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?

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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

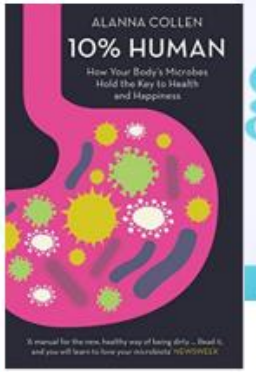
Does Gut Microbiota Manipulate Our Minds?

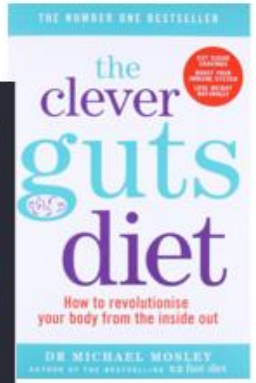
How bacteria are changing your mood

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.

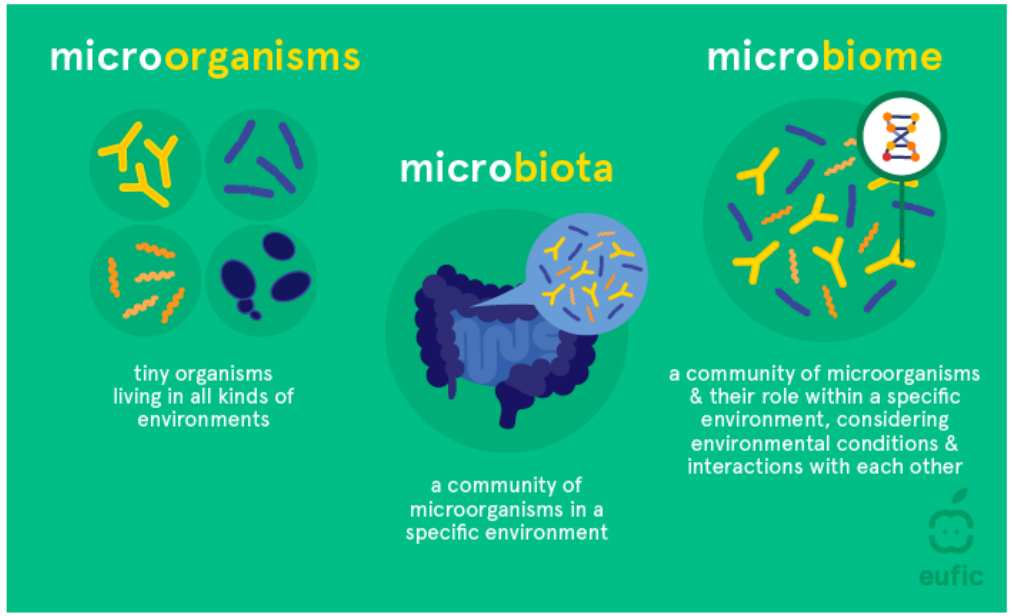




Scientists use dietary seaweed to manipulate gut bacteria in mice

Walnuts impact gut microbiome and improve health

What do we mean by gut microbiota?



Functions of gut bacteria:

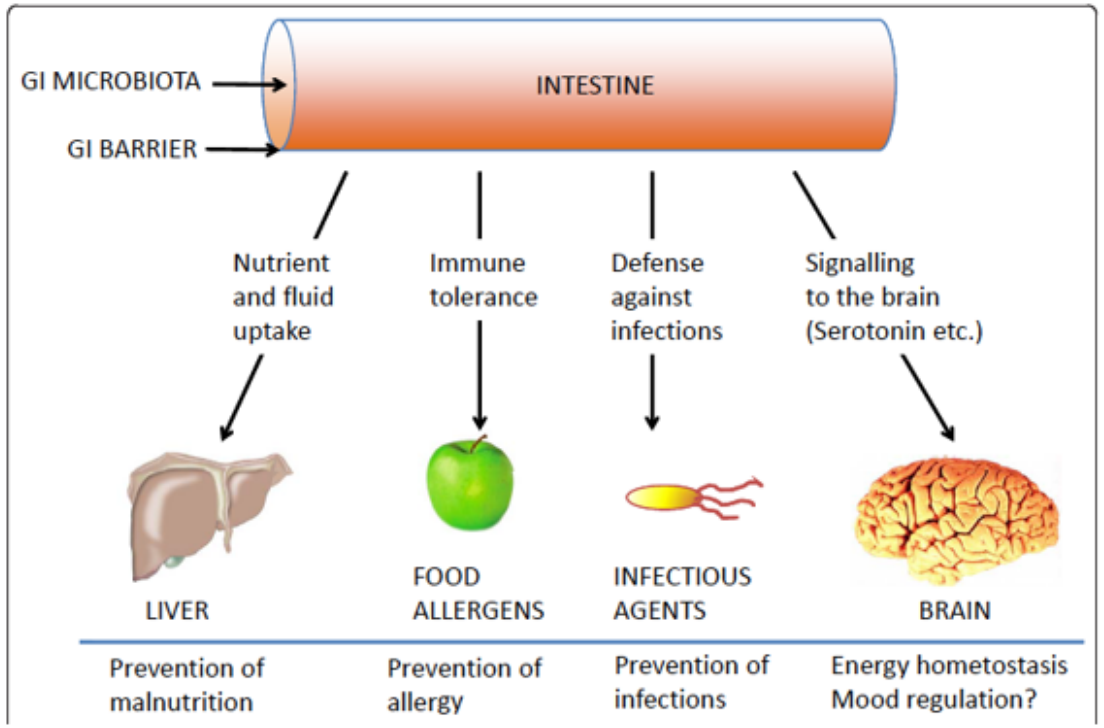
- Digestion of food
- Synthesis of vitamins and other nutrients
- Development and training of the immune system
- Metabolism of medications
- Resistance to pathogens
- Reinforce gut barrier

Why such interest in our gut bacteria?

