

# Inflammation and lymphoma: Quelling inflammation through nutritional choices

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# Presentation outline

- What is naturopathic medicine?
- What is chronic inflammation?
- How does inflammation influence the development of lymphoma?
- How can the diet be used to reduce inflammation?



# Naturopathic medicine

A system of primary health care with 6 guiding principles:

- First, do no harm – strive for minimal side effects from care
- Work with the healing power of the body (of nature)
- Identify and treat the cause of disease – rather than symptom management
- Doctor as teacher – emphasizes patient participation
- Treat the whole person – beyond cancer diagnosis, individualized
- Disease prevention and health promotion



# Naturopathic modalities

Strategies and treatments used by naturopathic doctors include:

- Traditional Chinese medicine and acupuncture
- Homeopathy
- Nutritional medicine (supplements/dietary counseling)
- Botanical medicine
- Physical medicine (massage, chiropractic, hydrotherapy)
- Lifestyle counseling (sleep, stress, personal habits)

Treatments are individualized and practitioner-specific.



# Naturopathic medicine in oncology

How can naturopathic support me through cancer treatment?

- Management of treatment side effects
- Therapies that may complement and enhance conventional care
- Strategies for prevention of primary or recurrent cancer
- Assessment of the health of the body overall before, during and after treatment



# Inflammation

## What is inflammation?

- A normal and necessary response to injury
- 4 key signs of inflammation:
  - redness, swelling, pain, heat
- Evidence of the activation of the body's immune responses
- Events occurring during this response:
  - Activation and proliferation of immune cells
  - Movement of cells to affected area
  - Changes in permeability of tissue

