Nutrition and Myositis

What we know
(and still need to learn)

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Talk Outline

- Eating healthy in general
- Nutritional abnormalities in chronic disease
- Specific supplements and diets related to myositis
“It’s not rocket science”

- Eat healthy foods
- Eat moderate portion sizes
- Eat a varied diet
- Enjoy your meals
- Involve yourself in meal preparation
We are so much more than our myositis

We are what we are thanks to our genes and our environment

We do have control over some things

We unfortunately can also get:

- Diabetes
- Heart disease
- Cancer
- Alzheimer’s
Anti-oxidants

- Decrease oxidative stress, especially in heart disease and cancer
- Water-soluble, e.g. vitamin C
- Fat-soluble, e.g. carotene, vitamin E, CoQ10
- Found in vegetables, fruits, beans, nuts, herbs and spices
- Supplements are not as effective as whole foods and may even be harmful
Anti-oxidants

Foods richest in antioxidants:
- Beans, like red, kidney and pinto
- Artichoke hearts
- Berries
- Apples and plums
- Green tea
- Dark chocolate!!

Balance!!
- Over-eating of one type can result in mineral binding (iodine, calcium, zinc, iron)
- Binding can occur from:
  - Oxalates (cocoa, spinach),
  - Phytates (legumes, whole grains)
  - Tannins (tea, beans, cabbage)
Eat Your Veggies (and Fruits)

- All vegetables provide good nutrients and fiber with some exceptions:
- Corn and white potatoes have a high-glycemic index
- Other veggies can nearly be eaten in unlimited quantities with a healthy preparation
- Fruit: “One is a serving; two or more is dessert”
- Juice: how many apples or oranges would you eat?
Carbohydrates: Our love-hate relationship

- Think of these foods as “CARBAGE”
- Sugar really can be addictive; eliminating it causes decreased desire
- Learn to lower your glycemic load
- Avoid all processed foods
- “Fight the white”: Grains should be whole-grain, such as bulgur wheat, brown rice, quinoa
Carbohydrates: Our love-hate relationship

- No high-fructose corn syrup (HFCS)!!
  - Long-term effects similar to alcohol due to its metabolism by the liver
  - May increase one’s risk of *nonalcoholic fatty liver disease* (NAFLD).

Avoid soda:
- Sugary ones have the HFCS
- But artificial sweeteners in diet sodas change the gut microbiome
- Both contain phosphoric acid
And then there are the fats…

- Our society has an imbalance of omega-6 and omega-3 fatty acids, also called PUFAs (polyunsaturated fatty acids)
- Major factor responsible for obesity epidemic and heart disease
- Omega-3 = anti-inflammatory
- Omega-6 (in excess) = pro-inflammatory
- Early human diet was a 1:1 ratio of 6 and 3 PUFAs; now it is 10:1-15:1 or higher
Fatty Acids: *Omega-3*

- Alpha-linolenic acid (ALA): flaxseeds and walnuts richest sources as well as canola
- Body converts ALA $\rightarrow$ EPA $\rightarrow$ DHA (men less than women, all of us less with age)
- Major sources EPA and DHA: oily fish, enriched eggs
- Supplements: fish oil has EPA and DHA; algal and fungal sources have DHA
Fatty Acids: *Omega-3*

- Can decrease production of inflammatory molecules, including TNF-alpha
- May increase the efficacy of anti-TNF-alpha therapy
- Eating oily (wild-caught) fish 1-3 times a week may be enough
- Fish or krill oil (distilled) 2-3 grams per day as supplement as alternative
- Avoid if on blood thinners, upcoming surgery
Fatty Acids: *Omega-6*

- **Food sources:** linoleic acid (LA)
  - Safflower, sunflower, grapeseed, soy, corn
- **Supplements:** gammalinolenic acid (GLA)
  - Considered an anti-inflammatory agent; possibly helpful for autoimmune disorders
  - Borage, black currant, & evening primrose oils
  - Choose borage oil without *pyrrolizidine alkaloids*, which may damage the liver; also use with caution if on blood thinners
Fatty Acids: *Omega-7*

- Conjugated linoleic acids (CLA)
- Made by gut bacteria in ruminant animals (sheep, goats, cows, kangaroo!)
- Anti-cancer*, anti-RA/lupus, anti-abdominal fat deposits, promotes muscle growth, opposes stress-induced cortisol
- Grass-fed animals have 300-500% more CLA than grain-fed
- Caution if overweight: may cause insulin resistance

*(except HER2+ breast cancer)*
What fats are good to eat?

