Prostate Cancer- Part Three:

Immune Support
Gut Health Optimisation
Living well after treatment

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Three Webinars- Objectives

By the end of the three webinars you should be able to:

- Understand the principles and importance of **gut health**
- Employ at least **1 new technique to help optimise gut health**
- Identify at least **1 key supplement that can potentially benefit your situation**
- Discuss **nutritional support** in the context of your treatment
- Learn and put into practice at least **1 change in your diet which will benefit your immune system**
- Learn and put into practice at least **1 change in lifestyle**

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What we will cover in Part Three

- Supporting immunity
- Gut health optimisation
- Supporting brain health and bone health
- Modifiable lifestyle factors to support health

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Poll 1

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Immunity

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Immunity

- The immune system is the body's defence apparatus

- Efficient defence is reliant on **intact defence barriers, good border control, detection and recognition of harm, intelligence (memory), surveillance mechanisms**

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Immunity

1. Defence barriers: the body's linings (e.g. the gut barrier)
2. Border control (immune cells beneath the linings)
3. Recognition systems (specialised immune cells beneath the linings)
4. Intelligence and memory (e.g. antibodies)
5. Surveillance (messengers)

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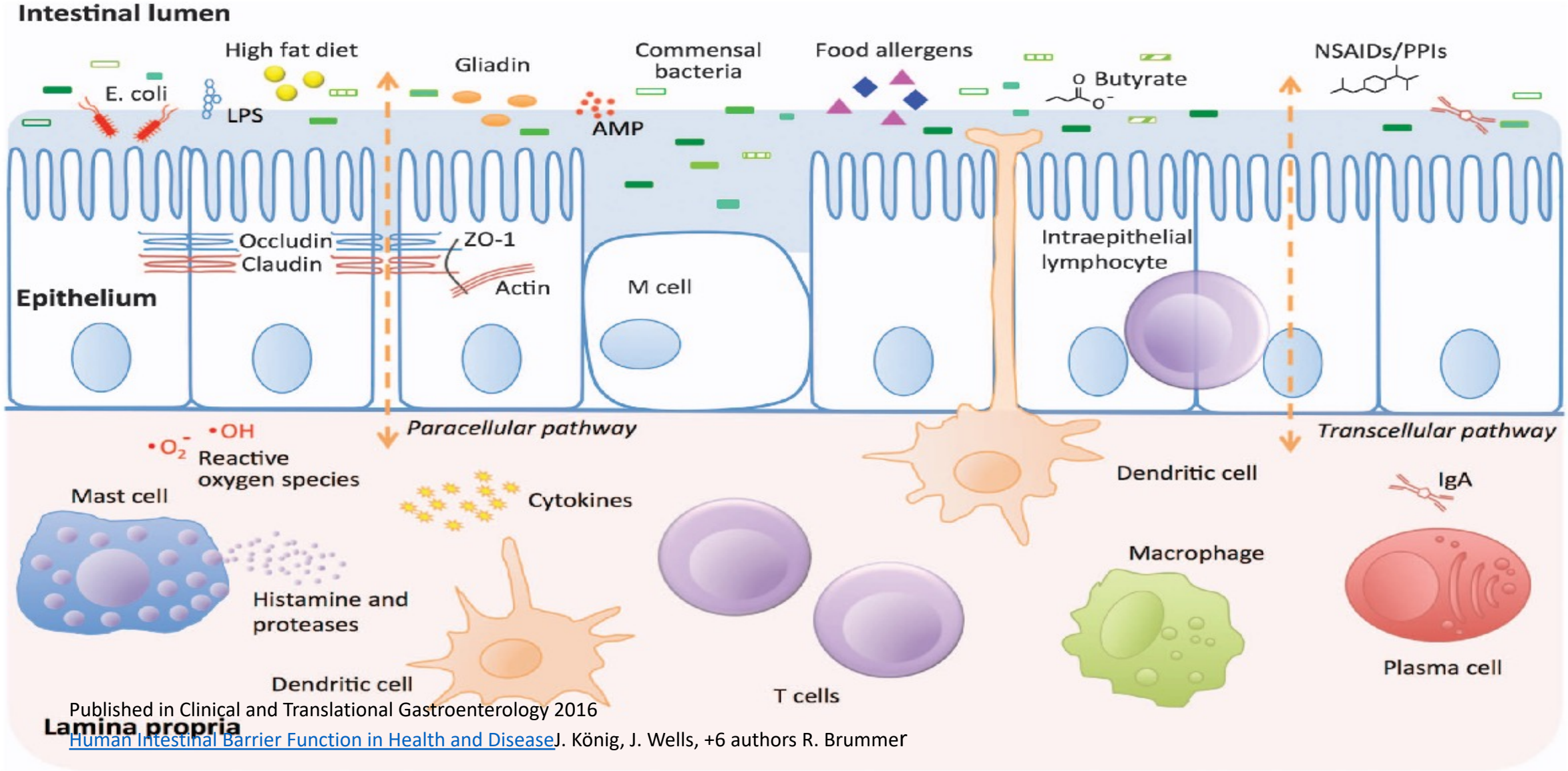
The gut barrier - defence - the first part of the immune response

