

Importance of Nutrition & Inflammation in MPN

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Nutrition & MPN Inflammation



What is inflammation – acute vs chronic



MPN Inflammation



How food choices impact inflammation



Gut microbiome, fibre & health



Anti-inflammatory eating tips



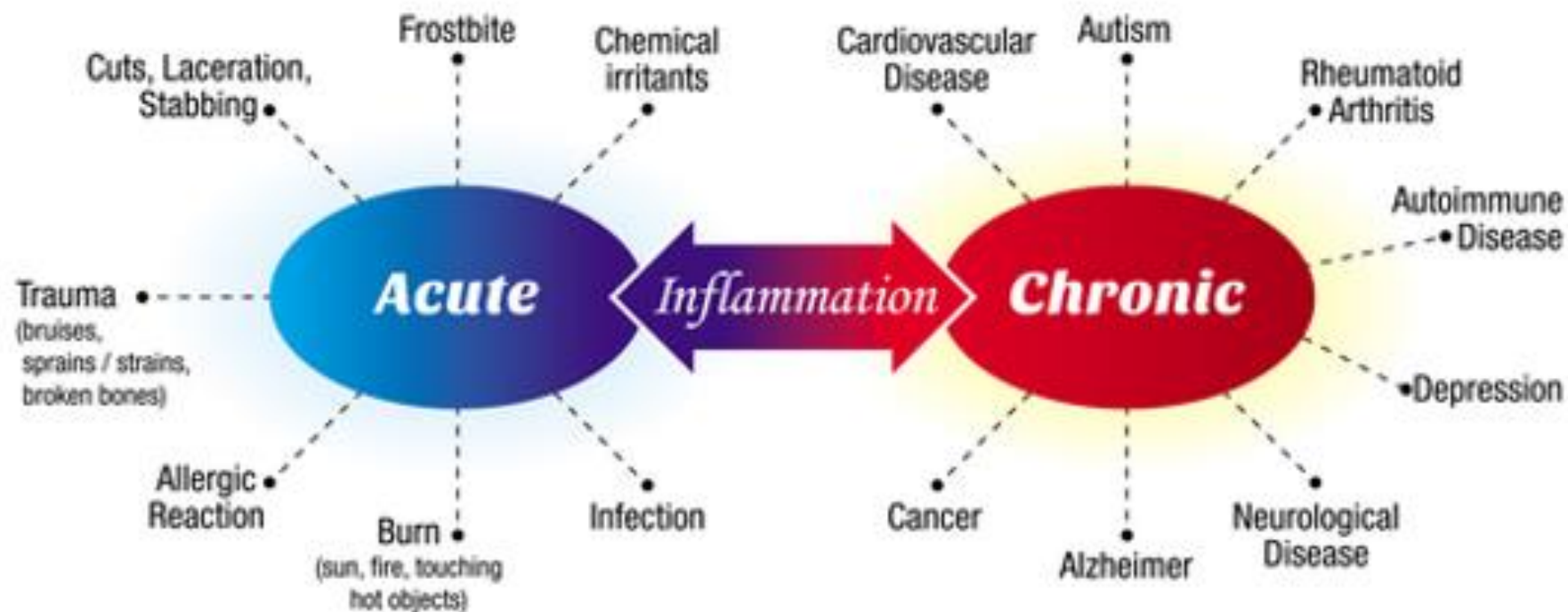
Eating priorities before a SCT



Nutrition links



Inflammation - Acute VS chronic



Short term immune response

- fights infection, assists healing
- important immune function

Prolonged immune response.

- Chronic low-grade inflammation
- Last months or years.
- Leads to tissue damage rather than healing
- Measure by biomarkers: CRP, IL-6, TFNa

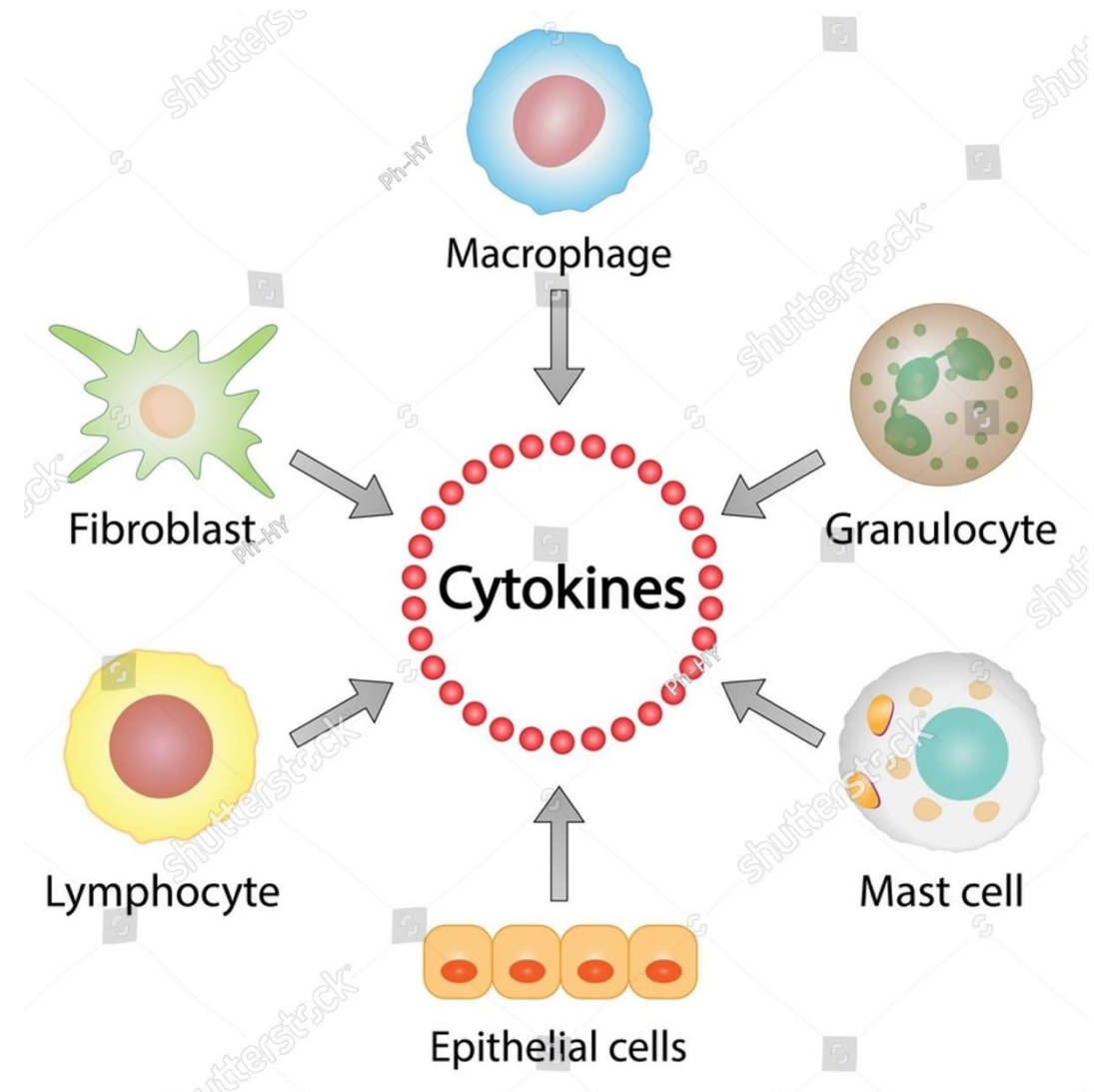
Inflammatory response produces CYTOKINES

- Small molecules released by immune cells to fight infection & assist healing.

