



# Detoxification for PD

The liver/gut/brain axis



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REVIEW ARTICLE

# Nutrition and Lifestyle Interventions for Managing Parkinson's Disease: A Narrative Review

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 Academy of  
Nutrition  
and Dietetics

## Evidence Analysis Manual:



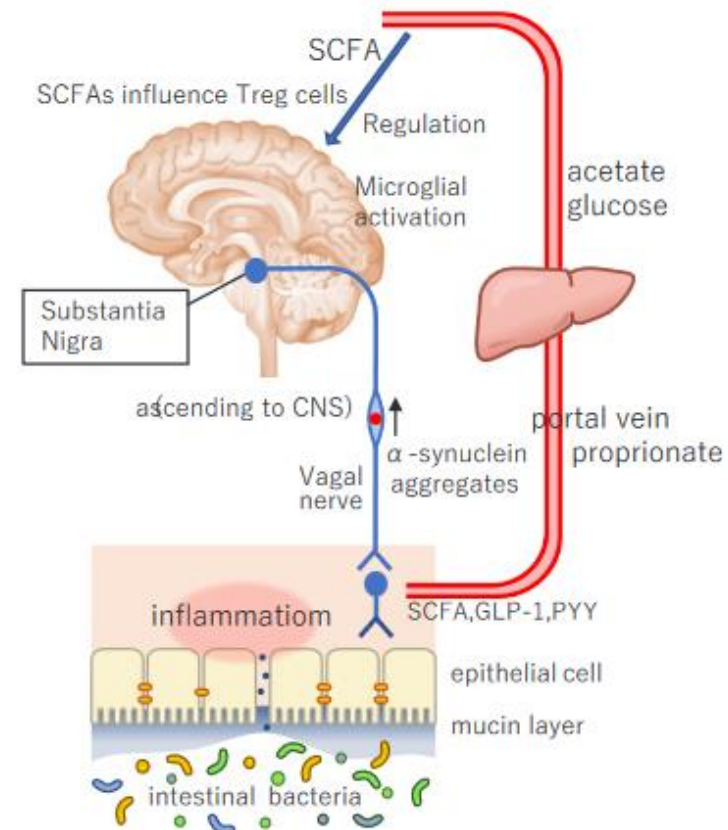
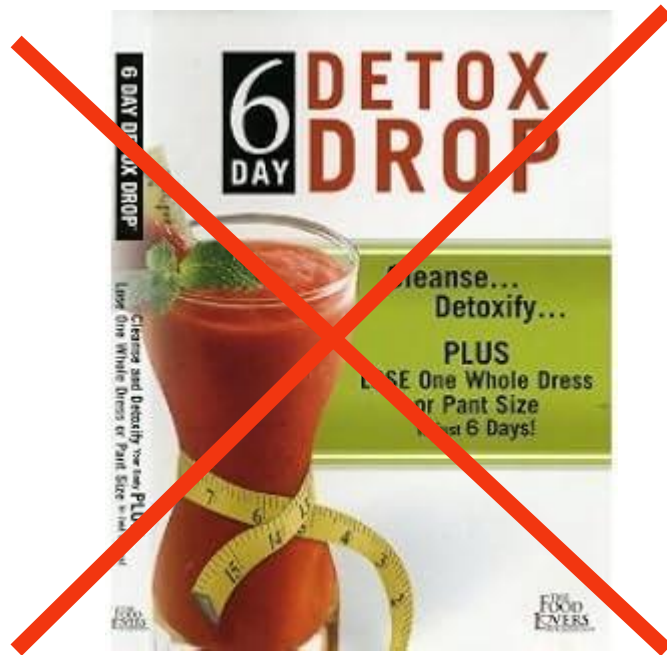
Steps in the Academy  
Evidence Analysis Process

Research and Strategic Business Development  
Academy of Nutrition and Dietetics  
August 2012

# Detoxification (Metabolic) Definition

Not something that comes in a box

Your natural detoxification system





# Causes of PD

*Toxic burden is thought to be a cause of PD*

Genetics increases risk by 10%

## Toxic Burden

- Triggers
  - Environmental toxins
  - Medications
  - stroke, Wilson disease, TBI
  - Infections
- Mediators
  - Suboptimal detoxification
  - Abnormalities of the gut

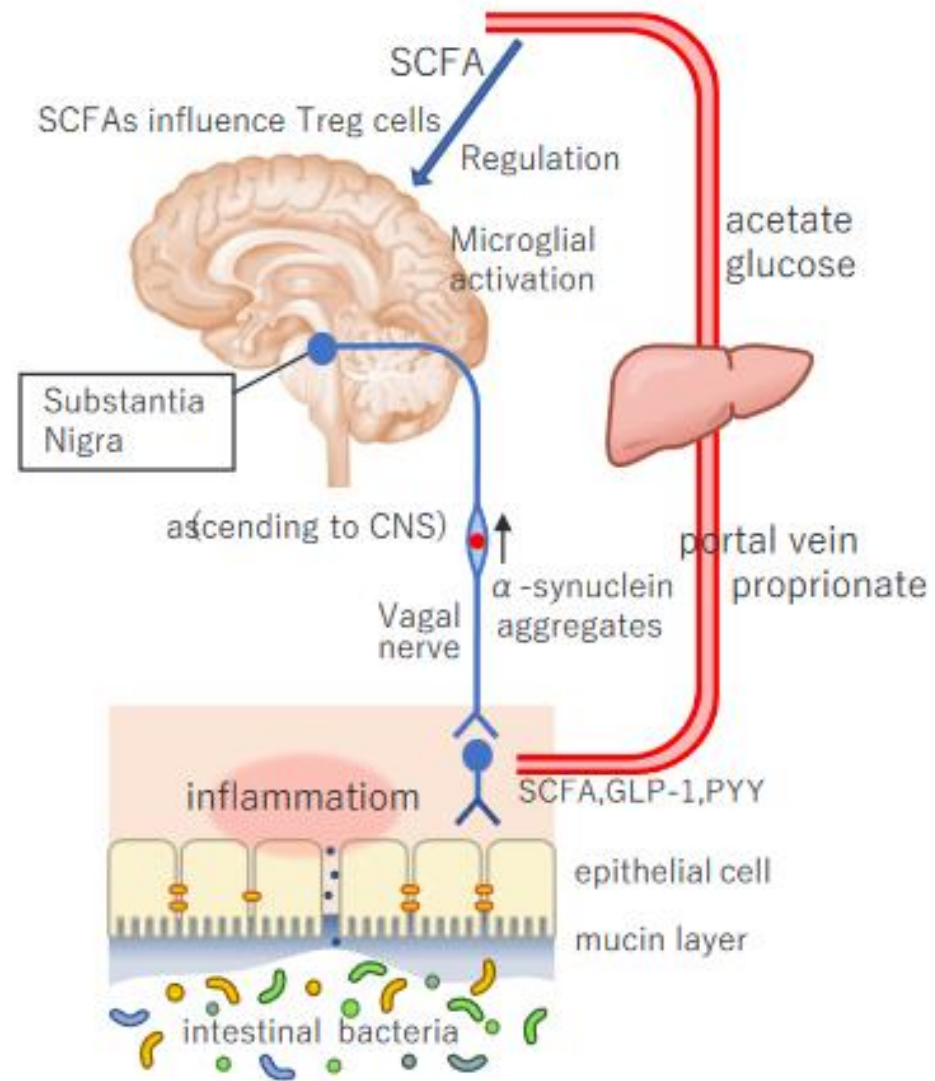


# Genetics – quick mention

- Genes are expressed (turned off/on), some people have the PD turned on, can we turn it off?
  - Maybe not
- There are genes that affect vitamin/mineral metabolism or liver detoxification that can increase the risk of the developing PD, can we turn these off?
  - Maybe not, but we can work around it
- The microbes in our gut can turn genes off and on!

