
Well Up Medical presents
Immune Boosting

Agenda

The Immune system

The Energy system

- Cellular: Mitochondria

How to optimize both

When they don't work, Auto-immune disease:

- Overview
- Thyroid

Introduction to the immune system

A complex network of cells, tissues, and organs

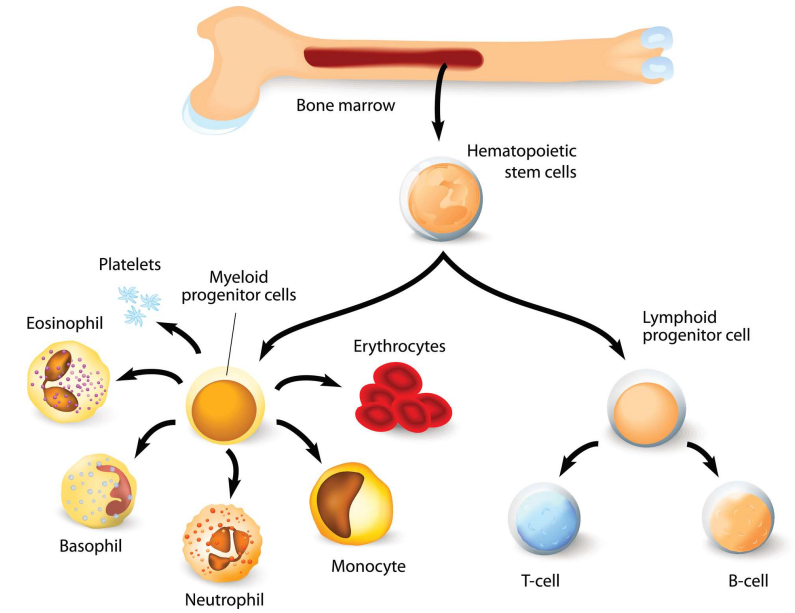
White blood cells

N-L-M-E-B – 60-30-6-3-1

There are several types including **neutrophils, lymphocytes (B cells and T cells),** monocytes, eosinophils and basophils.

Antibodies

Are proteins produced by B cells that can recognize and neutralize specific foreign substances



Presentation title 5

Molecules & proteins

Proteins

The complement system enhances the immune response by **coating pathogens and marking them** for destruction.

Molecules

Special signaling molecules called **cytokines**

Immune Barriers

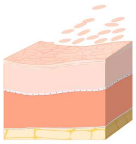
Outside

Skin, eyes, nose, throat, stomach and intestines

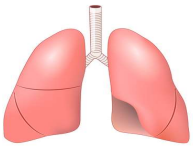
Inside

Blood brain barrier, liver

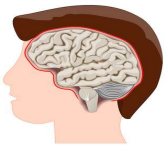
SKIN
(desquamation)

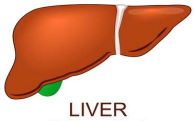


LUNGS
(surfactant)



BLOOD–BRAIN
barrier

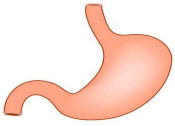




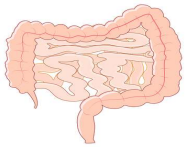
LIVER
(bile acids)

ANATOMICAL BARRIERS
(immune system)

EYES
(tears)



STOMACH
(gastric acids)



DIGESTIVE TRACT
(peristalsis)

NASOPHARYNX
(saliva and lysozyme)

Lymphoid Organs & Tissue

Organs

Thymus, spleen, tonsils and lymph nodes mainly filter the blood.

Appendix helps maintain gut health.

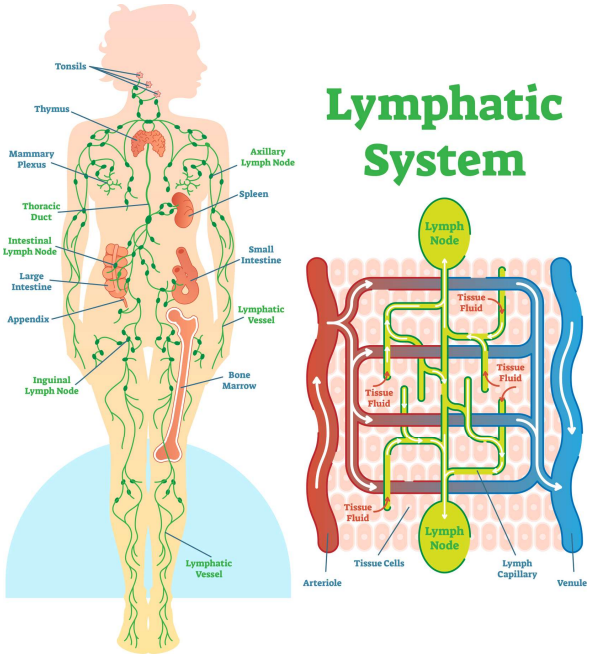
Tissue

Bone marrow produce and store immune cells.