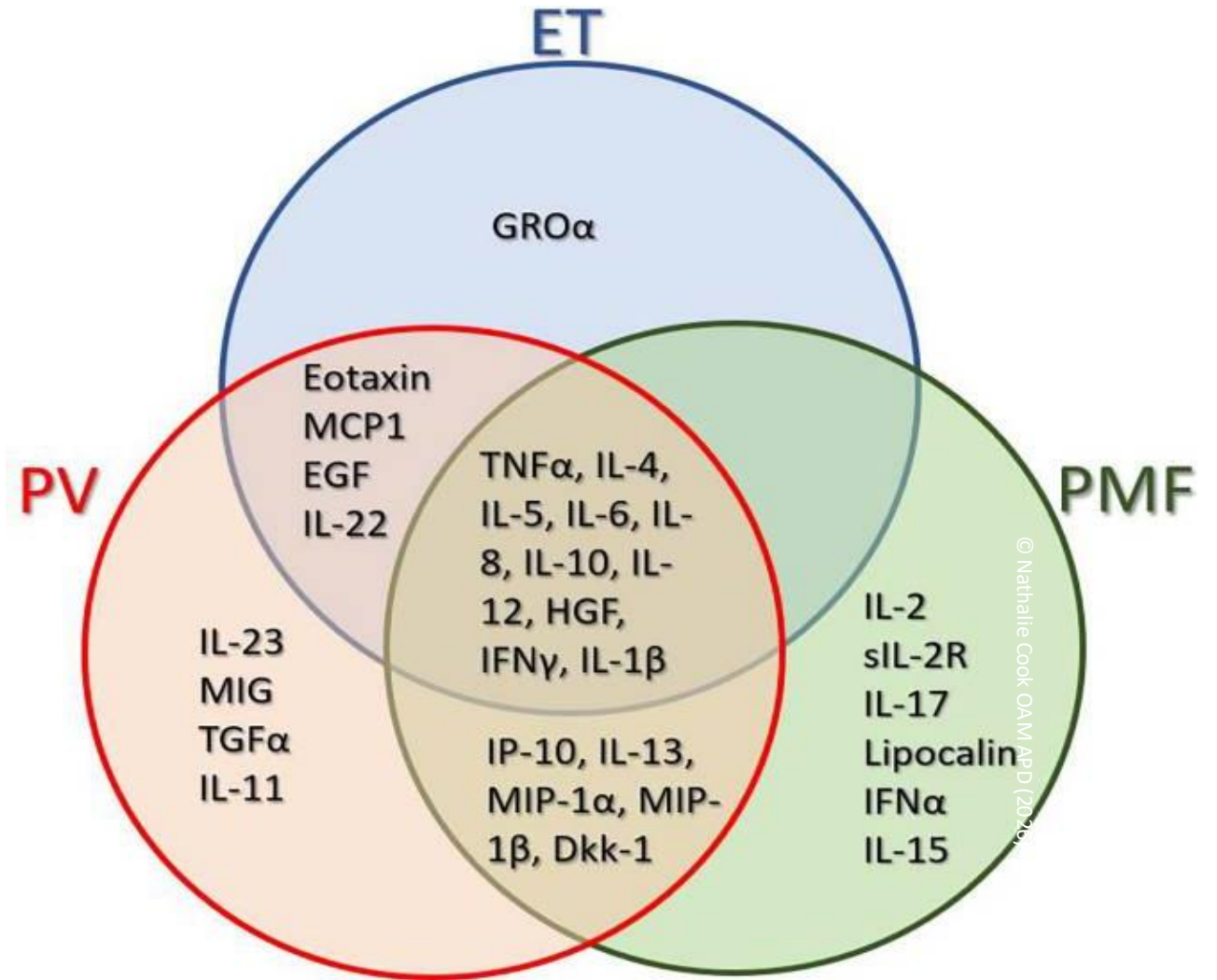
CRP, IL-6, TNF-alpha

- Signal danger & call for help from the immune system.
- Chronic low-grade inflammation & cytokines drive:

MPN & other chronic inflammatory diseases -
CVD, T2DM, RA etc



MPNs (ET, PV, MF)
are assoc. with
chronic
inflammation &
elevated
inflammatory
cytokines



Ramanathan G, **Fleischman AG**. The Microenvironment in Myeloproliferative Neoplasms. *Hematol Oncol Clin North Am*. 2021;35(2):205-216.

