

Nutrition and gut health - myths and false promises?

22/03/23

Covered in today's webinar

- The gut microbiota – why the interest?
- The role of fibre in the diet including health effects, food sources and barriers to consumption.
- Prebiotics and probiotics – what are they?
- Fermented foods and health – what's the evidence?
- Links to *Food – a fact of life* resources.
- Sources of further information and support.



Nutrition and gut health - myths and false promises?

Dr Stacey Lockyer BSc (hons), MSc, PhD, RNutr
Senior Nutrition Scientist, British Nutrition Foundation

Gut microbiota in the news...

Could gut bacteria drive colon cancer?



Are the gut microbiota determined by genes or the environment?

Study reveals if gut microbiota is determined by genes or environment

How bacteria are changing your mood



Does Gut Microbiota Manipulate Our Minds?

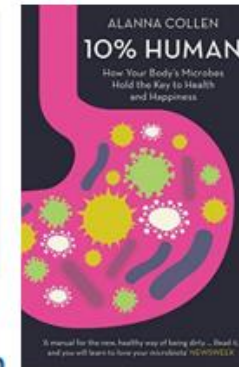
Gut microbiome linked to artery health

Gut bacteria flora linked to chronic heart failure

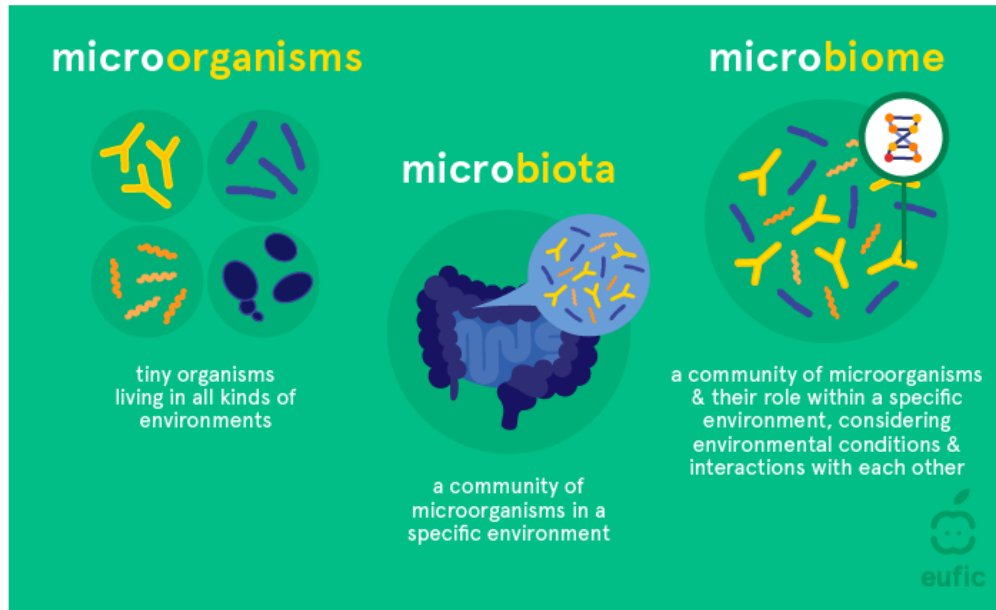
A new Norwegian study has found that chronic heart failure patients lack important microbiota in their intestinal tracts.

Scientists use dietary seaweed to manipulate gut bacteria in mice

Walnuts impact gut microbiome and improve health



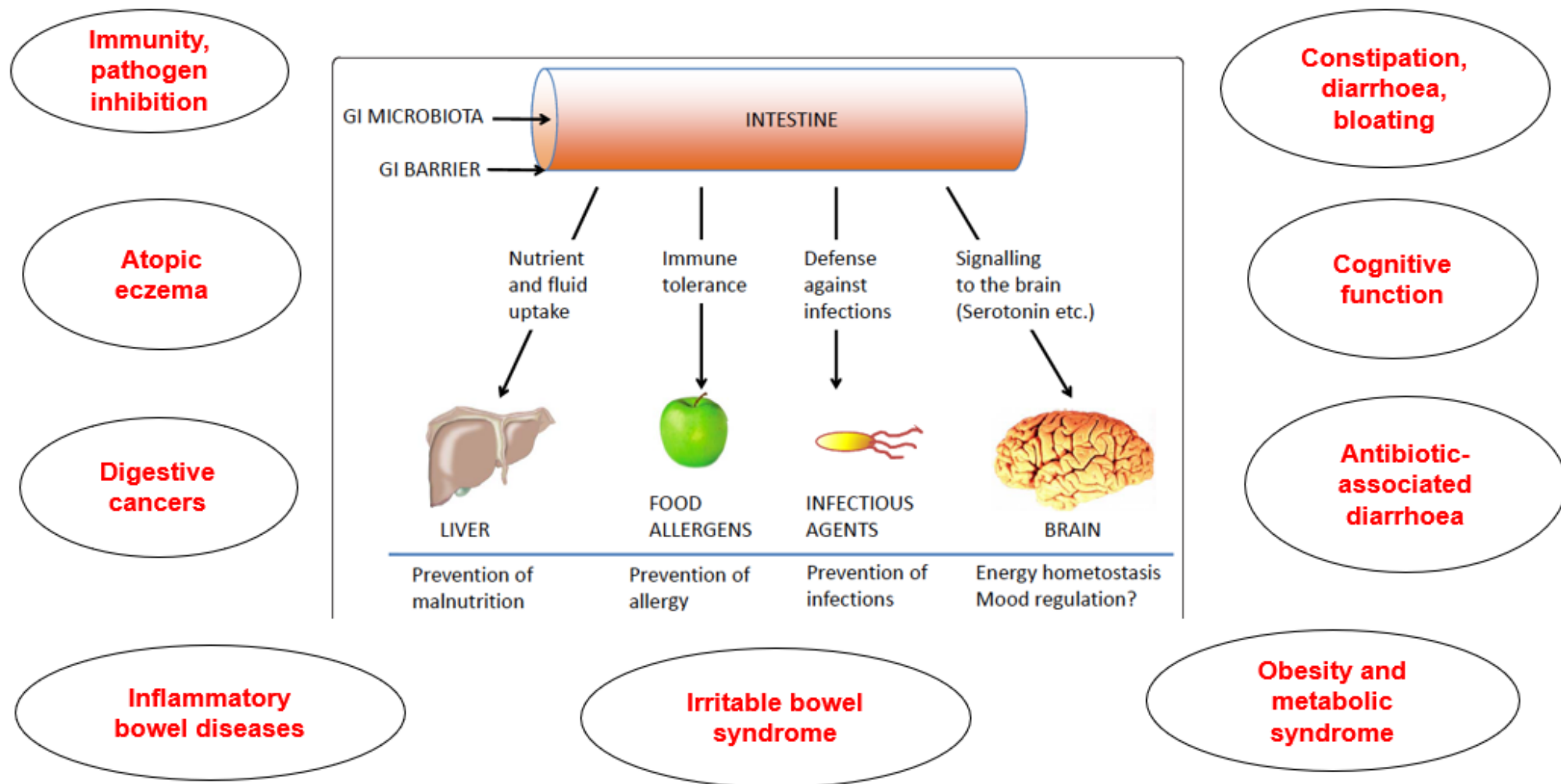
What do we mean by gut microbiota?



