Diet with an Ileo-anal pouch for patients

Gabriela Poufou
Advanced Specialist Inflammatory Bowel Disease Dietitian
St. Mark's Hospital
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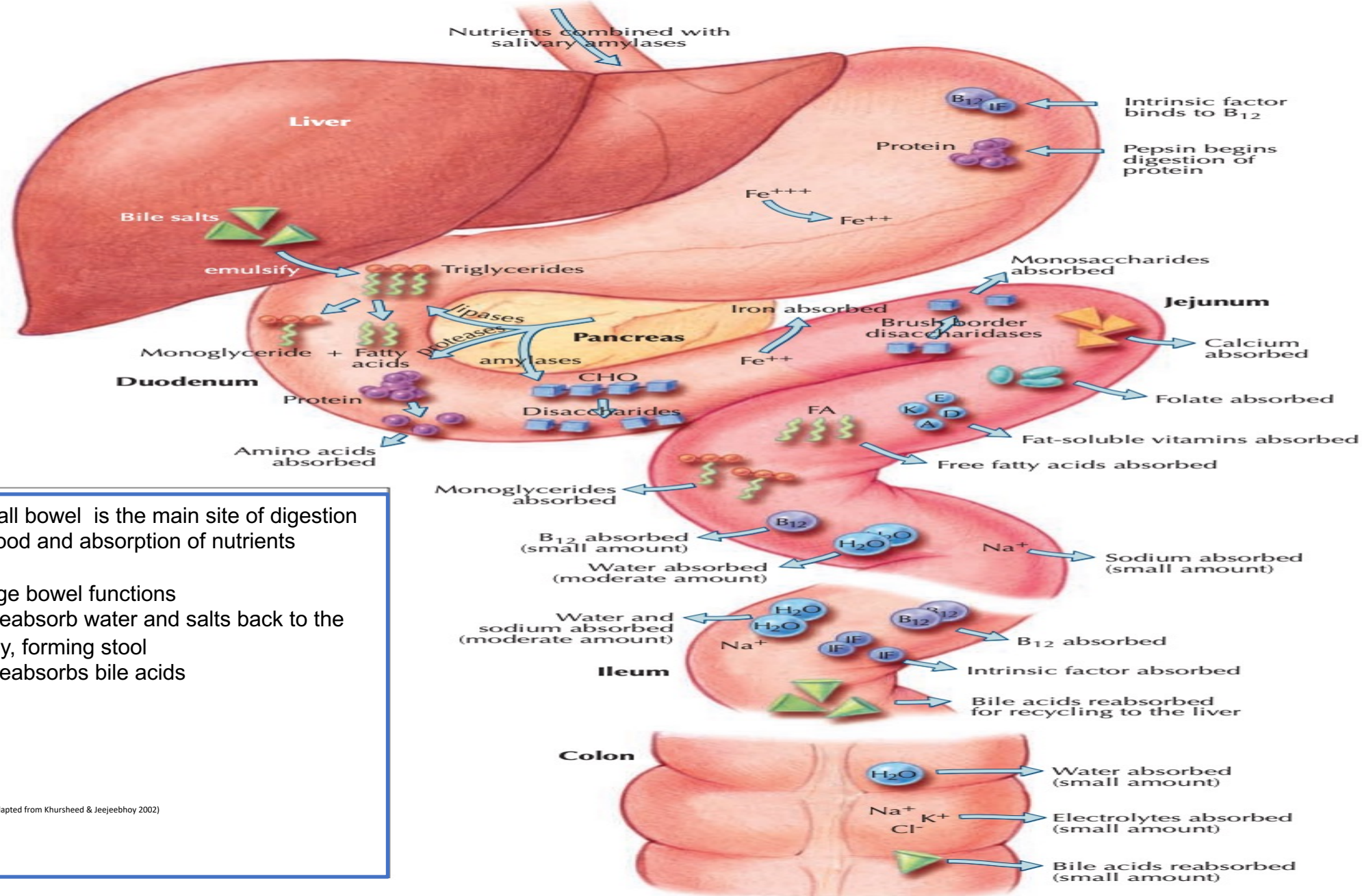
objectives

- Nutrient absorption and digestion
- Pouch formation and its effects
- How to reintroduce food post-op
- How to choose a healthy diet
- How diet can affect pouch function

Digestion and Absorption

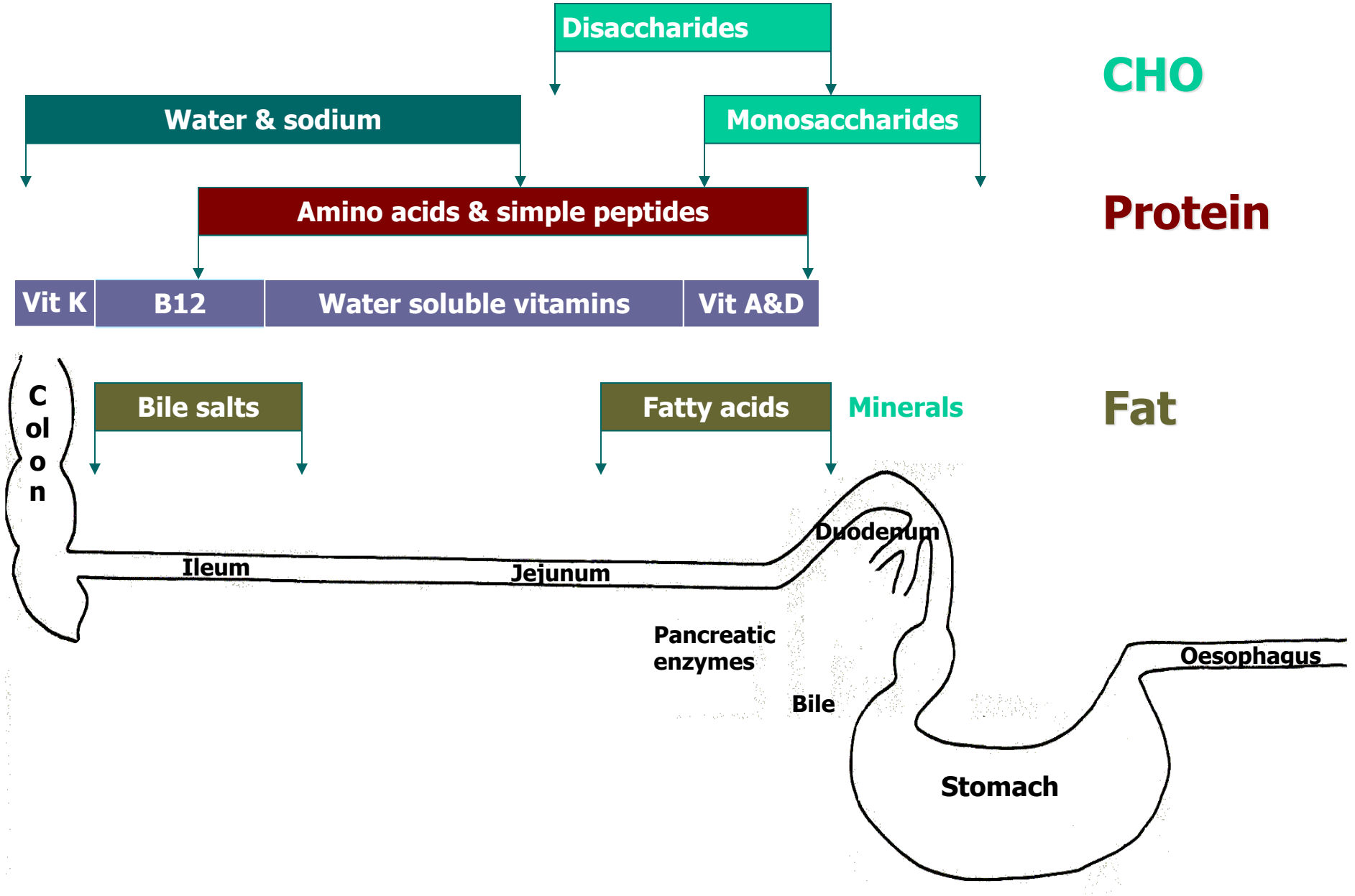


Small bowel is the main site of digestion of food and absorption of nutrients

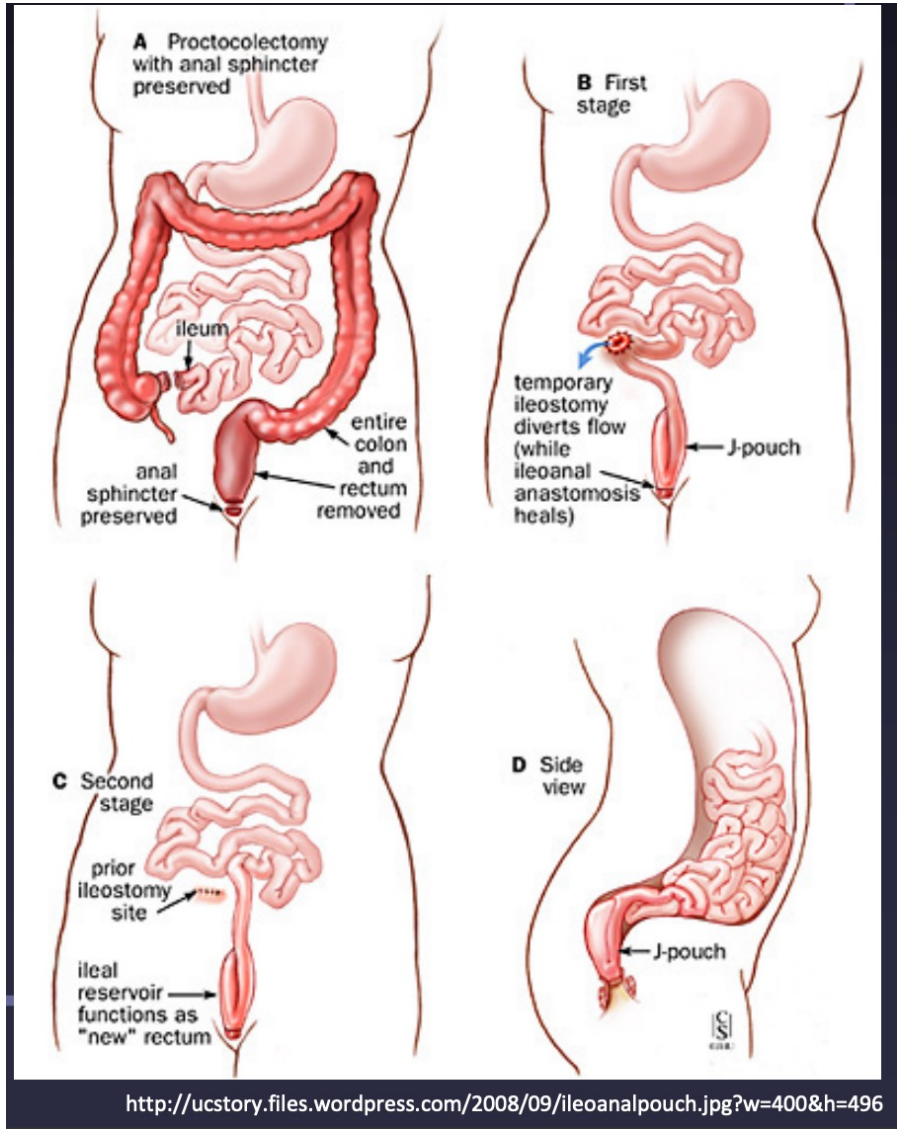
Large bowel functions
1)Reabsorb water and salts back to the body, forming stool
2)Reabsorbs bile acids

(Image adapted from Khursheed & Jeejeebhoy 2002)

Digestion and Absorption



Pouch Formation



http://ucstory.files.wordpress.com/2008/09/ileoanalpouch.jpg?w=400&h=496

- Loss of large bowel
- Large bowel responsible for reabsorbing water and salt
  - More liquid stool
  - ↑ volume of stool

- Pouch formed from last 30-60cm of terminal ileum
- -Terminal ileum absorbs B12 and bile salts

European
Crohn's and Colitis
Organisation

ECCO Guidelines 2020

- There are NO specific nutritional measures for patients with an ileal pouch-anal anastomosis
- However, advice on fluid and fibre intake is beneficial
- Monitoring for anaemia, vitamin B12 deficiency, and osteopenia is indicated in the long term