Peyer's patches line the small intestine, part of the **gut-associated lymphoid tissue** (GALT)

Appendix and tonsils

- Tonsillectomy and appendectomy may be associated with an increased risk of autoimmune disease, the exact nature of this relationship is still not clear
- Are you missing one or more of these organs?
- This is likely a "root cause" that we are always looking for in functional medicine.


Lymphatic System
Tonsils
Thymus
Mammary Plexus
Axillary Lymph Node
Thoracic Duct
Spleen
Intestinal Lymph Node
Small Intestine
Large Intestine
Appendix
Lymphatic Vessel
Inguinal Lymph Node
Bone Marrow
Lymphatic Vessel
Lymph Node
Tissue Fluid
Tissue Fluid
Tissue Fluid
Tissue Fluid
Lymph Node
Arteriole
Tissue Cells
Lymph Capillary
Venule

So, initial reaction:

- **Prevents** the development of infections
  - **Fights** infections & illnesses
  - **Reduces** the severity of **allergies**

Localized swelling is immune response

- Redness, warm, swelling, and pain. While these symptoms may be uncomfortable, they are generally a **sign that the immune system is working to protect the body.**
- Increased blood flow delivers oxygen and nutrients.
- Can also containing it to a specific area of the body.


Chronic immune activation leads to inflammation and tissue damage.
Presentation title
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Chronic inflammatory disorders

- Autoimmune diseases (80+)
- Eczema
- Cancer
- Gut: gluten intolerance, Crohn's and Ulcerative Colitis
- Diabetes
- Neurological: Parkinson's, Alzheimer's and MS
- Depression
- Cardiac: hardening of the arteries

What causes "prolonged activation" 1 of 3

Chronic or persistent infections, such as

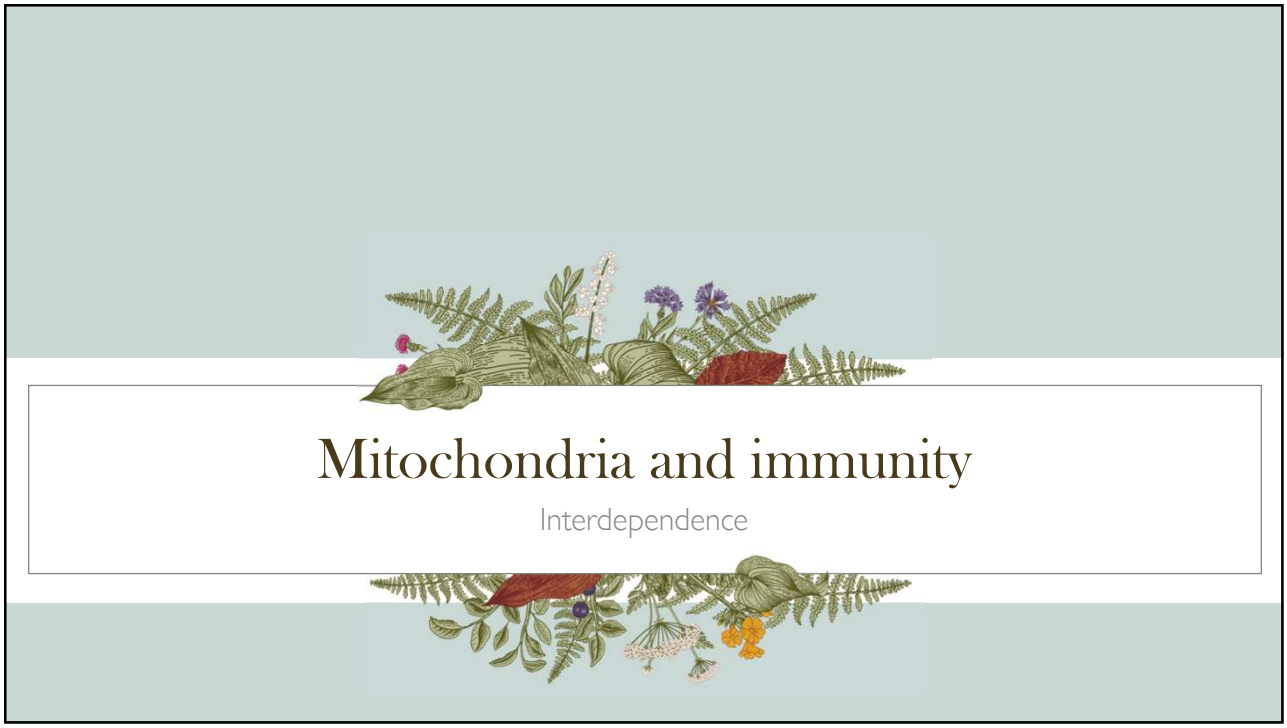
- Viral infections like Epstein-Barr (Mono)
  - How about "long" Covid?
- Bacterial infections (Lyme's)
- Parasitic infections