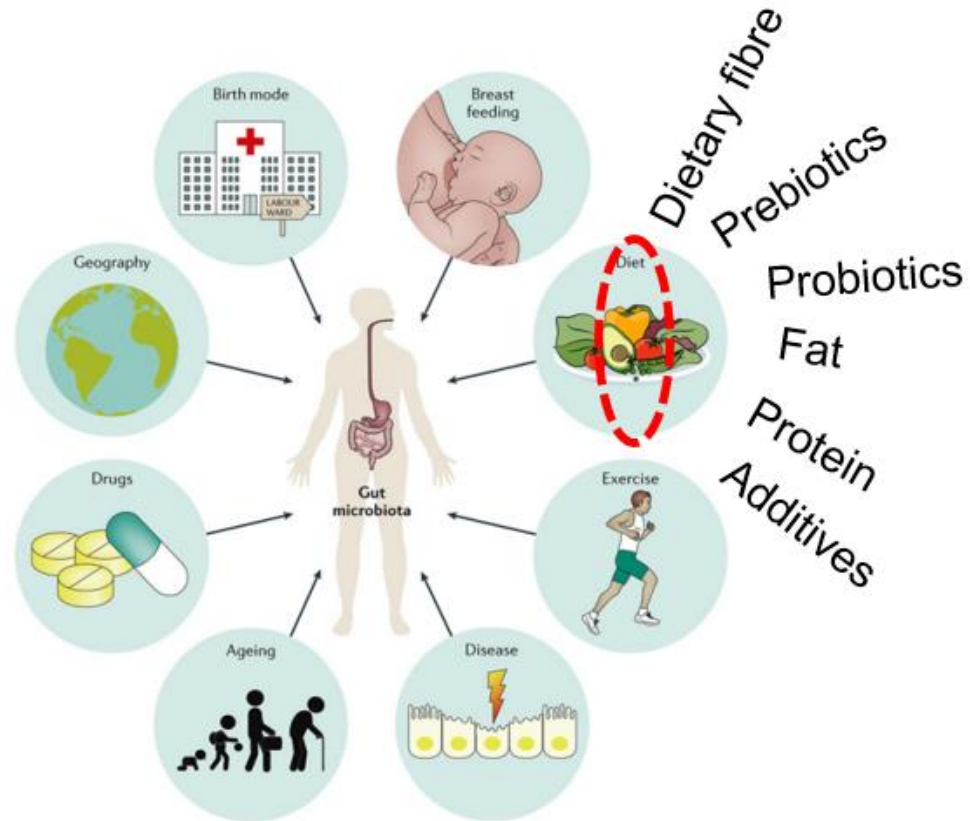
Functions of gut bacteria:

- Digestion of food
- Synthesis of vitamins and other nutrients
- Development and training of the immune system
- Metabolism of medications
- Resistance to pathogens
- Reinforce gut barrier

Why such interest in our gut bacteria?



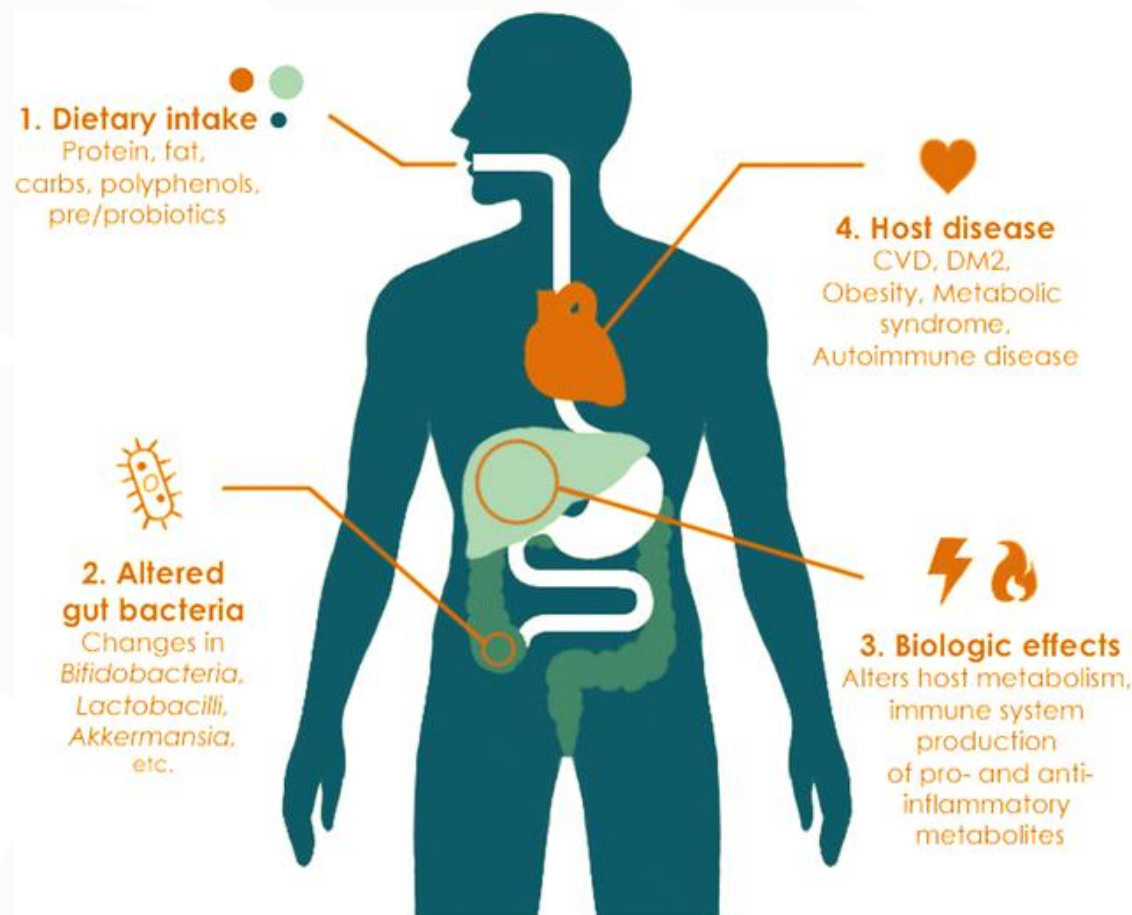
What determines the microbes you have?



Cryan & Dinan (2012)



Influence of diet



Acute diet modification can promptly cause change in gut microbiome, but such changes may not be sufficiently large or enduring to be conducive to better health.

Composition of a “healthy microbiome” has not been precisely defined; may vary from individual to individual – may influence response to dietary manipulation.

As technology evolves, we will find out more about different bacteria and their role in health.

Research into effects of diet on microbiome is at early stage but has promising therapeutic potential.

More human studies needed and care must be taken extrapolating animal studies to the human intestinal microbiota.

Singh, et al. (2017) *J Transl Med*



The importance of fibre

Global Burden of Disease study 2019

What is absent from diets can be a greater marker of risk than what is present in excess.

'Eat more' messages (e.g. wholegrains, vegetables, nuts, seeds, fibre) should be balanced with 'eat less' messages (salt, saturated fat, free sugars)

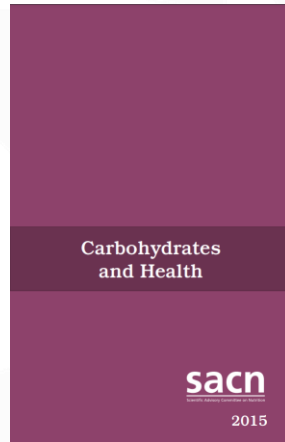


Aligning UK diets with the Eatwell Guide (without increasing total energy intake) could:

- increase life expectancy by 5.4 months (men) and 4.0 months (women)
- avert 17.9 million DALYs over the lifetime of the current population.
- prevent 440,000 new cases of T2D in men and 340,000 in women over 10 years.
- **23% of the health gains would be attributed to increases in fibre consumption**

Cobiac et al. (2016) PLOS ONE 11(12): e0167859

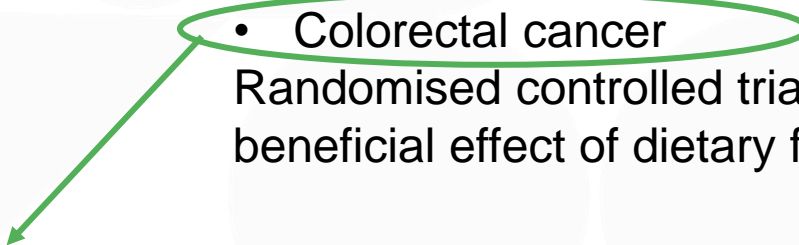
Health effects of fibre



Diets higher in fibre are associated with reduced risk of:

- Cardiovascular disease
- Coronary events
- Stroke
- Type 2 diabetes
- Colorectal cancer

Randomised controlled trials indicate a beneficial effect of dietary fibre on constipation.



- Fibre > fermented/metabolised by the colonic microflora > influence the types and patterns of bacterial populations found in the colon.
- Fermentation within the large bowel > short-chain fatty acids e.g. butyrate > anti-cancer activity.
- Reduction of intestinal transit time and increased faecal bulk > reduced contact between faecal toxins and tissues in the colon.

Fibre components and types

Sources of fibre

Because the components of dietary fibre are found in different proportions in fibre-containing foods and have different properties, it is important to eat a variety of fibre-containing foods. Some examples of different components of fibre and their food sources are listed below.