Nutritional implications of pouch formation

- Fluid and Electrolyte abnormalities (dehydration)
- Vitamin B12 malabsorption (M'Koma 1992)

- Bile acid/salt malabsorption
- ? fat malabsorption/ gallstones (no evidence for ↑ risk of gall stones)
- Iron deficiency
- Trace element abnormalities
- Independent risk for osteopenia

Buckman et al. 2010

—>First 6-8 weeks of surgery large losses of fluid and salts 1.2L-2.0L/day

Adaptation

- Kidneys adapt and reserve more water/salts
- Small bowel adapts and ↑ absorption of nutrients
- Pouch empties 3-7 times/day
- ~650g stool/day (mushy consistency) (Pearson 2008 chapter 14 (210-232) in Stoma Care (J Wiley)
- Bowel movements similar throughout years ~ 6-7 x 24 hours (night frequency 1-2x) Bullard et al. Dis Col Rect 2002

Nutrition Goals

- Identify malnourished patients
  - Before and after surgery
  - Identify those **at risk** of malnutrition
  - Use Nutrition Screening Tools
  - Monitor for weight loss
  - Check for food restrictions
- Supporting patients reintroducing foods post-operatively
- Supporting a healthy diet in the long term (varied and balanced)
  - Prevent nutritional deficiencies
  - Maintain good pouch function
  - Maintain a healthy weight
- Ensure well hydrated -fluid and salt
- Monitor

The New patient: What to eat after surgery

- Introduce a soft, low fibre diet to avoid
  - Blockages
  - Delay healing of the wound

Avoid🚫:

Nuts	Seeds	Pips
Pith	Fruit/Veg skins	Peas
Raw Vegs	Salad	Sweetcorn
Mushroom	Celery	Dried fruit
Coconut	Pineapple	Mango

For how long?

- 6-8 weeks after your ileostomy is formed
- 2-6 weeks after your pouch is formed

<u>What about after?</u>

- Reintroduce above eliminated foods in small quantities
- Trial one food at a time , in small portions for 2-3 days and if tolerated double the portion until you are happy with the amount
- Eat slowly and Chew well

The New patient:What to eat after surgery

- **Choose high protein/energy diet**

➔Promotes wound healing

➔Speeds up recovery

➔Stops weight loss

- Choose nutritious balanced meals
  - include protein e.g. meat, fish, cheese, eggs, milk, yogurt or pulses
  - include carbohydrate e.g. cereals, bread, rice, pasta, potato
  - e.g. milk puddings, custard, blancmanges, yogurt, cheese and biscuits
- Choose nutritious snacks
  - e.g. sandwiches, cereal, milky drinks, cold puddings
- Supplement meals with energy dense ingredients (fortify)
  - e.g. butter, margarine, cream, sugar, jam, honey, marmalade, sweets, chocolate, biscuits, cakes, ice-cream, crisps
- Introduce oral supplements as per dietitian advice

The New patient:Hydration after surgery

Take enough fluids and salt to stop dehydration

• Aim for 1.5-2.0 litres (3-4 pints or 8-10 cups) of fluid per day

-water, tea, coffee, unsweetened fruit juices or sugar free squashes

• Add extra salt to your meals.

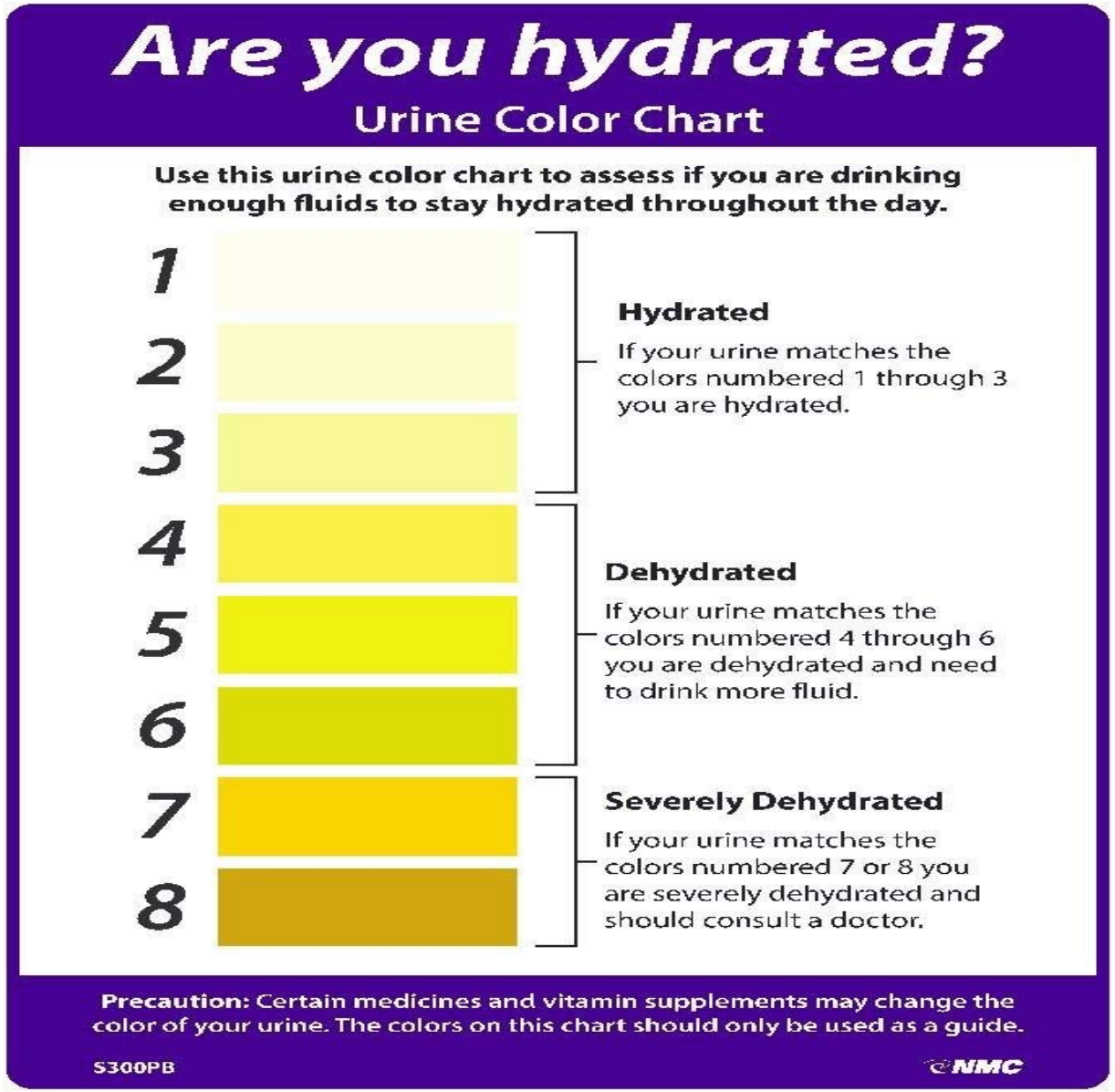
- ½ - 1 teaspoon a day

• If your output is ↑ ; you may co[illegible]ned diet+ medication

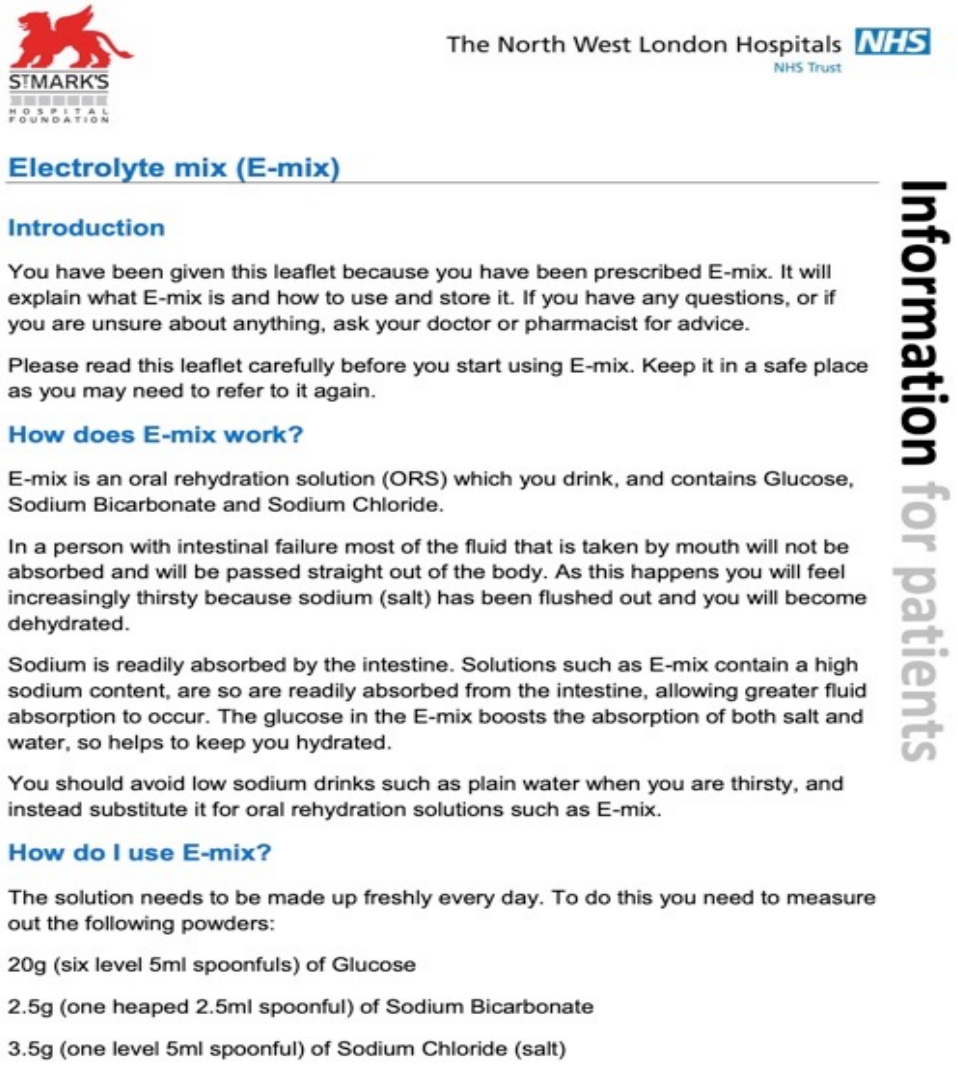
--> anti-diarrhoeal medication (e.g loperamide(IMODIUM®)), restrict diluted drinks like water/tea/juice to 1L and take 1L Oral Rehydration solution e.g St. Marks Electrolyte mix

• Take Loperamide 30-60 minutes before meals

• Consider adding fiber supplement, such as psyllium husk(take with half of the recommended amount of water)



- Check your urine colour
- Do you have leg cramps?
- Are you feeling thirsty?
- Are you craving salty foods?
- Do you suffer from headaches?
- Do you feel tired/lethargic
- Unable to concentrate



The North West London Hospitals NHS
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St MARK'S HOSPITAL FOUNDATION

Electrolyte mix (E-mix)

Information for patients

Introduction

You have been given this leaflet because you have been prescribed E-mix. It will explain what E-mix is and how to use and store it. If you have any questions, or if you are unsure about anything, ask your doctor or pharmacist for advice.

Please read this leaflet carefully before you start using E-mix. Keep it in a safe place as you may need to refer to it again.

How does E-mix work?

E-mix is an oral rehydration solution (ORS) which you drink, and contains Glucose, Sodium Bicarbonate and Sodium Chloride.

In a person with intestinal failure most of the fluid that is taken by mouth will not be absorbed and will be passed straight out of the body. As this happens you will feel increasingly thirsty because sodium (salt) has been flushed out and you will become dehydrated.

Sodium is readily absorbed by the intestine. Solutions such as E-mix contain a high sodium content, are so are readily absorbed from the intestine, allowing greater fluid absorption to occur. The glucose in the E-mix boosts the absorption of both salt and water, so helps to keep you hydrated.

You should avoid low sodium drinks such as plain water when you are thirsty, and instead substitute it for oral rehydration solutions such as E-mix.