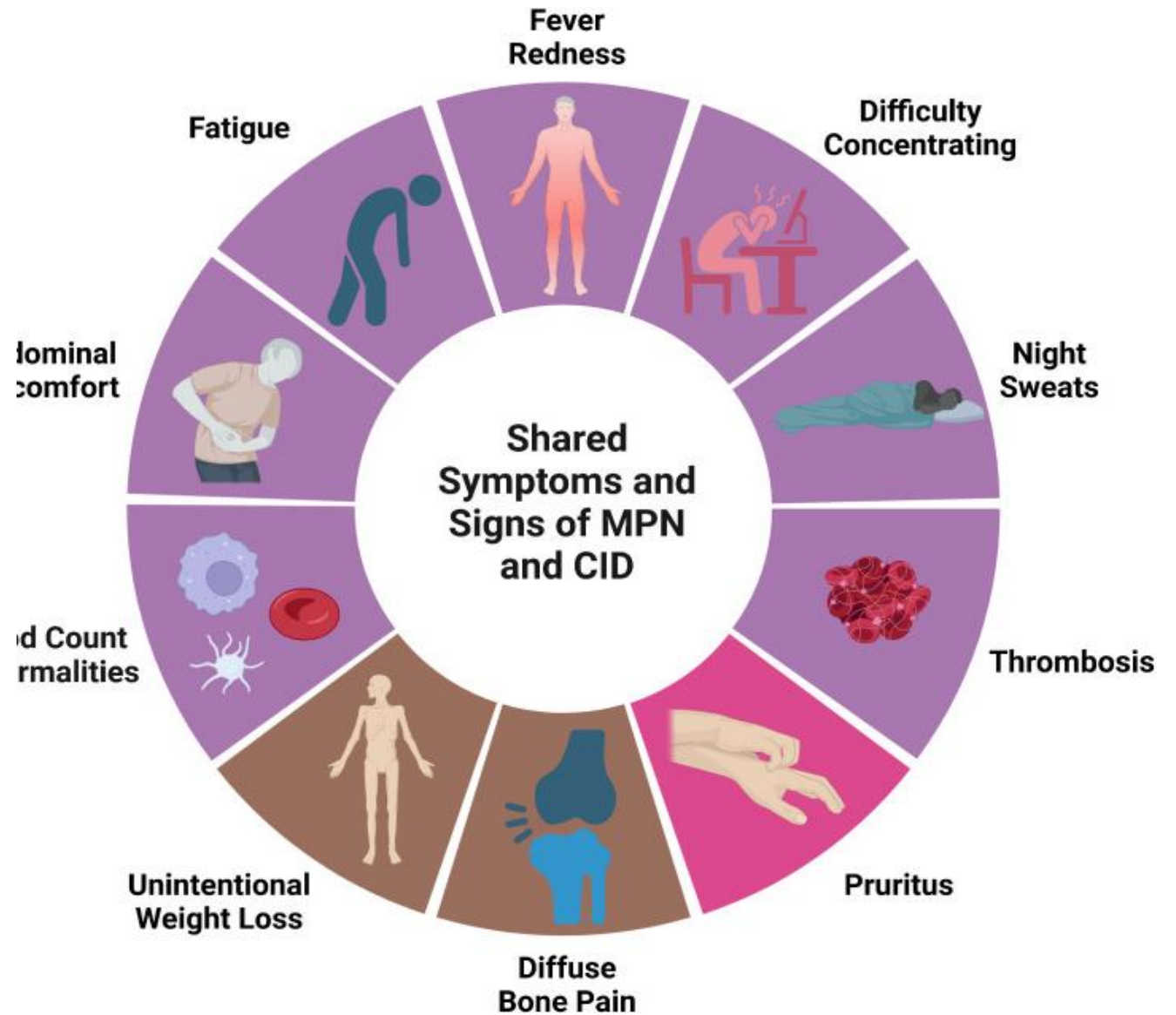


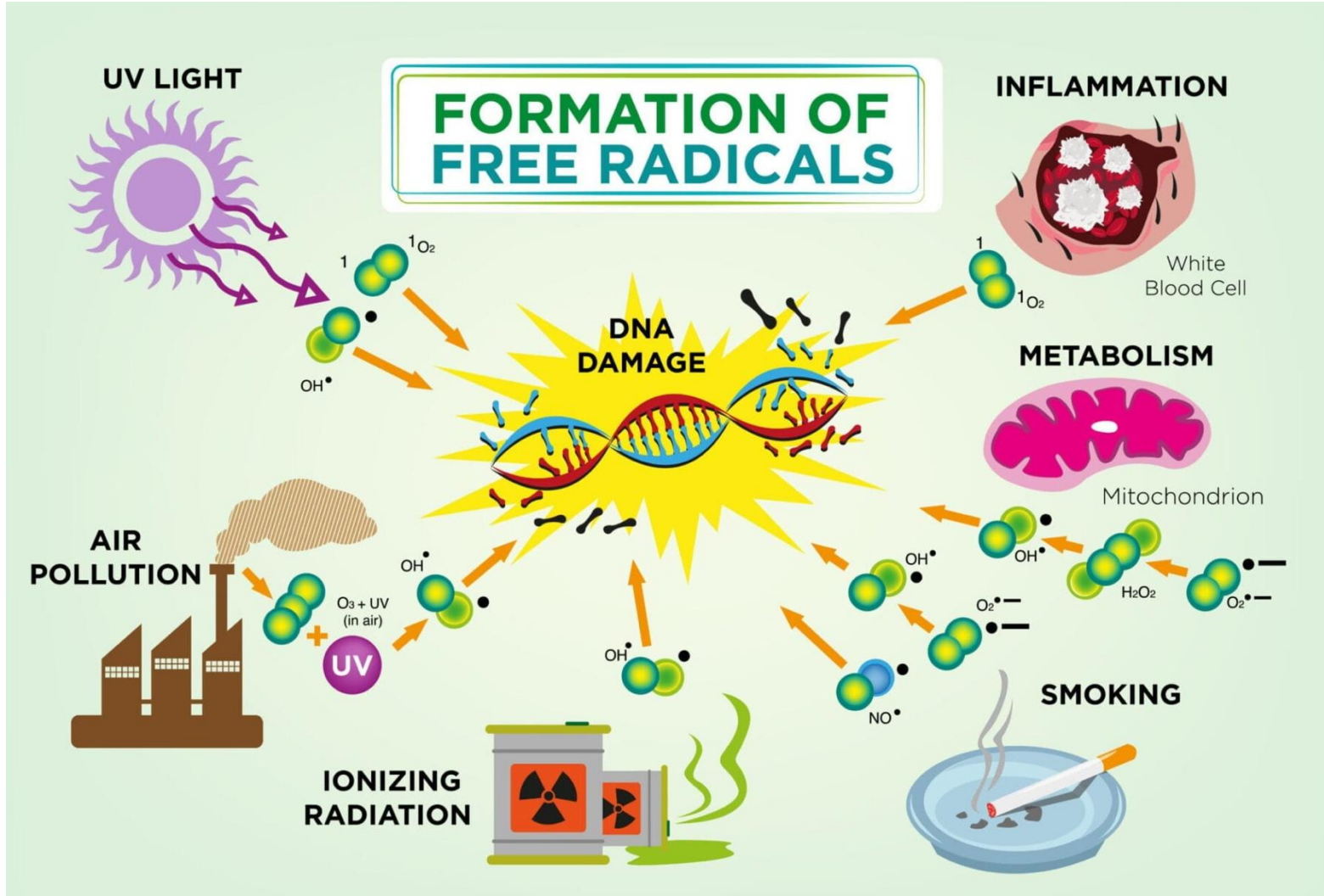
SOURCE: Fleischman, AG, University of California, Irvine- Nutrition and MPN

Myeloproliferative neoplasms – blurring the lines between cancer and chronic inflammatory disorder