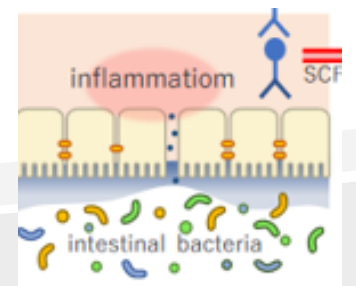
*We can influence the gut microbiome*



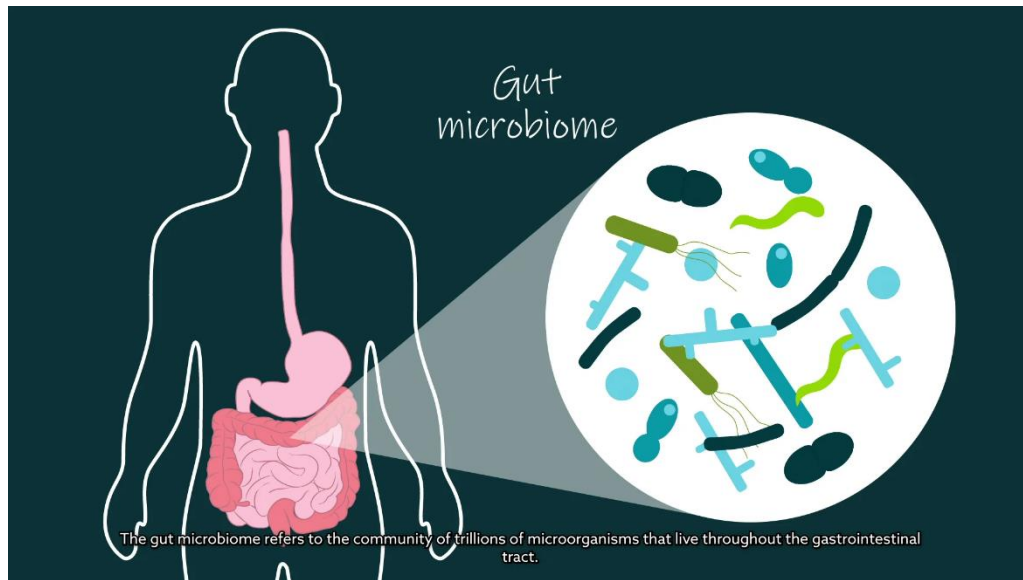


# The Gut

- Part of the detoxification.
- Tube that runs from your gums to your bum.
- It is very susceptible to disruptions.
- Gut disruption may be the root cause of many diseases.
- Constipation is a disruption of the gut.
- Many sources of research say constipation starts 15-20 years before we notice other s/s of PD.
  - Root cause of PD?



# Gut Microbiome

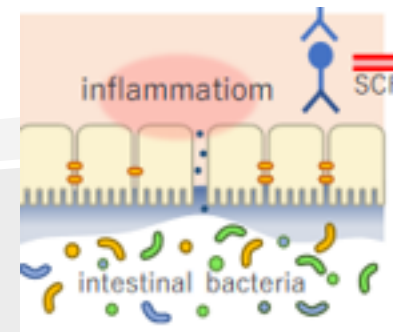


- Specific microbes like specific foods. Undesirable microbes feed on processed foods, SUGAR, toxins, medications,.

*You are what you eat*

- The bacteria is also influenced by stress, lack of sleep, inactivity

***Lifestyle factors disrupt the microbiome which has a negative impact on health and disease.***



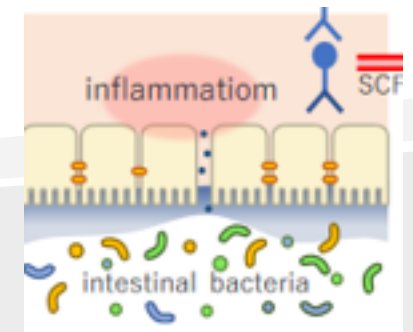


# Disrupted Microbiome

Most consistent microbiota alterations measured in PD patients with respect to healthy individuals (from [15,17,18,19,20]).

Microbiota Alterations in PD Patients	Downstream Metabolites	Local Impact in PD Patients	Impact on Brain in PD Patients
↑ <i>Akkermansia</i>	Mucin-degrading enzymes	Immune gut homeostasis	
↑ <i>Bifidobacterium</i> , ↑ <i>Lactobacillus</i>	Tight junction proteins	Infection in immune-compromised individuals	
↑ Enterobacteriaceae family	LPS	↑ Inflammation	↑ BBB permeability ↑ Neuroinflammation
↓ <i>Blautia</i> ↓ <i>Faecalibacterium</i> ↓ <i>Roseburia</i>	SCFAs	↓ Gut permeability (mucus formation) ↓ Inflammation (via the NF-κB pathway)	↑ BBB permeability ↓ Microglia-mediated protection
↓ Prevotellaceae family	Mucins synthesis	↓ Gut permeability (mucus formation)	↑ BBB permeability ↑ Neuroinflammation

- Too much of some species and not enough of others.
- Lipopolysaccharides are a toxin that damages the gut lining, & blood brain barrier causing inflammation.
- Short chain fatty acids protect the gut and the blood brain barrier.