Fibre component	Description	Food sources
Cellulose	Polysaccharides comprising up to 10 000 closely packed glucose units arranged linearly.	Grains, vegetables, fruit, nuts, cereal bran.
Hemicellulose	Polysaccharides containing sugars other than glucose.	Cereal grains, vegetables, fruit, legumes (like peas, beans, chickpeas, lentils) and nuts.
Lignin	A non-carbohydrate component associated with plant walls.	Foods with a woody component, for example celery and the outer layers of cereal grains.
Beta-glucans	Glucose polymers that (unlike cellulose) have a branched structure	Mainly found in cell wall of oats and barley.
Pectins	A non-starch polysaccharide common to all cell walls.	Fruits and vegetables, legumes, nuts and potatoes.
Gums and mucilages	Non-starch polysaccharides which are thick gel-forming fibres that help hold plant cell walls together.	Gums: seeds and seaweed extracts; Mucilages: psyllium seeds. Gums and mucilages are used as gelling agents, thickeners, stabilisers and emulsifying agents.
Resistant starch	Starch and the products of starch digestion that are not absorbed by the small intestine.	Legumes, potatoes, cereal grains.
Oligosaccharides	Short chain carbohydrates of 3-9 monomers. These include fructo-oligosaccharides and galacto-oligosaccharides.	Onions, chicory, Jerusalem artichokes.
Micro components (waxes, cutin and suberin)	Micro components of the plant structures.	Cereal grains.



Fibre type	Claim
Barley grain fibre	Barley grain fibre contributes to an increase in faecal bulk
Beta-glucans	Beta-glucans contribute to the maintenance of normal blood cholesterol levels
Beta-glucans from oats and barley	Consumption of beta-glucans from oats or barley as part of a meal contributes to the reduction of the blood glucose rise after that meal
Oat grain fibre	Oat grain fibre contributes to an increase in faecal bulk
Oat beta-glucan	Oat beta-glucan has been shown to lower/reduce blood cholesterol. High cholesterol is a risk factor in the development of coronary heart disease
Resistant starch	Replacing digestible starches with resistant starch in a meal contributes to a reduction in the blood glucose rise after that meal.
Rye fibre	Rye fibre contributes to normal bowel function
Wheat bran fibre	Wheat bran fibre contributes to an acceleration of intestinal transit
Wheat bran fibre	Wheat bran fibre contributes to an increase in faecal bulk

Fibre recommendations

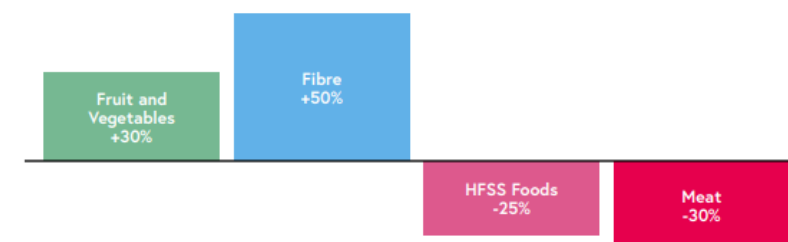
Age group	Recommended dietary fibre Intake
Adults	30g/day
Adolescents aged 16-18 years	30g/day
Children aged 11-16 years	25g/day
Children aged 5-11 years	20g/day
Children aged 2-5 years	15g/day

Age group (years)	Mean intake (g/day)	% meeting DRV
1.5-3	10.4 ▼	12
4-10	14.3 ▼	14
11-18	16.0 ▼	4
19-64	19.7 ▼	9
65-74	19.7 ▼	9
75+	17.3 ▼	3

*National Diet and Nutrition Survey years 9-11
(2016-2017 and 2018-2019)*

Figure 16.1

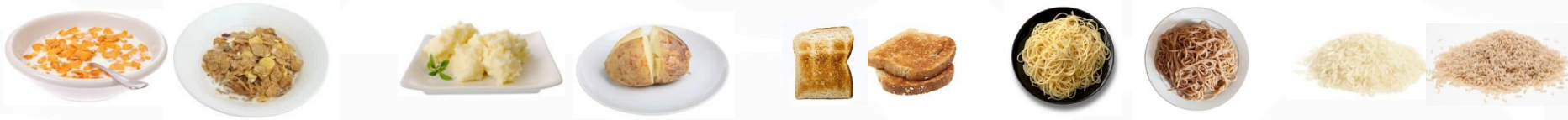
Changes are needed to the national diet by 2032 (compared to 2019) to meet health, climate and nature commitments[†]



[†] Three of the diet-related targets are based on advice from the Scientific Advisory Committee on Nutrition. A 30% increase in fruit and vegetables would bring us in line with the Eatwell recommendation to eat five pieces of fruit and vegetables per day; a 50% increase in fibre would bring us in line with the SACN recommended 30g/day; a 25% reduction in consumption of HFSS foods will take us towards the required 60% reduction in salt, 20% reduction in saturated fat, and 50% reduction in free sugars. A 30% reduction in meat is required to achieve the fifth carbon budget and the 30x30 nature commitment – this represents the creation and maintenance of at least 410,000 hectares of woodland, maintaining and restoring 325,000 hectares of peatlands, and managing 200,000 hectares mainly for nature (for example, heathland and species-rich grassland, some of which would be managed through conservation grazing.)

Fibre content of starchy foods

Food, portion size	Fibre content (per portion)	Food, portion size	Fibre content (per portion)
Corn flakes (30g)	0.8 g	Bran flakes (30g)	4.0 g
White toast (54g)	1.6 g	Wholemeal toast (62g)	5.1 g
White spaghetti (220g)	3.7 g	Wholewheat spaghetti (220g)	9.2 g
White rice (180g)	0.9 g	Brown rice (180g)	2.7g
Mashed potato (120g)	1.6 g	Jacket potato with skin (180g)	4.7g



Source: McCance and Widdowson's Composition of Foods

Fibre content of fruit, veg, pulses, nuts, seeds

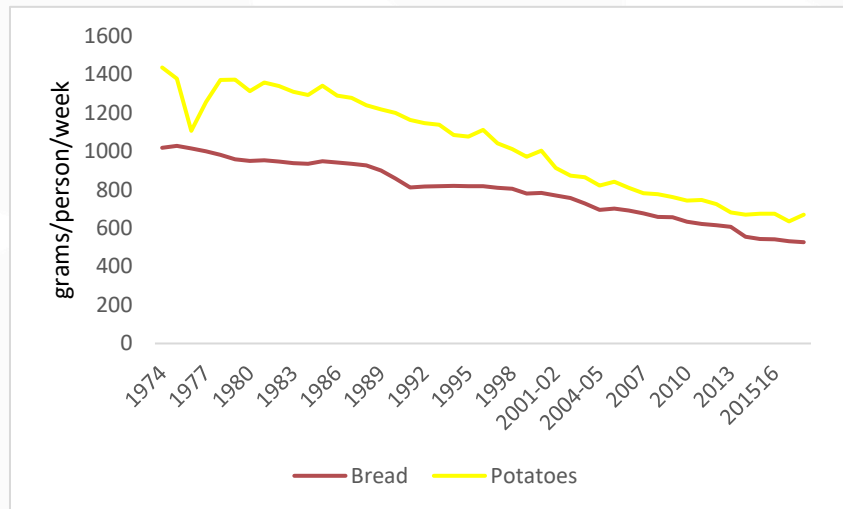


Food, portion size	Fibre content (per portion)
Red kidney beans (80 g)	6.0 g
Baked beans (80 g)	3.9 g
Hummus (50 g)	2.5 g
Peas (80 g)	4.5 g
Carrots (80 g)	2.7 g
Broccoli (80 g)	2.2 g
Strawberries (80 g)	3.0 g
Pears (80 g)	2.2 g
Bananas (80 g)	1.1 g
Almonds (25 g)	2.5 g
Hazelnuts (30 g)	2.1 g
Sunflower seeds (25 g)	1.7 g



Source: McCance and Widdowson's Composition of Foods

Intake of fibre-rich foods



Source: Family Food Survey 2017/2018 ([DEFRA 2019](#))



Less than a third of adults achieve 5 A DAY (average 4.3 portions/day).



Nuts and seeds only contribute on average around 2% of fibre in the UK diet (average consumption ~6 g/day including nut butters).