Eli M Soyfer¹, Angela G Fleischman

Front Oncol. 2023



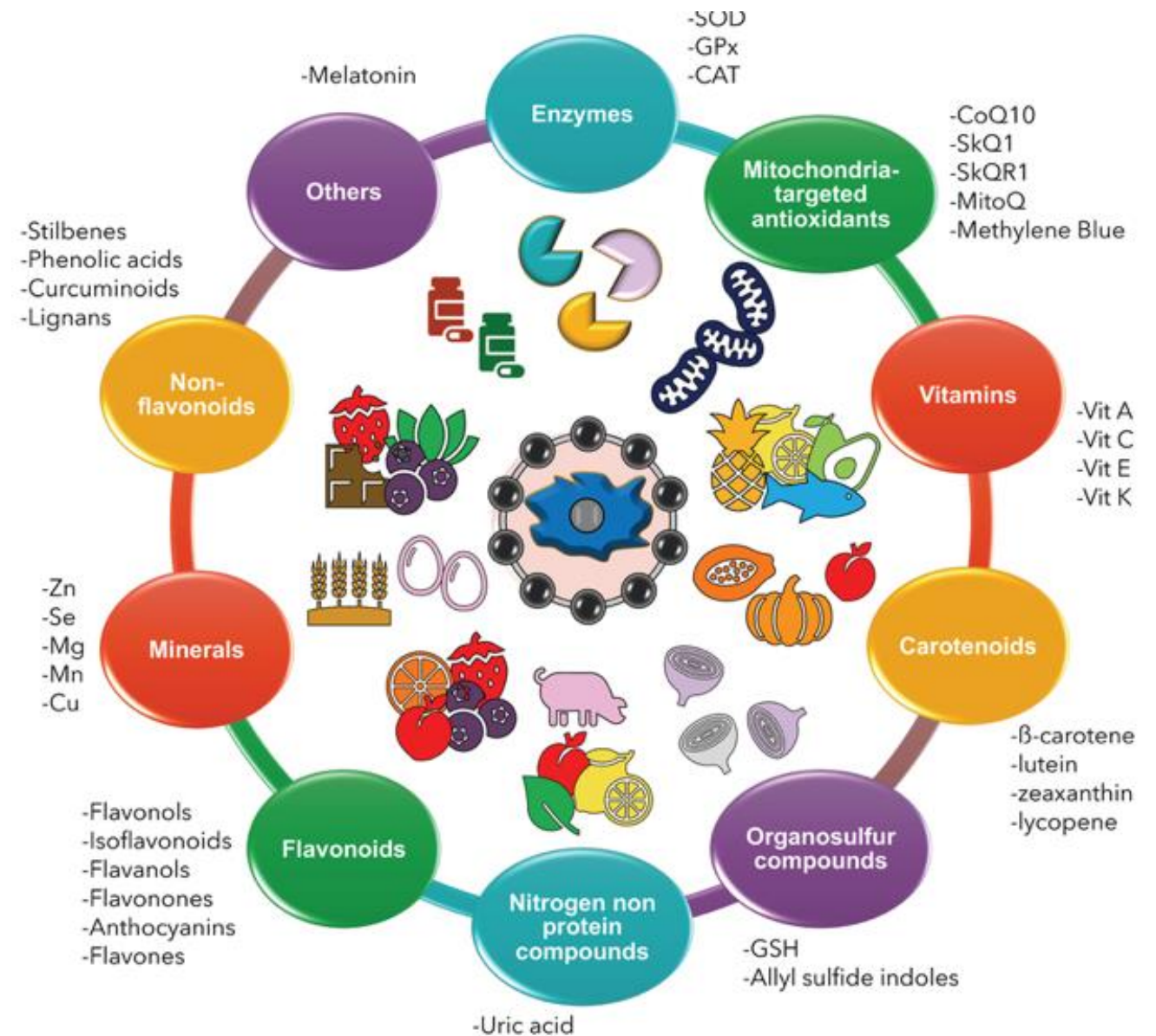


- Inflammatory cytokines & environmental factors produce **FREE RADICALS**

(unstable molecules missing an electron)

- Free radicals cause oxidative cell damage

- **Antioxidants** stop free radical chain reactions, without becoming unstable themselves
- Both internal & external antioxidants - help balance cytokines & oxidation:
 - Enzymes
 - Flavonoids/polyphenols
 - Vitamins (A,C,E,K)
 - Minerals - selenium, zinc etc



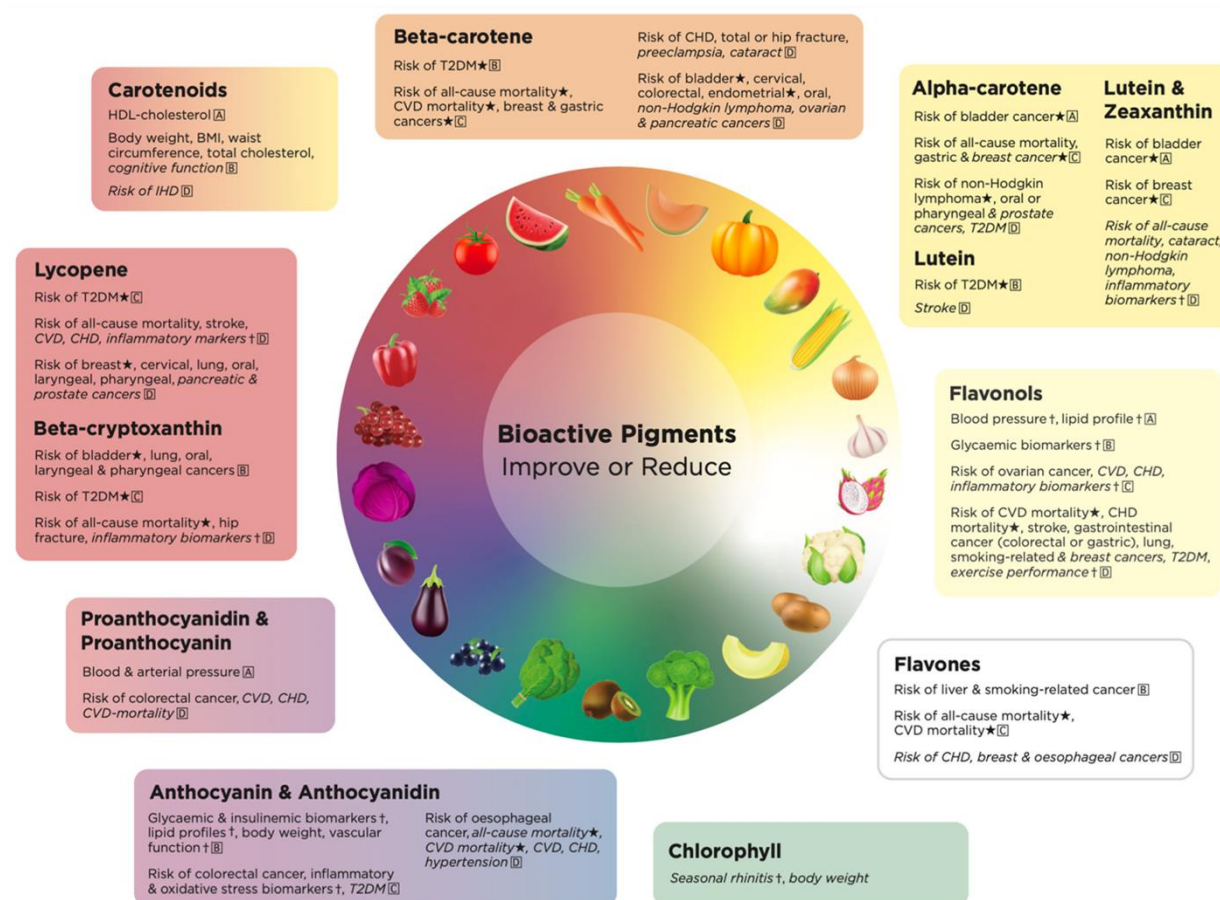


- Good news –**ANTIOXIDANTS** in colourful plant foods help reduce inflammation & limit free radical/oxidative cell damage!
- No specific ‘MPN diet’, however, experts agree...

We benefit from a diet of **mostly minimally processed, colourful, high fibre plant foods, including olive oil & by limiting ultra-processed foods.**
- Healthy eating **also protects general, gut & cardiovascular health.**

Flavonoids and other bioactive pigments in plant foods give their bright colours and are assoc. with better health outcomes: type 2 diabetes, blood lipids, inflammation, cardiovascular disease, cancer & overall mortality

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Blumfield, M., Mayr, H., Vlieger, N. D., Abbott, K., Starck, C., Fayet-Moore, F., & Marshall, S. (2022). **Should We ‘Eat a Rainbow’? An Umbrella Review of the Health Effects of Colorful Bioactive Pigments in Fruits and Vegetables.** *Molecules*, 27(13), [4061]. <https://doi.org/10.3390/molecules27134061>

Review

Flavonoids—Chemistry, metabolism, cardioprotective effects, and dietary sources

N.C. Cook and S. Samman

Human Nutrition Unit, Department of Biochemistry, University of Sydney, Sydney, Australia

N.C. **Cook**, S. Samman. Flavonoids – Chemistry, metabolism, cardioprotective effects, and dietary sources, ***The Journal of Nutritional Biochemistry***, Volume 7, Issue 2, (1996), Pages 66-76 (Cited by 4164)

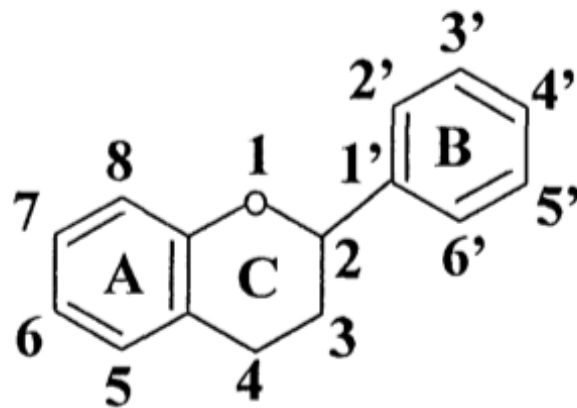


Figure 1 The generic structure of flavonoids.