Cooking oils:
- Olive (use regular; save pricier extra-virgin for dressings)
- Walnut
- Flaxseed
- Expeller-pressed organic canola, sunflower or safflower
- Coconut (medium chain saturated fat)
What fats are good to eat?

Food sources:
- Fatty fish (salmon, sardines, herring)
- Pasture-fed beef and pork
- Omega-3 fortified eggs
- Hemp, chia seeds and flaxseeds
- Nuts, especially walnuts, cashews, almonds
- And….a weed??
Purslane

- You probably have it in your yard
- More omega-3 fatty acids (ALA) than any other leafy plant
- Use as you would spinach
- Can be eaten raw, stir-fried, in soups
What fats not to eat?

Simple: Avoid any partially hydrogenated fats

Avoid corn, cottonseed, vegetable, palm kernel, safflower* and sunflower* oils

Avoid fried foods: potential for trans-fats or toxic compounds with high heat

*unless expeller-pressed, organic
Anti-Inflammatory Diet

- Avoid processed foods: eat “whole foods”, the way nature intended it
- Avoid sugar, high-fructose corn syrup
- Eat lean protein, more fish, less animal protein, except free-range poultry, grass-fed beef or pork in moderate amounts
Anti-Inflammatory Diet

- Remember those vegetables
- Broth-based soups
- Green, white or oolong tea
- Chocolate (at least 70% cocoa)
- Consider eating organically
Positive Effects of Anti-Inflammatory Diet

- In a 2007 study, Rose Mary Istre found those with myositis who followed an AID over 12 weeks had improved:
  - Ease of routine activities
  - Severity of depression
  - Grip, arm and leg strength measurements
Consider Eating Organic

Unsafe if pesticides, etc. are harmful for (or trigger?) autoimmune disease

Organic foods are also non-genetically-modified (non-GMO)

GMO foods can have animal genes inserted into fruit and vegetable genes

While GMO foods may have the same nutritional value, it is not known if long-term ingestion is safe.
The “Dirty Dozen”: “Buy organic or not at all”

- Peaches
- Apples
- Bell peppers
- Celery
- Nectarines
- Strawberries
- Carrots
- (Lettuce)

- Cherries
- Kale
- Grapes
- Blueberries
- Spinach
- Potatoes
- Grapes (imported)

www.thedailygreen.com
The “Clean Fifteen”: Lowest in Pesticides

- Onions
- Avocados
- Sweet corn
- Pineapple
- Mango
- Asparagus
- Sweet peas
- Sweet potato
- Kiwi
- Cabbage
- Eggplant
- Papaya
- Watermelon
- Broccoli
- Tomatoes

www.thedailygreen.com
Salt

Daily salt intake should be 1200 mg (over 70 years) – 1500 mg (under 50)

One McDonald’s’s bacon, egg, cheese biscuit has 1250 mg of salt

77% of sodium comes from restaurant and processed foods (5% home-cooked, 6% added at table, 12% naturally-occurring)
Salt

Recent studies found that mouse and human cells cultured in high-salt conditions produced more of the immune T_H17 cells than those grown in normal conditions.

Some forms of autoimmunity have been linked to overproduction of T_H17 cells, a type of helper T cell that produces an inflammatory protein called interleukin-17.
Salt

The rising popularity of fast food -- laden with up to 100 times as much salt as similar home-prepared meals -- has accompanied an increase in autoimmune diseases.

Particularly relevant would be for patients with MS and psoriasis, which both are strongly influenced by TH17.

Salt = sodium chloride; “fancy” and sea salts still contain sodium.
Body Mass Index and Medication Effects

- Increased BMI is associated with increased inflammation
- Studies in patients with inflammatory conditions such as asthma and rheumatoid arthritis show decreased results from medications, such as steroids, adalimumab, etanercept, and infliximab

Daïen CI, *Mediators Inflamm*, 2014
So remember…

Eat the rainbow!