Immunity, pathogen inhibition

Atopic eczema

Digestive cancers



Constipation, diarrhoea, bloating

Cognitive function

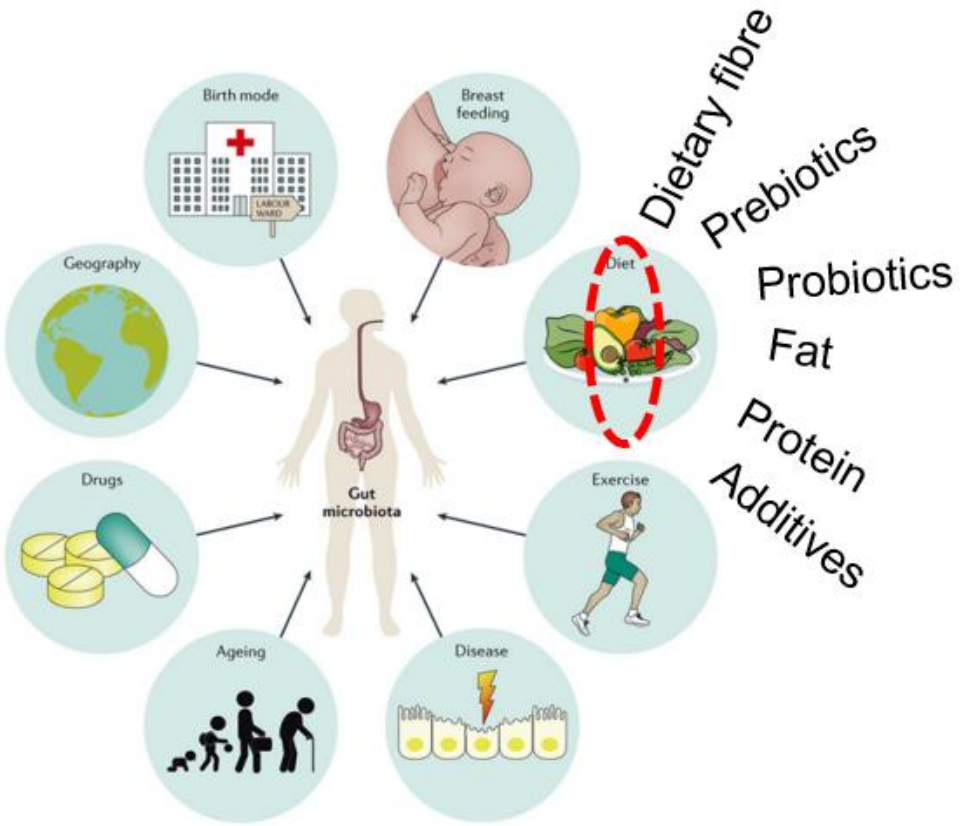
Antibiotic-associated diarrhoea

Inflammatory bowel diseases

Irritable bowel syndrome

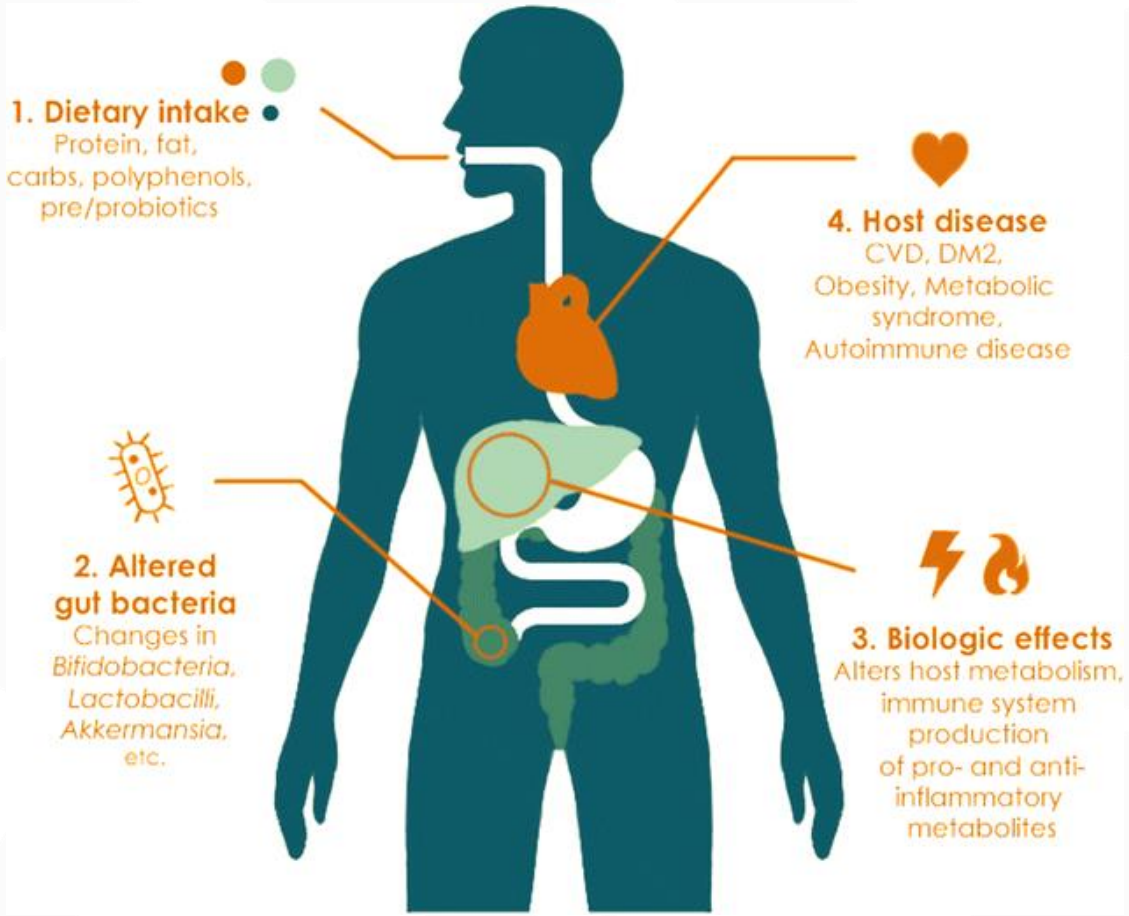
Obesity and metabolic syndrome

What determines the microbes you have?