Flavonoids: Cook and Samman

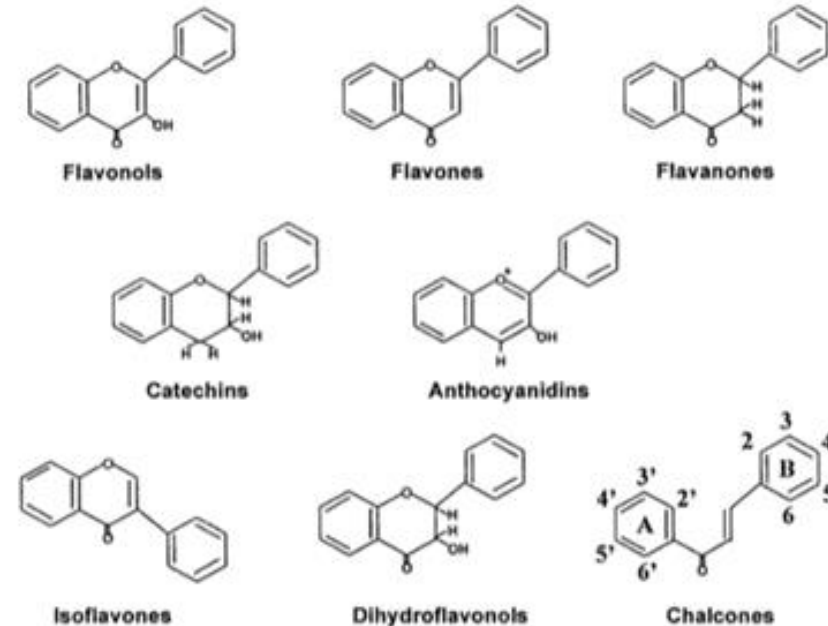


Figure 2 The structures of the major classes of flavonoids.

Functional groups on flavonoids **donate electrons** to stabilize **FREE RADICALS**:

- Carbonyl group (C=O):
- Carboxylic acid group (-CO₂H or -COOH)
- Methoxy group (-OCH₃)

Antioxidants in Foods

	Antioxidant	Sources
	Vitamin E	Sunflower seeds, almonds, peanut butter, wheat germ oil, avocados
	Vitamin A	Carrots, sweet potatoes, liver, pumpkin, turnip greens
	Vitamin C	Kiwis, sweet peppers, peaches, broccoli, citrus fruit
	Cryptoxanthin	Butternut squash, tangerines, papaya, plums, corn
	Selenium	Mixed nuts, turkey, wheat, tuna, wheat germ
	Astaxanthin	Lobster, crab, shrimp, seaweed, salmon
	Anthocyanin	Eggplant, blueberries, raspberries, blackberries, red cabbage
	Lycopene	Tomatoes, guavas, watermelon, pink grapefruit, asparagus
	Lutein	Spinach, kale, mustard green, swiss chard, green peas
	Catechins	Dark chocolate, green tea, black tea, red wine, black grapes,
	Quercetin	Onions, apples, parsley, olive oil, dark cherries

Evidence diet impacts cytokines & inflammatory biomarkers

THE MEDITERRANEAN DIET



Adherence to a Mediterranean style diet: (N=3,042):

Lower inflammatory markers (cytokines):

20% lower **CRP**

17% lower **IL-6 levels**

Lower coagulation markers

15% lower **homocysteine** levels

14% lower **white blood cell counts**

6% lower **fibrinogen levels**

Inverse assoc. between healthy eating and **all cause mortality**

* **Physical activity** – as normal part of life

Mitrou et. al. Arch Intern Med. 2007;167(22):2461-2468.

Chrysohoou et. al. J Am Coll Cardiol. Jul 7 2004;44(1):152-158.

(Adapted from: R. Scherber, MD Mays Cancer Center)



1st trial investigating impact of a Mediterranean style diet on MPN symptoms & inflammation:

28 MPN pts - able to adhere to a Mediterranean diet pattern (15 weeks).

Adherence to a Mediterranean diet resulted in 42% reduction in MPN symptoms

The NUTRIENT Trial (NUTRitional Intervention among myEloproliferative Neoplasms): Results from a Randomized Phase I Pilot Study for Feasibility and Adherence

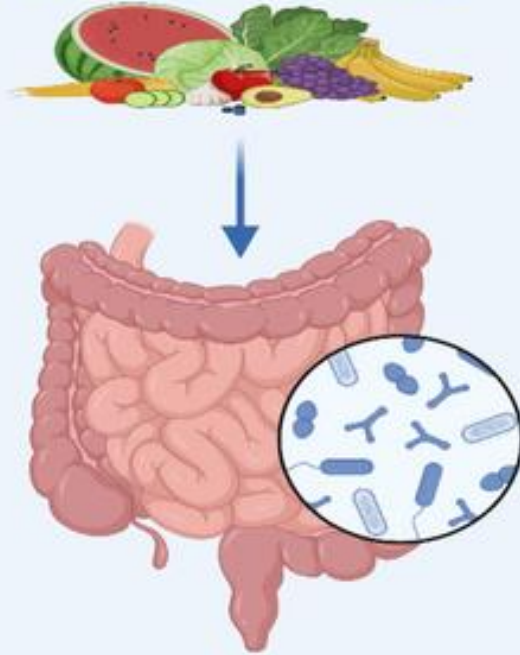
L. F. Mendez Luque, J. Avelar-Barragan, H. Nguyen, J. Nguyen, E. Soyfer, J. Liu, J.H.Chen, N. Mehrotra, X. Huang, H. Kosiorek, A. Dueck, A. Himstead, E. Heide,, M. Lem, K. ElAlaoui, E. Mas,. R. Scherber, R. Mesa, K. Whiteson, A. Odegaard, and A.G. Fleischman (*Cancer Res Commun* 2024)

Research is ongoing....



Western Diet vs. Mediterranean Diet effects on Gut Health

Mediterranean Diet



- ↓ Gut inflammation
- ↑ Rich in fiber, fruits, and vegetables
- ↑ High in healthy fats
- ↑ Supports gut microbiota balance
- ↑ Boosts beneficial bacteria