Parasite in America?

- Food
- Trichinellosis & Toxoplasmosis undercooked meats, Anisakiasis in **sushi or sashimi**.
- The Cyclospora cayetanensis parasite in contaminated **produce, such as raspberries, lettuce, or cilantro**.
- Giardia & Cryptosporidiosis in **contaminated water**
- **Pets**
- Toxoplasmosis, Roundworms and Tapeworms through contaminated surfaces.
- Hookworms, and Fleas are parasites, **fleas can transmit certain diseases, such as cat scratch fever and plague.**

Prolonged activation, cont. (2 of 3)

- Exposure to environmental toxins, pollutants, and allergens can trigger an immune response e.g. exposure to cigarette smoke can cause chronic inflammation in the lungs.
- Chronic stress can cause a dysregulation of the immune system
  - can **suppress** the immune system & **increase** the production of inflammatory cytokines


Mitochondria and immunity
Interdependence

Mitochondria

- Mitochondria are the "powerhouse" organelles of cells that are responsible for generating energy in and for the use of each cell. There are hundreds to thousands in EVERY cell in the body of various ages: new to dying.
- Mitochondria contain their own DNA, (mtDNA).
- They generate energy and reactive oxygen species (ROS)

ROS

- Reactive oxygen species (ROS) encompass a variety of molecules, including
  - free radicals (molecules with an unpaired electron)
  - non-radicals (more stable)
- These are formed as natural byproducts
- ROS are beneficial in small, controlled quantities.
- Excessive or uncontrolled production leads to oxidative stress


What produces free radicals?
Alcohol
Certain drugs
Chronic stress
Cigarette smoking
Exposure to ultraviolet rays
Exposure to environmental toxicants
Poor diet
Inflammation
Normal physiological processes
(e.g., metabolism)

Oxidative Stress

- An imbalance between the production of ROS and the body's ability to neutralize or repair their damaging effects. (with anti-oxidants)
- Implicated in the aging process and the development of several chronic diseases, including
  - cardiovascular disease,
  - neurodegenerative disorders, and
  - cancer.

Mitochondrial dysfunction

- Lifestyle factors:
  - poor diet (deficiencies in certain nutrients),
  - lack of exercise
- Genetic mutations
- Exposure to toxins such as
  - heavy metals, (in dark chocolate?!)
  - pesticides, or industrial chemicals,
  - electromagnetic fields (EMF)
- Infection
- Aging – can't be stopped but it can be helped

The same things that corrupt the immune system contribute to mito dysfn

Interdependence

- The same things that corrupt the immune system can contribute to mito dysfunction Proper mitochondrial function is essential for a healthy immune response, and
- Poor immune function contributes to mitochondrial dysfunction.
- The relationship between mitochondria and the immune system is complex and multifaceted.

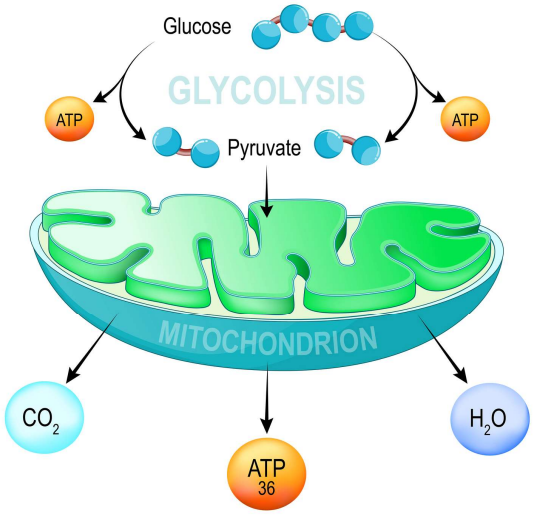
How mitochondria activate the immune system

- In viral infection or cellular stress, mtDNA activate the immune system leading to the production of **inflammatory cytokines.**
- Do you remember the cytokine storm of covid?