Cryan & Dinan (2012)

Influence of diet



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

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.

The importance of fibre

Global Burden of Disease study 2019

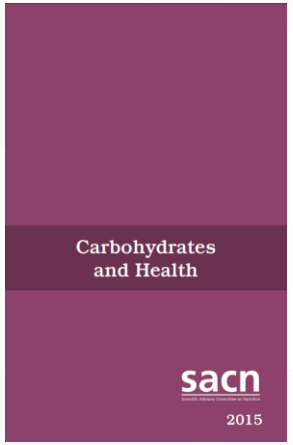
What is absent from diets can be a greater marker of risk that what is present in excess. 'Eat more' messages (e.g. wholegrains, vegetables, nuts, seeds, fibre) should be balanced with 'eat less' messages (salt, saturated fat, free sugars)

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: pysillium 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

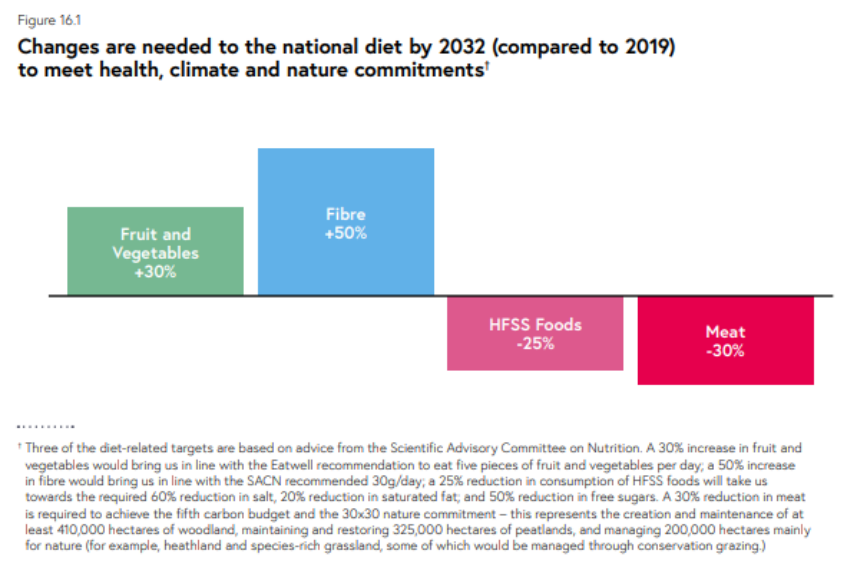
https://www.nutrition.org.uk/healthy-sustainable-diets/starchy-foods-sugar-and-fibre/fibre/

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

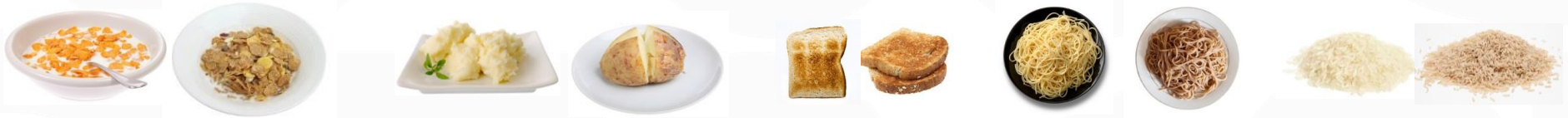
Age group (years)	Mean intake (g/day)	% meeting DRV
1.5-3	10.4▼	12
4-10	14.3▼	14
11-18	16.0▼	4
19-64	19.7▼	9
65-74	19.7▼	9
75+	17.3▼	3

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



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



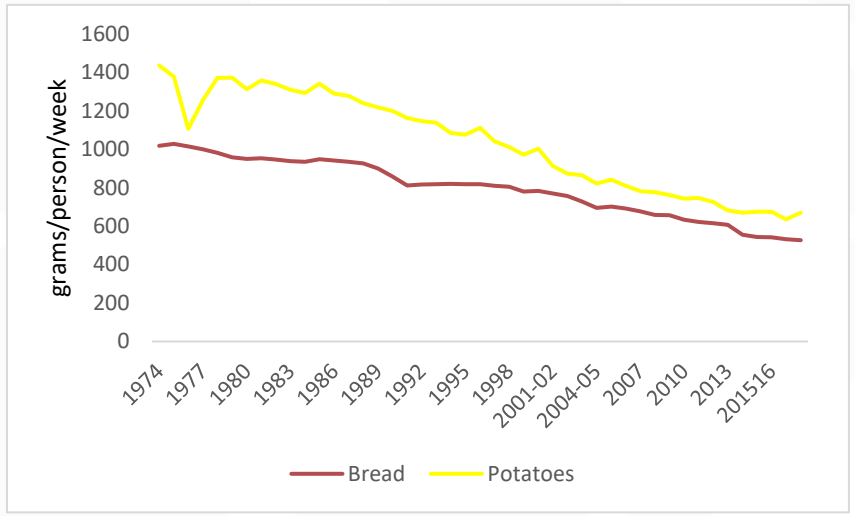
Source: McCance and Widdowson's Composition of Foods

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)