How do I use E-mix?

The solution needs to be made up freshly every day. To do this you need to measure out the following powders:

20g (six level 5ml spoonfuls) of Glucose

2.5g (one heaped 2.5ml spoonful) of Sodium Bicarbonate

3.5g (one level 5ml spoonful) of Sodium Chloride (salt)

RECIPE

- 20g (six level 5ml spoonful) of Glucose
- 2.5g (one heaped 2.5ml spoonful) of Sodium Bicarbonate
- 3.5g (one level 5ml spoonful) of Sodium Chloride (salt)

Instructions:

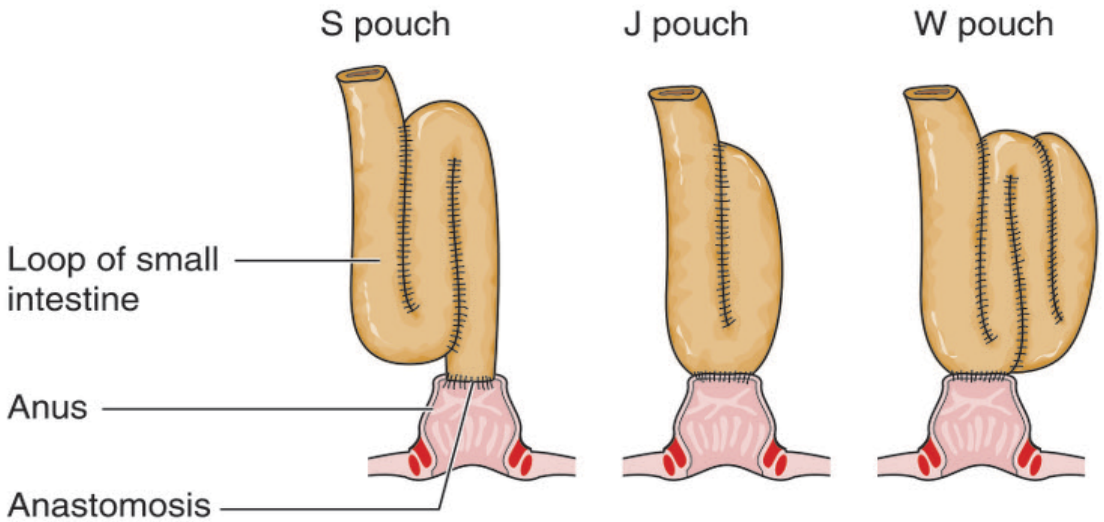
- Dissolved in 1 litre of cold tap water
- Make freshly every day
- Sip slowly throughout the day
- Cold is best, keep refrigerated
- Flavour with small amounts of **no added sugar** double strength squash/lemon/fresh mint

Provides 90mmol/L of sodium= ideal sodium concentration for absorption to the small bowel

LIMIT OTHER FLUIDS TO. 1. LITRE

https://www.stmarkshospital.nhs.uk/wp-content/uploads/2014/05/Electrolyte-mix.pdf

The Established Pouch



	Question	Yes	No
1.	Is olive oil the main culinary fat used?		
2.	Are ≥ 4 tablespoons of olive oil used each day?		
3.	Are ≥ 2 servings (of 200g each) of vegetables eaten each day?		
4.	Are ≥ 3 servings of fruit (of 80g each) eaten each day?		
5.	Is < 1 serving (100-150g) of red meat/ hamburgers/ other meat products eaten each day?		
6.	Is < 1 serving (12g) of butter, margarine or cream eaten each day?		
7.	Is < 1 serving (330ml) of sweet or sugar sweetened carbonated beverages consumed each day?		
8.	Are ≥ 3 glasses (of 125ml) of wine consumed each week?		
9.	Are ≥ 3 servings (of 150g) of legumes consumed each week?		
10.	Are ≥ 3 servings of fish (100-150g) or seafood (200g) eaten each week?		
11.	Is < 3 servings of commercial sweets/pastries eaten each week?		
12.	Is ≥ 1 serving (of 30g) of nuts consumed each week?		
13.	Is chicken, turkey or rabbit routinely eaten instead of veal, pork, hamburger or sausage?		
14.	Are pasta, vegetable or rice dishes flavoured with garlic, tomato, leek or onion eaten ≥ twice a week?		
TOTAL SCORE (total no. of 'yes' answers)			

Table 1. ***Mediterranean Diet Serving Score*** (MDSS).

	Recommendation*	Score
Fruit	1–2 servings/main meal**	3
Vegetables	≥ 2 servings/main meal**	3
Cereals[a]	1–2 servings/main meal**	3
Potatoes	≤ 3 servings/week	1
Olive Oil[b]	1 serving/main meal**	3
Nuts	1–2 servings/day	2
Dairy products[c]	2 servings/day	2
Legumes	≥ 2 servings/week	1
Eggs	2–4 servings/week	1
Fish	≥ 2 servings/week	1
White meat[d]	2 servings/week	1
Red meat[e]	< 2 servings/week	1
Sweets[f]	≤ 2 servings/week	1
Fermented beverages[g]	1–2 glass/day	1
Total score		**24**

* According with the new Mediterranean Diet Pyramid [16].

** Main meals: breakfast, lunch and dinner.

[a] Bread, breakfast cereals, rice and pasta.

[b] Olive oil used on salads or bread or for frying

[c] Milk, yoghurt, cheese, ice-cream

[d] Poultry

[e] Pork, beef, or lamb

[f] Sugar, candies, pastries, sweetened fruit juices, and soft drinks

[g]Wine and beer.

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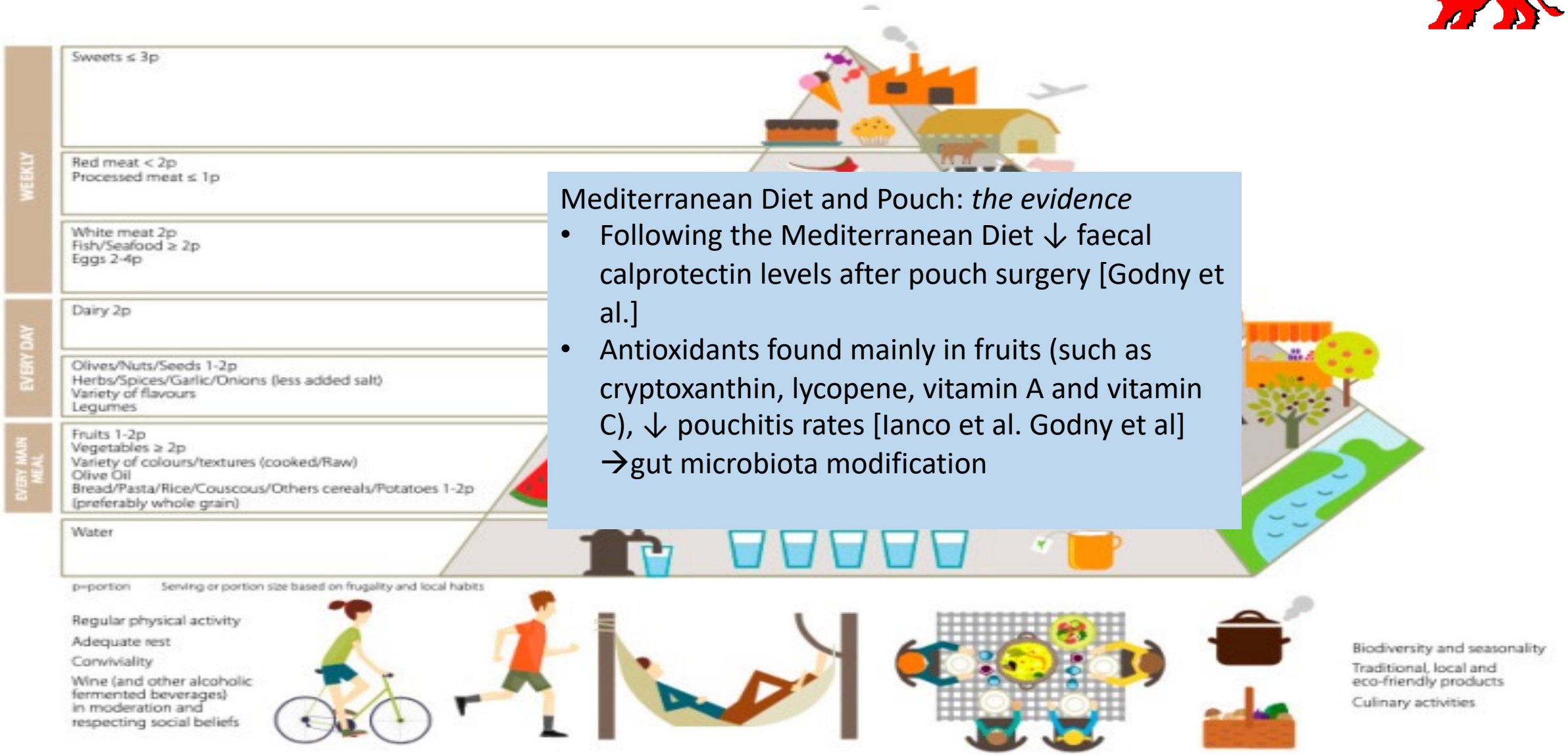
The Sustainable Mediterranean Diet Pyramid

Serra-Majem et al. 2020

The Sustainable Mediterranean Diet Pyramid and Pouch



Mediterranean Diet and Pouch: *the evidence*

- Following the Mediterranean Diet ↓ faecal calprotectin levels after pouch surgery [Godny et al.]
- Antioxidants found mainly in fruits (such as cryptoxanthin, lycopene, vitamin A and vitamin C), ↓ pouchitis rates [Ianco et al. Godny et al] →gut microbiota modification

Serra-Majem et al. 2020

The Sustainable Mediterranean Diet Pyramid

Base every meal around:

- Vegetables and fruits (variety of colours=variety nutrients, darker colour,=more anti-oxidants!)
- Legumes/beans, whole grains, nuts (e.g., lentils, walnuts)
- Olive oil (EVOO) as principal source of fat (swap out margarine and butter!)

Ensure minimum Water/non sweetened beverages intake of 1.5-2L/day

Eat at least 2x/week:

- Fish, seafood (wild, sustainably sourced)

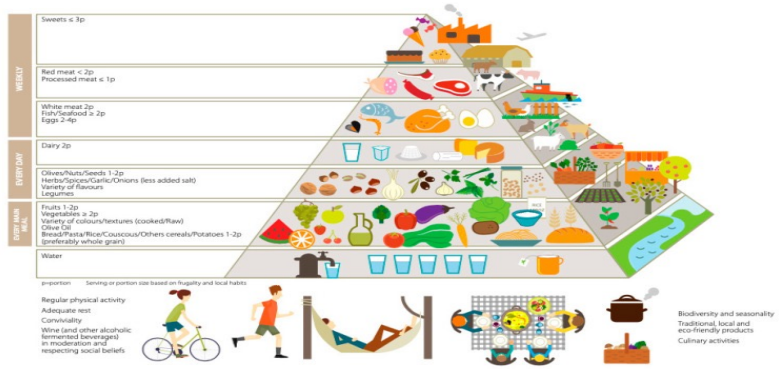
Eat moderate portions daily to weekly:

- Poultry
- Dairy (yoghurt), cheese and eggs (max 2 servings/day)
- Red wine (typically with meals)

Females: 1 glass/day s Males: 2 glasses/day

Eat less often than other foods: (max. 2 x week)

- Red meat
- Saturated fat
- Sweets



Sustainability

- Choose variety of seasonal local foods, minimally processed, sustainable farming practices, free from pesticides, fair trade origin