# Probiotics? Maybe one day

Probiotics are usually Bifidobacterium & Lactobacillus - don't want more

- ↑ *Akkermansia*
- ↑ *Bifidobacterium*,
- ↑ *Lactobacillus*
- ↑ Enterobacteriaceae family

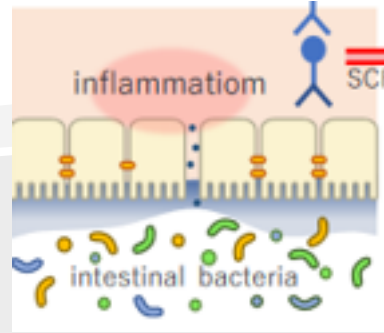
The key is a balanced, individualized microbiome

These are hard to find as a probiotic

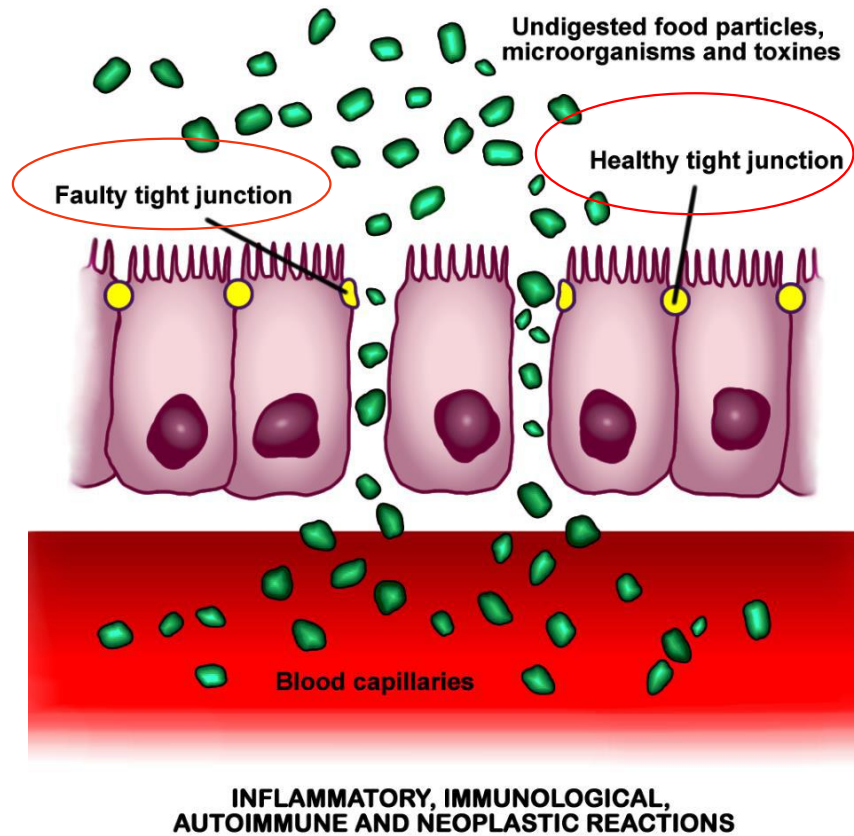
- ↓ *Blautia*
- ↓ *Faecalibacterium*
- ↓ *Roseburia*
- ↓ Prevotellaceae family

If these become overgrown, they cause disruptions

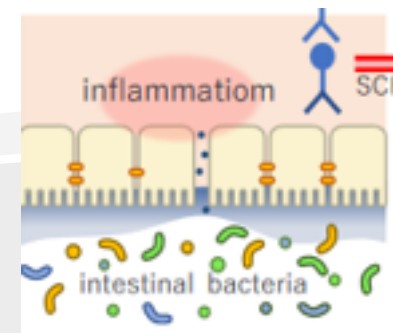
*Create a balanced microbiome with food*



# Increased Intestinal Permeability aka Leaky Gut

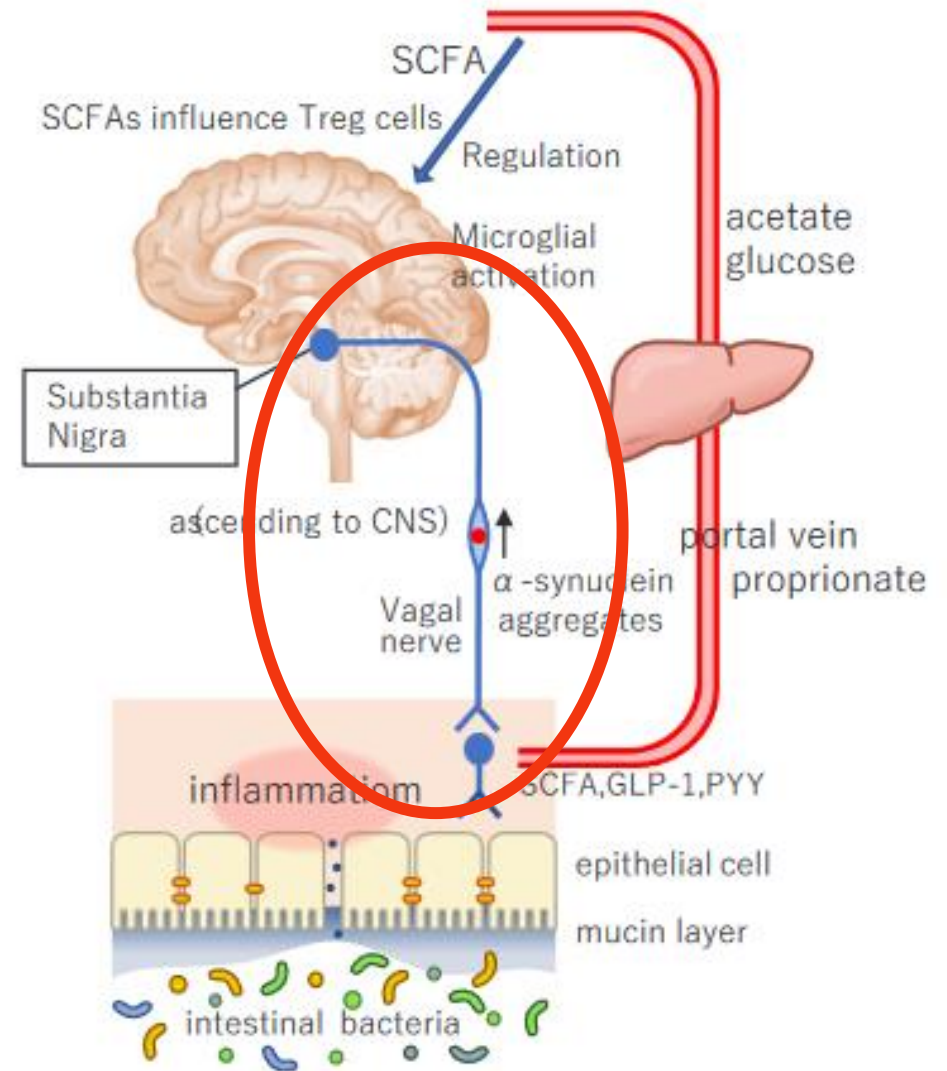


- The cells in the gut lining are normally tight with receptors that regulate what goes to the blood from the gut.
- When it is damaged it leaks letting toxins, viruses, bacteria, fungi, waste products pass through to the blood stream.
- Immune system is activated.
- Once in the blood toxins can travel to the brain and cross the damaged blood brain barrier.