Mito can also

- Humanin, has been shown to have **anti-inflammatory and cytoprotective effects in various cell types.**
- Mitochondria regulate T cell function, specifically, **mitochondrial respiration** can control the differentiation of T cells, leading to changes in their ability to fight infections and cancer.

AEROBIC RESPIRATION



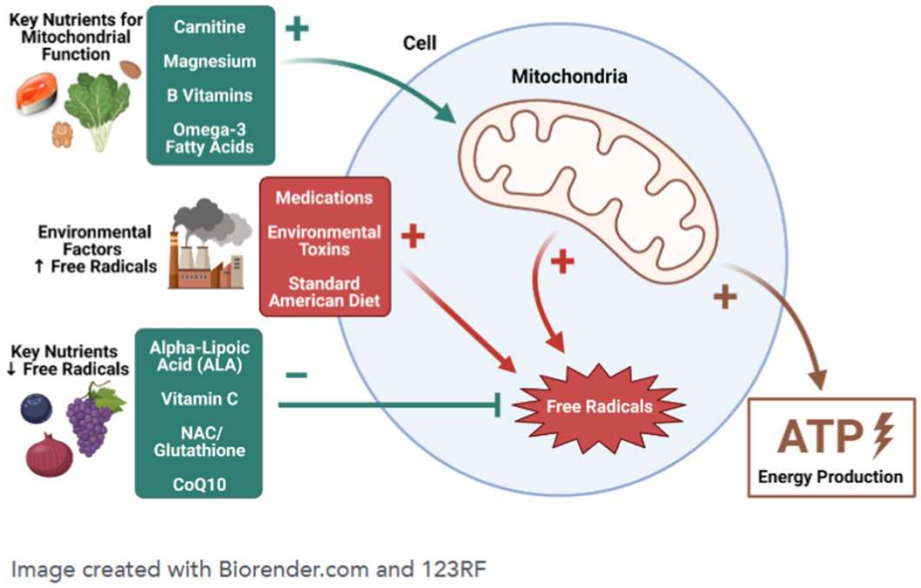


Image created with Biorender.com and 123RF

Do you have to know all this?

- No, but you do need to know that you have to care for your mitochondria to help your immune system and you have to help your immune system to take care of your mito….
- LIFESTYLE changes can do that.
- WE CAN'T IGNORE it any longer.


Activities that promote immune and mito health
Get moving

Boost the mito/immune system

- Stay hydrated
- Get enough sleep: aim for 7-8 hours of quality sleep each night.
- Moderate exercise can help to boost your immune system by increasing blood flow, reducing stress, and strengthening your muscles.
- Strenuous physical activities like HIIT increase the energy demands of cells & lead the mito to adaptation.
- Reduce stress: Stress can have a negative impact on your immune system, so try to find ways to manage stress, such as mindfulness, practicing gratitude and deep breathing.


GOOD DIET
INTERMITTENT FASTING
HIIT
ENDURANCE
EXERCISE
MITOCHONDRIAL HEALTH
SUPPLEMENTS
QUALITY SLEEP
MASSAGE

Boost immune/mito together

- Caloric restriction can reduce the energy available to cells, leading to mitochondrial stress and adaptation. THINK Time restrictive feeding
- Sauna – Increases body temperature raising the body's core temperature, which can mimic a mild fever. Fever is a natural immune response that helps to stimulate and enhance immune function.
- Cold exposure: Exposure to cold temperatures can increase the energy demands of cells, leading to mitochondrial stress and adaptation. Cold shower but for sure cool sleeping
- Low levels of oxidative stress can also stimulate mitochondrial adaptation and improve mitochondrial function.
  - Which takes of to our word of the day…

Hormesis (word of the day)

- A biological phenomenon in which exposure to **low levels of a stressor can stimulate an adaptive response that provides increased resistance to a higher level of stress.**
- In the case of mitochondria, exposure to **low levels of stressors such as exercise, caloric restriction**, or oxidative stress can stimulate adaptive responses that improve mitochondrial function.
- **Everything in moderation, sauna every once in a while, HIIT twice a week, there is nor place for obsession**

