other cereal based products which contribute 10.4%.

Vegetables contribute 21% of total fibre intake. In particular:

- Potatoes and other starchy vegetables contribute 6.5%;
- Cooked vegetables like broccoli, peas, and beans contribute 5.3%;
- Vegetable soup and mixed dishes that contain vegetables contribute 5.7%.

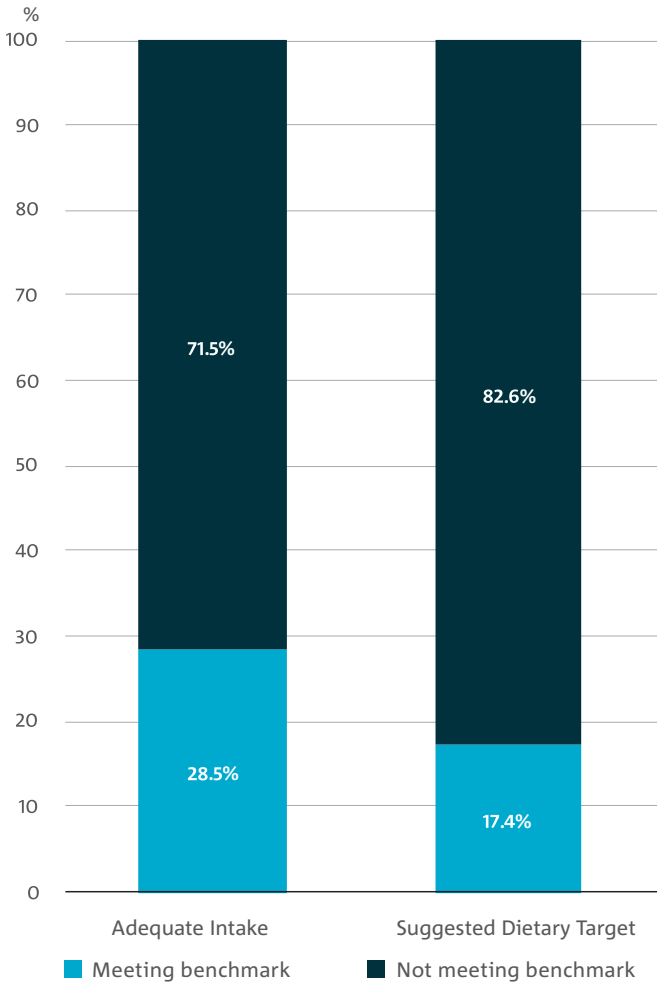
Fruit contributes 16.8% to total fibre intake.

Discretionary foods contribute 17% to total fibre intake. These foods are poor sources of fibre, however, they account for a large part of the diet and therefore are a significant contributor to total fibre intake.

TABLE 2. **AUSTRALIANS' AVERAGE FIBRE INTAKE (GRAMS PER DAY) FROM THE 2011-13 AUSTRALIAN NATIONAL NUTRITION AND PHYSICAL ACTIVITY SURVEY**