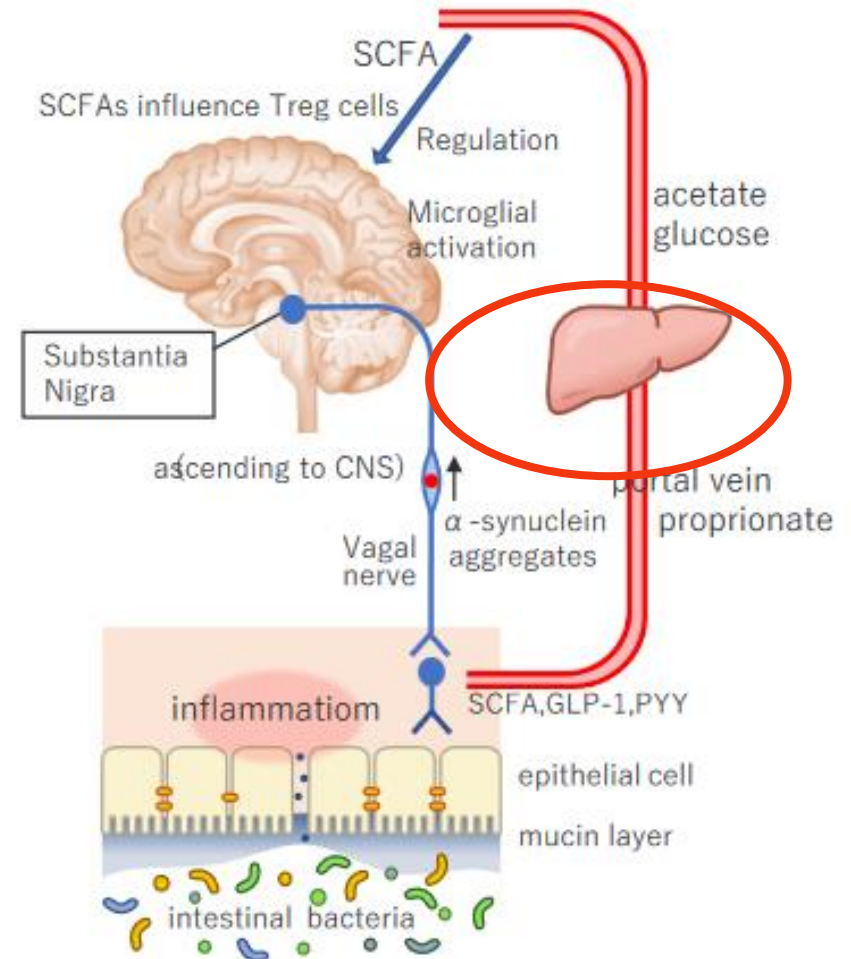
# The Vagus (vagal) Nerve

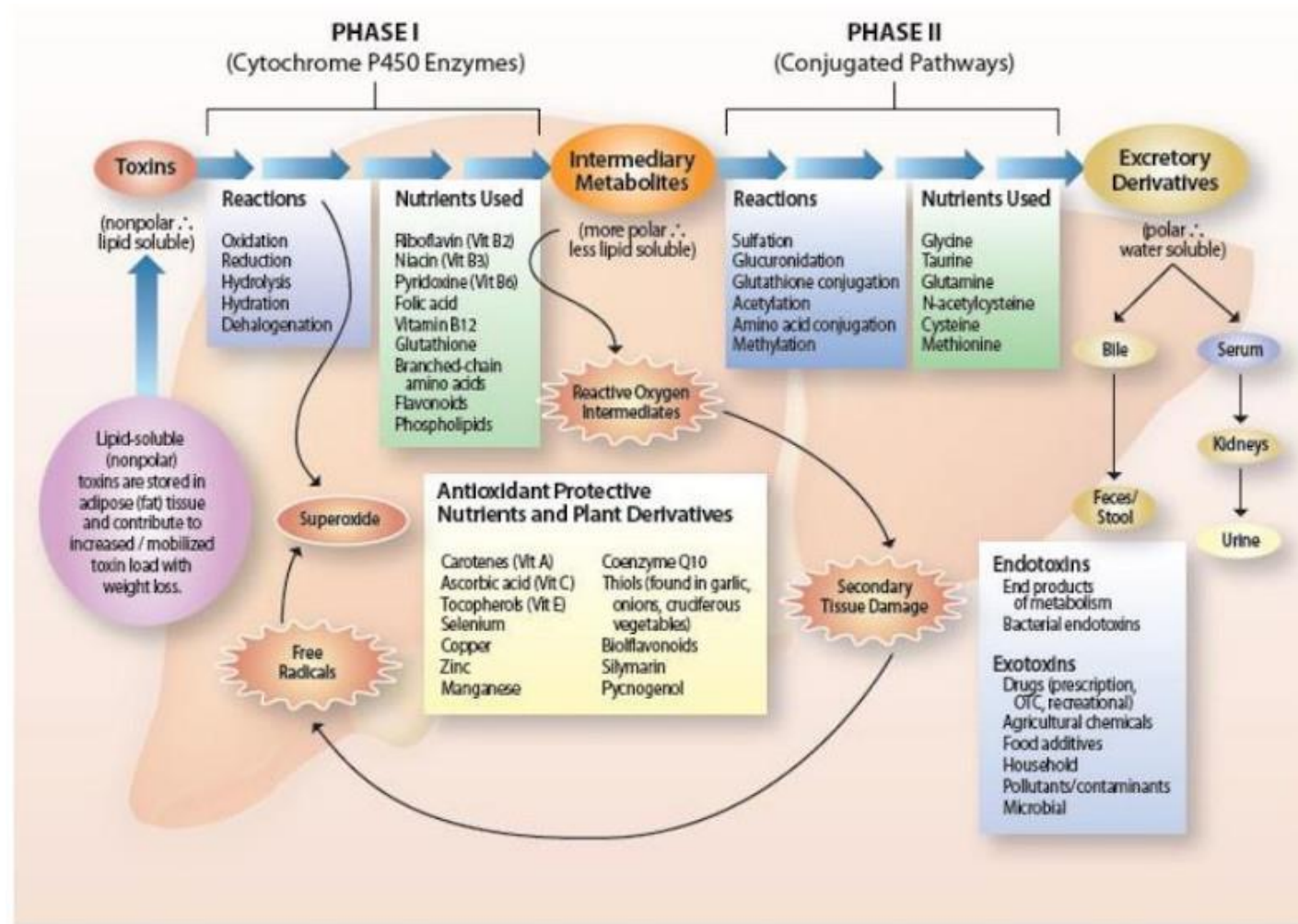
- The connection between the gut and the brain.
- Bacteria in the gut create neurotransmitters that travel to the brain via the vagus nerve.
- Undesirable bacteria send nasty messages to the brain that may cause depression, anxiety.
- Increases damage to the blood brain barrier.



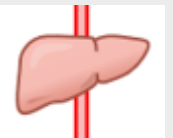
# Liver

- The function of the liver is to clean the blood.
- Leaky gut causes an excess of toxins to enter the blood stream.
- Excess toxins burdens the liver and detoxification is slowed.
- Liver detoxification is complicated and requires many nutrients.