Help the immune by protecting barriers

BBB

- Healthy lifestyle,
- Avoiding toxins
  - alcohol, tobacco, and some drugs.
- Protecting the head from injury
  - helmets
- Managing hypertension
  - Celery
- Control diabetes
  - Berberine

Skin, eyes, nose, lungs

- Protective clothing from mosquitoes, chemicals
  - gloves with chemicals, sick people, pet feces
- Eye protection when weed whacking, gardening
- Nasal washes, mask for working with soils (cat)
- Avoiding toxins
  - tobacco, Respirators when painting, chemicals

Stomach/ liver / intestines

- Don't suppress stomach acids
  - **Long term use of proton pump inhibitors, may decrease thyroid medication T4 conversion to T3.**
- Avoiding toxins
  - Alcohol & some drugs
- Constipation
- IBD – Crohn's & Collitis
- IBS ? / SIBO
- Celiac/ Gluten insensitivity

Avoid Toxins: BPA, BPS, BPF, BPAF, BPB, BPC, and BPE.

- Minimize exposure to all bisphenols.
- Choose products that are labeled as "bisphenol-free" (not just BPA)
- Avoid plastic containers with the recycling codes 3 (PVC), 6 (polystyrene), and 7 (polycarbonate) REMEMBER you have to be vigilant 367 days of the year to avoid toxins (yes, more than you really have).
- The linings of some food cans (next slide) and thermal paper receipts contain bisphenols.
- Wash your hands frequently
- Use glass, ceramic, or stainless steel containers for food and drink.

NUTRIENTS FOR IMM/MITO HEALTH

See HANDOUT

- NAC ---> Glutathione
- Coenzyme Q10
- Alpha-lipoic acid
- Carnitine (caution thyroid)
- Magnesium
- B Vitamins
- Omega-3 fatty acids
- Vitamin C

Fight back with Anti-oxidants

- Antioxidants are compounds that neutralize free radicals,
- When the ratio of antioxidants to free radicals in the body back into balance.
- Glutathione/ NAC
  - Glutathione is a tripeptide composed of three amino acids: cysteine, glutamic acid, and glycine. NAC is a precursor to cysteine, which is the rate-limiting amino acid in glutathione synthesis.


Nutrients in real food
Supplement in times of need


GINGER
SWEET POTATO
BLUE BERRY
SPIRULINA
AVOCADO
PERSIMMON
GARLIC
IMMUNE SYSTEM BOOSTERS
BROCCOLI
PAPAYA
KALE
SEEDS
ARTICHOKE
SALMON
KIWI

Eat what you can… many hand outs

- Vitamin A
- Vitamin C
- Vitamin D – sun in summer, supplement in winter
- Zinc
- Green tea for epigallocatechin gallate (EGCG) 4 cups daily
- Turmeric spice <not exact> Curcumin 500-1,000 mg, 2x daily
- Beta glucans

Beta glucans

- The importance of grains: beta-glucans
- Beta-glucans are a group of polysaccharides that **improve immunity** and have **profound anti-cancer effects**, and demonstrate the value of using whole foods to improve health outcomes in general, and cancer in particular
- Present in foods like **barley, oats, mushrooms, brewer's yeast**, and seaweed.

Supplement the rest – only rarely = MAXdose

- N-Acetylcysteine (NAC) 600-900 mg, 2x daily
- Melatonin 5-20 mg, taken at bedtime
- Elderberry (Sambucus nigra) 500 mg orally, daily
- Resveratrol 100-150 mg orally, 2x daily
- Quercetin – the anti-histamine before the response
- Licorice root (standardized to glycyrrhizin)200-400 mg daily in divided doses (short-term use <4 weeks)

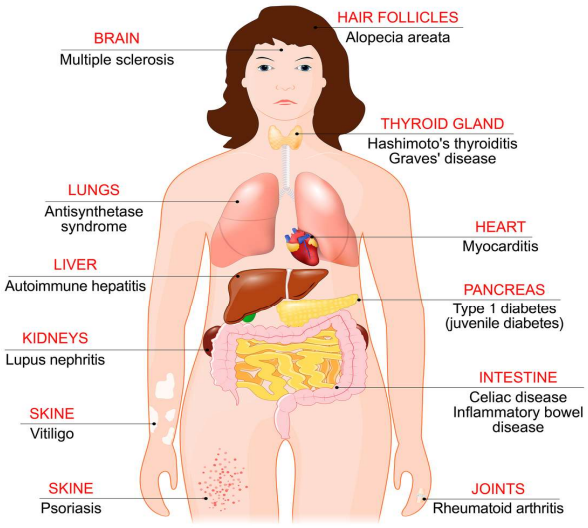
Cellular energy vs. body energy

Our overall energy levels are likely to be higher if we

- have a balanced diet, engage in regular physical activity
- Get sufficient restorative sleep.
- Reduce stress which can deplete our energy reserves.
- Depression (chronic inflammation), anxiety, and other mood disorders can contribute to feelings of fatigue.
- Anemia, thyroid disorders, or chronic fatigue syndrome (now a mitochondropathy), can cause persistent fatigue.