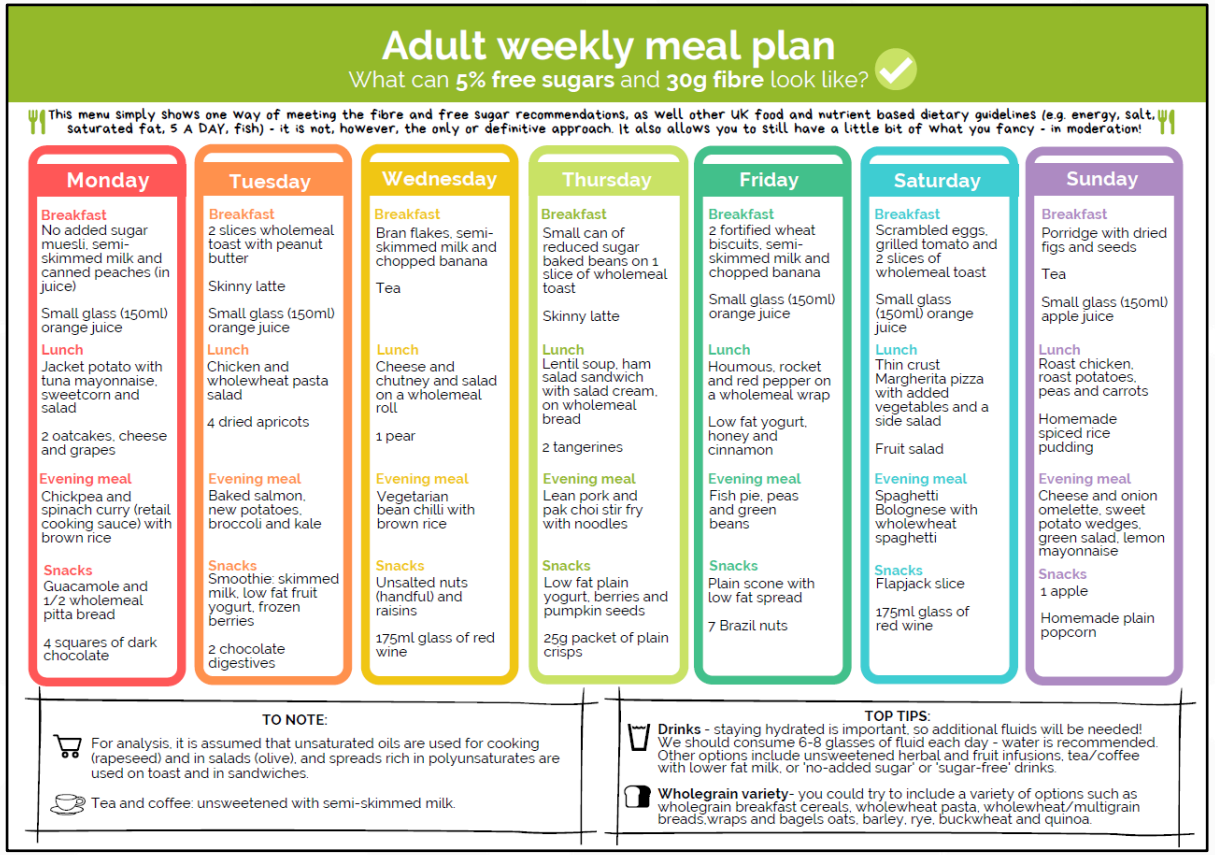
Average intake of pulses 14 g/day (estimated 26 g/day to bring in line with Eatwell Guide).

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

Scarborough et al. (2016) BMJ Open 6:e013182.

Mann et al. (2015) BJN 113: 1643–51.

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	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Breakfast No added sugar muesli, semi-skimmed milk and canned peaches (in juice) Small glass (150ml) orange juice	**Breakfast** 2 slices wholemeal toast with peanut butter Skinny latte Small glass (150ml) orange juice	**Breakfast** Bran flakes, semi-skimmed milk and chopped banana Tea	**Breakfast** Small can of reduced sugar baked beans on 1 slice of wholemeal toast Skinny latte	**Breakfast** 2 fortified wheat biscuits, semi-skimmed milk and chopped banana Small glass (150ml) orange juice	**Breakfast** Scrambled eggs, grilled tomato and 2 slices of wholemeal toast Small glass (150ml) orange juice	**Breakfast** Porridge with dried figs and seeds Tea Small glass (150ml) apple juice
Lunch Jacket potato with tuna mayonnaise, sweetcorn and salad 2 oatcakes, cheese and grapes	**Lunch** Chicken and wholewheat pasta salad 4 dried apricots	**Lunch** Cheese and chutney and salad on a wholemeal roll 1 pear	**Lunch** Lentil soup, ham salad sandwich with salad cream, on wholemeal bread 2 tangerines	**Lunch** Houmous, rocket and red pepper on a wholemeal wrap Low fat yogurt, honey and cinnamon	**Lunch** Thin crust Margherita pizza with added vegetables and a side salad Fruit salad	**Lunch** Roast chicken, roast potatoes, peas and carrots Homemade spiced rice pudding
Evening meal Chickpea and spinach curry (retail cooking sauce) with brown rice	**Evening meal** Baked salmon, new potatoes, broccoli and kale	**Evening meal** Vegetarian bean chilli with brown rice	**Evening meal** Lean pork and pak choi stir fry with noodles	**Evening meal** Fish pie, peas and green beans	**Evening meal** Spaghetti Bolognese with wholewheat spaghetti	**Evening meal** Cheese and onion omelette, sweet potato wedges, green salad, lemon mayonnaise
Snacks Guacamole and 1/2 wholemeal pitta bread 4 squares of dark chocolate	**Snacks** Smoothie: skimmed milk, low fat fruit yogurt, frozen berries 2 chocolate digestives	**Snacks** Unsalted nuts (handful) and raisins 175ml glass of red wine	**Snacks** Low fat plain yogurt, berries and pumpkin seeds 25g packet of plain crisps	**Snacks** Plain scone with low fat spread 7 Brazil nuts	**Snacks** Flapjack slice 175ml glass of red wine	**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