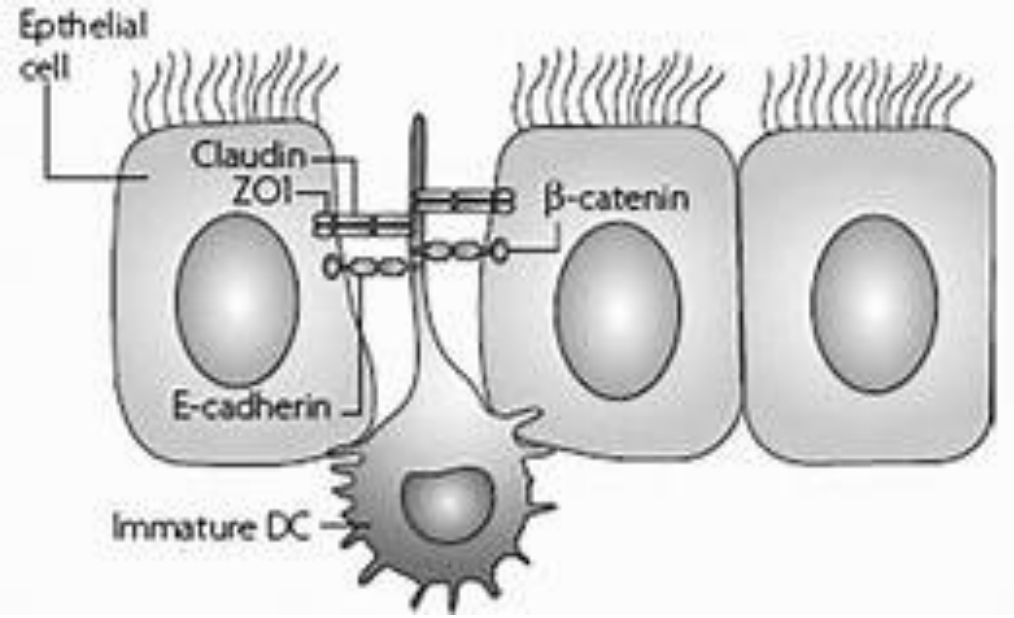


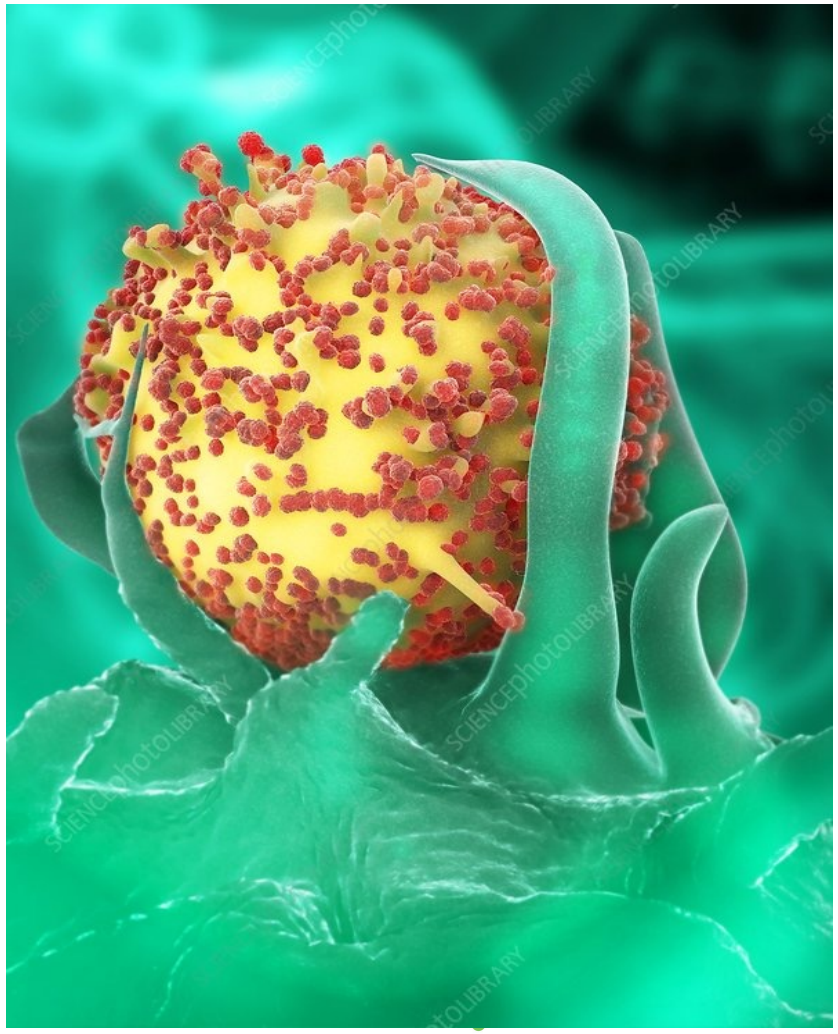
Published in Clinical and Translational Gastroenterology 2016

Human Intestinal Barrier Function in Health and Disease J. König, J. Wells, +6 authors R. Brummer

1 Schematic figure of the intestinal barrier and affecting factors. The intestinal barrier is composed of several layers providing protection against microbia

Border control-dendritic cells





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Boundaries, Immune Dysfunction, & Disease

	Immune Response	
Boundary	*Excess*	*Deficiency*
Internal (self)	**Autoimmunity Cardiovascular Neurodegeneration**	**Cancer**
External (non-self)	**Allergy, Atopy, Hypersensitivity**	**Infection**

IFM – Dr Robert Rountree

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How to support our immunity

1. Maintain healthy barriers: reduce toxins, feed the microbiome, reduce inflammation, provide building blocks to ‘repair the fence’ (e.g. short chain fatty acids from fibre feed the cells in the bowel lining)
2. Fuel the system: Good nutrition. Barrier repair, intelligence and memory (e.g. antibodies) and surveillance (messengers) require energy.
3. Reduce stress: cortisol (the stress hormone) can dampen the immune response

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Dietary factors to support the immune system

- Intermittent fasting

  IF or reduced food quantities has been shown to help immunity

- Anti-inflammatory diet (rich in anti-oxidants and omega 3)

- Good protein intake

  Game meats like venison and rabbit have better fat profiles and are rich in the protein arginine, which helps increase immune cells called Natural Killer cells. Raised arginine levels been shown to help T cells fight tumours and respond better to immunotherapy.

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Supplements to support the immune system

Supplement or intervention	Direction
Medicinal mushrooms	Discuss with practitioner
Vitamin D	Up to 5000 IU a day
Beta-glucans	250 mg three times a day
Elderberry	500 mg daily
Resveratrol	250 mg twice a day
Curcumin	500-1000 mg a day
Biobran	500 mg-3 g a day (up to 8 weeks if using higher dose 1 g threafter)
Astragalus	1500 mg twice a day
Melatonin	3-10 mg a day

Not intended to be a substitute for pharmacological therapy

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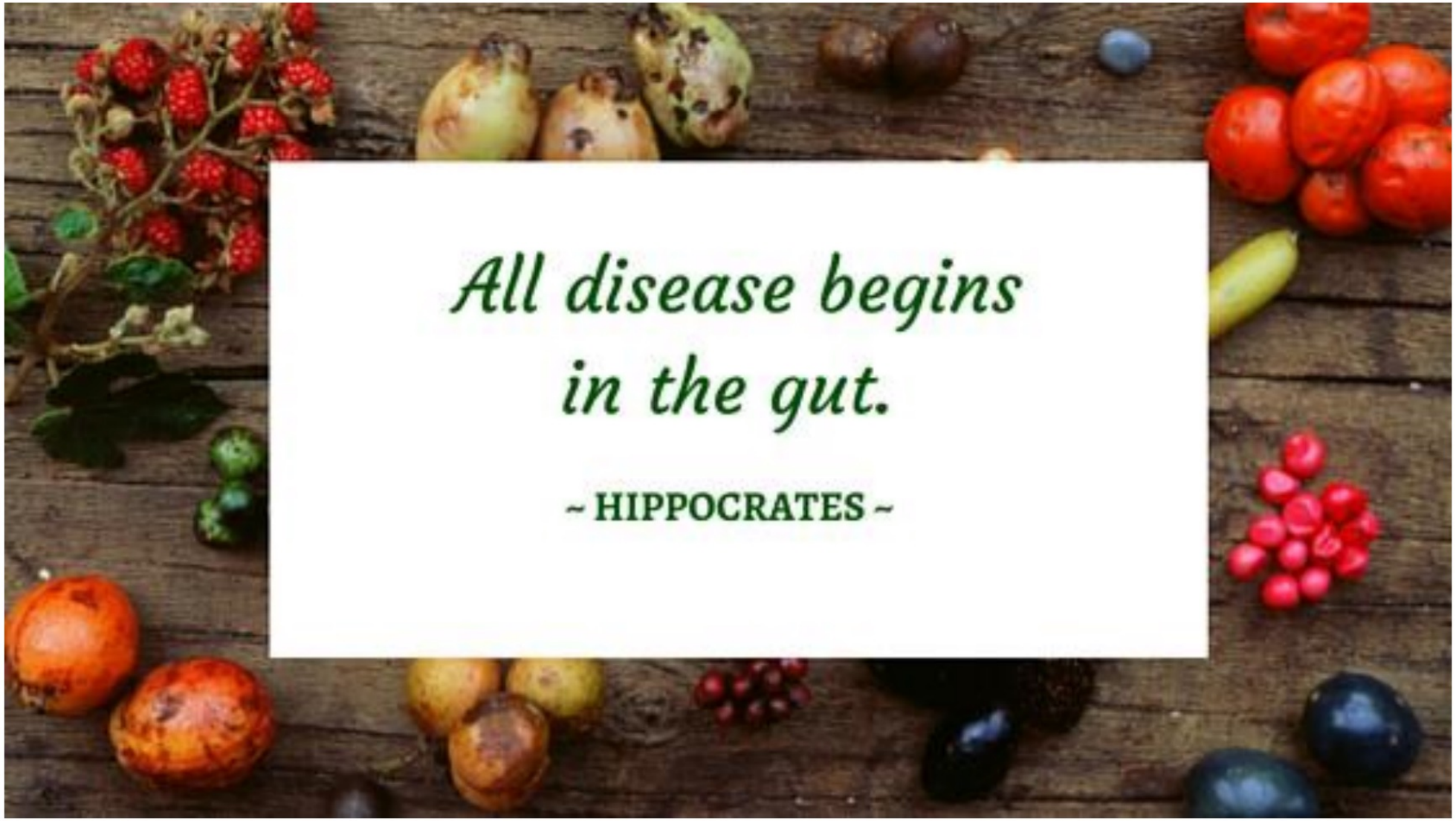