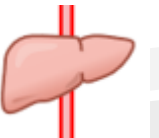
**Figure 3.5** Liver detoxification pathways, activities, influences, and effects. (c) 2005 The Institute for Functional Medicine. Used with permission granted by The Institute for Functional Medicine, [www.functionalmedicine.org](http://www.functionalmedicine.org). No part of this content may be reproduced or transmitted in any form or by any means without the express written consent of The Institute for Functional Medicine, except as permitted by applicable law.





# Detoxification – Phase 1

- Phase one uses nutrients to convert the fat-soluble toxins into water soluble forms.
  - B-vitamins
    - Beef liver, beef, chicken, seafood, soy, nuts/seeds, vegetables
    - Microbiome, if healthy
  - Flavonoids
    - Soy, berries, lychee, orange peel, apples, onion, garlic, chia seeds, green/chamomile/milk thistle/bergamot tea, herbs (fresh, dried), cocoa
  - Branch chain amino acids
    - Meat, fish, poultry, eggs





# Detoxification – Intermediate Phase

- Now that the toxins are water soluble, they are free to roam the body.
- We need antioxidants to quench them to prevent damage.
  - Colorful vegetables and fruit



*Eat the rainbow*



Panda et al. Guided metabolic detoxification program supports phase 2 detoxification enzymes and antioxidant balance in healthy participants. *Nutrients*. 2023

## RED

### Foods

Apples	Pomegranate	Sweet red bell peppers
Applesauce	Radishes	Tomato
Cherries	Strawberries	
Kidney beans		

## ORANGE

### Foods

Apricots	Cantaloupe	Nectarine
Bell peppers	Carrots	Orange
Butternut squash	Mango	Sweet potato

## YELLOW

### Foods

Bell peppers	Popcorn	Succotash
Corn	Spaghetti squash	Yellow squash
Lemon	Starfruit	

## GREEN

### Foods

Asparagus	Cabbage	Greens ( <i>beet, dandelion, collard, mustard, turnip</i> )
Avocado	Celery	Kale
Bean sprouts	Chard	Lettuce
Bell peppers	Cucumbers	Olives
Broccoli	Green beans	Snow peas
Brussels sprouts	Green peas	

## BLUE/PURPLE

### Foods

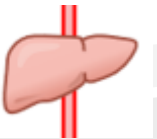
Blackberries	Eggplant	Potatoes ( <i>purple</i> )
Blueberries	Grapes ( <i>purple</i> )	Raisins
Cabbage ( <i>purple</i> )	Kale ( <i>purple</i> )	Rice ( <i>black or purple</i> )
Carrots ( <i>purple</i> )	Plums	
Dates		





# Detoxification – Phase 2

- Phase two converts the water-soluble toxins into a form that can be excrete.
  - Glutamine
    - Animal protein, spinach, parsley, cabbage
  - Sulfur compounds
    - Cruciferous vegetables
      - Arugula, bok choy, broccoli, Brussel sprouts, cabbage, kale, horseradish, cauliflower, kohlrabi, mustard, radish, rutabaga, watercress, wasabi, turnip





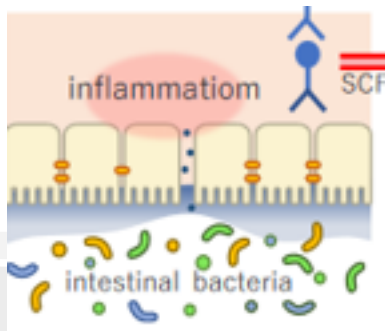
# What does a detox diet look like?










# Detoxification – Phase 3

- Gut
  - Need a healthy gut and microbiome
  - Regular bowel movements (1-2 days)
  - Aim for type 4

*\*Treat constipation\**



BRISTOL STOOL CHART			
	Type 1	Separate hard lumps	<b>SEVERE CONSTIPATION</b>
	Type 2	Lumpy and sausage like	<b>MILD CONSTIPATION</b>
	Type 3	A sausage shape with cracks in the surface	<b>NORMAL</b>
	Type 4	Like a smooth, soft sausage or snake	<b>NORMAL</b>
	Type 5	Soft blobs with clear-cut edges	<b>LACKING FIBRE</b>
	Type 6	Mushy consistency with ragged edges	<b>MILD DIARRHEA</b>
	Type 7	Liquid consistency with no solid pieces	<b>SEVERE DIARRHEA</b>

# Treating Constipation

- Diet high in prebiotics
  - Vegetables
  - Psyllium husks (ground)
- Physical activity
- Stress reduction
- Good sleep
- Water





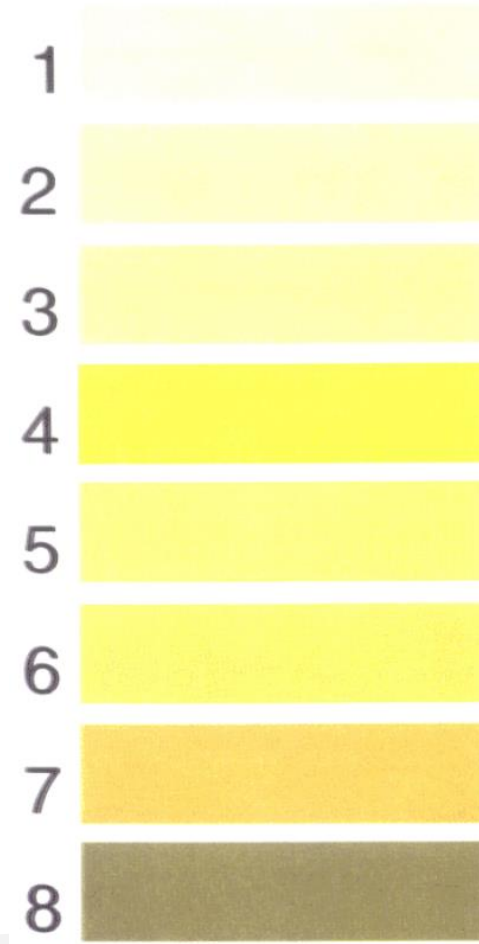
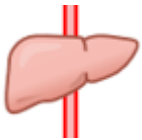
# Detoxification – Phase 3

## Kidney

- Adequate water (2-3 L daily)
- Pale color urine (aim for 1-3)

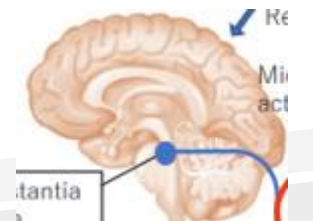
## Skin

- Sweating
  - Sauna, exercise



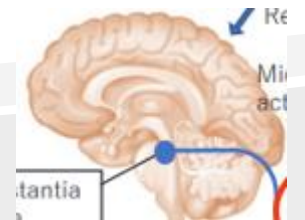
# Brain

- Once we have corrected the microbiome, healed the gut, enhanced detoxification we can start working on the brain.
- Neuroplasticity & Neuro-regeneration
  - The blood brain barrier can be repaired
  - We can influence neurotransmitters
  - Rebuild the brain