NDNS: results from years 9 to 11 (2016 to 2017 and 2018 to 2019)



Average intake of pulses 14 g/day (estimated 26 g/day to bring in line with Eatwell Guide).



18% of adults and 15% of children do not consume any wholegrains.



What does 30g of fibre per day look like?

Adult weekly meal plan What can 5% free sugars and 30g fibre look like?						
This menu simply shows one way of meeting the fibre and free sugar recommendations, as well other UK food and nutrient based dietary guidelines (e.g. energy, salt, saturated fat, 5 A DAY, fish) - it is not, however, the only or definitive approach. It also allows you to still have a little bit of what you fancy - in moderation!						
Monday Breakfast No added sugar muesli, semi-skimmed milk and canned peaches (in juice) Small glass (150ml) orange juice Lunch Jacket potato with tuna mayonnaise, sweetcorn and salad 2 oatcakes, cheese and grapes Evening meal Chickpea and spinach curry (retail cooking sauce) with brown rice Snacks Guacamole and 1/2 wholemeal pitta bread 4 squares of dark chocolate	Tuesday Breakfast 2 slices wholemeal toast with peanut butter Skinny latte Small glass (150ml) orange juice Lunch Chicken and wholewheat pasta salad 4 dried apricots Evening meal Baked salmon, new potatoes, broccoli and kale Snacks Smoothie: skimmed milk, low fat fruit yogurt, frozen berries 2 chocolate digestives	Wednesday Breakfast Bran flakes, semi-skimmed milk and chopped banana Tea Lunch Cheese and chutney and salad on a wholemeal roll 1 pear Evening meal Vegetarian bean chilli with brown rice Snacks Unsalted nuts (handful) and raisins 175ml glass of red wine	Thursday Breakfast Small can of reduced sugar baked beans on 1 slice of wholemeal toast Skinny latte Lunch Lentil soup, ham salad sandwich with salad cream, on wholemeal bread 2 tangerines Evening meal Lean pork and pak choi stir fry with noodles Snacks Low fat plain yogurt, berries and pumpkin seeds 25g packet of plain crisps	Friday Breakfast 2 fortified wheat biscuits, semi-skimmed milk and chopped banana Small glass (150ml) orange juice Lunch Houmous, rocket and red pepper on a wholemeal wrap Low fat yogurt, honey and cinnamon Evening meal Fish pie, peas and green beans Snacks Plain scone with low fat spread 7 Brazil nuts	Saturday Breakfast Scrambled eggs, grilled tomato and 2 slices of wholemeal toast Small glass (150ml) orange juice Lunch Thin crust Margherita pizza with added vegetables and a side salad Fruit salad Evening meal Spaghetti Bolognese with wholewheat spaghetti Snacks Flapjack slice 175ml glass of red wine	Sunday Breakfast Porridge with dried figs and seeds Tea Small glass (150ml) apple juice Lunch Roast chicken, roast potatoes, peas and carrots Homemade spiced rice pudding Evening meal Cheese and onion omelette, sweet potato wedges, green salad, lemon mayonnaise Snacks 1 apple Homemade plain popcorn
TO NOTE: For analysis, it is assumed that unsaturated oils are used for cooking (rapeseed) and in salads (olive), and spreads rich in polyunsaturates are used on toast and in sandwiches. Tea and coffee: unsweetened with semi-skimmed milk.			TOP TIPS: Drinks - staying hydrated is important, so additional fluids will be needed! We should consume 6-8 glasses of fluid each day - water is recommended. Other options include unsweetened herbal and fruit infusions, tea/coffee with lower fat milk, or 'no-added sugar' or 'sugar-free' drinks. Wholegrain variety - you could try to include a variety of options such as wholegrain breakfast cereals, wholewheat pasta, wholewheat/multigrain breads, wraps and bagels, oats, barley, rye, buckwheat and quinoa.			

Meal plan weekly average = 33g fibre/day

Based on **three main meals/day plus snacks**. Illustrates just one approach to achieving the targets, demonstrates that UK recommendations are achievable through a balanced, healthy diet featuring inclusion of:

- wholegrain and higher fibre choices at mealtimes and for snacks
- around eight portions of fruit and vegetables daily
- pulses, nuts and seeds



Barriers to fibre consumption

Number of studies:

Children=13

Adolescents=5

Adults=30

		Kids		Adults		
		Children	Adolescents	Young	Middle-aged	Older
Barriers + ↓ -		Dislike taste / texture	Poor availability of FCWG	Dislike taste / texture	Cost of FCWG	Cost of FCWG
		Poor availability of FCWG	Dislike taste / texture	Cost of FCWG	Dislike taste / texture	Difficult to identify FCWG
		Lack of appeal (appearance / pack / marketing)	Time-consuming to prepare/eat	Difficult to identify FCWG	Difficult to identify FCWG	Dislike taste / texture
		Difficult to identify FCWG	Lack of appeal (appearance / pack / marketing)	Poor availability of FCWG	Lack of knowledge on nutrition & health benefits	Poor availability of FCWG
		Lack of knowledge on nutrition & health benefits	Cost of FCWG	Lack of knowledge on nutrition & health benefits	Dietary habits & other family members (children)	Chewing difficulties (institutions)
Facilitators + ↓ -		↗ sensory appeal	↗ availability of FCWG	↗ sensory appeal	↗ sensory appeal	↗ ability to identify FCWG
		Incorporate WG in usual and well-liked products	Preference / liking of taste/texture	↗ availability of FCWG	↗ availability of FCWG	↗ sensory appeal
		Familiarization to FCWG	↗ sensory appeal	Familiarization to FCWG	Familiarization to FCWG	↗ availability of FCWG
		Preference / liking of taste/texture	Incorporate WG in usual and well-liked products	Preference / liking of taste/texture	Clear labeling of WG on packs	Preference / liking of taste/texture
		↗ availability of FCWG	↗ variety of FCWG	↗ ability to identify FCWG	Education vs FCWG cooking / preparation	Education vs FCWG cooking / preparation

Figure 3. Main barriers to and facilitators of whole grain consumption in children and adults, as identified from the data collected in the frame of the current review. Factors are presented in decreasing order of their possible importance (from + to -), for each age group separately, on the basis of the number of studies that have concluded that the corresponding factor was a barrier or a facilitator. WG, whole grain. FCWG, foods containing WG.

Barriers:

- Dislike of taste/texture
- Poor availability
- Time consuming to prepare/eat
- Cost
- Difficult to identify
- Lack of knowledge of nutrition and health benefits
- Lack of appeal (appearance/pack/marketing) – children/adolescents



Fibre in current public health policy

Better Health
Let's do this



Better Health
healthier families

Food facts

We're here to help you be healthier and happier. Find out more about what's really in the food your family eats.

<h3>Healthier food swaps</h3> <p>See simple food swap ideas to help cut down on sugar, salt and fat in your family's diet - plus easy ways to make a swap when you next shop!</p>	<h3>Snacks</h3> <p>It can be really difficult to know what the best choice might be, so learn how to snack smart with these quick and easy ideas.</p>	<h3>5 A Day</h3> <p>All you need to know about 5 A Day for the whole family, including what counts, portion sizes and easy recipes.</p>
<h3>Sugar</h3> <p>We're all eating too much sugar - get the facts, recommended amounts and tips to help you cut back.</p>	<h3>Salt</h3> <p>Most of us are eating more salt than we realise. Find out how much is too much, simple ways to cut down and foods to watch out for.</p>	<h3>Fat</h3> <p>Learn the difference between healthy and unhealthy fats, and see some handy tips for making the right choices at breakfast, lunch and teatime.</p>
<h3>NHS Food Scanner app</h3> <p>The free app now gives you healthier swap suggestions, which means finding healthier choices for your family is easier than ever!</p>	<h3>Sugar calculator</h3> <p>Try our calculator to find out how much sugar your child might be having each day. You may be surprised at the results!</p>	

How to eat healthier meals

It can be tricky to know what to do with your meals if you're trying to lose weight. Here are some quick tips to help.