Lifestyle

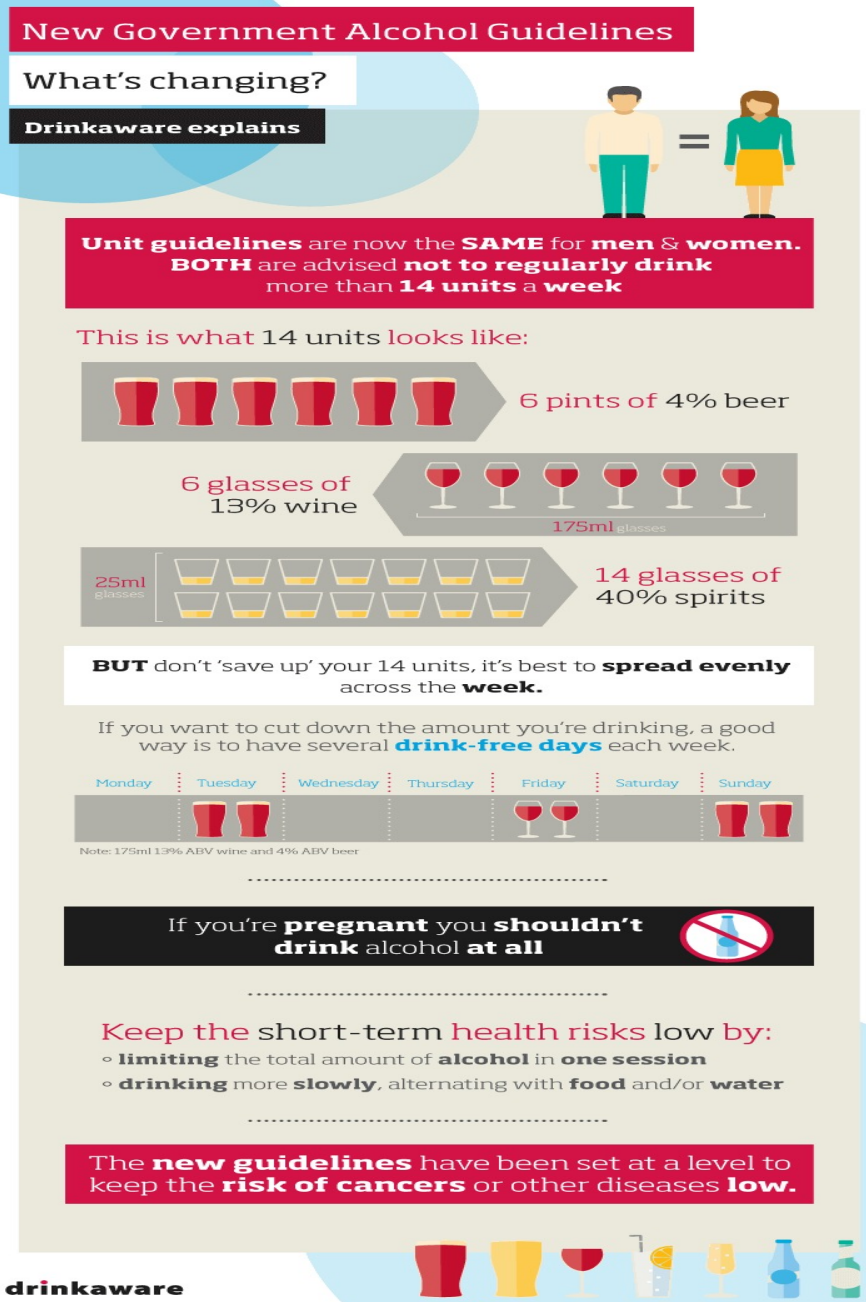
- Regular exercise ➔moderate-intensity physical activity (150 min throughout the week, >30 min/day x5 days /week) + >2x week muscle-strengthening activities

Sleep and Rest/Reduce Stress

Social/Cultural Value of mealtimes passing on recipes/traditions, enjoy food, relaxing atmosphere

Serra-Majem et al. 2020

	Question	Yes	No	Nutritional issue to discuss in response
1.	Is olive oil the main culinary fat used?			**Choosing Healthier Fats** Olive oil is high in monounsaturated fat. Using unsaturated fats instead of saturated fats in cooking and preparing food is advisable.
2.	Are ≥ 4 tablespoons of olive oil used each day?			**Healthy fats are better than very low fat** Med diet is more beneficial than a very low fat diet in prevention of CVD. So replacing saturated with unsaturated fat is better than replacing it with carbohydrates or protein.
3.	Are ≥ 2 servings (of 200g each) of vegetables eaten each day?			**Eat plenty of fruits and vegetables** Eating a wide variety of fruit and vegetables every day helps ensure adequate intake of many vitamins, minerals, phytochemicals and fibre. Studies have shown that eating plenty of these foods is protective for CVD and cancer.
4.	Are ≥ 3 servings of fruit (of 80g each) eaten each day?			
5.	Is < 1 serving (100-150g) of red meat/ hamburgers/ other meat products eaten each day?			**Choose lean meats and consider cooking methods** Red and processed meats are high in saturated fat, can be high in salt and are best replaced with white meat or fish or vegetarian sources of protein. Grill or roast without fat, casserole or stir fry.
6.	Is < 1 serving (12g) of butter, margarine or cream eaten each day?			**Keep saturated fat low** These foods are high in saturated fat which can increase your blood cholesterol level. Choose plant-based or reduced-fat alternatives.
7.	Is < 1 serving (330ml) of sweet or sugar sweetened carbonated beverages consumed each day?			Excessive consumption of sugar-sweetened beverages can worsen many risk factors for CVD: keep consumption to < 1/day.
8.	Are ≥ 3 glasses (of 125ml) of wine consumed each week?			**Moderate alcohol intake with meals** While this does have some protective effect but ***there is no evidence that non-drinkers should take up drinking alcohol.***
9.	Are ≥ 3 servings (of 150g) of legumes consumed each week?			**Include soluble fibre** These foods are high in soluble fibre and other useful nutrients. Regular consumption is advisable for raised cholesterol.
10.	Are ≥ 3 servings of fish (100-150g) or seafood (200g) eaten each week?			**Eat more oily and white fish** Oily fish is an excellent source of essential omega-3 fats. White fish is very low in saturated fat.
11.	Is < 3 servings of commercial sweets/pastries eaten each week?			**Eat less processed food** These foods are usually high in saturated fat, salt or sugar and often contain trans fats. Replacing these with healthy snacks such as fruit or unsalted nuts is beneficial.
12.	Is ≥ 1 serving (of 30g) of nuts consumed each week?			**Snack on modest servings of unsalted nuts** Nuts are rich in unsaturated fat, phytosterols, fibre, vitamin E and iron, e.g. walnuts, almonds, hazelnuts
13.	Is chicken, turkey or rabbit routinely eaten instead of veal, pork, hamburger or sausage?			'White meat' choices are lower in saturated fat. Remove the skin and consider your cooking method.
14.	Are pasta, vegetable or rice dishes flavoured with garlic, tomato, leek or onion eaten ≥ twice a week?			Using a tomato and garlic or onion or leek-based sauce regularly is a key feature of the Med diet.
TOTAL SCORE (total no. of 'yes' answers)				



Alcohol

- Irritant to the bowel
- Drink in **moderation**
  - Aim for **<14 units** a week for **BOTH** men/women
  - **Avoid** alcohol if **pregnant**
  - Aim for several alcohol-free days each week
  - Avoid binge days
  - Drink **slowly** alternate with non-alcoholic drinks
  - What is 1 unit
    =½ pint 4% beer
    =Pub measure 25ml of 40% spirit
    =A small glass 13% red wine
    Check how much you drink (Unit calculator)
    →https://www.drinkaware.co.uk/facts/alcoholic-drinks-and-units/how-much-alcohol-is-too-much?gclid=EAIaIQobChMI49S5jY2W8gIVFu3tCh0QuwKqEAAYASAAEgLL2_D_BwE

Triggers

- Caffeine➔**stimulant** ↑ bowel movements (gut transit)

Limit caffeinated drinks to a 250g cup /day /choose decaffeinated version

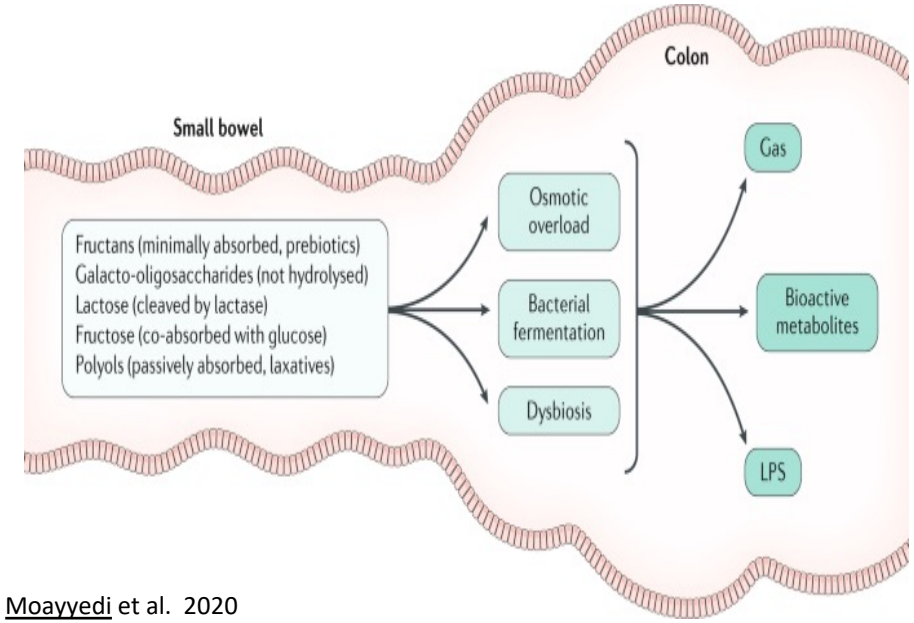
- Alcohol➔ i**rritatant ,**changes how body absorbs fluids (change regularity bowel movements =diarrhea or constipation.
- Chilly (Capsaicin) ➔stimulant ↑ bowel movements
- (gut transit)

c

Fermentable Carbohydrates (FODMAP)

- Fermentable Oligosaccharides Disaccharides Monosaccharides And Polyols
- =Fermentable Carbohydrates
- Rapidly fermented by microflora
- Fermentation = gas
- ↑ in fluid and gas =bowel distension

➔bloating , abdominal pain or discomfort



Moayyedi et al. 2020

	Foods to avoid	Suitable foods
Grains/starches	Wheat flour/rye flour and foods, semolina, cous cous, pasta and noodles, couscous, breakfast cereals, savoury and sweet biscuits, cakes, pastry, breadcrumbs and batter	Wheat free or gluten free flour, pasta, bread, rolls, pizza bases, cakes, biscuits, pastries, noodles, naan bread and cereals, potato, rice, quinoa, buckwheat, millet, oats, polenta
Fruit Aim for 5 portions of fruit and vegetables per day*	Apples, apricots, blackberries, boysenberries, cherries, dates, figs, mango, nectarines, peaches, pears, persimmon, plums, plums, dried fruit, watermelon, tinned fruit in apple/pear juices	Banana, blueberries, clementine, grapes, kiwi, passion fruit, pineapple, strawberry, raspberry, papaya, honeydew melon, oranges, lemon, lime, rhubarb Keep to a maximum 1 piece of any fruit at one sitting =80g fresh, 30g dried, 100ml juice Maximum three sittings across the day
Vegetables*, pulses	Mushrooms, peas, asparagus, baked beans, beetroot, black eyed peas, broad beans, butter beans, cabbage, cauliflower, kidney beans, leeks, mushrooms, mange tout, savoy cabbage, soy beans, split peas, shallots, artichokes, Brussel sprouts, legumes (baked. Beans, chickpeas, kidney beans, soya beans, pistachio nuts, cashews	Aubergine, butternut squash, carrot, celery, courgette, cucumber, ginger, kale, peppers, pumpkin, potato, spinach, spinach, green beans, lettuce, tomatoes, olives, ¼ avocado, courgette Thoroughly rinsed tinned legumes contain lower FODMAP vs to boiled or dry. 1/4 portions of these per sitting are allowed especially tinned chickpeas, butterbeans, azuki beans, ½ cup tinned lentils
Onions and garlic	Spring onion (white part),onions, garlic, soups, stock/cubes, sauces, dressings, ready meals containing onion/garlic	Spring onion (green part), garlic infused oil, chives, asafoetida (hing) – old Indian spice can be bought online or in Asian shops- has a strong garlic and onion smell. Herbs and spices (e.g chives, coriander, basil, thyme, rosemary), cumin)
Lactose Aim for 2 – 3 portions per d	Cows milk, yoghurts, cream & spreadable cheeses, custards, ice creams and frozen yoghurt	Lactose free, rice, oat, almond, coconut milk and products (cheese, creams, spreads, yoghurts, custards), cheeses- cheddar, feta, mozzarella*
Other foods/ingredients	Sugar free mints, sugar free chewing gum, honey, fructose syrup, pistachio nuts, agave, honey, high fructose corn syrup, sweeteners ending in –ol(mannitol, sorbitol etc) Foods with added inulin, fructooligosaccharides and galactooligosaccharides in their ingredients (cereal, yoghurt)	Golden syrup, maple syrup, table sugar- sucrose, glucose