# Brain Food

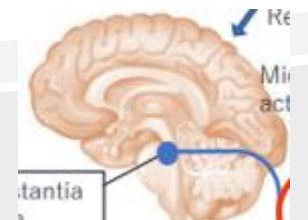
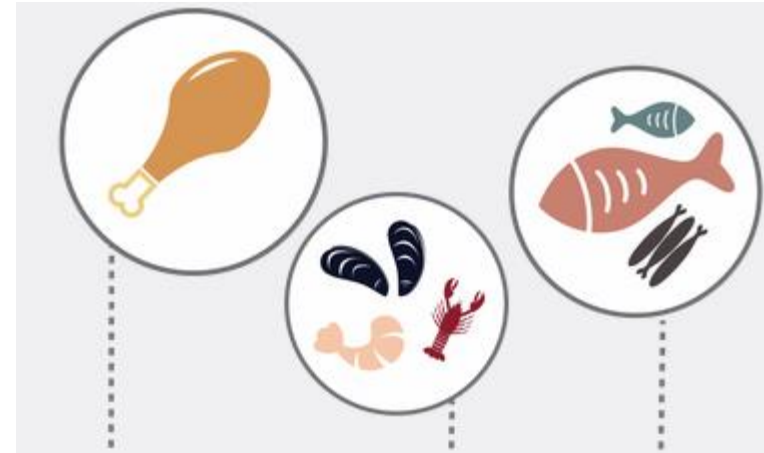
- Fats are the building blocks for the brain
- Need: omega-3 fatty acids, olive oil, flaxseed oil, saturated fats (coconut, animal)
- Avoid: processed fats such as margarine, salad dressings, commercial baked goods.





# Brain Food

- Protein is essential for all cells
- B-vitamins: meats
- Choline: eggs, soy, beef, chicken
- Iron: meat, poultry

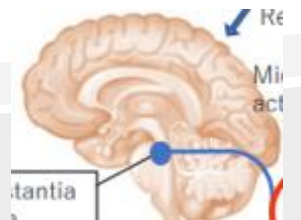




# Brain Food

## Vitamins

- Vitamin D: 2000-4000 IU daily
  - Our skin loses the ability to produce vitamin D ~ age 65
- Vitamin E: asparagus, avocado, olives, seeds, spinach
- Vitamin C: peppers, citrus, tomato, strawberries, spinach

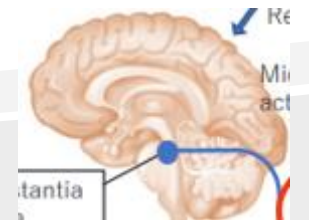




# Brain Food

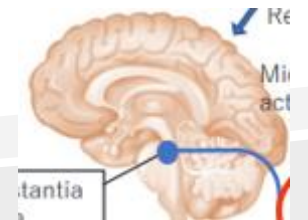
## Minerals

- Zinc: oysters, beef, crab, pumpkin seeds, shrimp, fish
- Magnesium: seeds, nuts, legumes, spinach
- Selenium: Brazil nuts
- Copper: Brazil nuts, beef, cocoa, black pepper



# Brain Food

- Antioxidants: colorful vegetables and fruit
- Spices: Curcumin/Turmeric
- Flavonoids: cocoa, tea, and citrus





# Intermittent Fasting

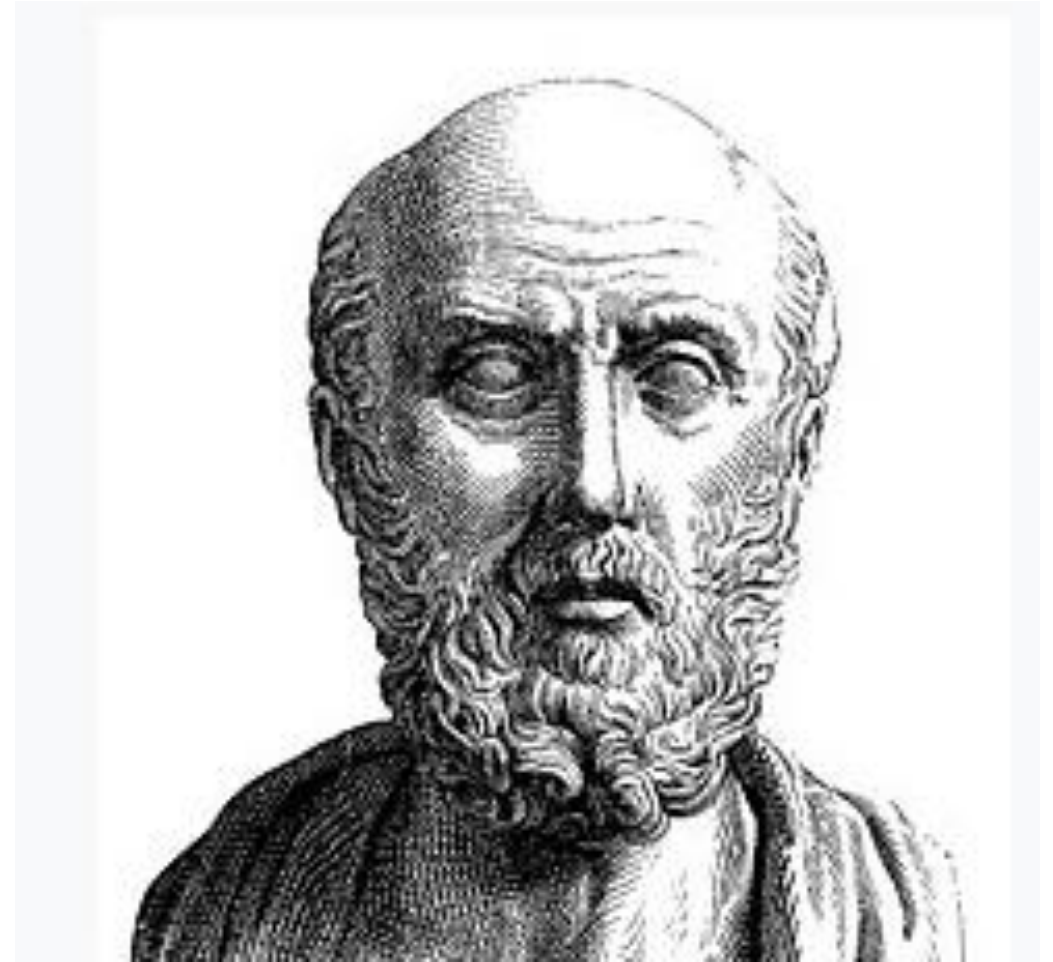
- Gives the body a rest from digesting/metabolizing nutrients.
- Resets the immune system.
- Strengthens the microbiome.
- Allows the body time to repair, including the brain.