	MEAN	STANDARD DEVIATION
Males	24.7	13.1
Females	21.2	11.7
Overall	23.0	12.5

FIGURE 1. **PERCENTAGE OF ADULTS MEETING THE ADEQUATE INTAKE AND SUGGESTED DIETARY TARGET BENCHMARKS**



How Australians get their fibre

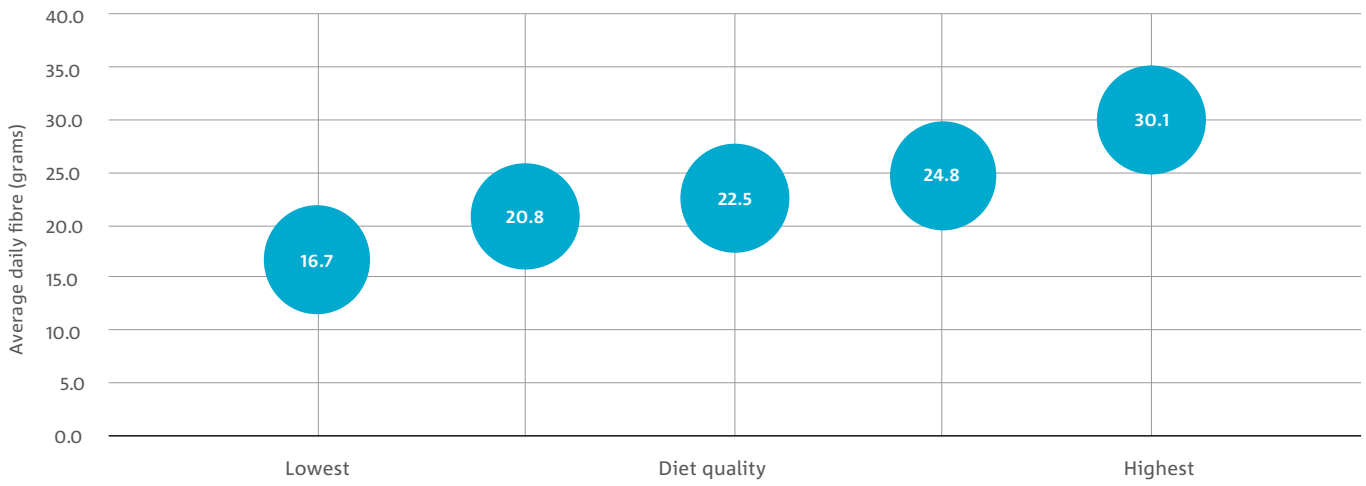
Higher fibre is associated with higher diet quality

The Australian Dietary Guidelines provide recommendations for a dietary pattern that promotes health and wellbeing for all Australians [11]. Using data from the National Survey we can categorise Australians' diets into those that comply least with the Australian Dietary Guidelines (that is of lowest quality) through to those that comply most with the Guidelines (that is of highest quality). Figure 2 shows the average daily fibre intake by quintile of diet quality. Australians with the highest diet quality, consume about 30 grams of fibre, which is nearly twice as much fibre as those with the lowest diet quality.

TABLE 3. **DETAILED BREAKDOWN OF FOODS WHICH CONTRIBUTE MOST TO TOTAL FIBRE INTAKE**

FOOD GROUP	% CONTRIBUTION TO TOTAL FIBRE INTAKE	
Fruit	Fruit	16.8
Vegetables	Potatoes and starchy vegetables	6.5
	Cooked vegetables	5.3
	Salad vegetables	1.4
	Soup and mixed dishes	5.7
	Legumes includes baked beans	1.7
Grains	Breakfast cereal	10.5
	Wholemeal bread and rolls	7.6
	White bread and rolls	6.3
	Other grain-based foods	10.4
Meat and alternatives	Dairy foods	1.0
Discretionary foods	Takeaway foods	6.6
	Savoury and sweet biscuits, cakes and pastries	5.6
	Snack foods and confectionary (chips, muesli bars)	3.1
	Other discretionary	1.8
Other	Other/Miscellaneous	2.7

FIGURE 2. **AVERAGE DAILY FIBRE INTAKE (IN GRAMS PER DAY) BY QUINTILE OF DIET QUALITY**



Fibre, weight loss and wellbeing

FAST FACTS

Obese Australians eat significantly less fibre than people of normal weight

Fibre may benefit weight management by promoting satiety and enhancing the microbiome

Increasing fibre can boost health and wellbeing

Fibre intake and weight control

Population studies consistently show that dietary patterns featuring plant-based diets, and higher consumption of wholefoods such as wholegrains, legumes, fruit and vegetables, are inversely associated with overweight and obesity, and body fatness.

Data from the National Nutrition and Physical Activity Survey shows that obese Australians consume significantly less fibre than normal and overweight adults. Obese individuals consumed, on average, 4 grams less fibre per day than normal weight individuals.