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Contributors to Gut Health

- ✓ The gut barrier – absorption of nutrients and defence
- ✓ The gut microbiome – complex metabolic functions
- ✓ Gut motility - waste disposal
- ✓ Enzymatic capacity - digestion of food
- ✓ Hormonal and neurotransmitter regulation – signalling to the brain

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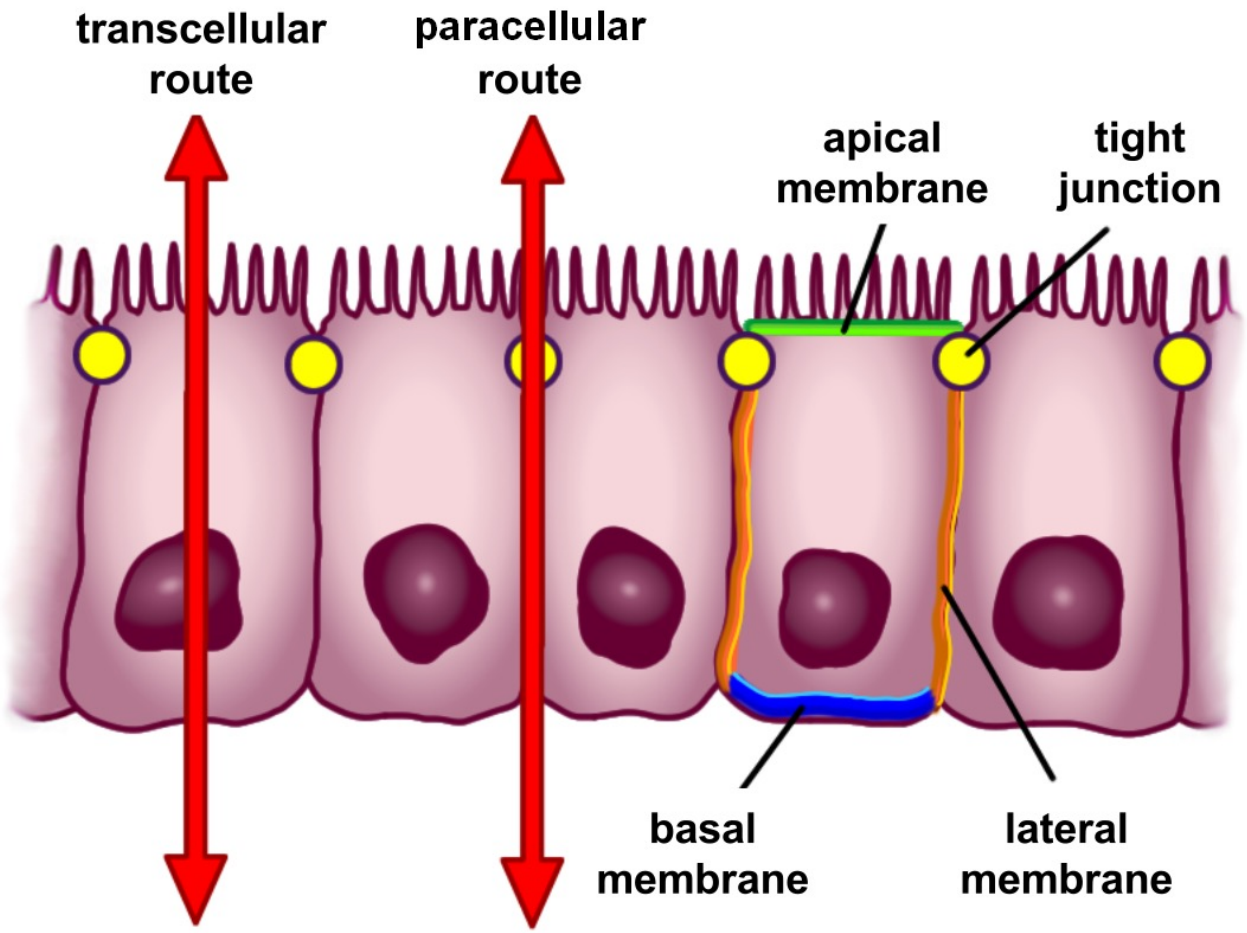
The gut barrier - absorption



- Single-cell layer
- Selectively permeable barrier
- Permits the absorption of nutrients
- Effective defense