A healthy lifestyle, including regular exercise, a balanced diet, adequate sleep, and stress management, can help improve overall health and reduce the risk of various health issues.

Tissues of the body affected by AUTOIMMUNE ATTACK



More prolonged activation: Autoimmune (3 of 3)

- Autoimmune disorders occur when damage tissue makes the immune cells recognize body's own good cells as foreign substances
- This creates a loop

The autoimmune loop

- Breaking this loop can be challenging:
- Conventional treatment strategies focus on **suppressing the immune system**.
- But, **lifestyle changes** can also help to manage autoimmune diseases.

Immunosuppressants are hard on the body

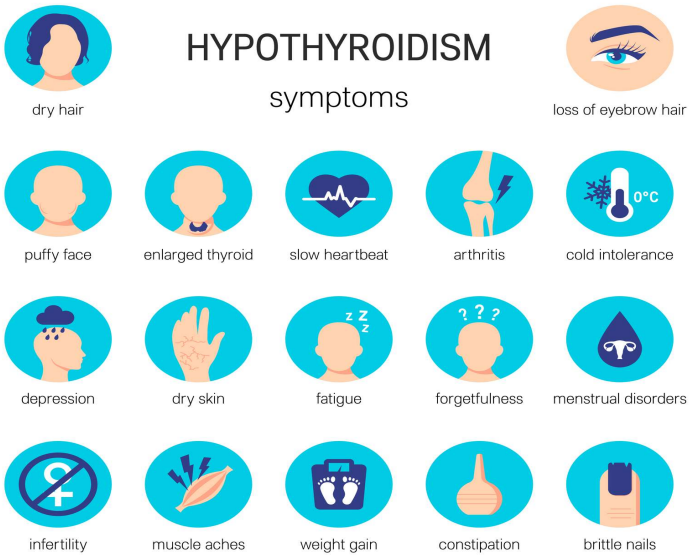
- Increased risk of infections. In some cases, severe and even life-threatening.
- Risk of cancers particularly skin cancer and lymphoma, can increase.
- **Interactions** with other medications leading to potential **side effects or reduced effectiveness** of one or both drugs.
- Common side effects can include nausea, vomiting, diarrhea, weight gain, high blood pressure, and headaches.
- Some immunosuppressants, such as corticosteroids, can have **long-term effects on the body, including bone loss, cataracts, and high blood sugar.**

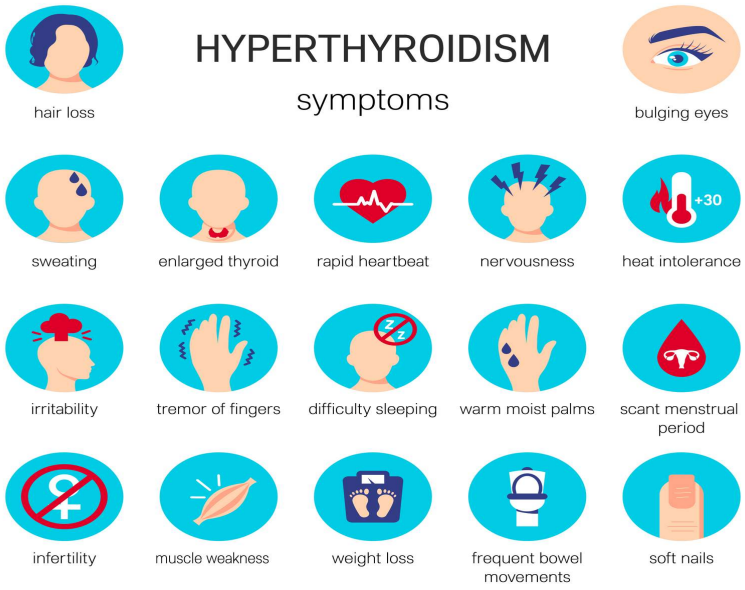
80+ known autoimmune diseases, each can affect different parts of the body