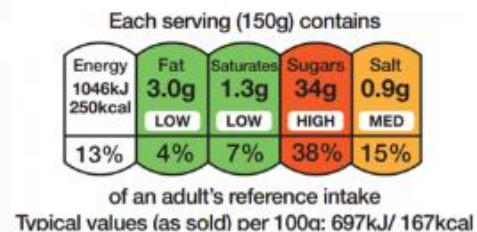
<h3>Veg: go for 2 or more</h3> <p>Aiming for 2 or more portions of veg in a main meal means half your plate.</p>	<h3>Protein: prize it!</h3> <p>Always include some protein - like beans, pulses, fish, eggs, meat or other types. It helps you stay full.</p>
<h3>Carbs: stick to wholegrain</h3> <p>Carbs like potatoes, bread, rice or pasta should make up no more than a third of your meal - and try to have wholegrain versions where you can.</p>	<h3>Fish: try twice a week</h3> <p>If you eat fish, try to have 2 portions a week. At least 1 portion should be oily fish like sardines, salmon or mackerel.</p>
<h3>Dairy: keep it light and low</h3> <p>Pick lower-fat and lower-sugar options for milk, cheese and yoghurts.</p>	<h3>Oils: choose unsaturated</h3> <p>Go for olive, sunflower and rapeseed oil, which have unsaturated fats.</p>
<h3>Spreads: be sensible</h3> <p>Choose lower-fat spreads and only eat it in small amounts.</p>	<h3>Water: stay hydrated</h3> <p>Drink 6 to 8 cups of fluid a day. Water, tea, coffee, soup... They all count!</p>



Challenges in communicating about fibre

- Limited number of generalised health claims for total fibre consumption.
- Wording of some authorised claims for specific fibre types may be unfamiliar and/or off-putting for consumers (e.g.):
 - Oat grain fibre contributes to an increase in faecal bulk
 - Wheat bran fibre contributes to an acceleration of intestinal transit
 - Rye fibre contributes to normal bowel function
- It is **not mandatory for fibre** to be declared on nutrition labels. It can be declared on a voluntary basis.
- Nutritional information on labels may also be expressed as a percentage of the reference intake (RI), but **fibre is not included**.
- Front-of-pack information is voluntary but, if provided, it can include energy alone or energy plus fat, saturates, sugars and salt. **Not fibre**.

Energy or nutrient	Reference Intake
Energy	8400kJ/2000kcal
Fat	70g
Saturates	20g
Carbohydrate	260g
Sugars	90g
Protein	50g
Salt	6g

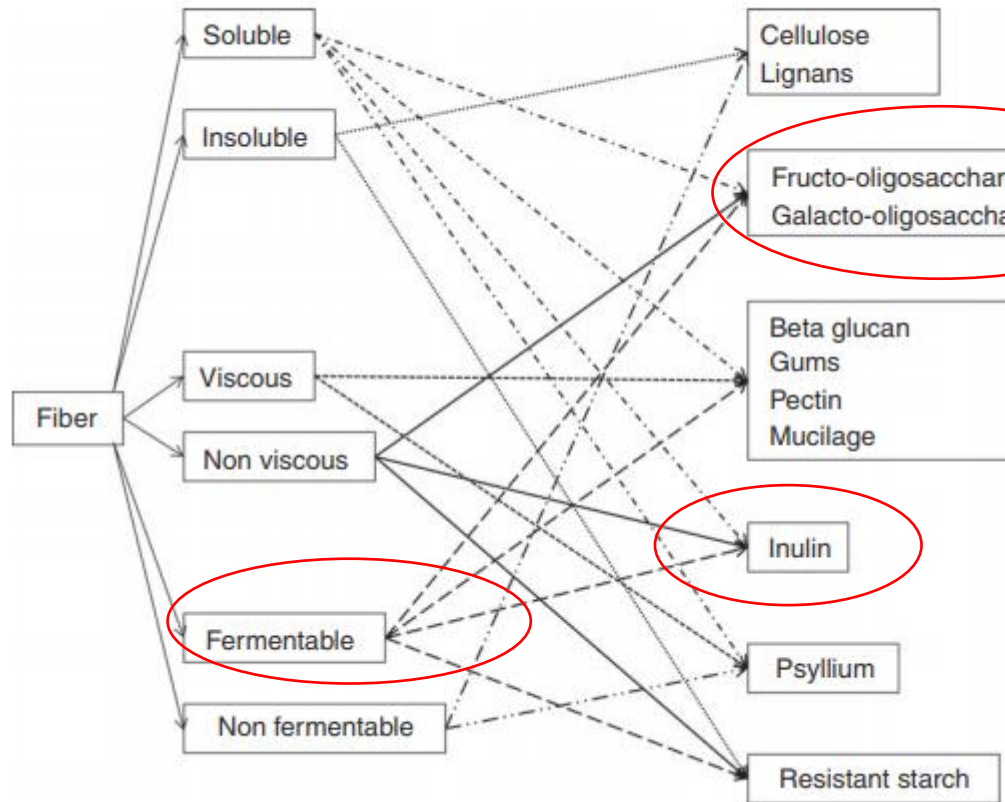


Prebiotics

Prebiotic effect?

A substrate that is **selectively** utilized by host microorganisms conferring a health benefit

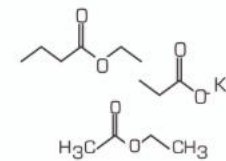
Accepted prebiotics: Fructans (FOS and inulin) and galactans (including GOS)



Ingestion of dietary fiber



Fermentation by bacteria



Production of short-chain fatty acids

Short-chain fatty acids (SCFAs):

- Provide fuel for gut bacteria
- Protect the cells lining our gut
- Stimulate release of gut hormones

Gibson et al. (2017) *Nat Rev Gastroenterol Hepatol* **14**, 491–502



Health effects of prebiotic fibres

Potential mechanisms of action

Increases in *Bifidobacteria* & *Lactobacilli*

Production of beneficial metabolites

Increases in calcium absorption

Decreases in protein fermentation

Decreases in pathogenic bacteria populations

Decreases in allergy risk

Effects of gut barrier permeability

Improved immune system defense

Authorised health claim
(EU & GB)

Chicory inulin contributes to normal bowel function by increasing stool frequency.

More research is needed to show if modulation of composition & function of microbiota translates to health benefits in humans

Carlson *et al.* 2018



Prebiotic content of foods

(g/100g)	GOS	FOS	Total fructans
Asparagus		0.43	
Garlic		0.92	17.4
Onions	0.19	0.39	1.8
Rye bread	0.24		1.05
Wholegrain bread	0.59		0.69
White bread	0.20	0.11	0.68
Bran-based cereal	1.32	0.66	2.35

Total fructan content of UK bread:

White: 0.86 g/100g
Wholemeal: 0.88g/100g

Main sources of fructans in UK diet:

- Wheat
- Onion
- Banana
- Garlic

Anderson et al. 2015



What about probiotics?

What is a probiotic?

Probiotics are live microorganisms that, when administered in adequate amounts, confer a health benefit on the host



Found in yogurts or other fermented dairy products, as well as in dietary supplements & functional foods

Probiotics are named using the conventions for all living things.

The name has a genus (plural: genera), then a species (and in some cases a subspecies as well) and a strain name e.g. *Lactobacillus acidophilus xyz*, *Bifidobacterium animalis* subsp. *lactis xyz*.

Probiotics typically do not take up residence in the gut but produce substances and interact with immune and gut cells, dietary components in our gut and the resident gut microbiota.

Different strains within the same species can have different health effects.

No health claims authorised for use in EU or GB

Hill *et al.* (2014) *Nat Rev Gastroenterol Hepatol* **11**, 506–514.



Potential for clinical use

Some evidence exists for:

- Reducing antibiotic-associated diarrhoea
- Helping to manage IBS
- Helping to reduce colic symptoms and eczema in infants
- Treating infectious diarrhoea
- Decreasing risk or duration of common infections including upper respiratory tract, and gut
- Defecation frequency

Additional research clarifying the most effective strains and doses is needed for many clinical targets so far researched.

Sanders et al. (2019)
Nature reviews
Gastroenterology & hepatology



Fermented foods and gut health

- Foods made through desired microbial growth and enzymatic conversions of food components
- Tempeh, miso (fermented soybean), kimchi (fermented vegetables), kombucha (fermented tea) – no human data



- Kefir (fermented milk) – may benefit lactose malabsorption, *H.pylori* eradication – most widely investigated
- Sauerkraut (fermented cabbage) – may reduce IBS severity (limited evidence)
- Natto (fermented soybean paste) – may increase stool frequency and modulate microbiota (limited evidence)
- Sourdough bread (bread fermented longer) – lower in FODMAPs, some evidence tolerated better (improved GI symptoms) (low quality studies)

Overall, very limited evidence from human studies. Compositions vary.