TABLE 4. **AUSTRALIANS' AVERAGE FIBRE INTAKE (GRAMS PER DAY) BY WEIGHT STATUS AND GENDER FROM THE AUSTRALIAN NUTRITION AND PHYSICAL ACTIVITY SURVEY**

WEIGHT STATUS	MALES	FEMALES	TOTAL
Underweight	27.0	21.0	23.1
Normal weight	26.6	22.9	24.5
Overweight	25.2	21.2	23.6
Obese	22.5	19.5	21.1

Studies in populations from other countries supports the Australian data. For example, in a study of over 4000 men and women from the Netherlands, there was an inverse association between higher intakes of fibre and lower BMI in men but not women. However, in both men and women, higher intakes of wholegrains was associated with lower Body Mass Index (BMI) and lower risk of overweight and obesity [12]. In a study of over 3000 men and women from Belgium, there was a significant inverse relationship between fibre and waist circumference; but fibre from fruit was positively associated with waist circumference [13].

In the 2005-2006 National Health and Nutrition Examination Survey (NHANES) in a population of over 4400 adults in the United States, dietary intake was assessed alongside perceived diet quality. People who perceived their diets to be healthier consumed more essential nutrients such as fibre. This finding was consistent across weight status groups [14].

Analysis of wholegrain food intake from the 2001-12 continuous NHANES showed a significant, inverse relationship with both BMI and waist circumference. Meaning higher consumption of wholegrain foods was associated with lower BMI and lower waist circumference. These analyses also showed a significant inverse relationship between wholegrain consumption and the percentage of people classified as overweight and obese [15].

Higher fibre intake and weight loss

All forms of energy-restricted dietary plans promote weight loss [16,17]. Higher intake of fruits, vegetables and whole grains is associated with reduced weight gain over time in adults [18,19], although the suggested size of this effect is very small. For example, Bertoia et al. suggested that it would take over 10 years of consuming one extra serve of fruit and vegetables per day before weight gain was reduced by 1 kilogram. A previous study found that during an 18 month weight loss trial, women with a higher fibre intake at 6 and 18 months had lower BMI [20], although this may simply be a proxy of how well individuals adhered to the healthy dietary regime. Moving towards more ideal dietary templates (such as The Australian Dietary Guidelines, the Total Wellbeing Diet and the Mediterranean dietary patterns) will inherently increase intake of dietary fibre as a result of increased intake of fruits, vegetable and whole grains [21-23]. Such approaches represent large-scale dietary changes that are not specific to increasing fibre intake.

Higher fibre intake from foods in energy restriction intervention studies does not improve weight loss or fat loss outcomes more than just energy restriction alone [24,25], while reduction of abdominal fat (but no other parameter of body weight or body fatness) was noted in one study [26]. A recent systematic review of data from wholegrain-based interventions and body weight highlighted no significant impact of consuming wholegrains on body weight versus control treatments [27]. The above evidence highlights that plant-based foods form the cornerstone of a prudent dietary pattern but do not support the notion that fibre intake per se improves weight loss.

Fibre intake alone will not induce weight loss, however it does play a supporting role. High fibre diets also have significant health benefits which can improve wellbeing during weight loss.

How could high fibre diets benefit weight management?

There are several mechanisms that may explain the effects of dietary fibre on body weight.

Fibre can help to reduce energy absorption

Dietary fibre is a source of energy but it provides approximately half the digestible energy of other carbohydrates. Fibres that escape fermentation in the large bowel provide no dietary energy. Hence, adding fibre to the diet is a simple way to reduce dietary energy density and total energy intake.

Certain dietary fibres reduce the amount of dietary energy absorbed by the gut by stimulating intestinal motility and increasing transit rate, which in turn increases energy excretion in the faeces. Some dietary fibres also reduce the digestibility of protein and fat.

However, the dilution effect of fibre on the amount of energy obtained from the diet is not large Consequently, an impractically large amount of fibre-rich foods would have to be eaten for fibre per se to have any meaningful effect on energy balance.

Fibre can increase satiety

High fibre whole foods are usually bulky, require more chewing and are filling. High fibre foods delay gastric emptying and increase gastric distension. Some but not all studies have shown that fibre consumption enhances satiety and reduces appetite.