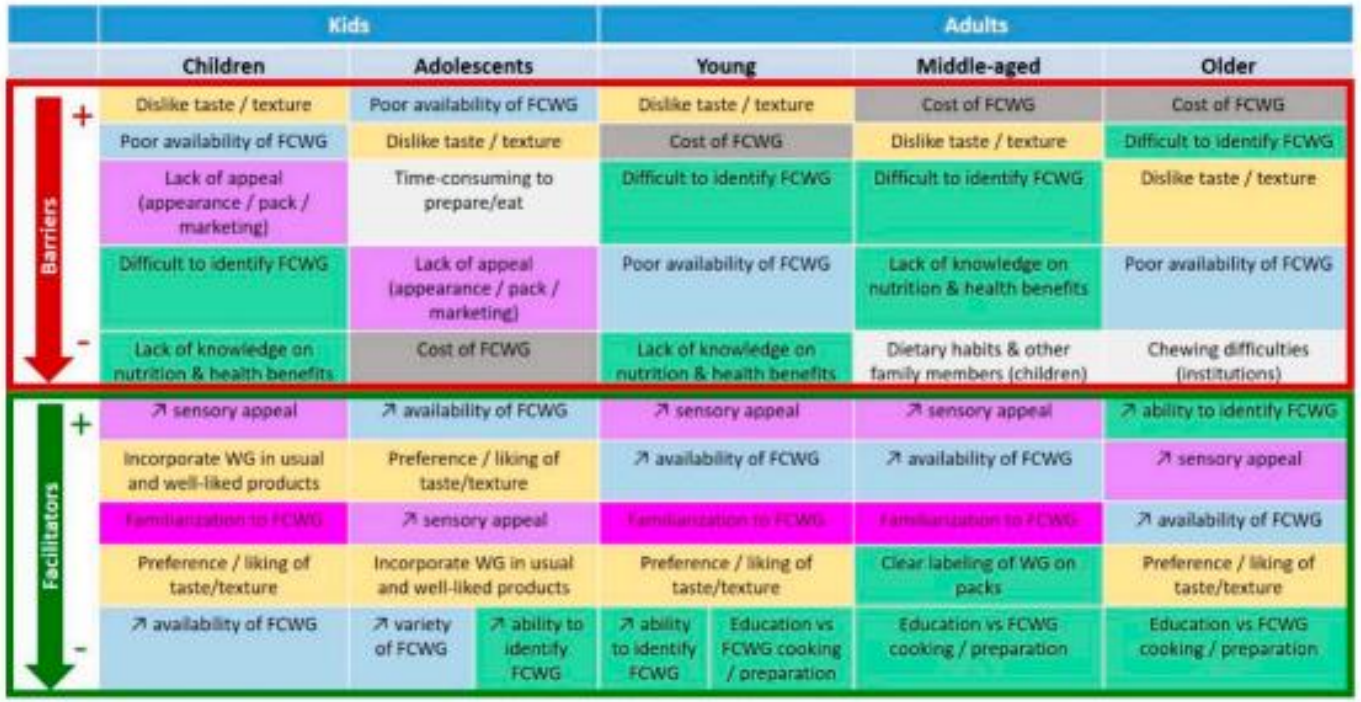
Based on **three main meals/day plus snacks**. Illustrates just one approach to achieving the targets, demonstrates that UK recommendations are achievable through a balanced, healthy diet featuring inclusion of:

- 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
Barriers -	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
Facilitators -	↗ availability of FCWG	↗ variety of FCWG; ↗ ability to identify FCWG	↗ ability to identify FCWG; Education vs FCWG cooking / preparation	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

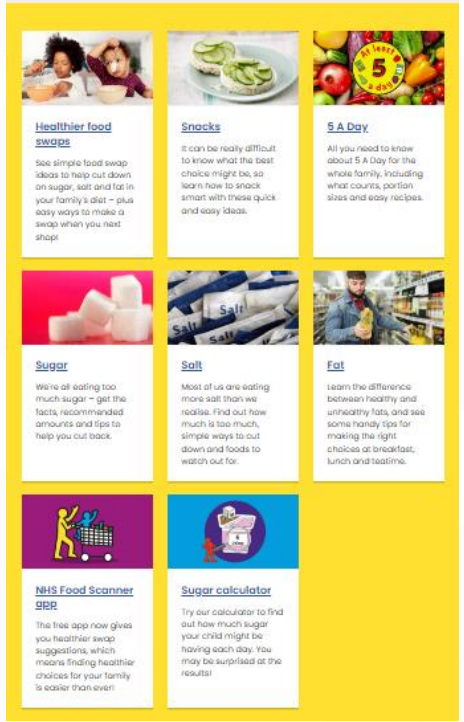
Meynier et al. (2020) *Nutrients*

Fibre in current public health policy

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.



Better Health Let's do this

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.

Veg: go for 2 or more
Aiming for 2 or more portions of veg in a main meal means half your plate.

Carbs: stick to wholegrain
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.

Dairy: keep it light and low
Pick lower-fat and lower-sugar options for milk, cheese and yoghurts.

Spreads: be sensible
Choose lower-fat spreads and only eat it in small amounts.

Protein: prize it!
Always include some protein – like beans, pulses, fish, eggs, meat or other types. It helps you stay full.

Fish: try twice a week
If you eat fish, try to have 2 portions a week. At least 1 portion should be oily fish like sardines, salmon or mackerel.

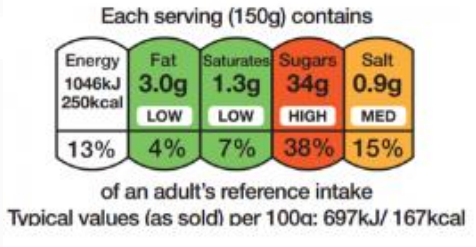
Oils: choose unsaturated
Go for olive, sunflower and rapeseed oil, which have unsaturated fats.

Water: stay hydrated
Drink 6 to 8 cups of fluid a day. Water, tea, coffee, soup... They all count!