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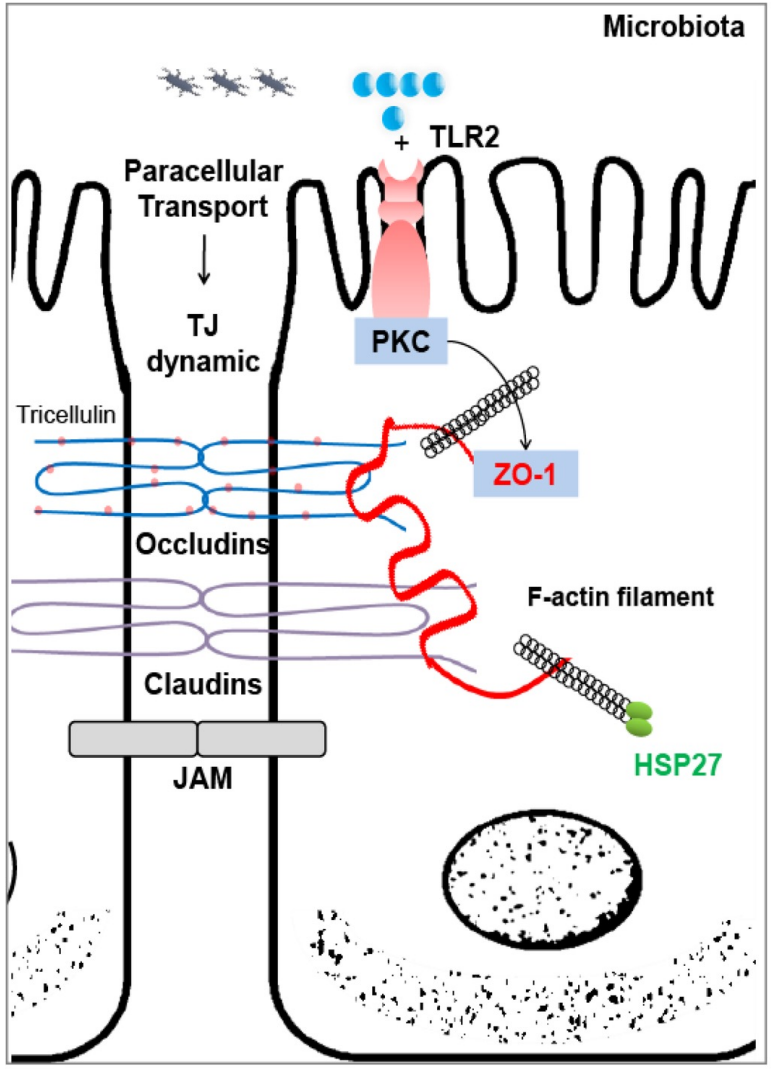
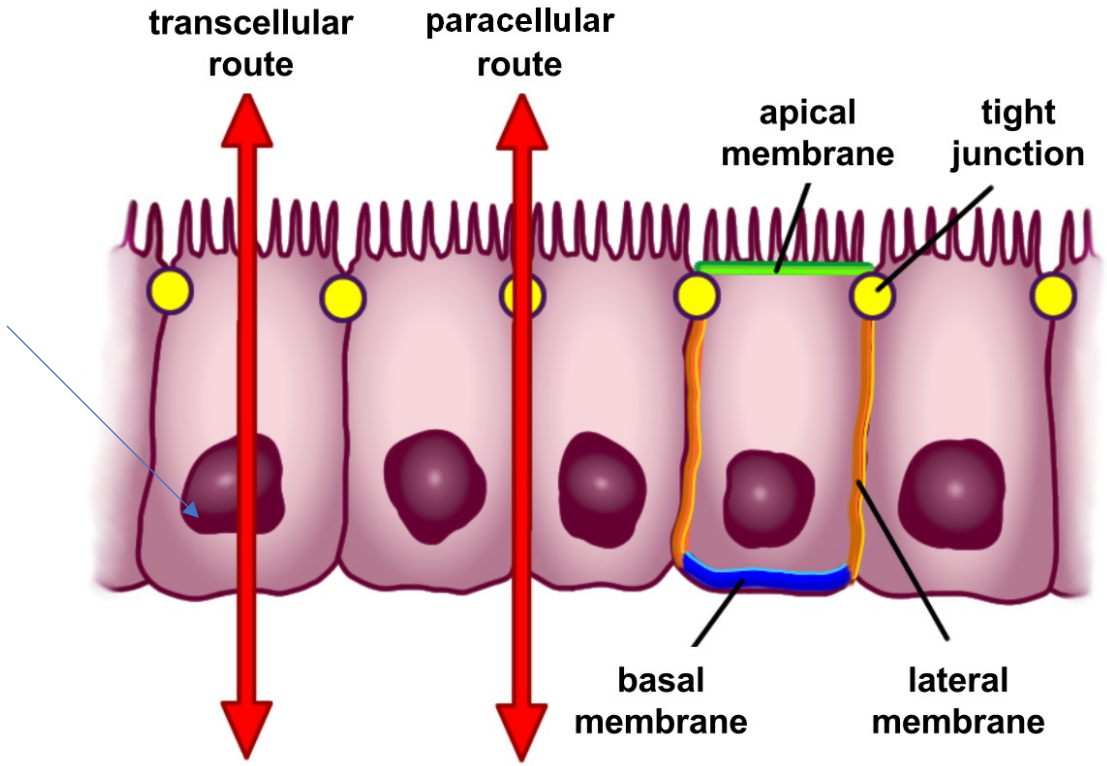
The gut barrier - Tight Junctions





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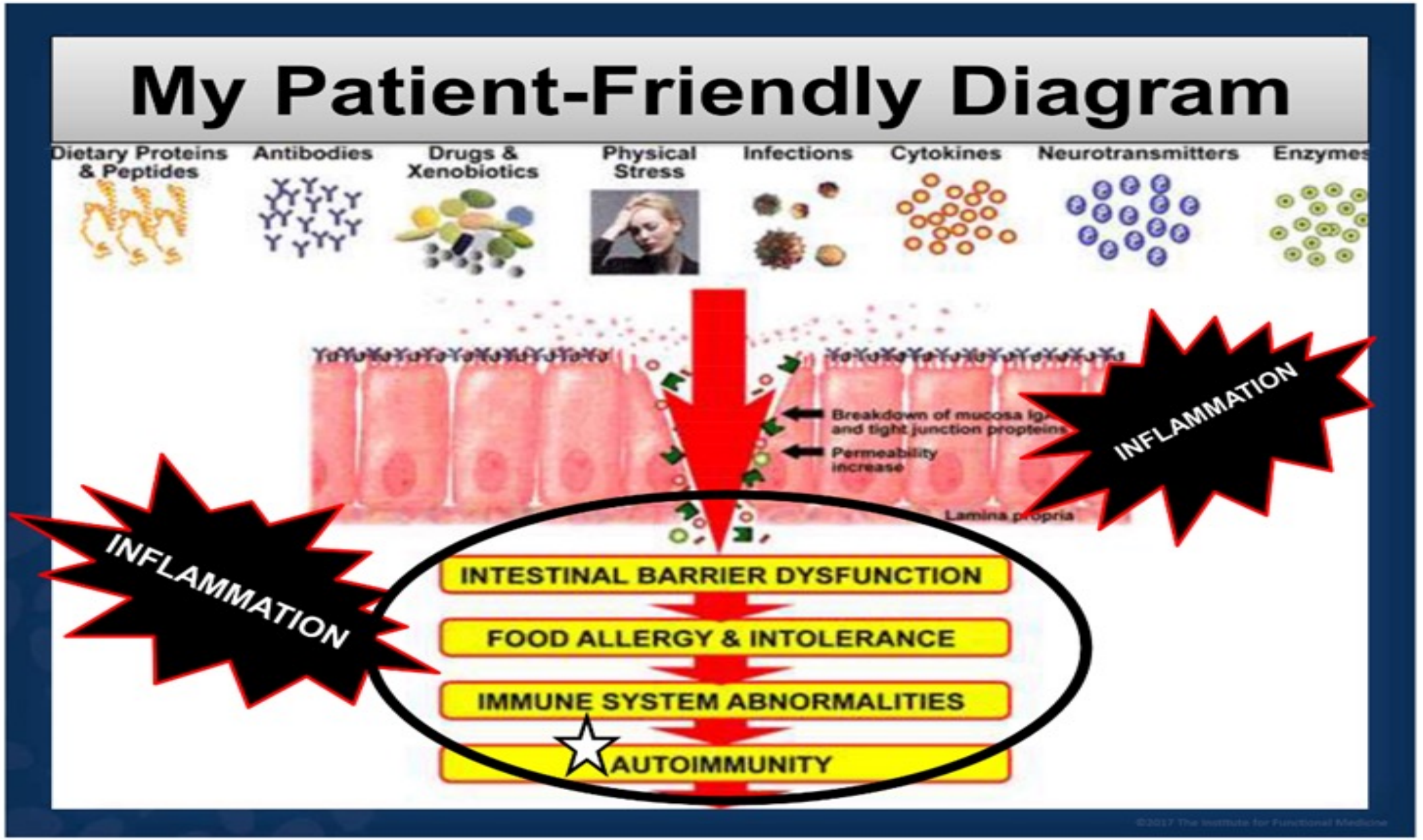
My Patient-Friendly Diagram
Dietary Proteins & Peptides
Antibodies
Drugs & Xenobiotics
Physical Stress
Infections
Cytokines
Neurotransmitters
Enzymes
Breakdown of mucosa ig
and tight junction propteins
Permeability increase
Lamina propria
INFLAMMATION
INFLAMMATION
INTESTINAL BARRIER DYSFUNCTION
FOOD ALLERGY & INTOLERANCE
IMMUNE SYSTEM ABNORMALITIES
AUTOIMMUNITY