Resistant starch has been shown in some studies to stimulate satiety and lower food intake. There is some evidence that it may positively modulate postprandial energy partitioning to reduce risk of weight gain. These systemic benefits likely relate to resistant starch-induced stimulation of fermentation and production of short chain fatty acids (SCFA) by the resident microbiota. SCFA initiate synthesis and release of peptides from endocrine cells in the gut wall. These messengers play key roles in promoting satiety, suppressing appetite and maintaining energy homeostasis. Other fermentable fibres may have similar effects.

Soluble fibres that potentially increase gut luminal viscosity suppress postprandial blood sugar levels and insulin response, which may also induce feelings of fullness. Studies on satiety tend to focus on the impact of a single meal on feelings of fullness. It is currently unclear whether increased fibre intake would reduce food intake over a long enough time to induce weight loss.

Fibre can alter the gut microbiome

Dietary fibre may help play a role in preventing obesity relapse by modulating the composition and activity of the gut microbiota. Dysbiosis of the large bowel microbiota has been implicated in the development of obesity and facilitating weight regain but a lot more research is needed to support this assertion.

Fibre intake is vital for supporting a balanced and resilient colonic microbiome, which has been linked to reduced weight gain and risk of obesity but causality has yet to be established. Diversity of dietary intake of plant-based foods has been associated with increased microbial diversity [28].

3 benefits of a high fibre diet for weight management

1 REDUCES ENERGY UPTAKE

FIBRE-RICH FOODS MAY REDUCE THE AMOUNT OF ENERGY ABSORBED FROM FOOD.

2 PROMOTES SATIETY

FIBRE HELPS YOU FEEL FULL, WHICH CAN HELP TO MANAGE APPETITE.

3 ENHANCES THE MICROBIOME

FIBRE FEEDS GUT BACTERIA; A HEALTHY MICROBIOME MAY HELP PREVENT OBESITY.

How do high fibre diets enhance health?

There is a wealth of evidence from population studies demonstrating that high fibre diets are both preventative and therapeutic for obesity and its major comorbidities. Controlled feeding trials using animals, which permit greater management of extraneous experimental factors, provide strong evidence that dietary fibre consumption reduces voluntary food intake, weight gain and adiposity, and improves various metabolic health biomarkers. However, results from randomised controlled trials in humans are mixed. The lack of consistency among dietary intervention studies in humans could be explained by a multitude of factors, including study design limitations, and the variation in fibre type and amounts tested, and the overall dietary pattern included.

Higher fibre may improve blood glucose control

The fibre content of a food may contribute to lowering the glycaemic response. This is most noticeable for soluble fibres such as beta glucan found in oats which can slow the digestion and absorption of carbohydrate in the meal. Also, foods containing higher levels of resistant starch tend to have a lower glycaemic response as less starch is available for digestion in the small intestine.

Higher fibre may lower cholesterol

Viscous soluble fibres can help to lower blood cholesterol. These soluble fibres include beta glucan which is found in oats and barley and are effective in lowering LDL and total cholesterol [29]. Other soluble fibres such as psyllium husk [30] and pectins from fruit also contribute to lowering cholesterol levels.

Higher fibre improves bowel regularity

While laxation is a generally accepted effect of dietary fibre, many highly fermented fibres may not increase stool frequency or stool output [31]. Fibre from cereal sources appears to have a greater laxative effect than fibre from fruits and vegetables. Healthy bowel habits are associated with better general health.

Higher fibre may improve wellbeing

Fibre intake is likely to affect the release of hormones and neurotransmitters from the gut and the rest of the body that may improve mood and other components of wellbeing. This could happen either directly (e.g. by triggering stretching of the gut wall) or indirectly (e.g. through metabolites produced by the large intestinal microflora). There do not appear to be any studies to date that have directly tested the effects of fibre supplementation or replacing refined plant-based foods for higher fibre options on parameters of wellbeing.