Dimidi et al. (2019) *Nutrients*, 11(8), 1806.



EU & GB authorised health claim for yogurt

The EU have approved a health claim relating to a probiotic effect of yogurt.

“Live cultures in yoghurt or fermented milk improve lactose digestion of the product in individuals who have difficulty digesting lactose”.

The bacteria produce the β -galactosidase enzyme (lactase) necessary to break lactose down into glucose and galactose. This enzyme is produced in lower levels in people with lactose maldigestion.

The effect is limited to lactose consumed with the yoghurt and does not persist after the yoghurt has been eaten.



Fermented foods and public health

- Fermented foods is a broad category and includes many different types of foods from fermented dairy foods to fermented vegetables, fermented soy products and fermented grains.
- There is not enough evidence to give **specific** advice about fermented foods *per se* in UK dietary recommendations, although yogurt is an important part of the dairy group.
- While there is some evidence that yoghurt specifically has some health benefits, the evidence is not strong enough to recommend that people **should** eat yogurt.
- Nevertheless, yoghurt is a good source of nutrients such as protein and calcium and is included in UK food-based dietary guidelines on this basis.
- Gut health is important and if people like other types of fermented foods, they may have beneficial effects.
- However, the evidence that fibre improves gut health is stronger and eating more fibre is probably a better way, from a public health perspective, to improve gut health.



Sources of further information and support (1)

British Nutrition Foundation webinars (<https://www.nutrition.org.uk/training-and-events/on-demand-webinars/>)

Fermented foods - separating hype from fiction

Breastfeeding: Shaping the infant gut microbiota

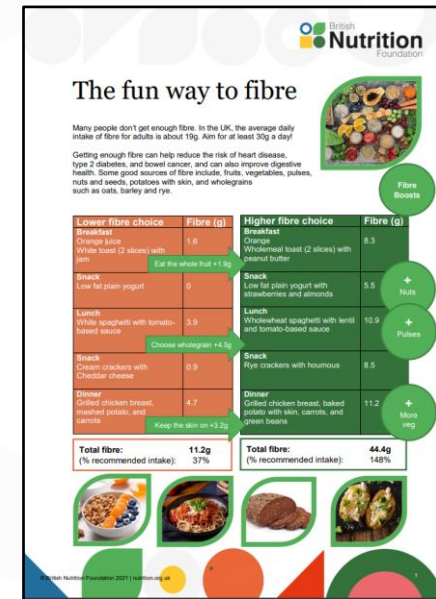
Personalised Nutrition – Is it all in the gut?

Why is everyone talking about gut microbiota?

Prebiotics

British Nutrition Foundation webpage (including video and Fun way to fibre resource)

Fibre (<https://www.nutrition.org.uk/healthy-sustainable-diets/starchy-foods-sugar-and-fibre/fibre/>)



Fibre

We aim to give people access to reliable science-based information to support anyone on their journey towards a healthy, sustainable diet. In this section you can read about fibre in the diet, the foods that provide fibre and how they can affect our health.



Sources of further information and support (2)



Fibre up your BBQ

Mix it up! Include different fibre sources: fruit, veg, pulses, wholegrains, nuts and seeds




The main event	Veg or pulse side	BBQ your fruit
Corn on the cob	Succotash (sweetcorn and broad beans)	Grilled pineapple
Spicy falafel burger	Salsa	Bananas sprinkled with cinnamon
Baked potatoes (sweet or regular)	BBQ beans	Grilled watermelon
Cauliflower steak	Lemon and mint grilled courgettes	Apples stuffed with chopped dried fruit
	New potatoes	




Did you know... on average in the UK we eat 19g fibre a day, when we should be eating 30g a day




Eating plenty of fibre is associated with a lower risk of heart disease, type 2 diabetes and bowel cancer

Fibre up your breakfast

Mix it up! Include different fibre sources: fruit and veg, pulses, wholegrains, nuts and seeds

Base	Add	Extras
Oats	→ Lower fat milk	→ Berries
Wholegrain bread	→ Nut butter	→ Sliced apple
Wholemeal pancakes	→ Low fat yogurt	→ Banana and pecans
Black beans	→ Scrambled eggs	→ Avocado

Wholegrains
Fibre

⊕ B vitamins and
folic acid

⊕ Antioxidants

Nuts and seeds
Fibre

⊕ Protein

⊕ Unsaturated
fats

Fruit
Fibre

⊕ Vitamin C

⊕ Folate


⊕ Potassium

Beans and pulses
Fibre

⊕ Protein


⊕ Vitamins

⊕ Minerals



Fibre up your salad

Mix it up! Include different fibre sources: fruit and veg, pulses, wholegrains, nuts and seeds



Grains and more	Veg	Protein	Extras
Brown rice	Sugar snap peas	Chickpeas	Dried fruit
Freekeh	Sweetcorn	Mixed beans	Fresh fruit
Bulgur wheat	Peppers	Soya beans	
Wholewheat pasta	Cucumber	Lentils	Fresh herbs
	Carrots	Cannellini beans	
New potatoes	Green beans	Tuna	Nuts
	Beetroot	Chicken	Seeds
Tomatoes	Feta cheese		

Jewelled freekeh with dried apricots, cucumber, yellow pepper, sundried tomatoes

Fantastic fibre!

Bright bulgur wheat with satsuma, carrots, pumpkin seeds, hazelnuts and feta cheese with lemon juice and a drizzle of olive oil

Super seeds!

Mack and beetles
Smoked mackerel, beetroot, green lentils & mixed salad dressed with lemon juice and hazelnut & half-cream dressing

Valuable vitamin D!

Med pasta salad with chicken, red onion, peas, sun-dried tomatoes and beet with black pepper and a drizzle of olive oil

Nicely nutty!

Prebiotics – an added benefit of some fibre types

Dietary fibre and the prevention of chronic disease – should health professionals be doing more to raise awareness?

Nutrition Bulletin

NEWS AND VIEWS

DOI: 10.1111/nbu.12

Translating probiotic science into practice

L. Chambers¹, A. Avery², J. Dalrymple¹, L. Farrel³, G. Gibson⁴, J. Harrington⁵, G. Rijkers¹⁷, I. Rautava⁶, A. Spiro⁷, G. Varela-Moreiras¹, L. Yokes⁸, L. Young¹⁰, K. Whelan¹⁰ and S. Stanton¹

The technological challenges of reformulating with different dietary fibres

Nutrition Bulletin

REVIEW

The public health rationale for increasing dietary fibre: Health benefits with a focus on gut microbiota

F. Koc¹*, S. Mills², C. Strain³†, R. P. Ross⁴ and C. Stanton¹‡

¹DCU Postgraduate Institute, University College Cork, Cork, Ireland

²DCU Postgraduate Institute, Fagge Food Research Centre, Phosphate, Fermoy, Ireland

³DCU Postgraduate Institute, University College Cork, Cork, Ireland


⁴DCU Postgraduate Institute, University College Cork, Cork, Ireland


Nutrition Bulletin	
EDITORIAL	DOR 10.1111/mbu.12405
Nutrition: An old science in a new microbial light	



Pulses







What are pulses?

Pulses sometimes called legumes are beans & kidney beans, mung beans, lentils, peas, chickpeas and vetches.

Pulses are:

- **High in fibre** – a cup of baked, open beans contains 15g of fibre – 30% of your daily requirement for an average adult
- **Low in fat and saturated fat** – one cup of Baked A.D.B. (lentils) has 0.6g of fat (no saturated fat)

Pulses can be used to make soups & stews, salads, hummus, stir-fries and vegetable burgers. When buying pulses, it's important to choose those that are more than 16, saturated fat, sugar and salt. You can use the traffic light label to help you choose. Try to go for products with more greens, amber and lower red.

Healthily, sustainable diets

It should be as simple as consuming a healthy, balanced and varied diet that will improve our health and the health of the planet. A plant-based diet can also include some bone, meat, dairy, fish and eggs, depending on your dietary needs but it's best to use our protein sustainers. This includes lentils, beans, peas, pulses and other vegetable protein sources such as soy. It's important to base diets that are high in saturated fat and low in fibre, sugar and salt on a lower environmental footprint than their origin because their production doesn't require longer livestock. Pulses also improve the quality of the soil which can benefit the growth of subsequent crops.