Western Diet

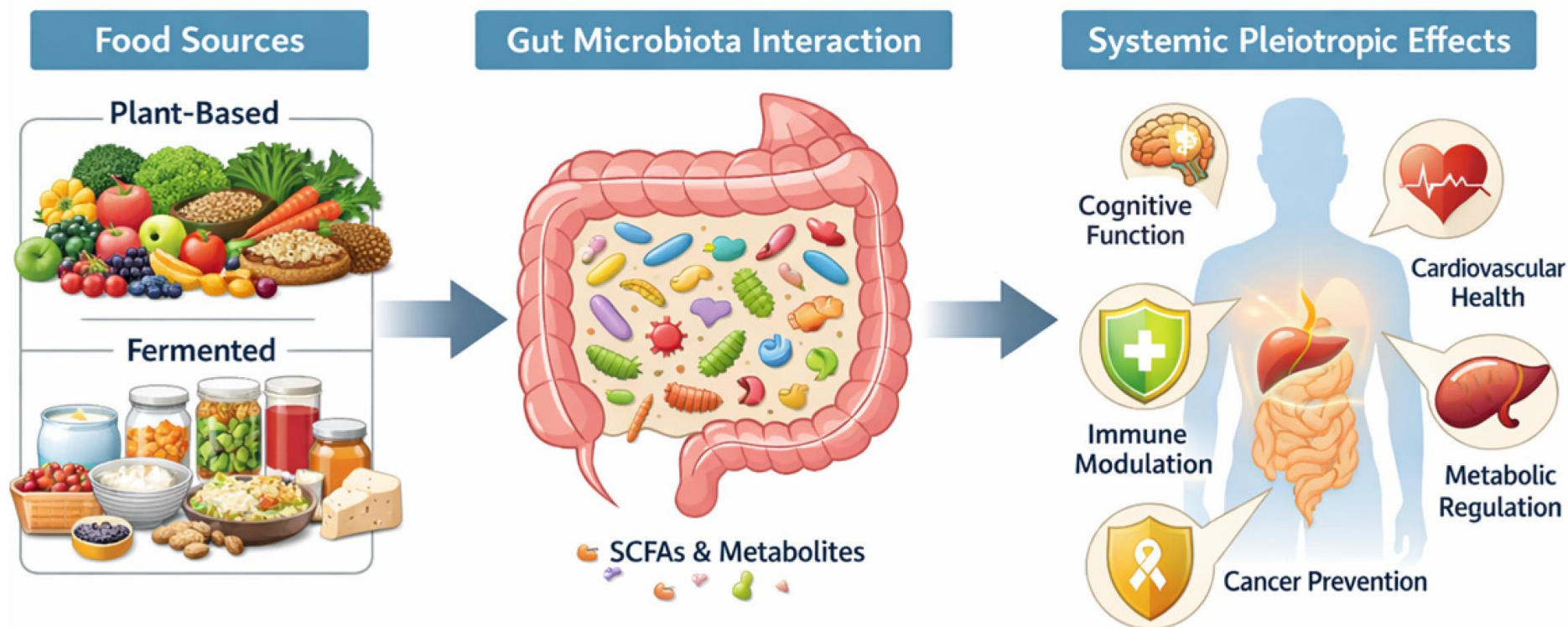


- ↑ High in saturated fats and sugars
- ↑ Increases harmful bacteria
- ↑ Triggers inflammation
- ↓ Low in fiber
- ↑ Linked to leaky gut

We have >38 trillion gut microbes. They use fibre & flavonoids from plant foods to make short-chain fatty acids (SCFAs) & other metabolites that fight inflammation throughout the body

(* SCFA: Butyrate, propionate, acetate)

(Pleiotropic = multiple effects)

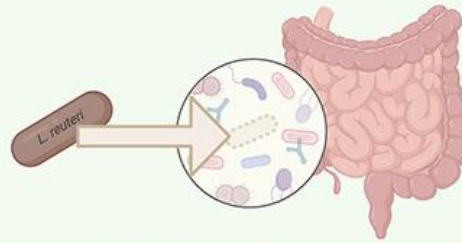


Review: Probiotic and Bioactive Compounds in Foods: From Antioxidant Properties to Gut Microbiome Modulation. B. Goncalves et al, *Molecules* **2026**, 31(2), 345;

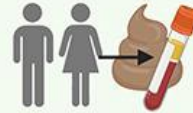
Non-industrialized-type diet "Restore diet"



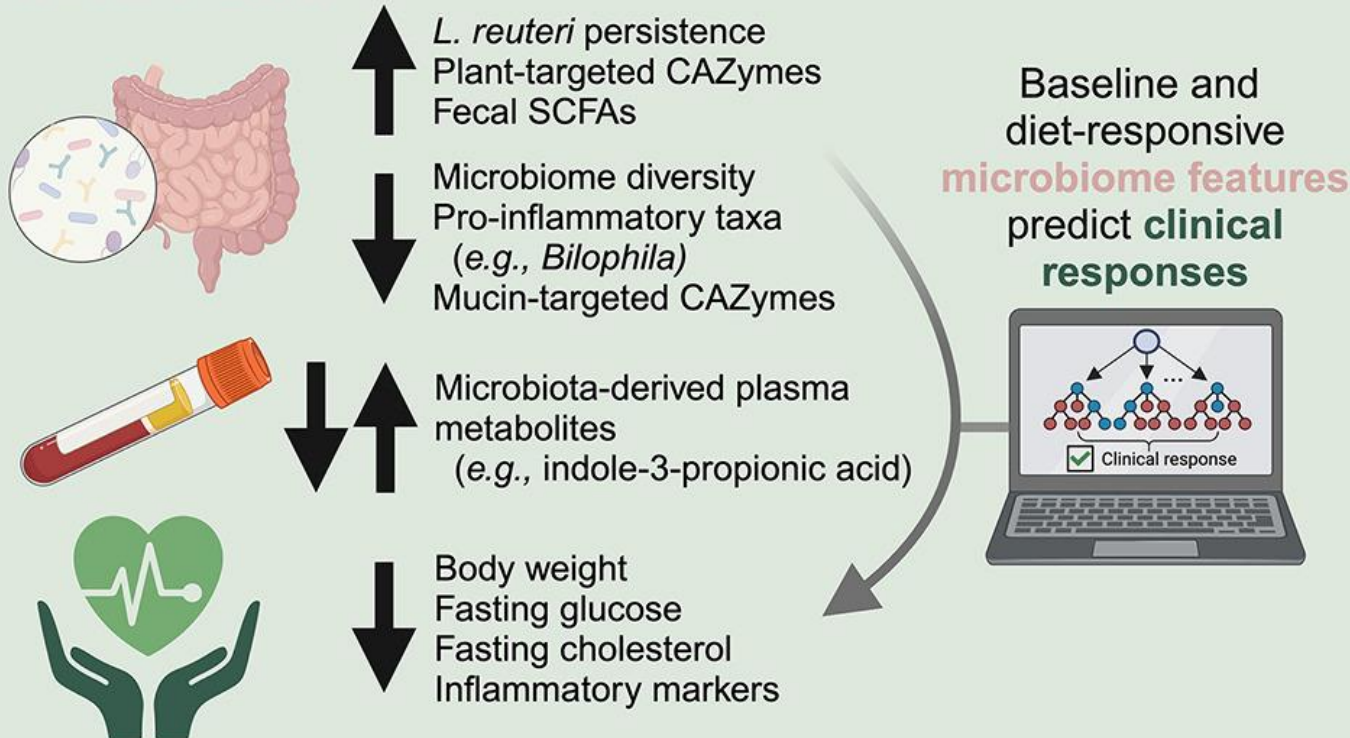
Lost microbe *Limosilactobacillus reuteri*



Randomized controlled feeding trial



Restore diet:



Cardiometabolic benefits of a non-industrialized type diet are linked to gut microbiome modulation