Fermentable Carbohydrates (FODMAP)

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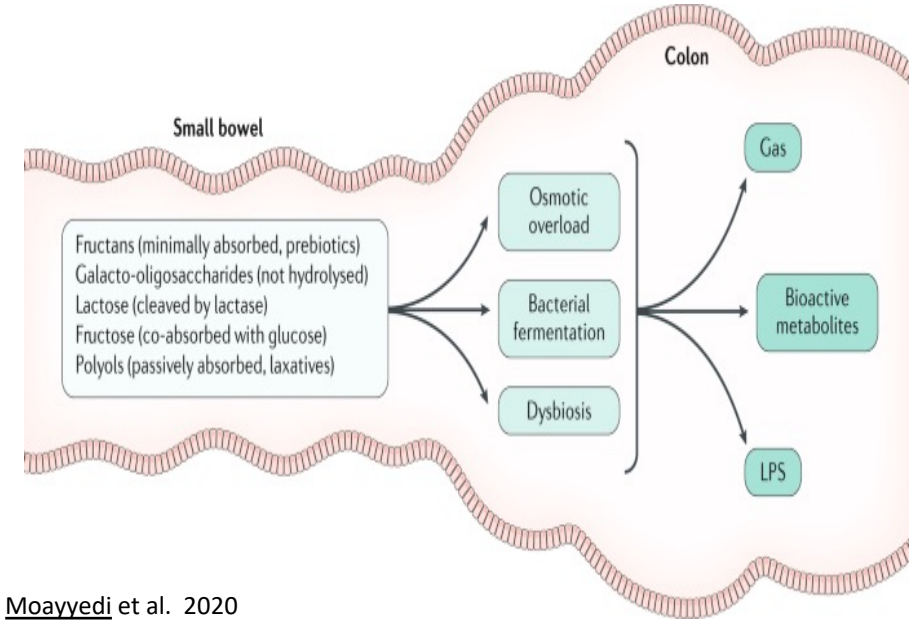

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Fruit Aim for 5 portions of fruit and vegetables per day*	Apples, apricots, blackberries, boysenberries, cherries, dates, figs, mango, nectarines, peaches, pears, persimmon, plums, plums, dried fruit, watermelon, tinned fruit in apple/pear juices	Banana, blueberries, clementine, grapes, kiwi, passion fruit, pineapple, strawberry, raspberry, papaya, honeydew melon, oranges, lemon, lime, rhubarb Keep to a maximum 1 piece of any fruit at one sitting =80g fresh, 30g dried, 100ml juice Maximum three sittings across the day
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Other foods/ingredients	Sugar free mints, sugar free chewing gum, honey, fructose syrup, pistachio nuts, agave, honey, high fructose corn syrup, sweeteners ending in –ol(mannitol, sorbitol etc) Foods with added inulin, fructooligosaccharides and galactooligosaccharides in their ingredients (cereal, yoghurt)	Golden syrup, maple syrup, table sugar- sucrose, glucose

Low FODMAP diet in Pouch: Evidence

UC patients with ileal pouch [67]	Chicory fructans (Raftilose P95®, Beneo Orafti, Belgium) placebo with glucose, 14.3 g daily, 3-period crossover/three 7-day supplement periods with 7-day washout periods	Total = 15	Faecal and breath sampling, self-reported diary record	Fructan supplementation: Fermentation ability is 83% ↑ faecal butyrate excretion RS supplementation: Fermentation ability is 46% ↑ faecal isobutyrate and isovalerate excretion
Inactive IBD patients [77]	Low FODMAP diet (Specific DFs (NDOs) reduced), NA, Pilot 6 weeks	Total = 15 UC = 13 CD = 1 Chronic Constipation = 1	Carbohydrate malabsorption breath testing, pouchitis assessed either clinically or endoscopically, faecal lactoferrin, and 7-day food diary	↓ Short-term overall stool frequency in patients without pouchitis

Low FODMAP diet in Pouch: Evidence

- ↓ frequency/stool bulk/↑consistency in patients without pouchitis
- Improvements in functional symptoms

↓pain
↓bloating
↓ wind
↓ diarrhoea
🚫 constipation

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General Guidelines

Perianal Irritation

- Spices and hot spicy foods
- Nuts/Seeds
- Citrus Foods (Vitamin C, tomatoes)
- Caffeine (coffee, tea, cola, chocolate)
- Dairy Products
- Beer /Wine

Stool thickening

- Pasta
- Potatoes
- Rice
- Bread
- Banana
- Marshmallows/ Jelly beans/ Instant mash
- Apple puree
- Increase soluble fibre i.e. psyllium husk, oatmeal
- Creamy smooth peanut butter

Stool Loosening

- Alcohol/beer
- Caffeine
- Fruit juice/excess fructose foods
- Spicy foods
- Fatty foods
- Nuts/seeds
- Dairy- if hypolactasic
- Vegetables like cabbage, kale, celery raw coconut
- High intake of refined sugar (grape juice, prune juice, date juice)
- Fluids with meals

Flatulence

- High intake of fermentable foods (FODMAPs) like broccoli, leeks, onion, garlic, cabbage, Brussel sprouts, peas, beans, cauliflower
- High FOS foods i.e. chicory root, artichoke, onion
- Carbonated beverages
- Large meals/Not chewing well/Eating quickly

Bad odour

- Eggs
- Fish
- Asparagus
- Garlic
- Onions

Hard to digest

- Celery
- Coconut
- Corn
- Dried fruit
- Green peppers
- Lettuce
- Mushrooms
- Nuts
- Olives
- Peas
- Pickles
- Pineapple
- Popcorn,
- Raw vegetables
- Seeds
- Spinach
- Skins/pips/pith of fruits and vegetables

Reduce bad odour

- Parsley
- Natural Yoghurt

Top tips to improve your pouch function

- Study of 69 people showed
  - Pouch opened 5-8 times a day (51 pts)
  - Bowel frequency related with meal number
  - Pouch opened ½ - 4hrs after a meal (28pts ½ - 2hrs aft
  - Stool output greatest after main meal of day (48 pts)

- How to improve pouch function:
  - Avoid > 3x meals a day
  - Experiment with timing and meal size
  - Eat last meal at > 2 hours before bedtime
  - You are Unique. Check your own bowel habit to determine how long after a meal you can leave home
  - Keep food and symptom diary to evaluate meal and pouch pattern
  - Food choices based on your tolerance
  - Avoid unnecessary restrictions
  - Tolerance changes with time- re challenge foods
  - Try one new food at a time
  - Mindful eating:Eat slowly, Chew food well, Avoid interruptions, ENJOY food
  - ?Radar key/ Toilet urgency card

RECORD

Honesty Equality Accountability Respect Teamwork

Putting **patients** at the **HEART** of everything we do

St MARK'S HOSPITAL

NHS
London North West University Healthcare
NHS Trust

*****EXAMPLE PAGE*****

Day: **Date:**	Morning	Lunch	Dinner	Snacks
Food & Drinks [Time/Place (include details like portion/added sauces/cooking fried/ raw/take away]				
Gut Symptoms [time they started, time they ended and severity. Use the scale 1 (mild) to 5 (severe) to capture the severity]				
Pooping Habits [Time /stool consistency, watery, formed, colour, approximate size, blood, mucus or pieces of food)]				
Exercise (walking/gym/yoga/pilates/meditation etc)				
Sleep waking time and bedtime, rate how refreshed you feel on a scale of 1 (super refreshed) to 5 (very groggy).				
Stressors and Emotions (i.e. work meetings, stressful day, arguments general mood across the day)				

RESTRICT 🚫

- Identify food/drink culprit from Food Diary
- If multiple culprits identified consult a dietitian
- Plan the elimination diet (choose the right time, educate yourself on the foods that contain the culprit (including ingredients), clean out and restock, check food labels, consider meal planning, inform your support network)
- Ensure whatever food you are eliminating you REPLACE with an alternative version
- Duration- eliminate for 4 weeks and monitor the effect

REINTRODUCE

- Reintroduction is necessary to confirm if suspected food/elimination is really the culprit

REMEMBER:

Unnecessary restriction for long periods:

↑ your risk of malnutrition(vitamin/mineral deficiencies)

↓ quality of life

Can change your microbiota (diversity)

↑ sensitivity towards that food

How to reintroduce: Example

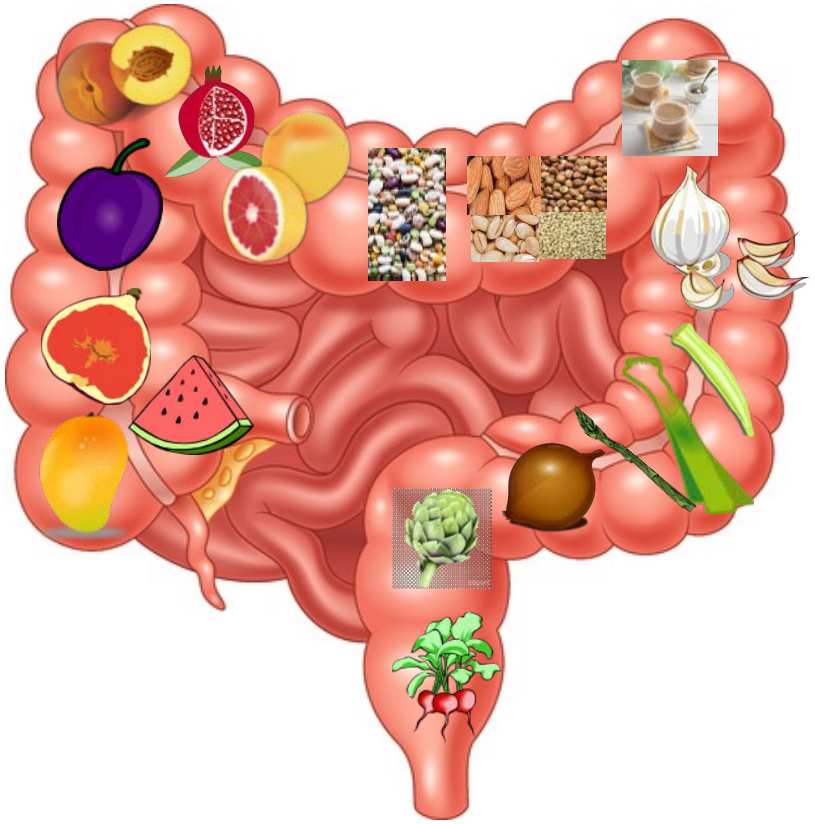
Day 1.Start with very small amount of food

Day 2. If you have no symptoms, double the portion. Monitor your symptoms. Monitor your symptoms and document the amount you tried.

If you do have symptoms, wait for these to settle and re-test at ½ of the initial dose. Monitor your symptoms and document the amount you tried.