A recent cross-sectional study noted that higher overall dietary quality was associated with good psychological wellbeing. After controlling for confounders, individuals with higher diet quality were almost twice as likely to report good wellbeing. There was no relationship between fibre intake specifically and better wellbeing or mental health [32]. Despite these findings, there is inconsistent data regarding the relationship between diet quality and mental health outcomes. There are not many studies in this area, and more research is needed to establish causation.

4 health benefits of high fibre diets

1
BLOOD GLUCOSE CONTROL

FIBRE MAY HELP TO LOWER THE GLYCAEMIC RESPONSE OF FOODS, SUPPORTING BETTER METABOLIC HEALTH.

2
LOWER CHOLESTEROL

FIBRE MAY HELP TO LOWER CHOLESTEROL, BY HELPING TO REMOVE LIPIDS (FATS) FROM THE BLOOD.

3
REGULARITY

FIBRE CAN HELP KEEP YOU REGULAR, PREVENTING CONSTIPATION.

4
BETTER WELLBEING

FIBRE AFFECTS GUT HORMONES AND BOOSTS OVERALL WELLBEING.


KOMBUCHA

Gut health myth busting

Scientific facts behind gut health fads

FAST FACTS

Evidence for many gut health foods is limited

Prebiotics have the strongest evidence

Probiotics and fermented foods have limited evidence

Kombucha has no evidence to support its impact on gut health

Gut health food facts

PROBIOTICS
(PROBIOTIC DRINKS, PROBIOTIC SUPPLEMENTS)

PREBIOTICS
(E.G. WHOLEGRAINS, VEGETABLES, FRUIT)

FERMENTED VEGETABLES
(KIMCHI, SAUERKRAUT)

FERMENTED DAIRY
(KEFIR, YOGHURT)

KOMBUCHA

Dispelling the myths: what does the science say?

There is no shortage of anecdotal information and hype on gut health products and claims, and it is increasingly difficult for the lay person to cut through this misinformation. Much of this is driven by the demand for solutions to gut problems people are experiencing. Digestive upsets and ailments are commonplace. While most are minor they can disrupt an individual's daily routine and compromise quality of life. Consequently, many people self-medicate and modify their diets by eliminating, reducing or increasing their consumption of certain foods or entire food groups to manage their gut symptoms. Here, we separate myths from facts.

Probiotics

The probiotic concept is not new and, despite the considerable research effort over many decades, probiotics have proven beneficial for only a few health problems. Positive effects are often strain-specific and involve much higher doses than those generally available in the marketplace.

Prebiotics

Increasing intakes of prebiotic fibres, preferably supplied in the form of whole foods, is likely a more effective, simpler, nutritious and less expensive option for promoting gut health and function than ingesting exogenous bacteria e.g. from probiotics. Prebiotics are dietary fibres that selectively improve the composition and activity of the large bowel microbiota. These fibres serve as fermentable supplements for 'good' bacterial species already residing in the gut, inducing a favourable shift in microbial population balance and fermentation patterns. Prebiotic fibres occur naturally in a wide variety of plant-based foods, fruits, vegetables and cereals.

Fermented foods

Fermentation has long been used to preserve food but there is currently much interest specifically in the bacteria formed during the fermentation process because of their purported health promoting properties.

Nowadays, purified, live (probiotic) bacterial cultures are added directly to all kinds of foods, including dairy, grains and vegetables, as well as supplements and capsules, and actively marketed for their health benefits. Adding fermented dairy foods, such as yoghurt and kefir, and vegetables like sauerkraut or kimchi can be beneficial to your diet quality because it will increase the amount of core food groups (e.g. dairy, vegetables) and essential nutrients (e.g. calcium) in your diet. However, there is very little evidence that fermented foods are beneficial for gut health and more research is needed.

Fermented vegetables

Fermented vegetables such as kimchi and sauerkraut are created by adding lactic acid bacteria to a vegetable, such as cabbage. Bacteria ferment the carbohydrates in the vegetable, creating lactic acid, which gives a tangy flavour. The fibre provided by these vegetables supports gut health, more so than the bacteria that cause fermentation.