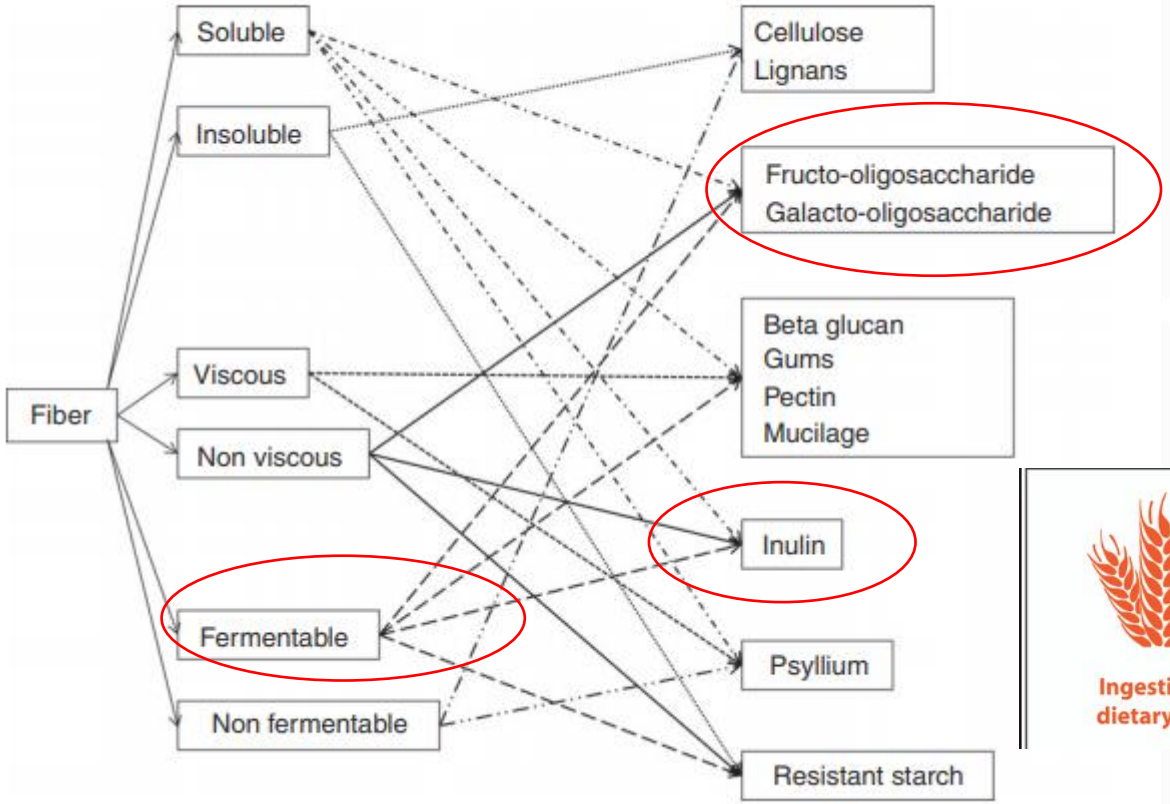
Challenges in communicating about fibre

- 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



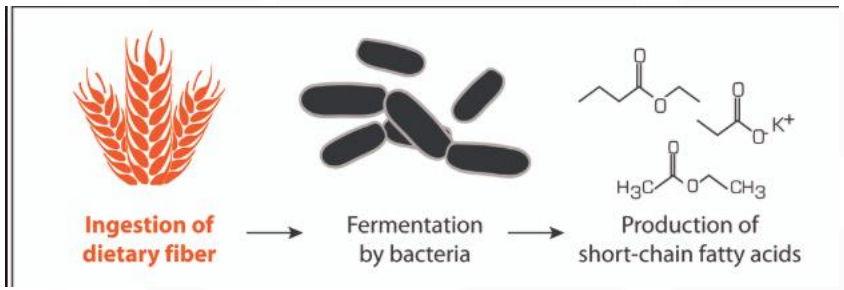
Prebiotics



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)



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

Australian data: Muir et al., 2007, 2009; Biesiekierski et al., 2001

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

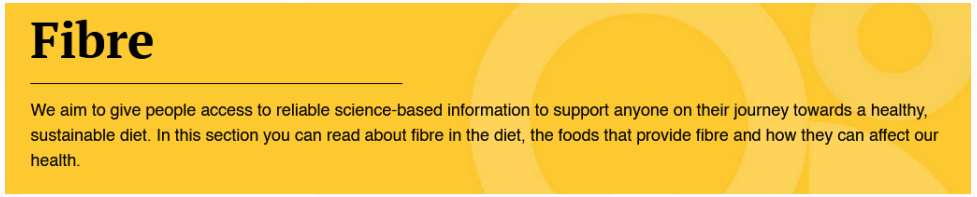
Personalised Nutrition – Is it all in the gut?

Why is everyone talking about gut microbiota?

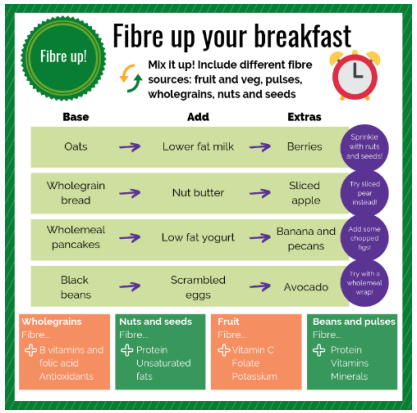
Prebiotics

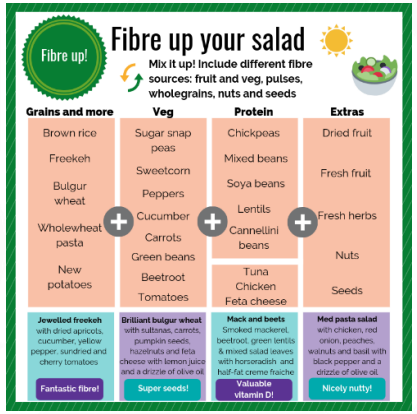
British Nutrition Foundation webpage (including video and Fun way to fibre resource)

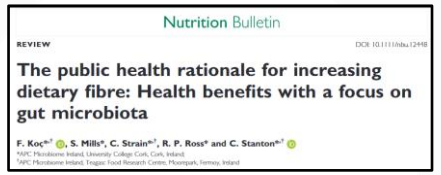
Fibre (https://www.nutrition.org.uk/healthy-sustainable-diets/starchy-foods-sugar-and-fibre/fibre/)

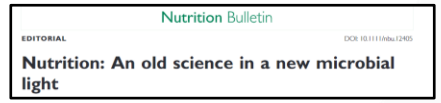


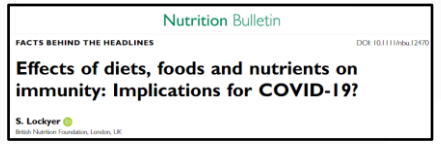
Sources of further information and support (2)