***Avoid eating before you go to bed***

# Mediterranean Diet

- Hippocrates lived on the Greek Island of Kos in the Mediterranean ~400 BC
- He started the first nutrition trend –the Mediterranean diet.
- Today the Mediterranean is the most researched diet.
- Currently recommend for good health.

***We don't live in the Mediterranean***



*Let Food be thy Medicine  
All Disease Begins in the Gut*



# Mediterranean

vs

# Canadian Diet

- Preserved many of their traditional ways.
- Does not allow genetically modified foods, pesticides, herbicides.
- Most food consumed is locally grown/in season.
- Animals are allowed to live their natural lives grazing in fields. Chickens roam the garden eating bugs and weeds.
- Very few processed foods.
- Eat from the land and home gardens. Some weeds are edible. Herbs have curative properties

- We eat fast foods.
- We genetically modify foods and use pesticides/herbicides increase the yield of crops. Particularly wheat.
- We import/transport most food that we eat out of season.
- We mass produce livestock keeping them in small spaces, so they need antibiotics.
- We consume processed foods are part of our regular diet.
- Home gardens are not norm.



# Mediterranean Lifestyle

- Mediterranean's live longer without disease not only because of diet but also lifestyle (lower stress).
  - They have nice weather most days and spend time outside.
  - Their lifestyle is more active, just doing day to day activities (tending the garden, goats, chickens, walking to the market).
  - They protect “down time” and engage in leisure activity every day.
  - Television is not a past time; being outside, with people socializing.
  - Keeping traditional ways results in less stress related to daily living.



# Canadian Mediterranean Diet

- Whole food diet limiting processed food (box, package, can)
- Focuses on vegetables.
  - Colorful with lots of variety
- Not too much fruit
  - Fructose is hard on the liver
  - Source of sugar
- High quality proteins
  - Variety of red meat, chicken, fish, seafood, organic soy
  - No processed meats (bacon, salami, bologna)
- High quality fats
  - Omega-3, olive oil, some animal fat, coconut oil
  - Not processed fats (margarine, miracle whip, salad dressings)
- Limits grains
  - In North American grains are genetically modified so they can be sprayed with round up
- Limits dairy
  - How cows are raised influences their milk
  - When raised in tight quarters they are given antibiotics and “feed” instead of being allowed to graze
  - Mammals concentrate toxins in their milk/fat
    - 17% ↑ PD risk/200 g/d milk
- Omits sugar
  - Feeds “bad” bacteria
  - Damages the gut
  - Increases inflammation





# Lifestyle

- Get outside most days
  - Forest Bathing
- Be active as much as possible
  - Proven to improve PD symptoms
- Be social
  - It is good for your heart
- Have protected down time
  - Learn to say “no” to commitments that do no bring you joy.
- Sleep
  - Allows the brain to heal
  - Allows dopamine to build up



# Glucose (blood sugar)- Enemy of Brain

- North America we consume too much carbohydrates (sugar, dairy, grains, fruit, potato, corn)
  - Potato, corn some fruit are genetically modified
  - Consumed in excess cause a high glucose load
  - Crosses the blood brain barrier
  - Damages the body tissues and brain

***Not keto, but less than 100 g CHO daily***



# Less than 100 g carbohydrate meal plan





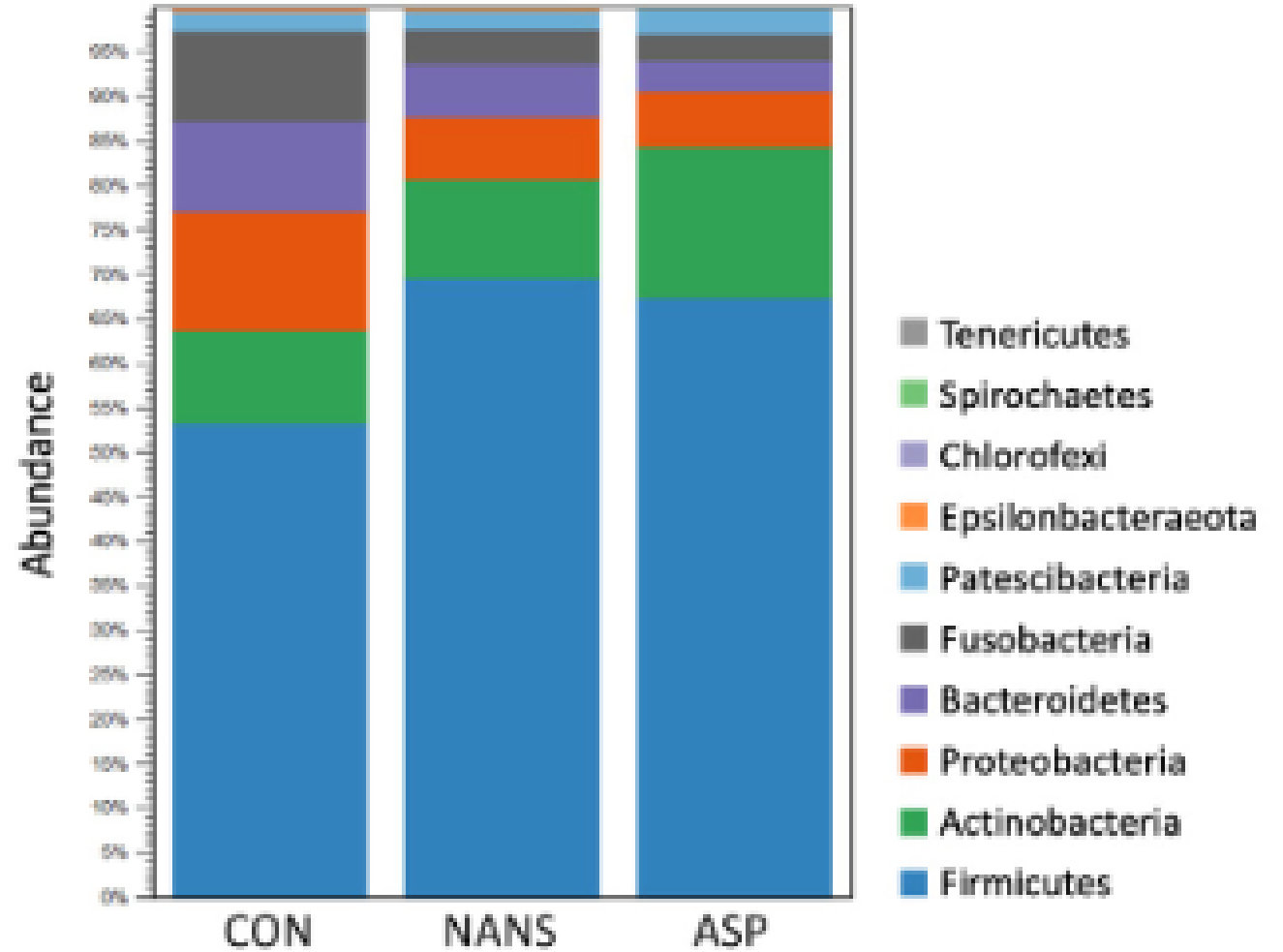
# Sugar Substitutes

- Alter the microbiome.