Li et al., 2025, *Cell* 188, 1226–1247 March 6, 2025

<https://doi.org/10.1016/j.cell.2024.12.034>

Limit these

Pro-inflammatory foods

Processed
foods



Fried snacks



Sugary foods
& beverages



Refined carbs



Alcohol



Eat more of these

Anti-inflammatory foods

Leafy greens
& vegetables



Healthy fats



Fruits



Spices & herbs



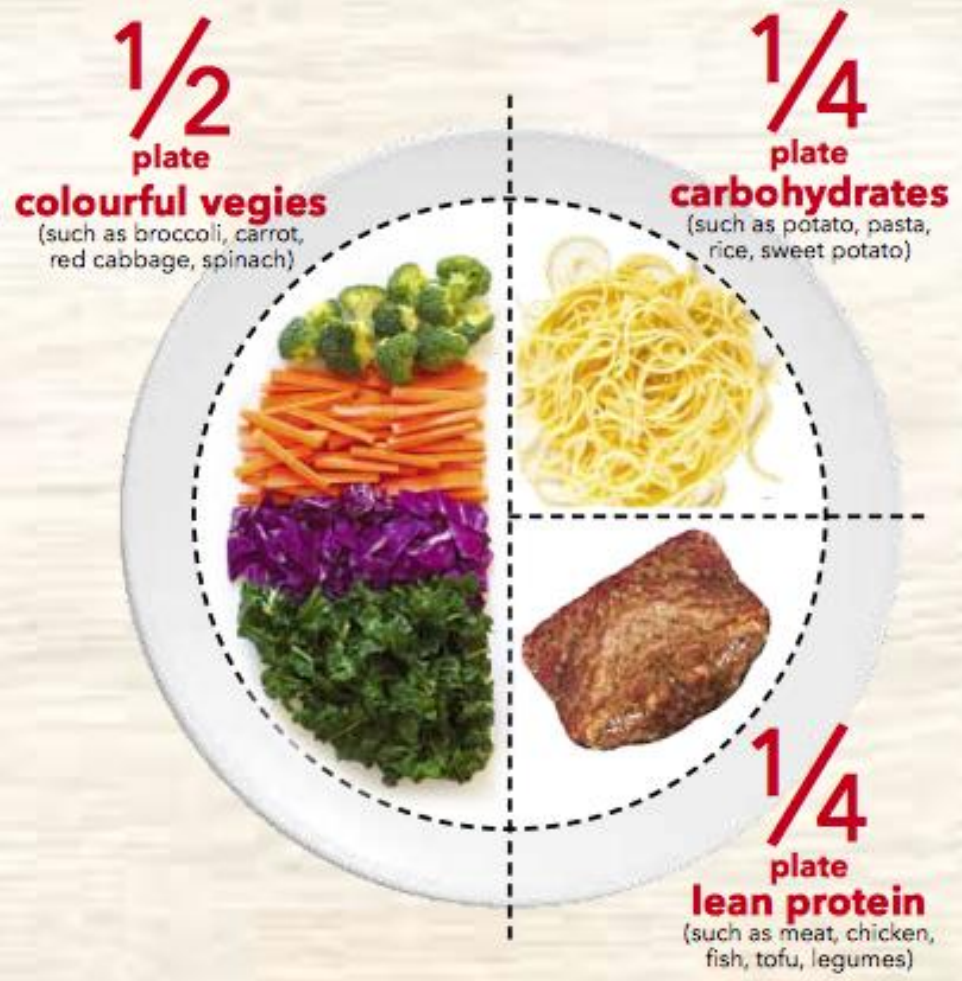
Whole grains



Green tea



Healthy plate portions



Source: www.healthyfoodguide.com.au

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- Increase fibre gradually for better GI tolerance
- Include a variety of different fibre sources to feed the diverse gut microbes
- Aim for 25-35g fibre/day
- Ensure adequate fluid intake

<https://dietitianconnection.com/category/patient-resources/gut-health-resources/>

Fibre-fuelled swaps

Fibre is a key nutrient for a happy, healthy gut. A few simple swaps like the examples below can give your fibre intake a big boost.

Try swapping...	For this...
 Regular pasta 2.5g fibre per cup (cooked)	 Wholewheat pasta 6.5g fibre per cup (cooked)
 White rice 1.5g fibre per cup (cooked)	 Brown rice 2.5g fibre per cup (cooked)
 Raspberries smoothie 4.5g fibre per cup	 Raspberries smoothie with 1/2 cup berries 9.5g fibre per cup
 Apple juice 0.5g per cup	 Whole apple 4.5g fibre per apple
 Plain crispbread 5.5g fibre per 6 crispbread	 Wholewheat crispbread 8.5g fibre per 6 crispbread
 Cream cheese dip 0g fibre per 100g portion	 Hummus dip 1.5g fibre per 100g portion
 White bread 1g fibre per slice	 100% wholewheat bread 3.5g fibre per slice
 Potato wedges 5.5g fibre per handful	 Beans 5.5g fibre per handful
 Chocolate milkshake 0.5g fibre	 Soft smoothie made with milk, banana and berries 5.5g fibre
 Butter 0g fibre per teaspoon	 Avocado 3g fibre per 1/2
 Cakes 0g fibre per handful	 Dried apricots 2.5g fibre per 10 dried apricots
 Vanilla ice cream 0g fibre per scoop	 Frozen grapes and berries 2.5g fibre per 1/2 cup each grapes and berries

- Men need 30g fibre per day
- Women need 25g fibre per day



Speak to a dietitian for personalised & practical nutrition advice



Aim for 30+ plants each week

Eating a variety of plants each week supports a healthy gut. Using the table below, tick off the plant foods you eat each week. Your goal is 30 different types – but the more, the merrier!

Veggies					
☐ Asparagus	☐ Broccoli	☐ Carrot	☐ Eggplant	☐ Kale	☐ Parsnip
☐ Avocado	☐ Brussels sprouts	☐ Cauliflower	☐ Fennel	☐ Mixed leafy greens	☐ Potatoes
☐ Beetroot	☐ Cabbage	☐ Celery	☐ Green beans	☐ Mushroom	☐ Pumpkin
☐ Bok Choy	☐ Capsicum	☐ Corn	☐ Iceberg lettuce	☐ Onion	☐ Rocket
☐ Broccoli		☐ Cucumber	☐ Jerusalem artichoke		☐ Silver beet
☐ Spinach					☐ Sweet potato
					☐ Turnip
					☐ Zucchini

Fresh Herbs			Nuts & Seeds		
☐ Garlic	☐ Mint	☐ Thyme	☐ Chia seeds	☐ Poppyseeds	☐ Almonds
☐ Chilli	☐ Onions	☐ Lemon grass	☐ Sunflower seeds	☐ Tahini	☐ Cashews
☐ Coriander	☐ Ginger	☐ Rosemary	☐ Pumpkin seeds	☐ Nut butter (natural)	☐ Walnuts
☐ Dill	☐ Basil		☐ Flaxseeds	☐ Pine nuts	☐ Hazelnuts
☐ Parsley	☐ Dill		☐ Sesame seeds		☐ Pistachios

Fruits					
☐ Apple	☐ Boysenberries	☐ Fig	☐ Jackfruit	☐ Orange	☐ Persimmon
☐ Apricot	☐ Rockmelon	☐ Grapefruit	☐ Kiwifruit	☐ Papaya	☐ Pineapple
☐ Banana	☐ Cherries	☐ Grapes	☐ Mandarin	☐ Passionfruit	☐ Plum
☐ Blackberries	☐ Custard apple	☐ Guava	☐ Mango	☐ Peach	☐ Pomegranate
☐ Blueberries	☐ Dates	☐ Honey dew melon	☐ Melon	☐ Pear	☐ Raisins
					☐ Raspberries
					☐ Strawberries
					☐ Tamarind
					☐ Watermelon

Legumes			
☐ Beans	☐ Chickpeas	☐ Lentils	☐ Peas

Whole grains	
☐ Brown rice	☐ Wild rice
☐ Barley	☐ Rye
☐ Bulgar wheat	☐ Buckwheat
☐ Tef	☐ Millet
☐ Sorghum	☐ Amaranth
☐ Quinoa	☐ Oats
☐ Popcorn	☐ Whole grain bread
☐ Whole grain crackers	☐ High fibre breakfast cereals

Speak to a dietitian for personalised & practical nutrition advice

GUT HEALTH MONTH

[Aim for 30+ plants each week | Dietitian Connection](#)

Easy anti-inflammatory breakfast ideas

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Oats, colourful fruit, seeds, nuts, yoghurt, lemon juice & zest etc



Eggs & veggies on grainy toast.