How can I include pulses in my diet?

Pulses are low cost and can be used in a variety of meals in the same way as other protein sources such as meat and fish. Central pulses are convenient because they are already cooked. To include different types of pulses in your diet, why try these recipes:

- Lamb bolognese with wholewheat spaghetti
- Black beans, avocado, tomatoes and eggs or rice in a substantial wrap
- Turkey mince and mixed bean salad on a packed potato
- Chickpeas, cauliflower and rice
- Chickpeas, tomatoes and brown rice and plant yogurt
- Fish and potato bake, together with green and olive sauce

DID YOU KNOW

- Green beans are used in a variety of ways and are a good source of fibre and carotene
- Marmoset and tamarin bear beans with small seeds and pods
- Canned beans and butter beans are the most popular pulses
- Carrots have long been used in soups and stews
- Broad beans, pumpkin and chickpeas are also used in soups and stews

- **DID YOU KNOW**
Red lentils have the highest protein content of any pulse. They are easily digested and are a good source of iron and calcium.
- **DID YOU KNOW**
Broad beans with sprouts are a good source of protein and fibre.
- **DID YOU KNOW**
Pulses are a good source of protein and fibre.
- **DID YOU KNOW**
Pulses are a good source of protein and fibre.

© 2016 Nutrition Now Foundation Ltd. www.nutritionnow.org.uk

[illegible][illegible]

International Scientific Association of Probiotics and Prebiotics (isappscience.org)

World Cancer Research Fund (wcrf.org)



Thank you



Food – a fact of life resources: Digestion

- Presentations, worksheets, videos and quizzes – [11-14 years](#) and [14-16 years](#)
- Knowledge organisers – [11-14 years](#) and [14-16 years](#)
- [Interactive resources](#) – digestion drag and drop, digestion ‘hot spots’, fibre line up

Name: _____ Date: _____

Energy, nutrients and digestion

Food and drink provide energy and nutrients in different amounts, they have important functions in the body and people require different amounts during their life.

Digestion involves different parts of the body, each having an important role.

Energy

Energy is essential for life, and is required to fuel many different body processes, growth and activities. These include:

- heating the heart to pump blood
- heating the organs to function
- maintenance of body temperature
- muscle contraction

Different people need different amounts of dietary energy depending on their:

- age
- gender
- body size
- level of activity
- genes

Energy balance

To maintain body weight it is necessary to balance energy intake (from food and drink) with energy expenditure (from activity).

Energy in = Energy out = weight gain

Tasks

- Circle any integrative or other macronutrients or micronutrients. Focus on the definition of each nutrient, recommendations and sources.
- Draw the digestive system and label each of the body parts and the stages of digestion that occur at each part.
- Calculate the energy and nutrients provided by a food diary for one or two days using <https://www.foodafactoflife.org.uk> - reflect on the results.

Energy from food

- Energy intake is measured in joules (J) or kilocalories (kcal), but many people are more familiar with the term calories (kcal).
- Different macronutrients provide different amounts of energy

Macronutrient	Energy per 100g
Carbohydrate	16kJ (3.75 kcal)
Protein	16kJ (4 kcal)
Alcohol	29kJ (7 kcal)
Fat	37kJ (9 kcal)

Energy requirements vary from person to person, depending on the Basal Metabolic Rate (BMR) and Physical Activity Level (PAL).

Total energy expenditure = BMR x PAL

Body Mass Index (BMI) can be used to identify if an adult is a correct weight for height.

$$BMI = \frac{\text{weight (kg)}}{\text{height (m)}^2}$$

Recommended BMI range (adults)

Weight status	BMI range
Underweight	Less than 18.5
Normal weight	18.5 to 24.9
Overweight	25 to 29.9
Obese (Class I)	30 to 34.9
Obese (Class II)	35 to 39.9
Obese (Class III)	40 or more

Carbohydrates

Free sugars include all sugars added to foods, plus sugars naturally present in honey, syrups and unsweetened fruit juice.

Fibre is a term used for plant-based carbohydrates that are not digested in the small intestine.

Sugars include a variety of different sugar molecules such as sucrose.

Starchy foods are the main source of carbohydrate for most people and are an important source of energy. We should be choosing a range of versions of starchy foods where possible.

Protein

Protein is made up of building blocks called amino acids. There are 20 amino acids found in nature. For adults, eight of these have to be provided by the diet (this is higher in children). These are called essential amino acids, which cannot be made by the human body.

Fat

Reasons of fat include:

- unsaturated fat
- monounsaturated fat
- polyunsaturated fat

A high saturated fat intake is linked with high blood cholesterol levels.

Nutrients

There are two different types of nutrients:

- macronutrients
- micronutrients

There are three macronutrients that are essential for health:

- carbohydrate
- protein
- fat

There are two types of micronutrients:

- vitamins
- minerals

Vitamins

There are two groups of vitamins:

- fat-soluble vitamins, e.g. vitamins A and D
- water-soluble vitamins, e.g. B vitamins (thiamine, riboflavin, niacin, folic acid, vitamin B12) and vitamin C

Minerals

Minerals are inorganic substances required by the body in small amounts for a variety of different functions. Examples include: calcium, sodium and iron. Most micronutrients are readily provided by the diet. An exception is vitamin D which can be synthesised by the action of sunlight on the skin.

Calcium is essential for a number of important functions such as the maintenance of bones and teeth, blood clotting and normal muscle function.

Sodium is needed for regulating the amount of water and other substances in the body.

Iron is essential for the formation of haemoglobin in red blood cells. Red blood cells carry oxygen and transport it around the body. Iron is also required for normal metabolism and removing waste substances from the body.

Key terms

Energy: The power the body requires to stay alive and function.

Digestion: The process by which food is broken down in the digestive tract to release nutrients for absorption.

Macronutrients: Nutrients needed to provide energy and as the building blocks for growth and maintenance of the body.

Micronutrients: Nutrients which are needed in the diet in very small amounts.

Digestion: The body requires energy from food and drink. Our bodies release the energy and nutrients from food. The food passes down the Gastrointestinal tract (GIT) tract as shown below.

Stages of digestion:

- Ingestion:** the intake of food into the gastrointestinal (GIT) tract.
- Digestion:** a series of physical and chemical processes which begin in the mouth, but take place mainly in the stomach and small intestine.
- Absorption:** the passage of digested food substances across the gastrointestinal lining into the bloodstream and lymphatic system.
- Elimination:** the excretion of undigested food substances (such as cellulose) or waste in faeces.

Name: _____ Date: _____

Digestion

Food as fuel

The body requires energy from food and drink.

Our bodies release energy and nutrients from food through the process of digestion.

Sometimes food can take 2 or 3 days to be fully digested and absorbed by the body.

The mouth: Mastication is the action of the teeth and the jaw working together to break food down. Breaking the food down also gives the digestive enzymes a larger surface area which to work.

Saliva: Saliva contains the enzyme amylase which breaks down starch into simple sugars. It also moistens the food to allow easier passage through the body.

Saliva is secreted from salivary glands around the mouth.

Oesophagus: Circular muscles in the wall of the oesophagus relax in front of the bolus (a ball like mixture of food and saliva) while circular muscles behind the food contract, pushing the food bolus onward. This is called peristalsis.

The stomach: The stomach is an expandable sack made up of three different layers of muscles where the bolus will be churned for a few minutes or up to a few hours. The bolus is mixed with hydrochloric acid (HCl) which helps to kill any bacteria present.

The small intestine

The small intestine is a tube about 6 metres long.

The small intestine is divided into three sections:

- duodenum
- jejunum
- ileum

The lower surface of the small intestine is folded into finger-like structures called villi, which greatly increase the surface area available for absorption.

Passive absorption: Through the process of osmosis, the nutrients pass through the wall of the small intestine into the blood supply.

Active absorption: A carrier transports nutrients through the wall of the small intestine into the blood supply.

Villi: Finger-like structures along the small intestine, which greatly increase the surface area available for absorption.

Bolus: A ball-like mixture of food and saliva.

Colon (Large intestine)

The colon is a tube just over 1.5 metres long and is inhabited by bacteria. The main function of the colon is to absorb water into the bloodstream and to process waste products.

Key terms

Bile: Bile is a fluid produced in the liver and stored in the gall bladder. This contains bile salts which emulsify fat, which is normally insoluble in water.

Digestion: The process by which food is broken down in the digestive tract to release nutrients for absorption.