The gut barrier – altered intestinal permeability

Factors which may disrupt intestinal barrier function

- Bacteria, Viruses, Parasites
- Gluten
- Medication
- Stress
- Hormones
- Toxins (solvents, pesticides, heavy metals...)
- Alcohol
- Food additives: Artificial sweeteners, sugar, salt, emulsifiers

Factors which may improve intestinal barrier function

- Microbiome- e.g. lactobacillus and bifidobacterium
- Prebiotic foods and supplements
- Probiotics
- Glutamine
- Zinc
- Vitamin A
- Short chain fatty acids

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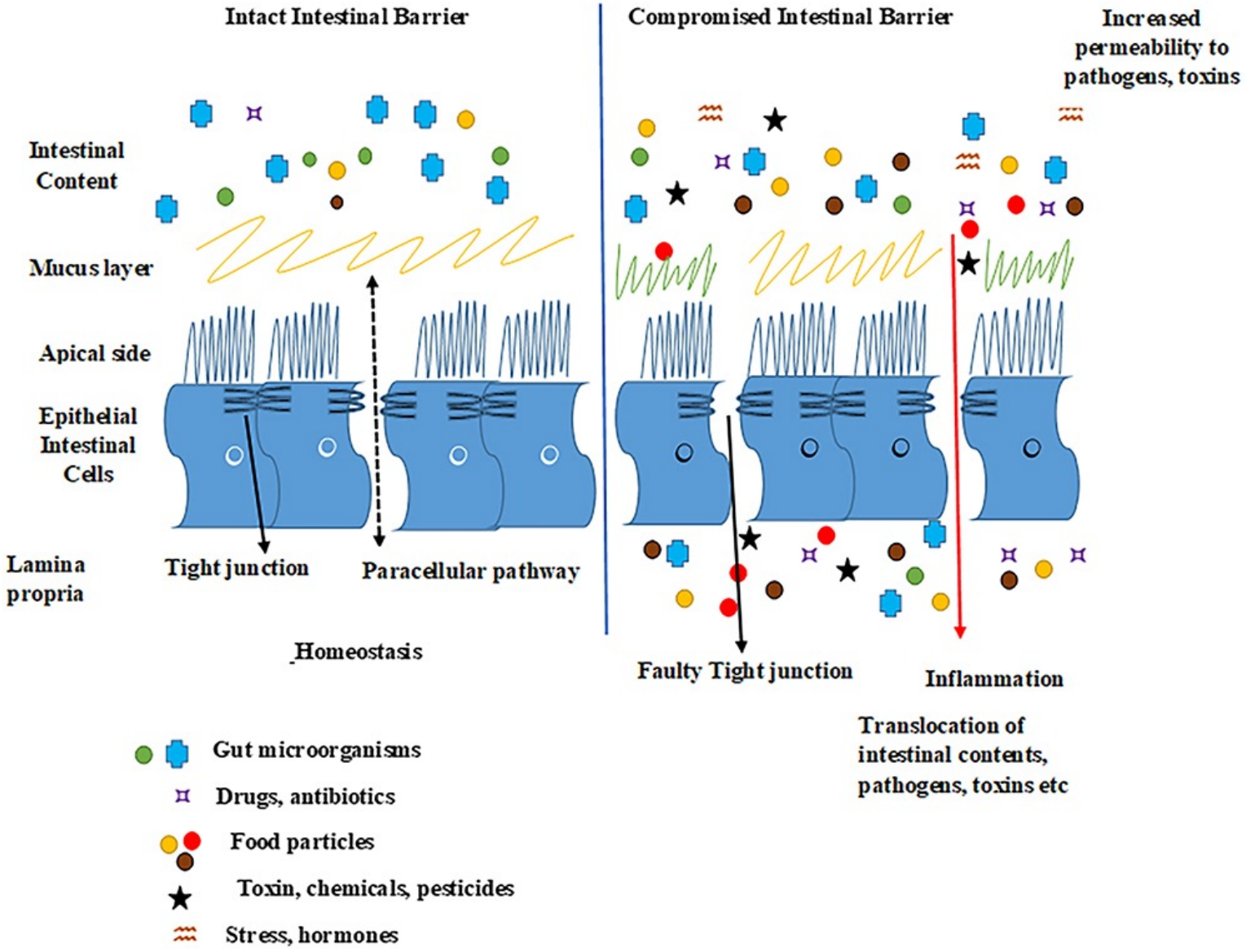
Altered intestinal permeability as a risk factor for cancer



Several cancers and inflammatory disorders have altered expression of Tight Junction proteins especially claudin family members

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Altered intestinal barrier function and chronic disease

Autoimmune disease

- Type 1 Diabetes
- Coeliac Disease
- Multiple Sclerosis
- Rheumatoid Arthritis
- IBD

Neurodegenerative

- Parkinson's disease

Infections

Cancer

Chronic fatigue syndrome

Allergies

Depression & Anxiety

Inflammatory disease

- arthritis

Gut disorders

- IBS
- Ulcers
- Chronic diarrhoea or constipation

Cardiometabolic disorders

- Obesity
- Cardiovascular disorders
- Type 2 Diabetes

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Gut Health and cancer

Gut health is relevant to:

- Nutritional status
- Energy
- Immunity
- Inflammation
- Brain health
- Detoxification
- Hormonal balance

All of these functions play a role in the way the body develops and fights cancer

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The Microbiome

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The microbiome

- **Collection of microbes living in the gut** ➡ build from birth ➡ shaped according to our environment.
- In the average body there are **20 times more bacterial cells than human cells**
- The centre for bacterial activity is the **lower intestine** *(1m long tube where over 400 species of bacteria live at any one time)*
- The residents of the intestinal tract are in a **constant state of flux** as new bacteria are constantly being produced and old bacteria are flushed out of the system
- Dysbiosis is the condition where there is an **imbalance between the good and the bad bacteria** in the gut.