Chia, yoghurt & fruit puddings



Toasties with colourful veg & cheese

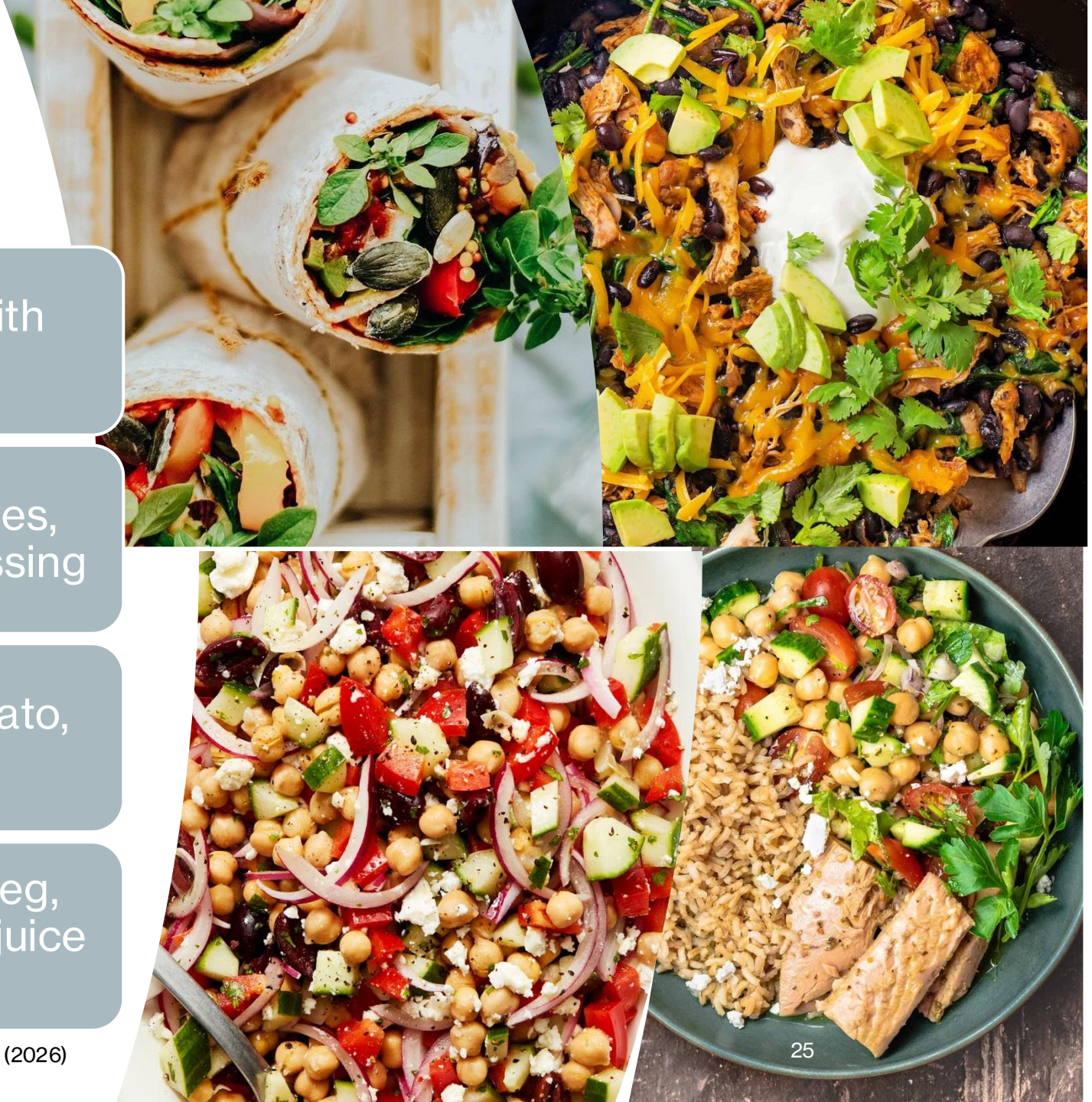
Easy anti-inflammatory lunch ideas

Egg, chicken, tuna or legume wraps with colourful salad, cheese & houmous.

Shredded chicken with beans, cabbages, grated carrot, lettuce, nuts & lime dressing

Legumes with cucumber, parsley, tomato, onion, rocket, feta & olives

Tinned salmon or tuna with colourful veg, quinoa or brown rice, legumes, lemon juice & olive oil



Easy anti-inflammatory dinner ideas

Baked salmon & veg with olive oil

Pesto, bean & veg pasta

Skinless chicken stir fry & veg

Legume & veg bowl

Lean beef & veg stir fry

Cook with olive oil, herbs & spices for flavour & extra anti-oxidants



Healthy Snack Ideas:



**Other lifestyle
factors that can
help reduce
inflammation**

How to Reduce Chronic Inflammation



Maintain a healthy weight.



Eat a healthy and balanced diet.



Minimize ultra-processed foods.



Limit alcohol.



Stay hydrated.



Avoid smoking.



Exercise regularly.



Practice stress management.



Get enough sleep.

Nutrition priorities before a stem cell transplant (SCT)

- **Build weight reserves:** high energy/high protein food to offset upcoming weight loss.
- **Boost protein intake:** to build/ protect muscles.
- AIM: 1.2-1.5g/kg bw (70kg = 84-105g/day)
- **Fix vitamin deficiencies:** Dr-approved supplements
- **Hydration:** Fluids help kidneys flush out chemotherapy waste
- **Learn about food safety:** to prevent food born infection when WCC/immunity is low post Tx



Healthy eating is good medicine!

It's empowering & something we can do everyday to stay well with MPN

- Include **colourful** plant foods daily- Vits, minerals, **flavonoids & fibre**
 - Increase slowly. Try 1 change/day
 - Think '**everyday**' & '**sometimes**' foods –**NOT** 'good' or 'bad' foods!
- **Enjoy olive oil** in cooking & salads
- **Include lean protein at each meal** for strong muscles & bones (dairy, chicken, meat, eggs, legumes, nuts, seeds)
- Use the **Portion Plate Model** (1/2 veg, 1/4 lean protein & 1/4 high fibre/low GI carbs, + healthy fats).
- **Move more & sit less** - reduces fatigue, assists weight mgt, mental & physical health.



Nutrition & Inflammation Links

[Portion plate guide | Baker Institute](#)

[What is the Gut Microbiome? | Deakin Food and Mood Centre](#)

[Dietary fibre](#) Baker Heart & Diabetes Institute www.baker.edu.au

[Diet and nutrition health advice | Dietitians Australia](#)

[Healthy Recipes: Thousands of perfect meals from Healthy Food Guide](#)

[Gut health resources | Dietitian Connection](#)

[Aim for 30+ plants each week | Dietitian Connection](#)

[Flavonoids—Chemistry, metabolism, cardioprotective effects, and dietary sources – ScienceDirect](#)
Cook, N.C & Samman, S. (1996) *J. Nutr. Biochem.*

Questions ???