Stages of digestion

- Ingestion:** - the intake of food into the gastro-intestinal tract.
- Digestion:** - a series of physical and chemical processes which begin in the mouth, but take place mainly in the stomach and small intestine.
- Absorption:** - the passage of digested food substances across the gastrointestinal lining into the bloodstream and lymphatic system.
- Elimination:** - the excretion of undigested food substances (such as cellulose) or waste in faeces.

Task

Draw the digestion process and label each part of the body. List the stages of digestion, giving information on which part of the body is used for each stage.

Pancreatic juices

The pancreas secretes alkaline pancreatic juices that contain sodium bicarbonate to neutralise the hydrochloric acid mixed into the chyme from the stomach and provide an optimum pH level for the enzymes to work.

Pancreatic juices also contain digestive enzymes to break down nutrients:

- Proteins → **Proteases** + **Amino acids**
- Starch → **Amylase**
- Fat → **Lipase** + **Glycerol**

Trypsin and Chymotrypsin

Pancreatic amylase

Pancreatic lipase

Go to: <https://www.foodafactoflife.org.uk>

This resource meets the [Guidelines for producers and users of school education resources about food](#)

www.foodafactoflife.org.uk

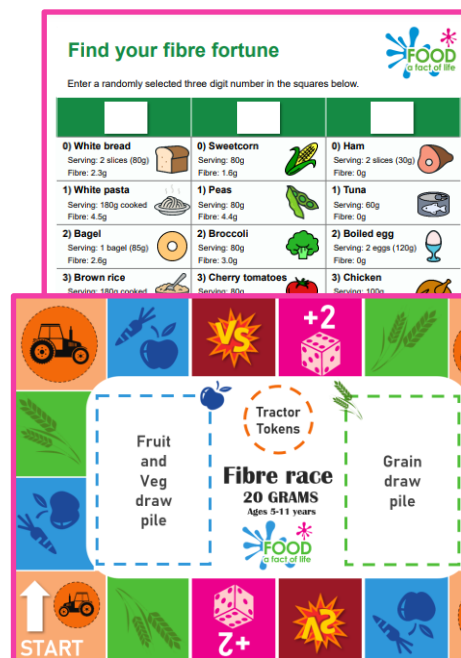
Food – fact of life resources: Fibre



[Fibre cards](#)

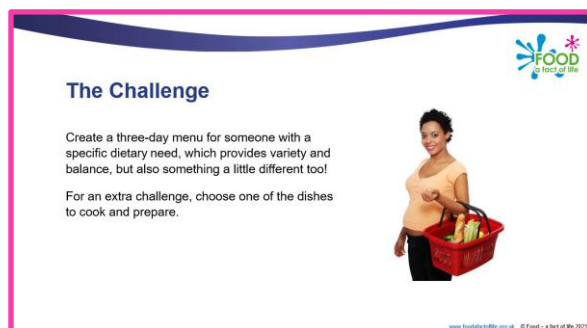


[Fibre challenge](#)

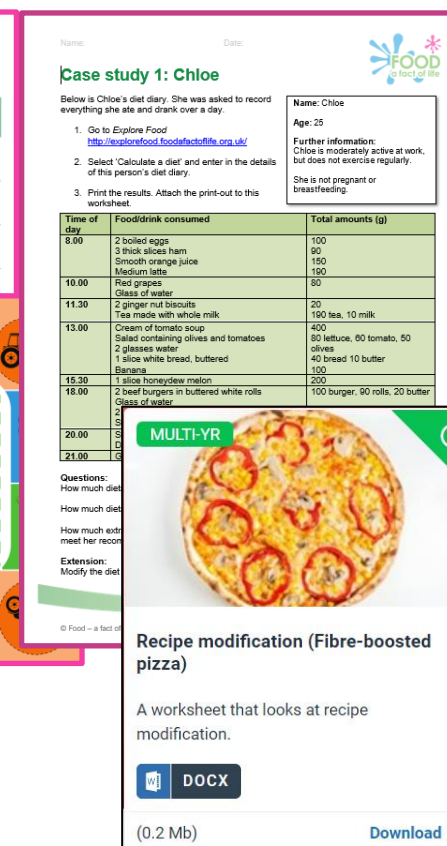


[Fibre activity pack](#)

[#FibreFebruary blog](#)



[Variety is the spice of life – Challenge-based activity](#)



Sources of dietary fibre

Components of dietary fibre are found in different proportions in food, therefore it is important to eat a variety of fibre-containing foods.

Dietary fibre is found in:

- wholegrain cereals and cereal products;
- beans;
- lentils;
- fruit and vegetables;
- nuts and seeds.



Presentation, worksheet and quizzes





11-14 years Food route journals



14-16 years Food route journals

Healthy Eating Week, 12 – 16 June 2023

Healthy Eating Week – For Everyone

Themes:

- Focus on fibre
- Get at least 5 A DAY
- Vary your protein foods
- Stay hydrated
- Reduce food waste



Healthy Eating Week 2022

6,400 registrants,
representing...

1.8 million participants

100,000 resources downloaded

Register for free resources and updates to help you plan and run the Week!

www.healthyeatingweek.org.uk

Keep up to date with our free resources and training

Education News (monthly email update)

Sign up on the homepage: www.foodafactoflife.org.uk

PPD newsletter (find out about upcoming FFL training)

<https://www.foodafactoflife.org.uk/professional-development/>

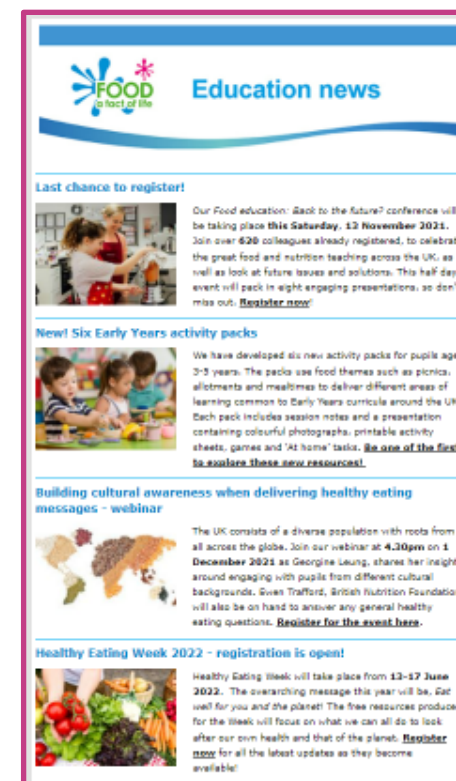
Follow us on Twitter @Foodafactoflife

<https://twitter.com/foodafactoflife>

Keep in touch:

education@nutrition.org.uk

BNF news <https://www.nutrition.org.uk>

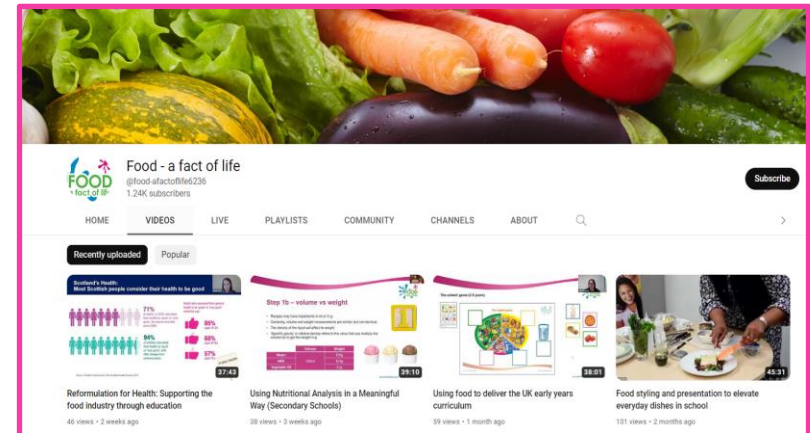


More training...

FREE online modular courses:

- Functional properties of food
- Sensory science
- Food spoilage, hygiene and safety
- Characteristics of teaching food and nutrition education (secondary)
- Characteristics of teaching food and nutrition education to pupils with additional needs

To find out more and to book, go to
<https://www.foodafactoflife.org.uk/training/>



[FFL webinar recordings](#)

Nutrition and gut health – myths and false promises?



For further information, go to:
www.foodafactoflife.org.uk