Yoghurt

Yoghurt is made by adding lactic acid (and other) bacteria to milk. The bacteria feed on the sugar lactose, creating lactic acid, which adds a tangy taste and thickens the milk by changing the shape of the proteins. Yoghurts with no added sugars are important sources of many other nutrients (e.g. protein, calcium, protein, zinc, and vitamins B12 and D) and should be included within a healthy dietary pattern. For people with lactose intolerance, yoghurt is also easier to digest than milk, because some of the lactose has already been broken down to smaller sugar molecules. But too much yoghurt can still be difficult for people with lactose intolerance to digest.

The probiotic bacteria Acidophilus and Bifidobacterium are suggested to provide gut health benefits. As with other probiotics, there is limited evidence as to their effectiveness in relation to gut health. When buying yoghurt, look for products that are low in fat, low in added sugar and high in calcium.

Kombucha

Kombucha is a bubbly, fermented beverage. It is created from a base of tea and sugar, which has a Symbiotic Colony of Bacteria and Yeast (SCOBY) added. The bacteria and yeast in the SCOBY ferment the sugar, creating carbon dioxide (the bubbles) and acetic acid (the slightly vinegar flavour). It can be made at home using a SCOBY, and is also available commercially in a range of flavours.

Kombucha is suggested to have many health benefits, mainly stemming from the probiotic bacteria present in the drink. While there may be probiotics present in the drink, the amount, strain, efficacy, and effect of the bacteria varies hugely between each preparation. Some drinks don't contain any bacteria, and some bacteria that are present may not survive passage through the strongly acidic environment of the stomach.

A limited number of preclinical studies using animals and cell culture show that kombucha preparations have favourable effects on health biomarkers. However, there is no evidence from good quality, well-controlled human trials of health benefits from drinking kombucha [33].

Another consideration is that many kombucha products have less desirable nutritional profiles. It is advisable to check the label. Avoid buying commercially made drinks that have added sugar or juice to sweeten and flavour the drink.

It is important to note that homemade kombucha is not recommended for children and pregnant women because it may be contaminated with pathogenic bacteria. Also, alcohol may be present as a bi-product of the fermentation process. Commercially-made products are tested regularly and are more likely to be safe. Commercial kombucha may still contain traces of alcohol but amounts up to 0.5% alcohol are classified as alcohol-free by Australian food standards. Kombucha can be a good alternative to drinks high in sugar and energy, such as soft drink, fruit drinks and alcoholic beverages, provided it does not have added sugar or juice. Check the label to be sure.

Kefir

Kefir is made by adding kefir 'grains' to milk. These grains are similar to a SCOBY, and contain bacteria and yeast, which ferment the lactose. This process is said to incorporate the probiotic bacteria and yeast into the milk. As with other products containing probiotics, there is almost no evidence of a direct effect of these probiotic products on gut health.

Green smoothies

Green smoothies are made with a combination of leafy green vegetables, fruit, and a base such as coconut water or almond milk. Many websites and wellness spruikers claim that green smoothies are good for the immune system, will give you more energy, and lead to weight loss.

Smoothies taste good, are convenient, and they are an easy way to meet fruit targets for the day. However, they are easy to consume in large serves, as liquid is less satiating than whole foods and it is particularly easy to consume more than you normally would. By comparison, a single apple would make you feel quite full and have significant chewing resistance. Because smoothies do not keep you full for long, it can lead to greater energy intake throughout the day.

There is also a perception that beverages are low energy. A typical green smoothie recipe, containing the equivalent of three serves of fruit and vegetables, plus milk or fruit juice, can have a high energy value. When compared to a serve of rolled oats, fruit, and yogurt, the typical smoothie is higher in energy, lower in calcium, and has more than twice as much sugar.

Fibre is also best provided in the form of minimally processed wholefoods. Extensive processing disrupts the food matrix, which can greatly increase the rate of nutrient delivery to the bloodstream, amplifies postprandial glycaemic and metabolic hormonal responses, and diminishes the benefits that dietary fibre potentially offers. If you choose to consume smoothies, remember that they should replace a whole meal, and are much higher in energy than the average snack or drink.

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18-00623