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The microbiome

- Good bacteria can be inhibited or killed by ***stress, surgery, illness, some medication, trauma or unhealthy eating habits.***
- We can look after our microbiome by **eating foods that encourage the growth of good bacteria**, and reduce the growth of bad bacteria.
- We also want to try and avoid or mitigate some of the factors above that impair its function such as ***stress, some medication, unhealthy eating habits***
- In the past decade there has been a **growing interest in cultivating friendly gut flora with the aid of probiotics.**
- **Probiotics** are used therapeutically to **control abnormal overgrowth of yeast, fungi and bacteria** in the GI tract.

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When the balance of the bacteria is disturbed it can lead to immune system dysfunction and disease

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Factors that disturb the balance of the bacteria

- Host genotype *(genetic makeup)*
- Type of birth *(vaginal vs C-sec)*
- Extensive hygiene *(not given opportunity to develop microbiota)*
- Diet *(pre and probiotics, fibre, phytochemicals, alcohol, sugar)*
- Stress *(social, emotional – affects acidity in bowel)*
- Chronic diseases and treatment of these
- Medications *(antibiotics, NSAIDs)*
- Aging
- Xenobiotics *(synthetic chemicals that are foreign to the body e.g. pesticides)*
- Surgery *(e.g. gastric bypass)*
- Probiotics and Prebiotics *(are essential!)*

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The benefits of maintaining a correct bacterial balance

- They manufacture B vitamins *(folic acid, niacin, pyridoxine)*
- They provide the enzyme lactase *(which enhances digestion of milk-based foods)*
- They act as anti-carcinogenic factors with powerful anti-tumour properties
- Good bacteria keep bad bacteria away *(by producing bacteriocins – a chemical that repels other bacteria)*
- They enhance bowel function by improving peristalsis
- They effectively help to control cholesterol levels
- Enhance immune function
- They may suppress inflammation

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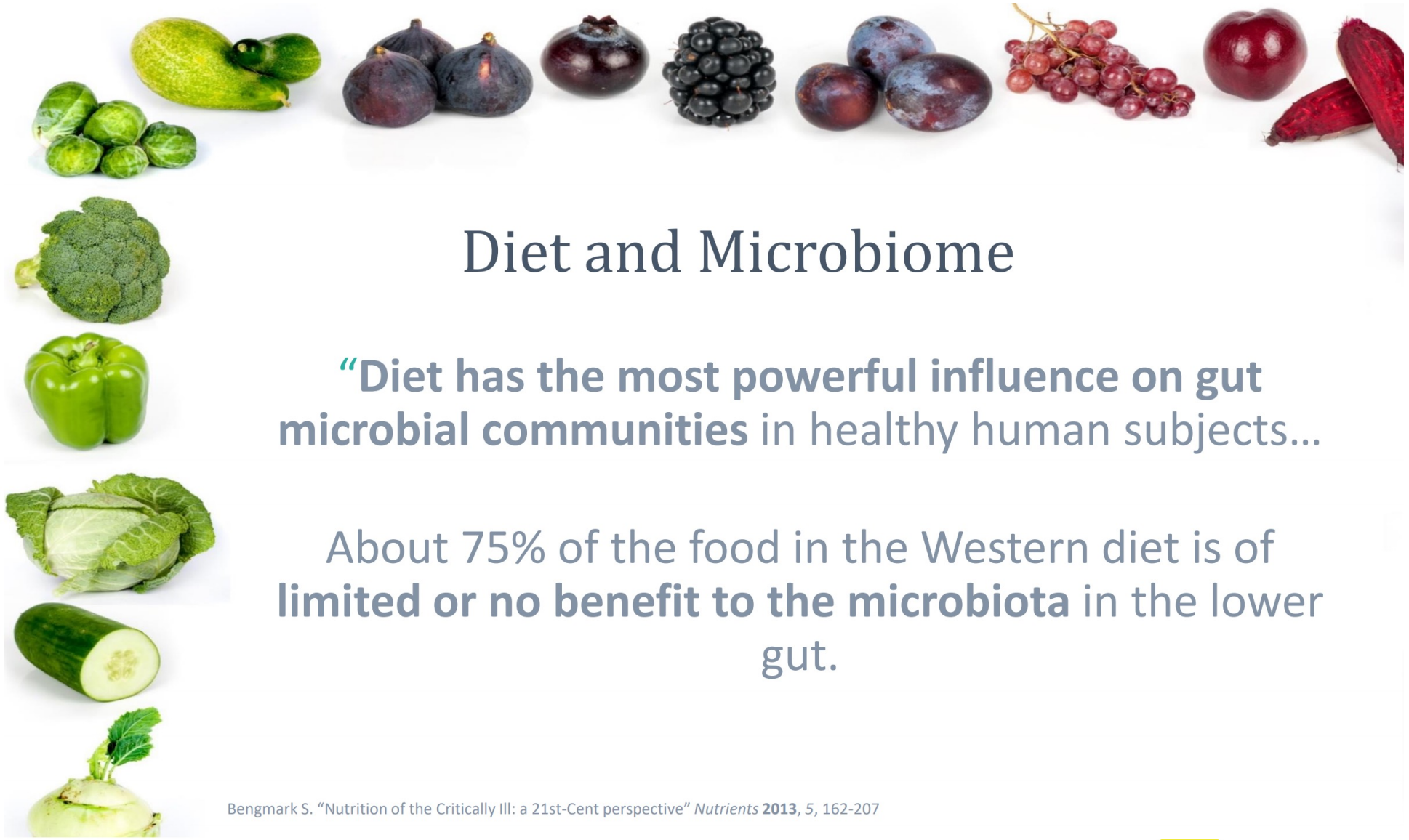

Diet and Microbiome

"**Diet has the most powerful influence on gut microbial communities** in healthy human subjects…

About 75% of the food in the Western diet is of **limited or no benefit to the microbiota** in the lower gut.