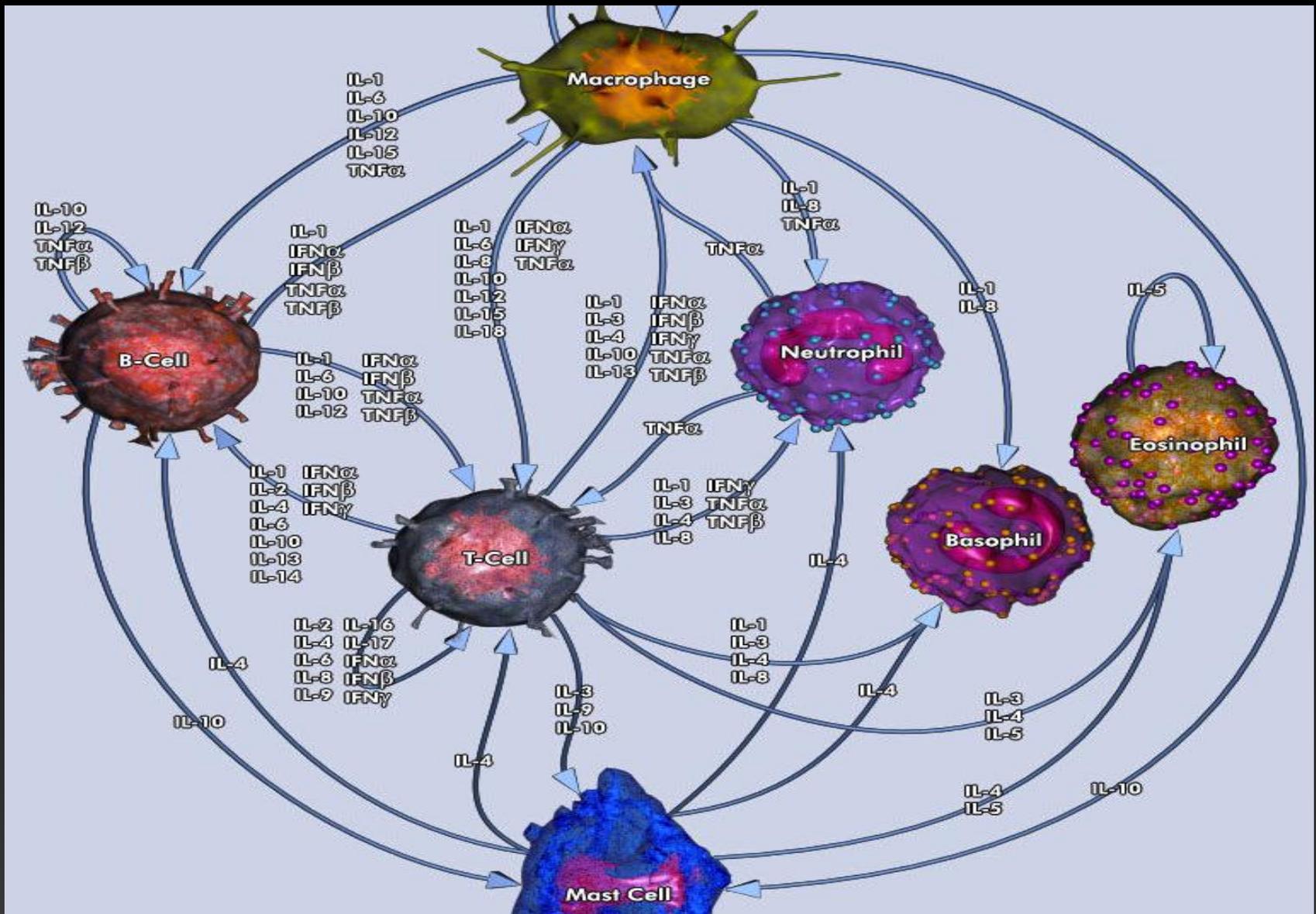


# Inflammation

## Acute inflammation:

- Complex, coordinated response: many cells, genes, chemical messengers
  - NF-kB, chemokines, interleukins, TNFa and b, Cox-2 enzymes, prostaglandins...
  - Cascade of events, chemicals, lead to healing





Qiagen.com "cytokine network"

# Chronic vs. acute inflammation

Normal (acute) inflammation:

- Harmonized effort over limited period

Chronic inflammation:

- Continuous, uncontrolled inflammatory response



# Chronic inflammation

- Drives growth of (abnormal) cells, decreases rate of (abnormal) cell death (Nf-kB plays important role)
- Factors contributing to chronic inflammation
  - Aging
  - Oxidative stress – chemicals, sunlight, environmental radiation, metabolic processes, free radicals
  - Cancer perpetuates the inflammatory response, produces inflammatory molecules itself
- Cancer has been described as a “wound that doesn’t heal”



# Does inflammation influence lymphoma?

- Some forms of lymphoma are directly linked to inflammatory processes
- Elevated levels of inflammatory markers may relate to risk of developing lymphoma (PMID: 23300021, 23814017)
- A scoring system based on inflammatory parameters (GPS) seems to be associated with survival (23423859)
- High levels of Nf-kB associated with poorer outcomes (21506127)



How can we use the diet to  
reduce inflammation???

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# Rule #1...

- Dietary changes must be sustained (and sustainable) to make a difference!
  - Make changes with the support of a health care provider (ND, nutritionist, dietician)
  - Think of these as healthy living choices rather than a “diet”
  - Every day is a new day... get back on the wagon!
  - Acknowledge that changes can be made over time



# The role of antioxidants

- Free radicals:
  - Unstable compounds that can create damage to tissues through oxidative stress
  - Both a product and cause of inflammation
- Antioxidants:
  - The “antidote” to free radicals
  - Quench free radicals by binding with them
  - Naturally anti-inflammatory through this process



# Key antioxidant foods

Most potent sources of anti-oxidants? PLANT-BASED FOODS:

- Brightly-coloured fruits and veggies
- Dark berries (anthrocyanadins reduce NF-kB)
- Herbs and spices (turmeric, garlic, green tea, rosemary)
- Leafy greens (kale, chard, spinach)
- Cruciferous veggies (broccoli, Brussels sprouts, cauliflower)
- Yellow/orange foods (peppers, pumpkins, carrots, pineapples)



# Lymphoma and food-based antioxidants

Do anti-oxidants make a difference?

- Increased fruit/vegetable intake associated with almost 20% reduction in NHL risk (19685491)
- Increased NHL survival rates (+26%) with higher fruit/veggie intake 20350273
- Diets high in antioxidant vitamins A and C, as well as zinc and manganese shown to reduce NHL risk (22211937, 18204928)



# Antioxidants – summary

- Anti-oxidants are powerful anti-inflammatory compounds
- Neutralize damage-causing free-radicals
- Plant based foods are excellent sources
- Anti-oxidants linked with lowered NHL risk, improved survival



# Fat facts

- Fats are essential to proper physical function.
  - Cell walls, hormones, signalling molecules are all fat-based
  - Required for vitamin absorption (ADEK)
  - Insulation and energy source
- Some fats promote inflammation while others are naturally anti-inflammatory.
- A low-fat diet is not necessarily the healthiest choice.