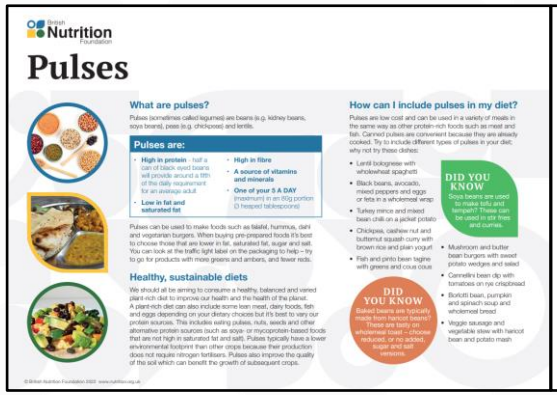


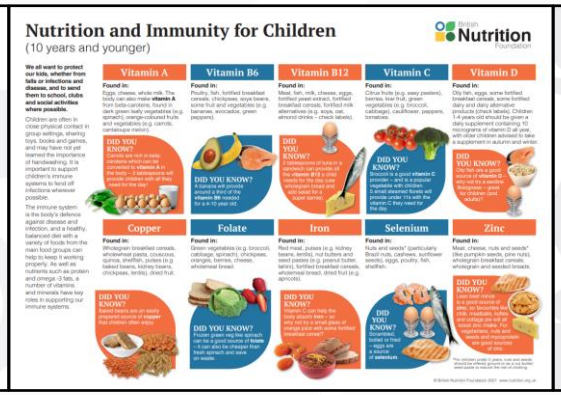


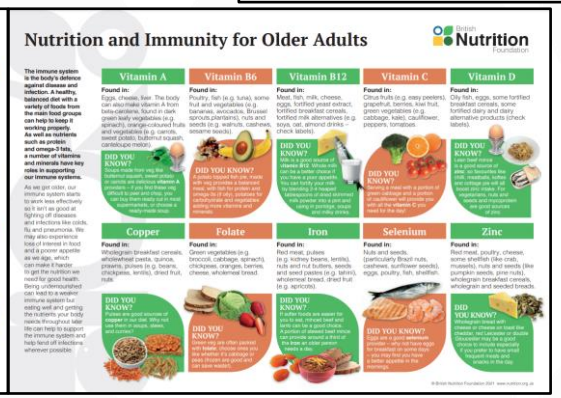












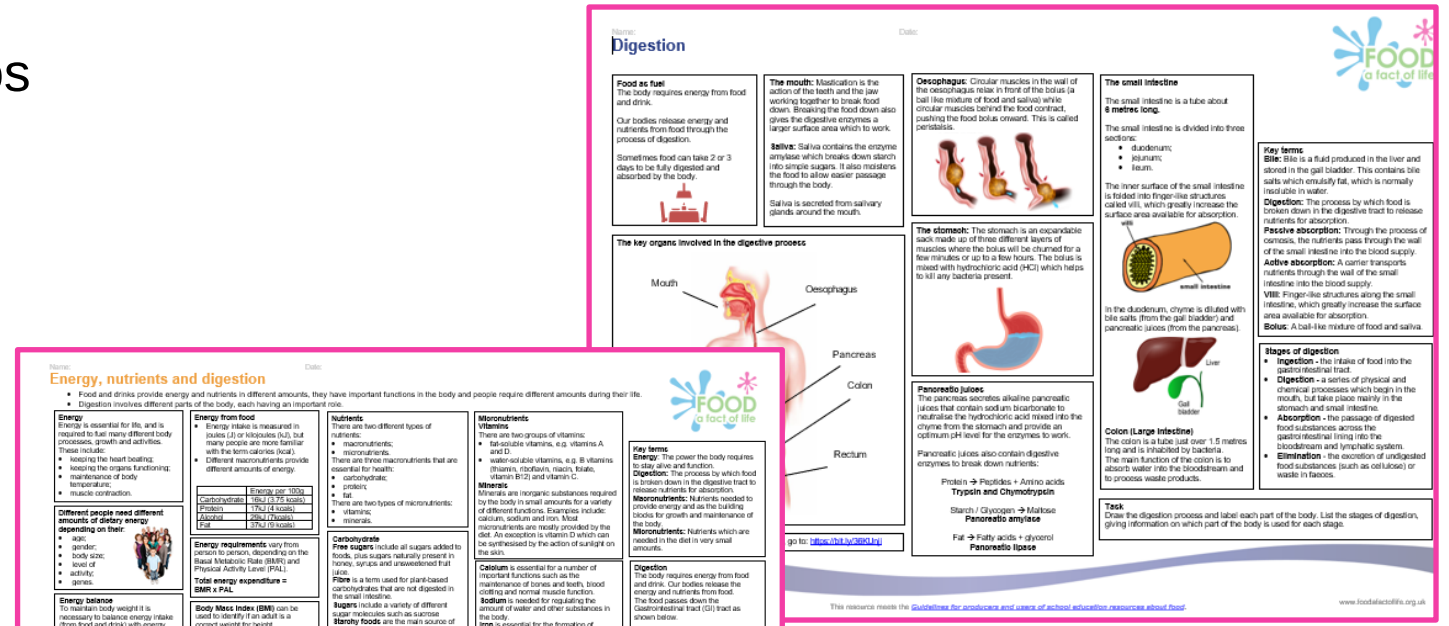
International Scientific Association of Probiotics and Prebiotics (isappscience.org)

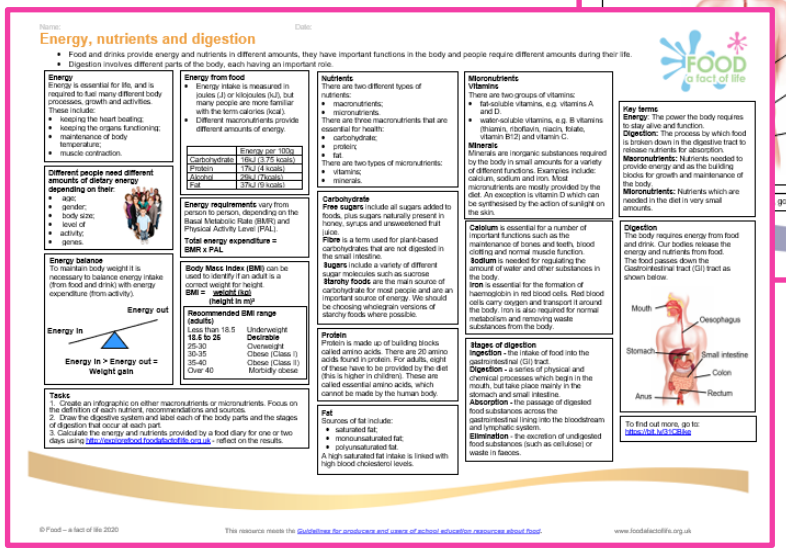
World Cancer Research Fund (wcrf.org)