Bengmark S. "Nutrition of the Critically Ill: a 21st-Cent perspective" *Nutrients* **2013**, *5*, 162-207

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How to support a good microbiome

- Stay hydrated
- Be sure to include both **prebiotic and probiotic foods** in your diet.
- Eat plenty of **high-fibre vegetables and wholegrains**, which help maintain a healthy digestive system.
- **Limit or avoid processed foods**, foods high in added sugar, artificial sweeteners, and trans fats.
- Take antibiotics only when medically necessary. During and after completing a course of antibiotics, eat probiotic foods **and take a probiotic supplement.** This can help rebuild the population of healthy bacteria in your gut

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Probiotic Foods

Dairy:

Acidophilus milk
Buttermilk
Cheese (aged)
Cottage cheese
Kefir
Sour cream
Yogurt (plain, no added sugar, active cultures)

Non-Dairy:

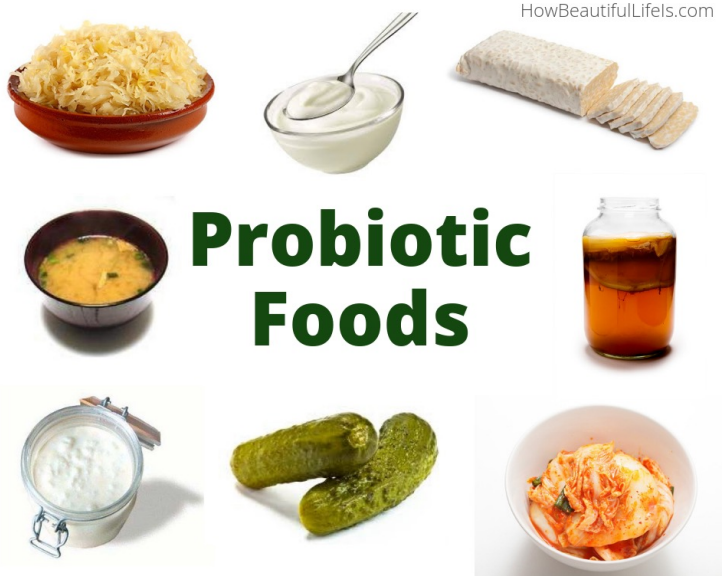
Fermented meats
Fermented vegetables
Kimchi
Kombucha
Miso
Natto
Pickled vegetables (raw)
Sauerkraut
Tempeh
Yogurt (plain, no added sugar, active cultures)

Prebiotic Foods

Asparagus
Banana
Dandelion greens
Eggplant
Endive
Garlic
Honey
Jerusalem artichokes (sunchokes)
Jicama
Leeks
Legumes
Onions
Peas
Radicchio
Whole grains

The gut microbiome – maintaining a good balance

HowBeautifulLifels.com



The gut microbiome – maintaining a good balance

- Probiotics and Prebiotics should be included
  - Probiotic foods: kimchi, sauerkraut, sour pickles, miso soup and kombucha
  - Prebiotic foods: onions, garlic, leeks, Jerusalem artichokes, asparagus, eggplant
- Aiming for 25g of fibre a day
- Ensuring that the gut is heathy is essential and often our first step in treatment.
- Ensure digestion and absorption are maximised
  - Mindful eating (chewing well, not rushing meals)
  - Stomach acid levels (acid reflux)
  - Digestive enzymes (floating stools)
  - Enough fibre
  - Regular bowel motions

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How to reach 25g of fibre a day

Meal	Food	(g) fibre
Breakfast	40g jumbo oats	3.6g
	10g ground flaxseed	2.4g
	80g berries	2g
Lunch	1 slice vogels seeded wholemeal bread	4.6g
	Lentil and vegetable soup	+/- 5g
Dinner	125g cooked Brown rice	3.8g
	Chicken casserole	
	Broccoli + carrots + red cabbage	2g each = 6g
TOTAL FIBRE		27.4g

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Low fibre eating ……

Meal	Food	(g) fibre
Breakfast	30g cornflakes	0.9g
	milk	0g
	banana	3.1g
Lunch	1 slice white bread	1.1g
	Ham and cheese	0g
Dinner	125g cooked white rice	0.9g
	Chicken casserole	
	Broccoli	2g
TOTAL FIBRE		8g

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Brain health

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Brain health

Relevant factors in PCa

- Neuroinflammation
- Metabolic dysregulation (high insulin, poor glucose control)
- Effects of androgen deprivation therapy

Resulting in brain fog, poor concentration, difficulty making decisions, memory loss, confusion

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Supporting brain health

- Diet (anti-inflammatory, ketogenic, detoxifying), correction of a poorly absorbing gut, management of infections, supporting microbiome, etc.
- Replacement of key contributors: vitamins, minerals, support hormonal balance
- Exercise: many benefits, including increasing Brain Derived Neurotrophic factor BDNF, improving oxygenation, sleep, decreasing stress
- Sleep: this is very important for brain health. Melatonin reduces the deposition of protein called beta-amyloid which is found in Alzheimer's Disease
- Mental exercise (reading, crosswords, quizzes, anything that maintains cognitive agility)

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Supporting brain health with diet

Minimizing Simple Carbohydrates

- Why:
  - Stimulate production of insulin and can create insulin resistance.
  - High glucose leads to inflammation

- How:
  - cut out sugar, sweet treats, bread, white rice, white potatoes, soft drinks (both regular and diet), alcohol, cakes, processed foods and anything else with simple carbohydrates.
  - Low GI carbohydrates in very small amounts are allowed – sweet potato, quinoa, brown rice

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Supporting brain health with diet

Fruit

- Avoid fruit juices in favour of whole fruits (which include fibre)
- Smoothies are fine (BUT not too sweet, add 2/3 vegetables + 1/3 fruit)
- Best fruits are wild, colourful berries, lemons, limes, tomatoes and avocados

Why deeply pigmented?

Pigments (especially **blue/purple/black**) are associated with improved cognitive performance and neuroprotection

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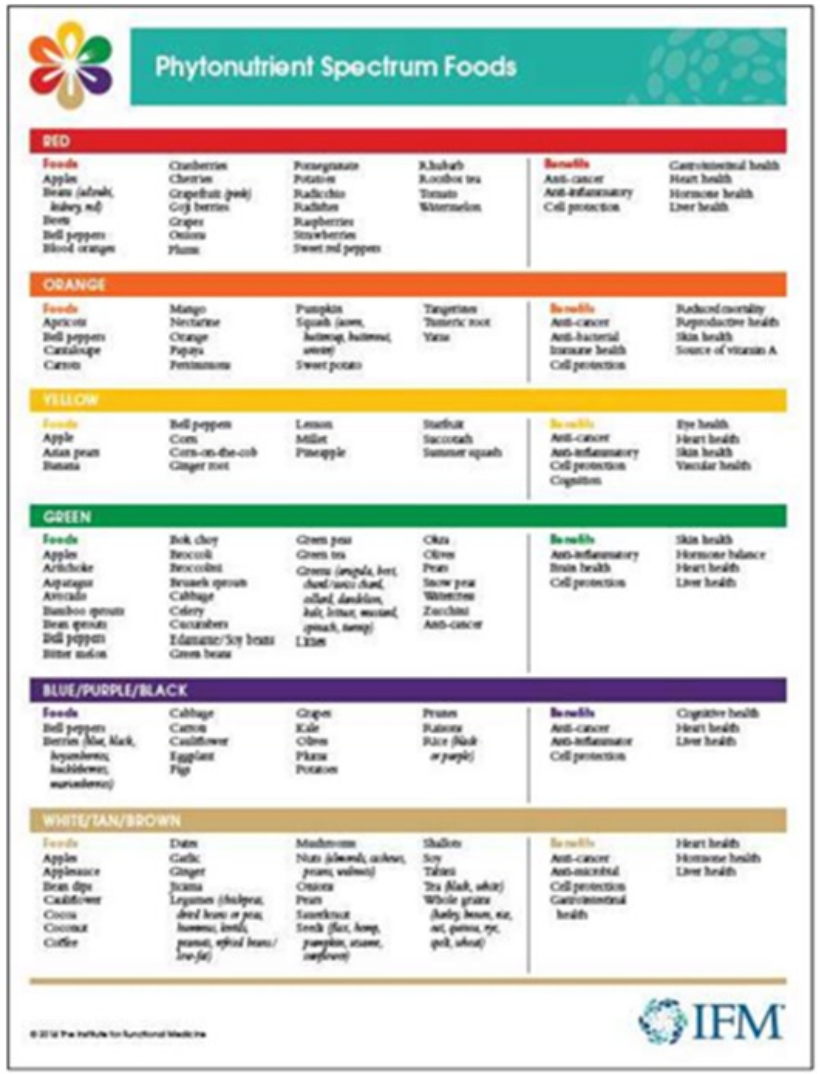
Supporting brain health with diet