- Rheumatoid arthritis
- Lupus
- Type 1 diabetes
- Multiple sclerosis
- Psoriasis
- Crohn's disease
- Hashimoto's thyroiditis
- Grave's disease
- Sjögren's syndrome
- Myasthenia gravis
- Celiac disease
- Vasculitis
- Polymyalgia rheumatica
- Ankylosing spondylitis
- Autoimmune hepatitis
- Goodpasture syndrome
- Pernicious anemia
- Dermatomyositis
- Addison's disease
- Antiphospholipid syndrome

Thyroid function (handouts)

- According to the American Thyroid Association, an estimated 20 million Americans have some form of thyroid disease, **and up to 60% of those with thyroid disease are unaware of their condition.**
- **That's 12 million people. Have yours checked.**
- HypOthyroidism (LOw functioning thyroid)
- HYPERthyroidism (an overactive thyroid)


HYPOTHYROIDISM
symptoms
dry hair
loss of eyebrow hair
puffy face
enlarged thyroid
slow heartbeat
arthritis
0°C
cold intolerance
depression
dry skin
fatigue
forgetfulness
menstrual disorders
infertility
muscle aches
weight gain
constipation
brittle nails


HYPERTHYROIDISM
symptoms
hair loss
bulging eyes
sweating
enlarged thyroid
rapid heartbeat
nervousness
+30
heat intolerance
irritability
tremor of fingers
difficulty sleeping
warm moist palms
scant menstrual period
infertility
muscle weakness
weight loss
frequent bowel movements
soft nails

2 auto-immune, 1 not

- Hashimoto's & Grave's are considered auto-immune
  - About 90 percent of people with hypothyroidism have Hashimoto's. Hashimoto's is the most common autoimmune disease in the world.
  - Often In Hashimoto's people might start off more hyper and then they eventually go to hypothyroid.
- Grave's is autoimmune hyperthyroidism
- Non-autoimmune hypothyroidism

Non-autoimmune hypothyroidism (or post-surgical)

- Basal body temperature tracking for anyone with hypothyroid, track over a week or two to determine if the thyroid issue is more thyroid related or if the issue is more adrenal related. First of the morning temp, before getting out of bed
- A relatively straight line = Thyroid
- If graph is going up and down = adrenal glands

Hashimoto's

- Usually triggered by an infection. The "big three" are Epstein-Barr virus, H. Pylori, or Yersinia Enterocolitica.
- Conventional medicine really doesn't treat Hashimoto's any differently than they do non-autoimmune hypothyroidism.
- But in functional medicine we focus on
  - gluten-free diet, and
  - good vitamin D levels.
  - overall gut health
  - finding the root cause infection

Herbals and supplements

Hashimoto's

- Ashwagandha, an adrenal adaptogen enhances the conversion of T4 into T3.
  .
- Whenever there is autoimmune disease, increase glutathione levels which helps to balance the immune system and it reduces inflammation:
  - Whey protein, Selenium. NAC,
- Stinging Nettles helps to balance the immune system. The roots and the leaf are the most commonly used. Use it for making tea.

Non-auto-immune hypothyroidism (including post-surgical)

- For non-autoimmune hypothyroidism, herbs can give a nice boost to the gland, not really a long-term solution.
- We want to find out why the gland isn't working well. Whether it's an iodine deficiency, nutrient deficiency, whether it's the adrenals that are shutting down the thyroid or mercury, environmental toxins, all these things can affect the thyroid.
- Eleuthero, formerly known as Siberian Ginseng.

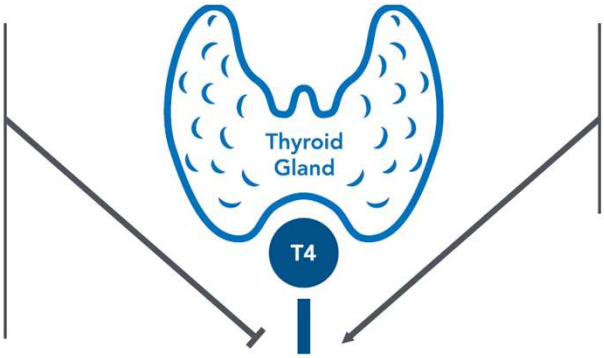
Graves' disease (Hyperthyroidism)

- Anti-oxidants
- If you have low thyroid function avoid the following that will be used to suppress the thyroid:
- Bugleweed
- Lemon-balm
- Motherwort
- L-Carnitine