Thank you

Food – a fact of life resources: Digestion

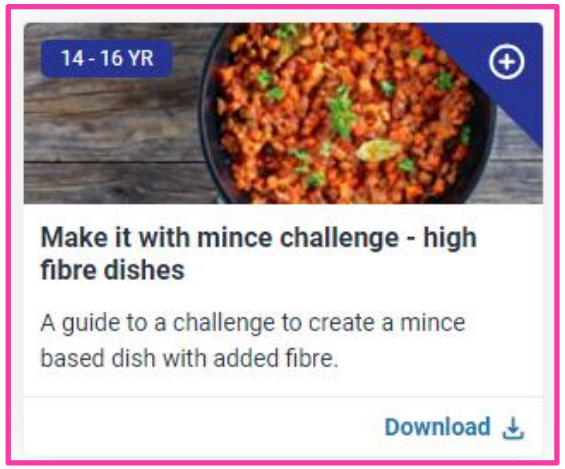
- Presentations, worksheets, videos and quizzes – 11-14 years and 14-16 years
- Knowledge organisers – 11-14 years and 14-16 years
- Interactive resources – digestion drag and drop, digestion ‘hot spots’, fibre line up



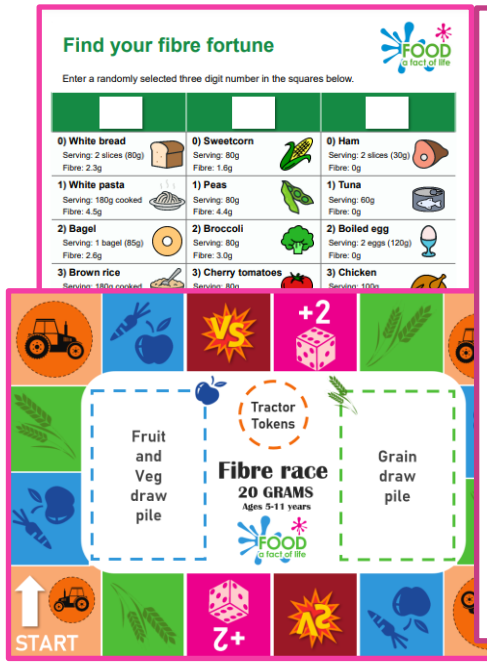


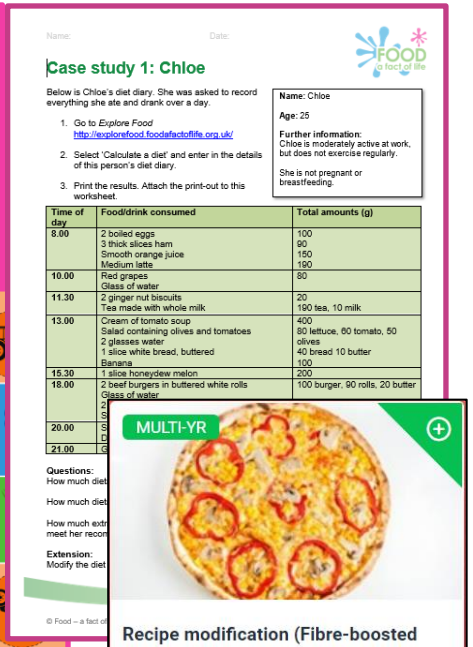
Food – fact of life resources: Fibre

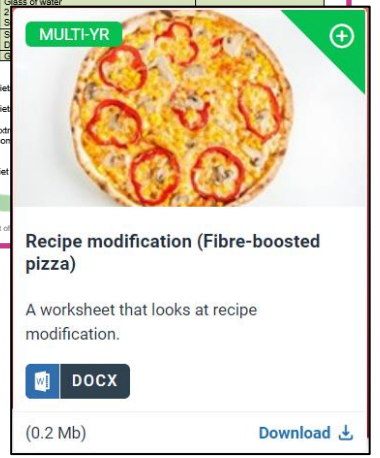
[Fibre cards]



[Fibre challenge]







[Fibre activity pack]

[#FibreFebruary blog]

[Presentation, worksheet and quizzes]

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

[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

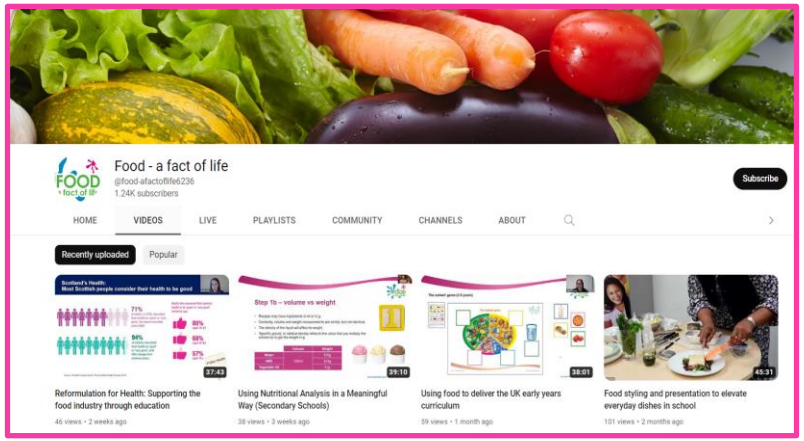
BNF news https://www.nutrition.org.uk

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



FFL webinar recordings

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

Nutrition and gut health – myths and false promises?

For further information, go to:

www.foodafactoflife.org.uk