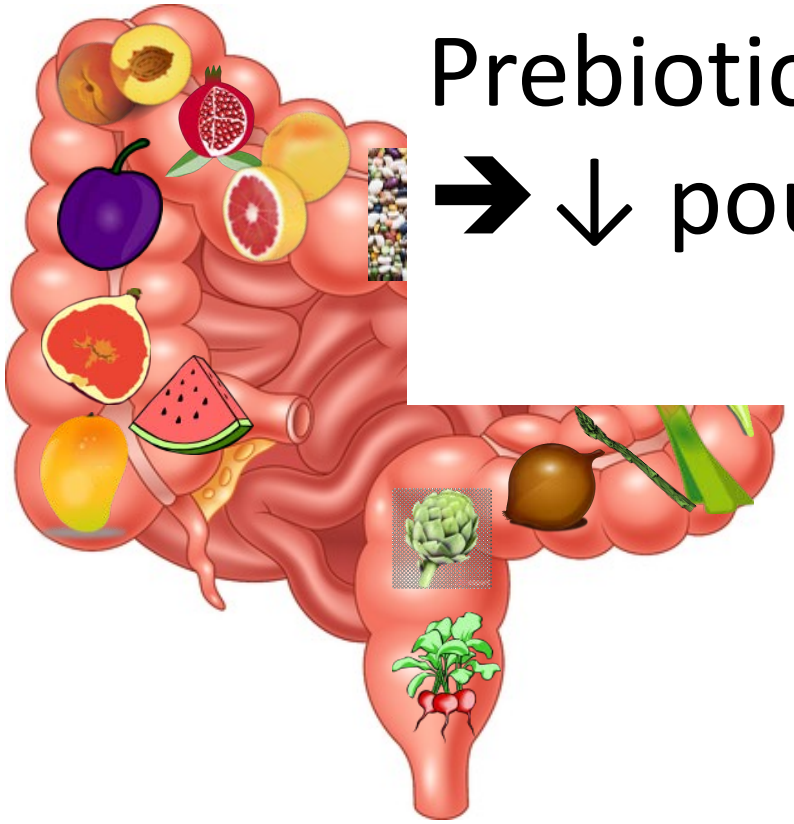
Day 3. If no symptoms, double the portion and monitor your symptoms. Continue until you are happy with the portion of food you are having/ you have symptoms.

PREBIOTICS



- Energy source of Probiotics
- Often are a type of fibre
- Main ones: inulin, fructooligosaccharides (FOS), galacto-oligosaccharides (GOS)
- Must have evidence in providing a health benefit
- Aim to take through a variety of foods/ diet

PREBIOTICS



Prebiotic inulin in Pouch

➔↓ pouchitis

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tructooligosaccharide
s (FOS), galacto-
oligosaccharides
(GOS)

- Must have evidence in providing a health benefit
- Aim to take through a variety of foods/ diet

FERMENTED FOODS

- Limited scientific evidence in humans
- Very few high quality studies

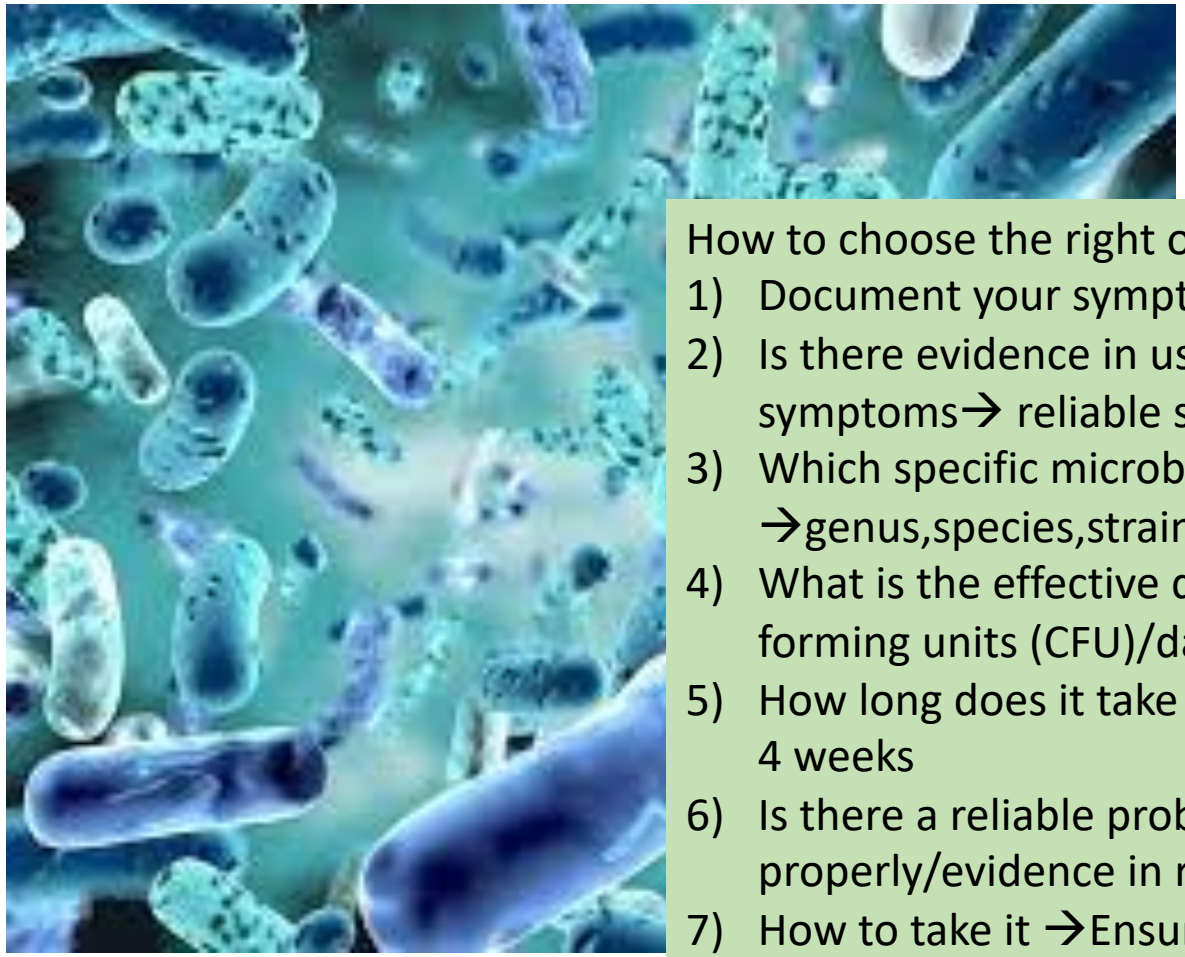
Benefits:

- Could potentially offer health benefits (live microbes)
- Improve the taste/texture/digestibility of food (red wine, sourdough bread, probiotics in yogurt)
- Increase concentrations of vitamins (B12, Folate, riboflavin)
- Contain beneficial compounds (organic acids like GABA➔ help ↓Blood pressure/Improves blood sugar control/support immune system/calm the brain
- Help ↓/remove toxins/antinutrients such as phytic acid (inhibits Zinc absorption

PROBIOTICS

- Are Good Gut Microbes (mostly bacteria)
- Have to be alive
- Have to be present in large numbers
- Have evidence in provide a health benefit for the specific symptom/condition

PROBIOTICS



- Are Microbes (mostly bacteria)

How to choose the right one:

1) Document your symptoms prior to starting
2) Is there evidence in using probiotics for your symptoms→ reliable sources/ask your team
3) Which specific microbe type has shown benefit →genus,species,strain
4) What is the effective dose –> Usually 10^7-10^14 colony forming units (CFU)/day
5) How long does it take to see a benefit → Usually at least 4 weeks
6) Is there a reliable probiotic to buy → has it been stored properly/evidence in reaching your gut alive
7) How to take it →Ensure it is taken as advised by manufacturer (empty stomach/with food

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GUT MICROBIOME

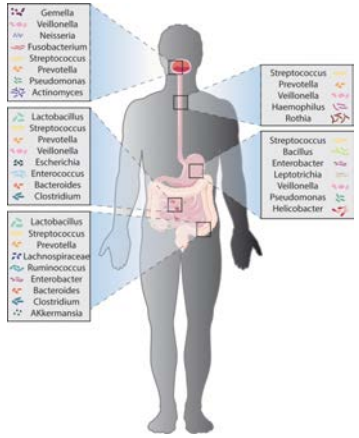
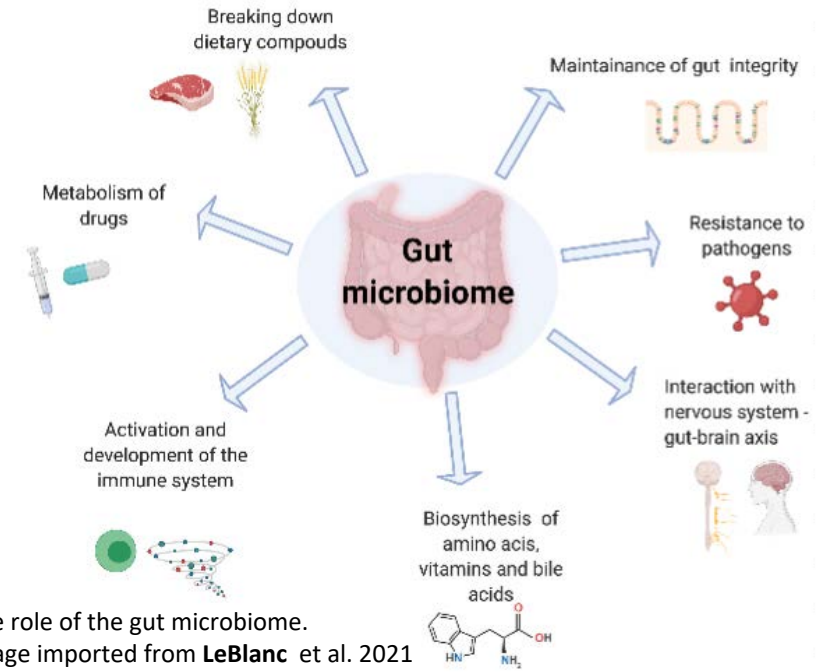
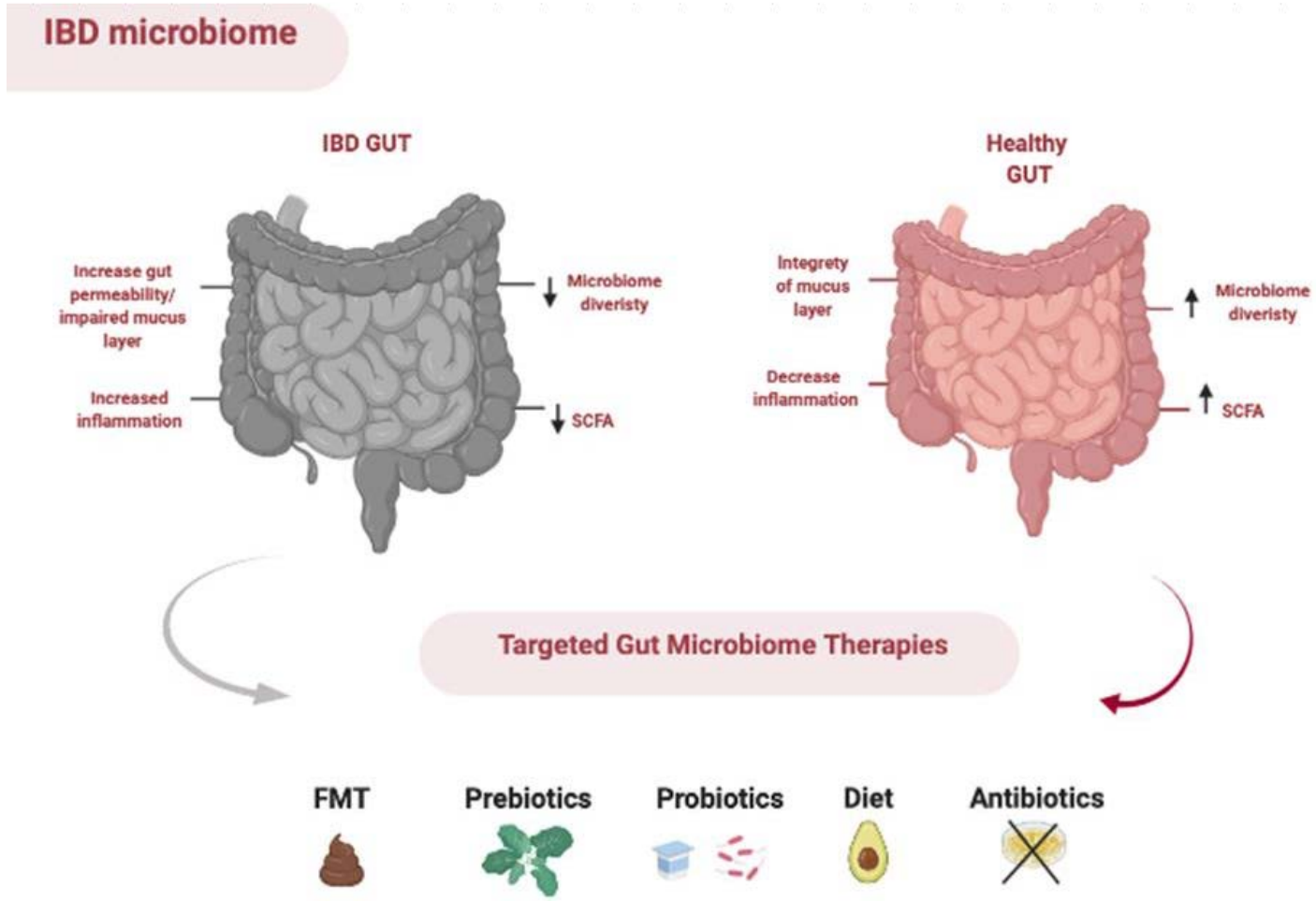