Thyroid function inhibition and proper function

Factors that inhibit proper production of thyroid hormones:

- Stress
- Infection, trauma, radiation, medications
- Fluoride (antagonist to iodine)
- Toxins: pesticides, mercury, cadmium, lead
- Autoimmune disease: celiac



Factors that contribute to proper production of thyroid hormones:

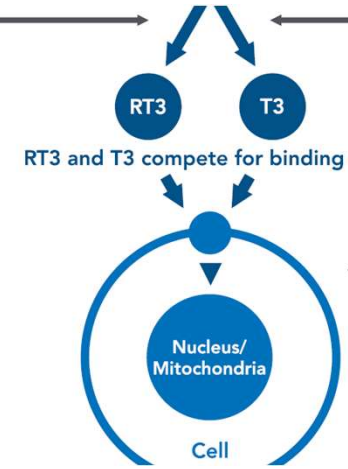
- Nutrients: iron, iodine, tyrosine, zinc, selenium, and vitamins E, B2, B3, B6, C, D

Foods sources first but what about iodine?

- Sea salt and pink Himalayan salt contain trace amounts of iodine, but the levels may not be sufficient for meeting the recommended daily intake of iodine for thyroid health.
- Many countries around the world still suffer from low iodine.
- The consequences of iodine deficiency extend beyond goiter and can lead to serious health issues, particularly affecting brain development in children and cognitive function in both children and adults. These effects can include mental impairment, reduced IQ, developmental delays, and increased risk of pregnancy complications.
- I suggest mixing in Iodized sale with your "fancy stuff"

Factors that increase conversion of T4 to RT3:

- Stress
- Trauma
- Low-calorie diet
- Inflammation (e.g., cytokines)
- Toxins
- Infections
- Liver or kidney dysfunction
- Certain medications



Factors that increase conversion of T4 to T3:

- Selenium
- Zinc

Factors that improve cellular sensitivity to thyroid hormones:

- Vitamin A
- Exercise
- Zinc

The lonely nut

- The Brazil nut (the best source of selenium) as medicine:
- When buying Brazil nuts in bulk, it is more common to find them in their shell. If you specifically want shelled Brazil nuts, it would be best to check the packaging options or ask a store representative about the availability of shelled varieties.
- Checking for expiration dates or best before dates on pre-packaged Brazil nuts can also provide guidance on their freshness.
- Proper storage in an airtight container in a cool, dry place can help prolong their freshness.
- One or two a day instead of more supplement pills.

Zinc and copper

- You do not need large doses of zinc
- On your food sources it will tell you about 8 mg a day
- Many were supplementing 50 mg with covid
- Cut back now, as zinc will pull copper from your body
- A good source of copper is dark chocolate, so make sure you balance yourself out.

Now we are getting really loopy...

- Firstly, the **thyroid hormones (T3 and T4) that are essential for cellular metabolism, including the energy-producing processes** that occur within the mitochondria.
- Secondly, mitochondria play a critical role in thyroid hormone synthesis. The production of thyroid hormones **requires the production of reactive oxygen species (ROS) by the mitochondria.**

Here's the loop.

- Thirdly, mitochondrial dysfunction has been implicated in several thyroid disorders, including thyroid cancer, autoimmune thyroid disease, and hypothyroidism.
- Overall, the mitochondria and the thyroid gland are closely linked, with each influencing the function and regulation of the other.

Interdependence

So helping the immune system,
helps the mitochondria that
help the thyroid, that
help the mito, that
help the immune system.


Psalm 139:14
"...fearfully and
wonderfully made..."


Thank you for participating today
JoAnn D. Eiman, PA-C
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www.wellupmed.com

See you next time

At Join us next month on Saturday June 24th or Monday June 26th

Let's connect + Educate + Inspire

Next subject Gut Health (including leaky gut).

Handouts to post for client to print

- Slide show in 3 up and 1 up formating
- Immune
  - Covid nutraceuticals
  - Effects of Poor Sleep – mentions immune
- Importance of Social– mentions mito and immune
- Mito
  - Effects of Physical Inactivity –mentions mito
  - Nutrients for Mitochondrial Health
  - Mito food plan – single page shopping list
- Thyroid
  - Factors that Affect Thyroid Function
  - 12 Food sources of Iodine, Iron, Selenium, A, C, D, E, Zinc, Tyramine, + these for cardiac B12, Folate, Magnesium
  - Understanding your thyroid tests
  - Understanding thyroid tests (for practitioners)
  - Thyroid Screening Questionnaire