Con = don't consume

Nans = non-nutrient sweeteners

ASP = aspartame





# Clinical Trials on Nutrition

1. Ketogenic diet to safeguard the microbiome.
2. Optimizing protein patterns for skeletal muscle preservation and sleep in PD.
3. The effects of psyllium and wheat bran on body weight in PD and constipation.
4. N-DOSE: how much niacin is needed to achieve max levels in the brain.
5. The effect of a gluten free diet on PD.
6. To investigate the effects of ketones on the brain.
7. Effects of vitamin E on PD symptoms.
8. Effects of fasting on the immune system, microbiome, and PD symptoms.



# Levodopa & Nutrition

- Constipation
  - Disrupts the microbiome
- Protein
  - Competes with Levodopa for absorption in the gut
  - Reduces stomach emptying also affecting when Levodopa is absorbed
  - Recommendation is to consume protein outside of taking Levodopa
  - Leads to insufficient protein intake → muscle wasting



# Organic – is it worth it?

- Researchers conducted a study with 23 children living at a private school in Washington State.
- Measured toxins in urine while consuming their usual diet.
  - Found pesticides/herbicides which damage the nervous system (brain).
- For a week they consumed organic food, which was tested to ensure it was toxic free. Also removed all toxic cleaning supplies and personal care products.
  - Urine testing did not detect pesticides/herbicides ( $p < 0.01$ )



# Finding Farms on Vancouver Island



[www.islandfarmfresh.com](http://www.islandfarmfresh.com)





# Click on Find a Farm

## Find By Location

Farms Nearest Me

---

Central Vancouver Island

---

Cowichan Valley

---

Gulf Islands

---

Saanich Peninsula

---

Western Communities

---

## ☰ Find By Category

Berries

---

Farm Tours

---

Food & Beverages

---

Meat, Livestock & Feed

---

Plants & Gardening

---

Tree & Vine Fruit

---

Vegetables

---



### Blue Harvest Farm

**Address**

13387 Code Rd, Ladysmith, BC, Canada

**Products**

- Blueberries



### Little Qualicum Cheeseworks

**Address**

403 Lowrys Road, Parksville, BC, Canada

**Products**

- Artisan Cheese
- Milk Dispenser
- Self-Guided Farm Tours



### Silver Meadows Farm

**Address**

1019 Errington Road

**Products**

- Beans
- Beef
- Beets



### Springford Farm

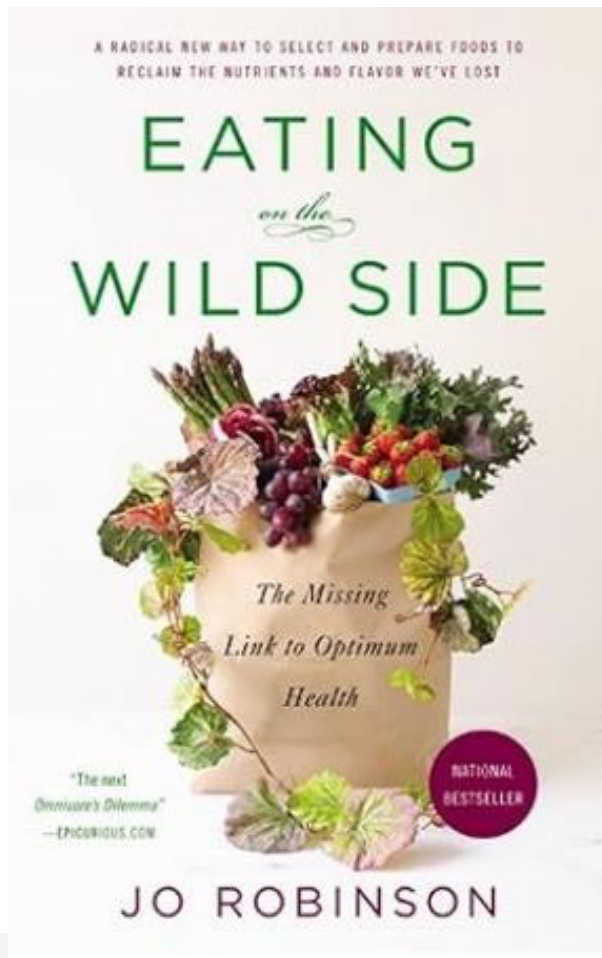
**Address**

1934 Northwest Bay Road, Nanoose Bay, BC

**Products**

- Beef
- Turkey
- Eggs

# Another Good Read

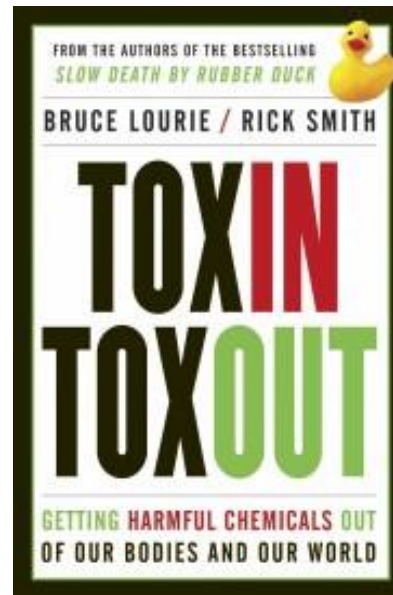
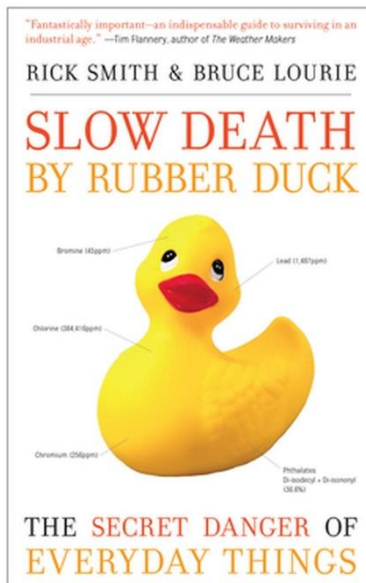


- Scours food science journals for the most nutrient dense variety of foods, tests growing them in this zone
- Blueberries have more nutrients after freezing
- Garlic has more nutrients when crushed and let to sit for 15 minutes before cooking



# Reducing Exposures

It's not just food - cleaning supplies, personal care products



Two Canadian Environmental researchers have written about our toxic exposures and how to avoid them.



*We will never be able to be fully toxic free  
but if we support the liver and reduce  
toxic exposures, we will be able to  
detoxify and eliminate those toxins that  
we can't avoid.*

Dr. Tracy Lister RD DCN



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