Image imported from Ruan et al. 2020



The role of the gut microbiome.
Image imported from **LeBlanc** et al. 2021



Methods of manipulating the gut microbiota. Image imported from **LeBlanc** et al. 2021

Gut microbiome in Pouch

TABLE 3 Microbiota in the UC pouch: Non-inflamed or "healthy" vs inflamed

Study type Quality assessment	Sample type Microbial composition assessment approach	Patient numbers	Non-inflamed or "healthy" UC pouch vs inflamed
Komanduri[28] Observational Quality: low	Biopsies from pouch and ileum above pouch Nonculture based length heterogeneity—polymerase chain reaction analysis	UC normal pouch = 15 UC pouchitis = 5	*Ruminococcus gnavus* 13% vs 8% *Clostridium paraputrificum* 8% vs 0% *Escherichia coli/Shigella* spp. 18% vs 11% *Streptococcus* spp. 34% vs 0%
McLaughlin[26] Observational Quality: low	Biopsies 10 cm from anal verge Nonculture based cloning	UC normal pouch = 8 UC pouchitis = 8	Overall diversity 2.70 vs 2.32 SDI (P = .009) *Streptococcus* spp. (P = .04) Alcaligenaceae spp. (P = .026)
Zella[29] Observational Quality: low	Biopsy from inflamed and non-inflamed sites Faeces Culture based 16S rDNA-based terminal restriction fragment length polymorphism analysis approach	UC normal pouch = 3 UC pouchitis = 9	*Clostridium* spp. (1:15 ratio) *Eubacterium* spp. (1:15 ratio) *Roseburia* spp. (1:15 ratio) *Streptococcus* spp. (1:2 ratio) *Escherichia* spp. (1:2 ratio)
Persborn[27] Observational Quality: low	Biopsies from pouch corpus Nonculture based	UC normal pouch = 13 UC pouchitis = 16	Bacteroidetes and *Clostridium* clusters IX, XI and XIVa associated with healthy pouch (No raw data provided all relative to pre- and post- treatment with antibiotics or probiotics.)

Segal et Al 2017

TABLE 5 Microbiota in acute pouchitis

Study	Sample type Microbial composition assessment approach	Patient numbers	Acute pouchitis vs nonpouchitis
Ruseler-van Embden[38] Observational Quality: low	Faeces Culture based	UC = 12 FAP = 2 (5 of these had pouchitis)	*Clostridium* spp. 5.60 vs 0 $\log_{10}$/g (P = .03) *Bifidobacterium* spp. and *Lactobacillus* spp. 0 vs 8.48 $\log_{10}$/g (P = .01)
Gosselink[32] Observational Quality: low	Faeces Culture based	UC = 13	Aerobes 9 vs 8 $\log_{10}$/g (P < .01) Anaerobes 8 vs 10 $\log_{10}$/g (P < .01) *Clostridium perfringens* 95% total species (P < .01) *Escherichia coli* 57% total species (P = .05)
Iwaya[35] Observational: low	Faeces culture based	UC = 22 (9 of these with pouchitis)	↓ Bacteroidetes[a] (P < .01) ↓ *Bifidobacterium* spp.[a] (P < .01) ↓ *Lactobacillus* spp.[a] (P < .05)
Lim[37] 2009 Observational Quality: moderate	Faeces Culture based 16S RNA	UC healthy pouch = 15 UC pouchitis = 5	*Enterococci* spp. 0 vs 8.9 OTU (operational taxonomic units) (P = .036) *Pseudoalteromonas* spp.[b] *Desulfosporosinus* spp.[b] *Microcystis* spp.[b] *Methylobacter* spp.[b]
Zella[29] Observational Quality: moderate	Biopsy from inflamed and non-inflamed sites Faeces Culture based-medium-16S rDNA-based terminal restriction fragment length polymorphism approach	UC healthy pouch = 3 UC pouchitis = 9 FAP normal pouch = 7 UC pouchitis vs FAP	*Clostridium* spp. 9% vs 1% total composition (P < .001) *Eubacterium* spp. (15:1) *Prevotella* spp.: 6% vs 1% total composition (P < .001) *Akkermansia* spp.: 22% vs 3% total composition (P < .001) Firmicutes: 52% vs 22% total composition (P < .001) Verrucomicrobia: 22% vs 3% total composition (P < .001) *Lactobacillus* spp. 5:1 in mucosa, 3:1 in stool *Streptococcus* spp.: 5:1 in mucosa, 3:1 in stool Bacteroidetes: 20% vs 71% total composition (P < .001)
Scarpa[39] Observational Quality: moderate	Biopsies from pouch body Faeces Culture based 16s RNA	UC healthy pouch = 22 UC pouchitis = 10	↑ Bacteroidaceae[a] (P = .0019) ↑ Clostridiaceae[a] Enterococcaceae 0 vs 16.65 CFU/mg (P = .028) Streptococcaceae: 0.25 vs 16.10 CFU/mg (P = .052)
Tyler[21] Observational Quality: moderate	Biopsies from pouch an afferent limb Culture based 16S RNA	FAP = 18 19 = UC normal pouch 15 = UC pouchitis 19 = Crohn's like disease	Lower bacterial diversity 3.12 UC vs 4.15 FAP vs 3.76 normal pouch vs 3.76 SDI Crohn's like disease (P = .006)
Li[33] Observational Quality: low	Faeces Culture based 16S RNA	UC healthy pouch = 11 UC pouchitis = 8	↑ *Clostridium perfringens*[a] ↓ *Eubacterium rectale pouchitis* vs non pouchitis[a] Decrease in diversity (P = .034)[a]

[a]No raw data.
[b]All found in pouchitis no raw data provided.

Gut microbiome in Pouch

TABLE 3 Microbiota in the UC pouch: Non-inflamed or "healthy" vs inflamed

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Persborn[27] Observational Quality: low	Biopsies from pouch corpus Nonculture based	UC normal pouch = 13 UC pouchitis = 16

Segal et Al 2017

TABLE 5 Microbiota in acute pouchitis

Acute pouchitis vs nonpouchitis
Clostridium spp. 5.60 vs 0 $\log_{10}$/g (P = .03) *Bifidobacterium* spp. and *Lactobacillus* spp. 0 vs 8.48 $\log_{10}$/g (P = .01)
Aerobes 9 vs 8 $\log_{10}$/g (P < .01) Anaerobes 8 vs 10 $\log_{10}$/g (P < .01) *Clostridium perfringens* 95% total species (P < .01) *Escherichia coli* 57% total species (P = .05)
↓ Bacteroidetes[a] (P < .01) ↓ *Bifidobacterium* spp.[a] (P < .01) ↓ *Lactobacillus* spp.[a] (P < .05)
Enterococci spp. 0 vs 8.9 OTU (operational taxonomic units) (P = .036) *Pseudoalteromonas* spp.[b] *Desulfosporosinus* spp.[b] *Microcystis* spp.[b] *Methylobacter* spp.[b]
Clostridium spp. 9% vs 1% total composition (P < .001) *Eubacterium* spp. (15:1) *Prevotella* spp.: 6% vs 1% total composition (P < .001) *Akkermansia* spp.: 22% vs 3% total composition (P < .001) Firmicutes: 52% vs 22% total composition (P < .001) Verrucomicrobia: 22% vs 3% total composition (P < .001) *Lactobacillus* spp. 5:1 in mucosa, 3:1 in stool *Streptococcus* spp.: 5:1 in mucosa, 3:1 in stool Bacteroidetes: 20% vs 71% total composition (P < .001)
↑ Bacteroidaceae[a] (P = .0019) ↑ Clostridiaceae[a] Enterococcaceae 0 vs 16.65 CFU/mg (P = .028) Streptococcaceae: 0.25 vs 16.10 CFU/mg (P = .052)
Lower bacterial diversity 3.12 UC vs 4.15 FAP vs 3.76 normal pouch vs 3.76 SDI Crohn's like disease (P = .006)
↑ *Clostridium perfringens*[a] ↓ *Eubacterium rectale pouchitis* vs non pouchitis[a] Decrease in diversity (P = .034)[a]

RESULTS

- **Important role of microbiota in inflamed+healthy ileoanal pouch**
- **Limited evidence for probiotics in pouchitis → No common signature changes in microbiota**
- **Established relationship between specific microbiota changes and inflammation**
- **Future ?manipulating microbiota for novel therapy**

Probiotics: Evidence in Pouchitis

European Crohn's and Colitis Organisation

ECCO 2020 (Current Practice Position)

- Probiotics may help to prevent acute pouchitis and maintain remission of chronic pouchitis.
- Probiotics are not indicated in the treatment of moderate pouchitis

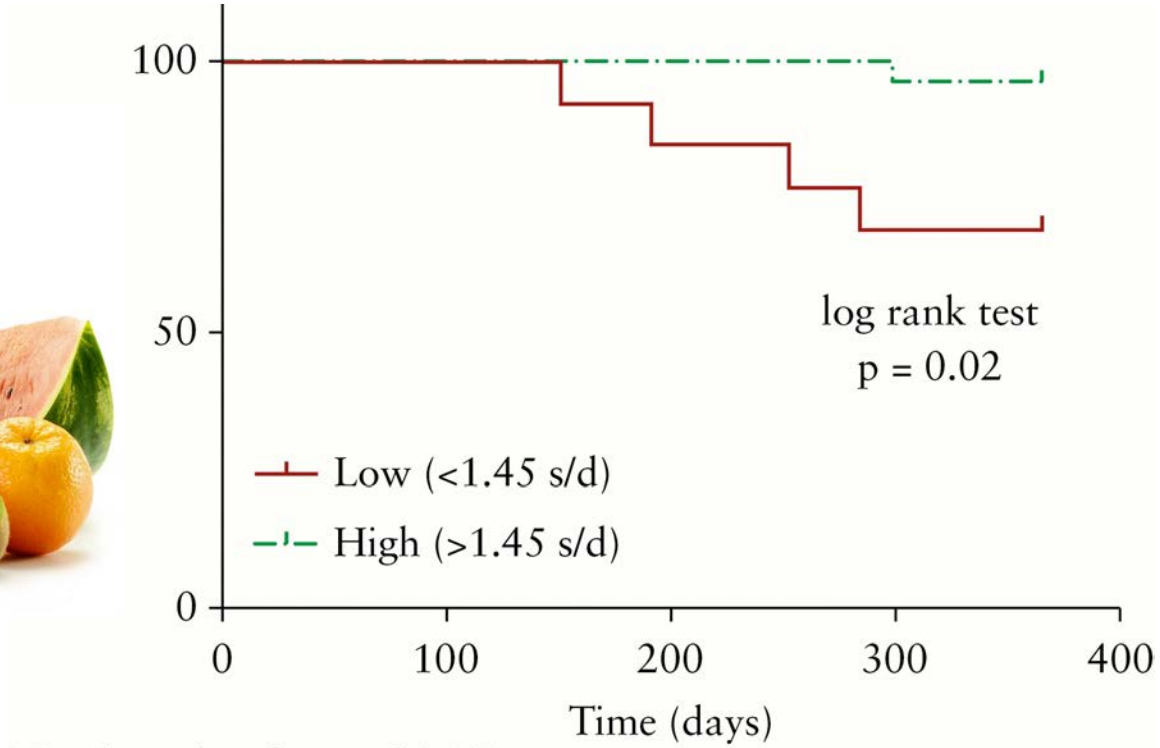
- Four randomised trials: 131 patients + one comparative cohort study of 117 patients= efficacy of prophylactic treatment with probiotics in preventing pouchitis after pouch surgery.
- Two randomised trials:76 patients + one observational study of 31 patients = Vivomixx (Ex VSL#3 effective treating chronic pouchitis + preventing relapse in patients with history of intermittent pouchitis
- Treating moderate active pouchitis with probiotics = NOT successful
- One small randomised trial = no benefit of probiotic cocktail[Lactobacillus plantarum 299 and Bifidobacterium infantis Cure 21] on pouch function
- Four meta-analyses (Cochrane meta-analysis) highlighted ➔low quality of all reported trials, low sample size /different patient groups (significant heterogeneity)