Vegetables

- Should make up the majority of the diet
- Preferably organic, non-starchy vegetables
- Include both uncooked (salads) and cooked
- Include as many colours as possible



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Vegetables

Reduce toxins by eating specific detoxifying plants:

- We are exposed to hundreds of toxins daily – from heavy metals to endocrine-disrupting agents like BPA to pesticides/herbicides/insecticides in our food, toxins in our personal care products, home cleaning products and list continues
- There are molecules in certain edible plants which are able to sequester and eliminate toxins from our bodies via urine, sweat and stool.
- These detox plants include coriander, cruciferous vegetables, avocado, artichokes, beets, garlic, ginger, grapefruit, lemons, olive oil and seaweed.

Need to be eating at least a portion of these foods daily

Mushrooms have been shown to be very neuroprotective.

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Cruciferous Vegetables

Eating a serving of these vegetables daily (particularly broccoli, kale, and Brussels sprouts) can help lower the risk of disease. To retain the full array of nutrients, it is best to eat cruciferous vegetables either raw, steamed, or lightly sautéed.

Arugula / **Rocket**
Kale
Dark leafy greens (all)
Radish
Turnips
Wasabi
Watercress
Brussels sprouts
Broccoli
Bok choy (pak choi)
Horseradish
Mustard greens
Broccoflower
Daikon
Collard greens
Cauliflower
Cabbage (all varieties)
Romanesco
Kohlrabi

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Supporting brain health with exercise

- Sitting is the new smoking! Sitting is detrimental to cognitive and physical health
- The most relevant benefits of exercise for cognition:
  - Reduces insulin resistance
  - Increases ketosis – and increases the production of the neuron supporting molecule BDNF
  - Increases the size of the hippocampus (key region for learning & memory)
  - Improves vascular function (crucial for neuronal & synaptic health)
  - Increases heart rate – pumps more oxygen to the brain
  - Reduces stress (trigger of AD - promoting inflammation)
  - Improves sleep
  - Increases the survival of the newborn neurons that are created in the brain (neurogenesis)
  - Improves mood

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Supporting brain health with mental exercises

- Reading
- Quizzing
- Learning a new language
- Doing Sudoku, crossword puzzles etc
- Online brain training (e.g. Posit Science,Lumosity, Dakim, Cogstate, Cognitive Rehabilitation NB)

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Bone Health

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Bone health

Relevant factors in PCa

- Bones can become very brittle around the area of radiotherapy.
- Hormone deprivation can itself contribute to bone loss
- Hormonal cancers can spread to the bones.

Good bone health relies on:

- Good nutrition. It's not just calcium and vitamin D! Many minerals are required to strengthen bone. Protein makes up the scaffolding upon which minerals deposit
- Absence of heavy metals (lead), which can affect bone density
- Hormonal balance

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Bone health

All The Right Raw Materials:

- Phytonutrients
- Calcium
- Phosphorus
- Magnesium
- Vitamin K
- Vitamin A
- Vitamin C
- Vitamin D
- Vitamin B:
  - B2
  - B6
  - B9
  - B12
- Boron
- Manganese
- Zinc
- Potassium
- Copper
- Silica
- Selenium
- Fe
- Amino Acids
- Omega 3 FA

GENOVA DIAGNOSTICS

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Bone health

- **Calcium calculator** available online through **osteoporosis foundation** which will give you an idea about how much calcium are getting a day
- *E.g. https://www.osteoporosis.foundation/educational-hub/topic/calcium-calculator*
- Males – generally aiming for **700mg a day**
- If not getting enough then supplement …..
- **Vitamin D** supplements also very important – 2000IU a day for maintenance, 5000IU a day if vitamin D is low for 12-16 weeks and re-retest

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Lifestyle interventions

- Exercise
- Sleep hygiene
- Stress reduction
- Emotional health

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Exercise

- Glucose regulation
- Increases nitric oxide (improves circulation and erectile dysfunction)
- Regulates mood
- Strengthens bones
- Helps with weight balance
- Improves sleep
- Reduces stress
- Helps cognition

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Types of exercise

- **Weight bearing** exercise (especially for bone health)
- **Stretch** to maintain flexibility
- **Balance work**
- **Posture** (Pilates, Yoga)
- Strengthen pelvic and **abdominal stabilizing muscles** which attach to vertebral spine
- **Fast walking** shown to be much more beneficial than generalized walking
- Running / Hopping also good but be careful if osteoporotic and ensure safety / balance / well lit and that you don't fall
- **Cleaning, gardening, shopping**
- **Increase slowly**
- Being **outside in nature** shown to boost mood and self esteem
- **Vary routine**
- **With a friend / family member**

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Sleep

- Sleep **clears waste from the brain**, and re-energises the body cells
- Sleep is a complex process – deep sleep is one of the most fundamental ways our **body heals itself**
- It is important for **cognitive function**
- It is important to focus on sleep hygiene aiming for **8 hours of sleep per night**

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Sleep hygiene

- Keep the room as **dark as possible**, use an eye mask if necessary
- Keep the environment as **quiet as possible**
- **Turn off electronics**
- Wind down prior to sleep, establish a **regular relaxing bedtime routine**
- Go to bed before midnight
- **Avoid exercise before bedtime**, rather exercise early in the day *(exposure to natural light)*
- **Avoid blue light at night**, use filters for your reading light or pc / laptop
- Avoid stimulants such as **caffeine** after early afternoon
- **Keep the TV out of the bedroom**
- **Avoid heavy evening meals**
- **Keep hydrated**, but don't drink too much before bed

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Stress reduction

- Stress **increases cortisol** which increases insulin
- **Affects digestion**
- Affects **microbiome** and gut barriers
- We evolved to handle intermittent stress, not constant stress
- Stress also **increases a number of risk factors for cancer** – increases **blood glucose** levels, **body fat** increases, **carbohydrate cravings** increases, gut permeability and inflammation, permeability of the blood-brain barrier

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Stress reduction

- Work/life balance
- Mindfulness/meditation
- Walking in nature
- Exercise
- Good sleep
- Spiritual practice

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Emotional and mental health

Strategies which improve emotional well being in men with PCa

- Exercise
- Social connection
- Avoid isolation
- Engage in hobbies
- Talking therapies. Cognitive behavioural therapy
- Mindfulness meditation
- Gut health

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Poll 2

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THANK YOU FOR COMING TODAY!

Any questions?

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