# Good vs. bad fats

## Pro-inflammatory fats:

- Saturated fats (red meat, high fat dairy products)  
23369030
- Trans-fats (processed foods, baked goods, deep fried foods, hydrogenated fats) 15051604
- Omega-6 fatty acids (meat, dairy, vegetable oils such as corn, sunflower) 21889886



# Good vs. bad fats

## Anti-inflammatory fats:

- \*\*\*Omega-3 fatty acids! (flax oil, fish oil, cod, halibut, salmon, mackerel, anchovies, sardines, herring)
- Monounsaturated fatty acids (olive, canola, avocado)

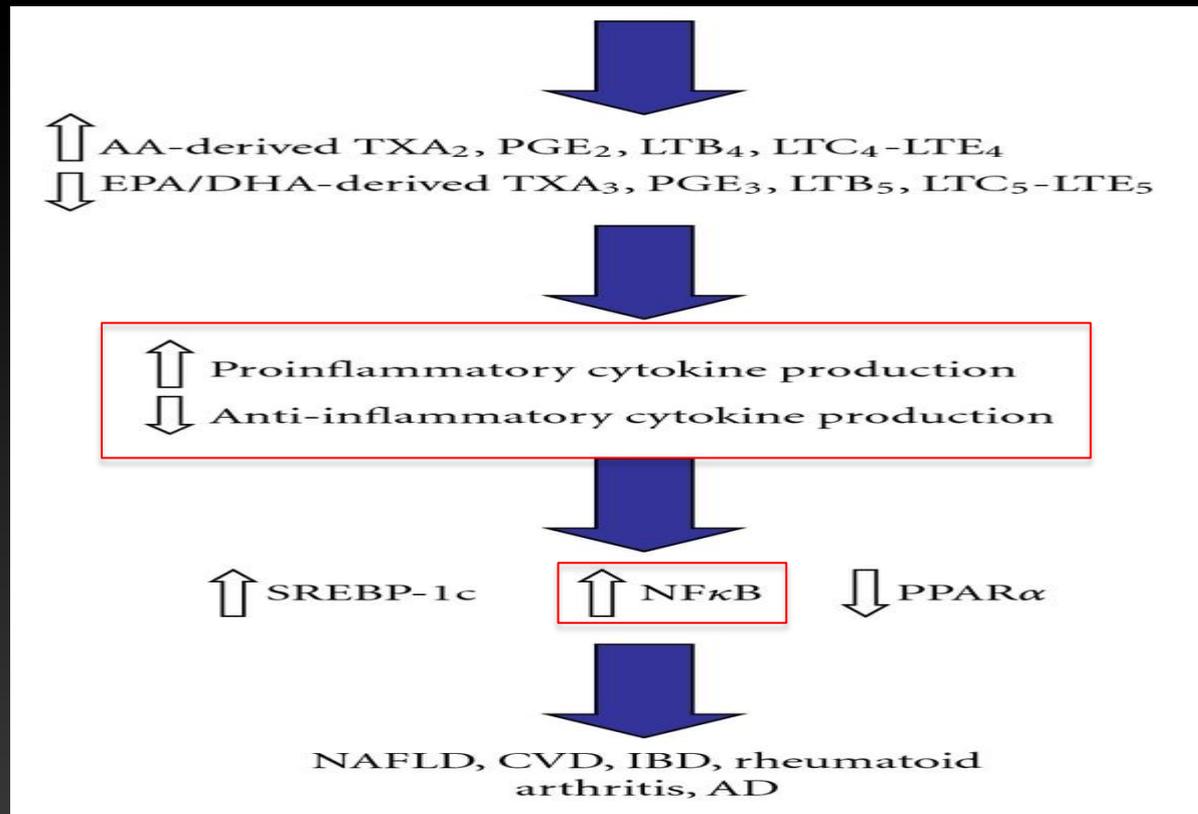


# Omega 6 and 3 demystified

- Named for chemical structure of each of these polyunsaturated fatty acids (PUFA)
- Essential fatty acids (EFAs) that the body cannot synthesize
- Both are required, healthy ratio of 6:3 is 1-4:1 (current intakes are 10-20:1)
- Less omega 3 intake linked with inflammatory diseases



# Effect of high omega-6:omega-3



# Effect of fat intake on NHL

The bad news:

- 90% increase in risk with high saturated fat intake <sup>14977641</sup>;
- 60% increased risk with trans fatty acid intake <sup>23486982</sup>
- Daily beef, pork or lamb ingestion more than doubled risk in women <sup>10528026</sup>
- 47% increased risk with fat-containing milk;  
**4x the risk with high fat ice cream!** <sup>23486982</sup>



# Effect of fat intake on NHL

The good news:

- Over 50% reduction in risk with high omega 3 fatty acid intake <sup>23486982</sup>
- 40% reduced risk with high fish/seafood intake <sup>23486982</sup>
- Delayed progression of NHL in mice fed high omega 3 diet <sup>20919854</sup>
- No relationship between monounsaturated fats and risk <sup>14977641</sup>



# Fats – summary

- Don't cut fat out of the diet entirely
- Avoiding trans fats, reduce saturated and omega-6 fatty acid intake
- Increase monounsaturated and omega-3 fatty acids from olive oil, fish, algae, flax
- Protein intake: lower sources of saturated fats (plants, fish, lean chicken)



# Sugar and carbohydrates

Directly contribute to inflammation:

- Trigger for release of inflammatory chemicals (NF-kB binding, TNF $\alpha$ , IL-1) 20067961

Indirectly contribute to inflammation:

- Promote obesity
- Promote insulin resistance

Other effects:

- Replace more nutrient-dense foods in diet
- Suppress immune function



# Sugar and carbohydrates

- Carbohydrate intake associated with 5X increased risk of NHL (very small study!)  
23621249
- High fasting blood sugar is associated with poorer prognosis in rare form of lymphoma (ENKTL)



# Artificial sweeteners

May not be any better...

- Increased risk of lymphoma in animals exposed to dietary aspartame in utero  
17805418
- Risk of NHL increased with diet soda intake 23097267



# Whole grains – helpful or harmful?

- Limited evidence – 60% reduction in NHL risk with whole grain consumption
- Whole grain-based diet associated with reduced inflammation <sup>22133051</sup>, reduced incidence of death from inflammation-related causes <sup>17556700</sup>
- Protective effects – antioxidant content of whole grains (before processing)



# Sugar and carbs - summary

- Sugars contribute directly to systemic inflammation
- High carbohydrate intake aggravates other inflammation-related conditions
- Whole grains (vs. multigrain) may be protective, possibly due to their anti-inflammatory effects





# The ideal anti-inflammatory, anti-cancer plate

- Plant-based foods (1/2 of plate/diet); 7-10 fruit/veg servings per day
- Small portions (3-4oz per serving) animal protein (optional), low in saturated fats (chicken, fish, seafood, omega-3 eggs). Less fat/protein from dairy sources and red meat
- Whole grains 4-6 servings per day (½ cup cooked grains, 1 slice bread)
- Anti-inflammatory fats (olive, fish, flax, canola, avocado)
- Liberal use of herbs and spices

*From Anti-cancer: a new way of life – David Servan-Schreiber and  
The Definitive Guide to Cancer – Lise Alschuler*



# The ideal anti-inflammatory, anti-cancer plate

- Liberal use of herbs and spices
- Lots of water (2L per day – can include non-caffeinated beverages, green tea)
- Minimally processed foods
- Avoid refined sugar, artificial sweeteners

*From Anti-cancer: a new way of life – David Servan-Schreiber and  
The Definitive Guide to Cancer – Lise Alschuler*



# When the diet isn't enough...

Key anti-inflammatory nutritional supplements

**\*\*\*SEEK ADVICE FROM A HEALTH CARE PROVIDER WITH KNOWLEDGE OF INTEGRATIVE CARE\*\*\***

“Natural” does not mean “without side effects or interactions”



# When the diet isn't enough...

## Antioxidants:

- Curcumin (extract from turmeric)
- EGCG (extract from green tea)
- Vitamin D

## Anti-inflammatories:

- Digestive enzymes (away from food)
- Fish oil (check EPA/DHA content)
- Curcumin



# Other anti-inflammatory strategies

Don't forget to include these important lifestyle practices to fight inflammation:

- Adequate sleep
- Regular, moderate-intensity exercise
- Stress management
- Quitting smoking
- Avoiding toxin exposure, where possible
- Explore food sensitivities, address chronic inflammatory conditions



# Conclusions

- Inflammation plays a role in the development of many cancers
- Lymphomas appear to be associated with inflammation (among other factors)
- Dietary strategies may reduce inflammation in the body, possibly having a positive effect on the development of lymphoma



# Thank you!

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