Adamina et. Al 2020

PROBIOTICS in POUCH

Probiotic Strain	Dosage Form	CFU/Dose	No of Doses/Day	Application/Evidence Level	COST
L. rhamnosus GG	Capsule Chewable tablet	10B/capsule 10B/tablet	1 capsule 1 tablet	IBD-P - Inflammatory bowel disease - Pouchitis (II)	£0.75-085/day= £17-£23/month
L. rhamnosus GG	Capsule	20B/2x capsule	1 capsule	IBD-P - Inflammatory bowel disease - Pouchitis (II)	£1.60/day=£51/month
L. rhamnosus GG	Capsule	15B/capsule	1 capsule	IBD-P - Inflammatory bowel disease - Pouchitis (II)	£0.75-085/day= £17-£23/month
8 strains: L. acidophilus DSM24735/SD5212 L. paracasei DSM24733/SD5218 L. delbrueckii subsp. bulgaricus DSM24734/SD5210 L. plantarum DSM24730/SD5209 B. longum DSM24736/SD5220 B. infantis DSM24737/SD5219 B. breve DSM24732/SD5206 S. thermophilus DSM24731/SD5207 Trademarked as Vivomixx (previously VSL3)	Sachet Capsule	450B/sachet 112.5B/capsule	2 sachets 2-4 capsule Dose: 1.8 trillion CFU twice per day Form: Powder, mixed with cold water or yoghurt. Duration: 12 weeks Timing: Morning and evening	IBD-P - Inflammatory bowel disease - Pouchitis (I) IBD-UC - IBD - Ulcerative colitis - Adjunct to standard therapy (I)	£3-£3.60/day=£90-£100/month

FRUIT CONSUMPTION AND RISK OF POUCHITIS



Number of patients with NP:

Low	13	11	9	9	9
High	26	26	25	25	25

Association between fruit consumption and the development of pouchitis within one year.

Journal of Crohn's and Colitis, jjz053, https://doi.org/10.1093/ecco-jcc/jjz053
Published 4/3/19. NP=Normal Pouch All patients [n = 39] 30% vs 3.8%

Ileo-anal Pouch: Diet Therapy in Clinical Practice

Pouchitis-Antibiotic dependent / refractory

-↑ Total starch intake (digestible and resistant starch) including bread, most grains and cereal products, potatoes

-Dietary fibre (NSP):maintain variety

-Fat: moderate intake according to healthy recommendations. Consider ↑ ratio of ω-3: ω -6 intake i.e. oily fish (salmon, mackerel, sardines etc), mussels, oysters, ω-3 fortified eggs plant sources like chia, flaxseed, walnuts, & their oils

-Avoid excess capsaicin (chilly)

-FODMAPs: (a) restrict fermentable carbohydrates [apples, pears, stone fruits, watermelon, and vegetables, such as asparagus, cauliflower and mushrooms & lactose-if intolerant

(b) gradual ↑ of rye, barley, legumes, garlic, onion, beetroot, grapefruit, cashews, pistachios or

(c) inulin

-Protein: moderate intake according to healthy recommendations particularly from red & processed meat

-↓ Sulphate & sulphite preservatives

- Consider a Mediterranean diet

-Probiotics

Irritable Pouch(no pouchitis)

-↓triggers (caffeine, fried/fatty foods, excess capsaicin(chilly), carbonated beverages

-↓ FODMAPs intake including

lactose, if lactose intolerant

-Fruits & vegetables: Eat as tolerated, avoid those high in

excess fructose and polyols i.e. apples, pears, stone fruits, watermelon, and vegetables, such as asparagus, cauliflower and mushrooms.

-Protein: moderate intake according to healthy recommendations particularly from red & processed meat

-↑ Total starch intake (digestible and resistant starch) including bread, most grains and cereal products, potatoes

Optimize Diet

Nourish

Minimize Symptoms/Optimize pouch function

Promote healthy microbiota

Enjoy Food

Pouch Narrowing/Stenosis

-Liquid diet (high output pouch advice may be given)

- Partial liquid diet if tolerated with soft low insoluble fibre foods (little and often, chew food well, eat slowly)

-Ensure nutritionally complete liquid meal replacements

-Ensure good hydration

High output pouch

-Restrict fluids (<1Litre)

-Take electrolyte replacement solution(i.e. 1 litre St Mark's E-mix)

-Correct electrolyte imbalances (i.e. Mg^{2+},K^{+})

-Restrict insoluble fibre and ↑ of soluble fibre i.e.psyllium husk x1 tbsp 2x day)

-Added salt /salty foods

-Optimize medical therapy (loperamide, omeprazole+/- codeine phosphate

-Consider trialling bile questran (colesevelam)

-Exclude other causes i.e. Pancreatic exocrine insufficiency (PEI)/Small intestinal bacterial overgrowth (SIBO)

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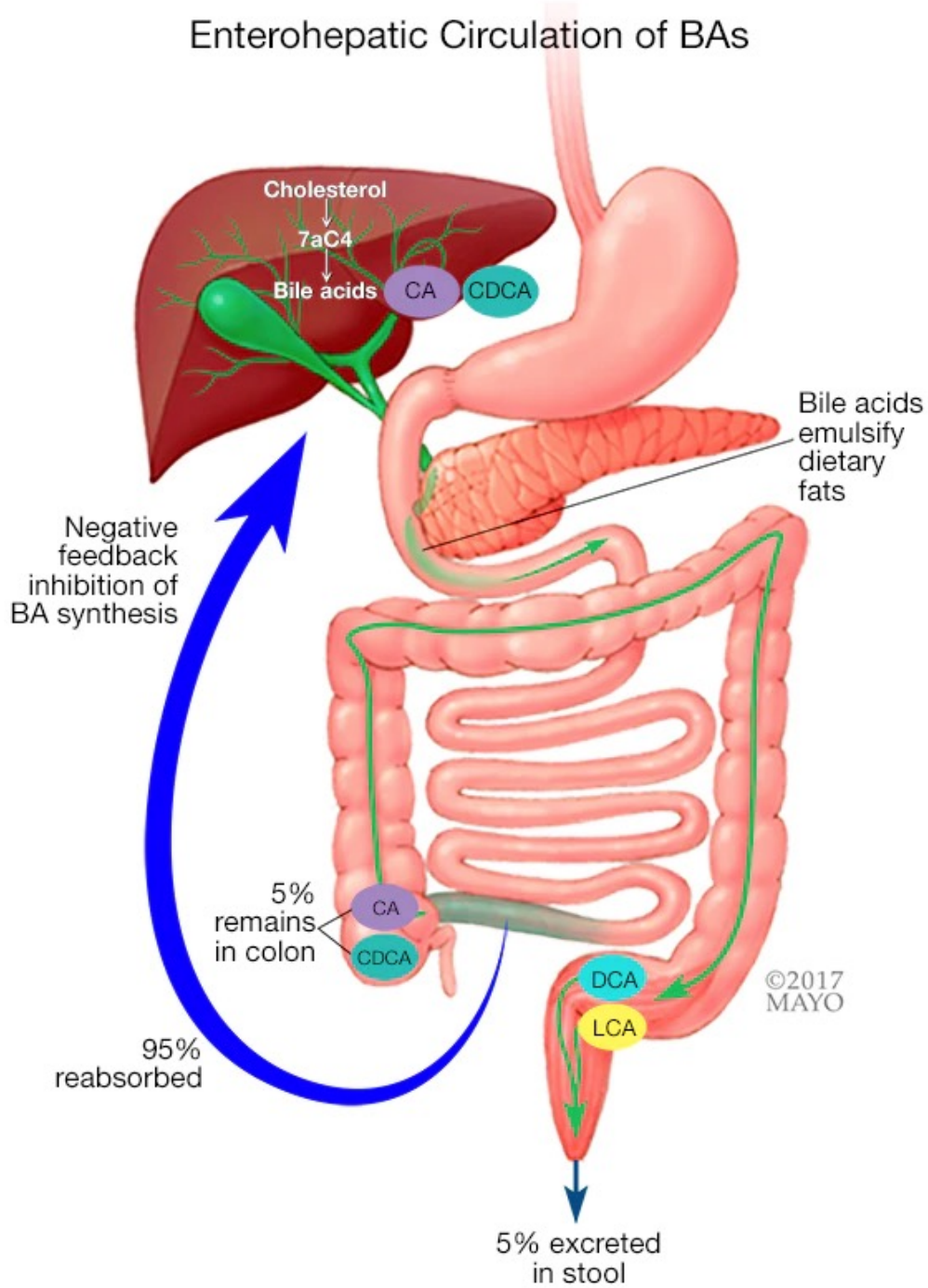
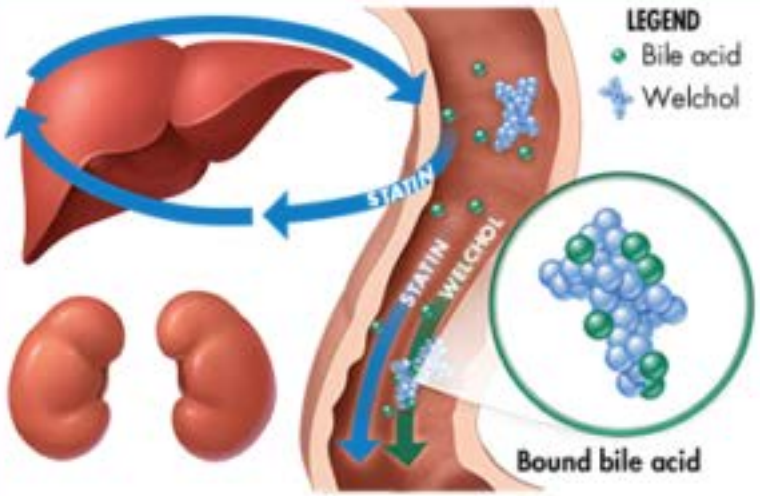
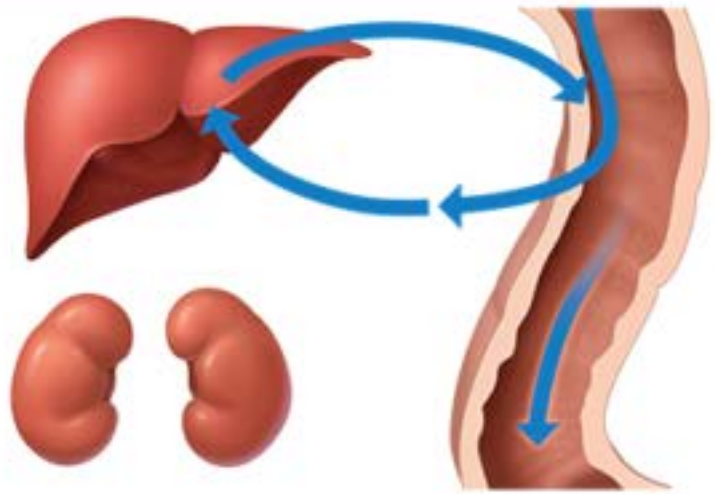

Enterohepatic Circulation of BAs
Cholesterol
7aC4
Bile acids
CA
CDCA
Bile acids emulsify dietary fats
Negative feedback inhibition of BA synthesis
5% remains in colon
CA
CDCA
DCA
LCA
95% reabsorbed
5% excreted in stool
©2017 MAYO

WELCHOL PATHWAY[2]



Welchol works in the small intestine, avoiding being metabolized by the liver and kidneys

STATIN PATHWAY



Statins work in the liver; they are mostly metabolized by the liver and excreted in the bile