- Include lots of foods - *whole and fresh* - that are red, orange, green, blue and yellow

“Fight the white”: Avoid…

- Added salt and processed foods
- White sugar (or too much of any kind, really)
- White potatoes
- White rice
- White bread
  (or maybe all wheat bread….)
Curcumin

Active ingredient in turmeric (think curry and mustard)

Inhibits inflammation with interest in cancer, inflammatory disease and Alzheimer’s

2007 study in mice: blunting of CK increase with exercise-induced muscle damage
Davis J. Am J Physiol Integr Physiol 2007;292:R2168

2008 study in mice improvement with muscular dystrophy
Pan Y. Mol Cells. 2008;25(4):531
Curcumin

- Seems to accumulate best in colon
- Holds promise for GI-related conditions
- Curcumin is very poorly absorbed
- Doses less than 4 grams per day were not detected in serum in human clinical studies
- New formulations, such as nanoparticles are being investigated to increase its availability
Curcumin

- Need to combine with piperines (black pepper extract) to improve absorption
- May increase bleeding in those taking drugs like coumadin
- Because of its inhibitory effect on COX-1 and COX-2, might increase risk of cardiac disease
- Have a good lipid profile as safeguard
Coenzyme Q10 (ubiquinone)

- Reduction in CoQ10 could cause abnormal mitochondrial dysfunction
- Statins lower CoQ10, but studies have not shown that supplements increase levels

“The present evidence does not support [its] supplementation in statin-induced myopathy.”

Schaars C and Stalenhoef, 2008 Current Opinion in Lipidology
The problem with CoQ10

- No great data for its use in myositis (IIM)
- As we age, CoQ10’s absorption, biosynthesis and conversion to ubiquinol decreases
- Ubiquinol form is better absorbed and probably more effective
- Does it matter? (Serum vs. tissue levels)
Coenzyme Q10

Interest in cardiac, neurologic and *periodontal* diseases

150 mg daily of ubiquinol used in studies

Choose ubiquinol form instead of ubiquinone for better absorption

Avoid if on coumadin
Vitamin D

- Clearly seems to have a role in preventing autoimmune disease (patients with DM/PM, RA, SLE, etc. found deficient)

- Its role in treatment less clear

- However, supplementation in statin-induced myositis patients reversed symptoms in 87% of 150 patients studied

Glueck C. Current Med Res Opin 2011;27:1683
Vitamin D

- Important to support bone health, mental health, infection control
- Especially important for those avoiding the sun and with dark skin
- Decreased by steroid use
- Blood levels above 30 considered adequate; 40-45 may be ideal; higher levels do not lead to longer life
Vitamin D

- Treatment for deficiency: 2000 IU/day of vitamin D$_3$ or 50,000 IU/week of vitamin D$_2$
- Roughly 100 units/day raises vitamin D level by 1 ng/ml (or 1000 U/day raises level by 10); double dose needed for overweight patients
- Recheck level after 6 weeks of supplement
Folate (folic acid or B9)

Important for anyone taking *methotrexate* to decrease its side effects:
- Decreased white blood cells, GI symptoms, hair loss, liver and lung toxicity
- Supplement as 1-2 mg daily (Rx)
- Controversial if should avoid taking on same day as methotrexate (possibly less effective)

Have adequate vitamin $B_{12}$ intake since symptoms of its deficiency can be masked by folate supplementation
- Good sources of $B_{12}$: fish/shellfish, beef, eggs
Probiotics

- Observed increase in autoimmune disease in those with decrease in beneficial bacteria
- Autoimmunity associated with “leaky gut”, allowing antigens to enter and stimulate the immune system
- Those with altered gut flora have slower metabolism, higher risk for obesity
Probiotics

- In many autoimmune conditions, improving intestinal inflammation improves symptoms.

- A normal “*human biome*” or “*microbiota*” is now considered a separate immune organ (maybe up to 75% of immune system);

- Altered by antibiotics and poor diet.
Probiotics

Use of probiotics in mice: improvements or prevention of RA, MS and type-1 diabetes

Improvement seen with periodontitis

Dietary sources: yogurt, kefir or lassi with live cultures, aged cheese, fermented foods (brine-cured, non-vinegar pickles, sauerkraut, kimchi, miso)
Probiotics

Bacterial supplements should have billions of cultures and include at least Bifidobacterium and lactobacilli (casei, rhamnosus)

The “jury is still out” on which strains are best for which condition.

Keeping them refrigerated prolongs effectiveness
Probiotics

🌿 Caution in those with severe immune-compromised states, malignancy, central venous catheters, cardiac valve disease, diabetes, infancy or advanced age

🌿 Rare fungal infections reported in those taking the probiotic yeast, Saccharomyces boulardii (Florastor)
Whey

Has been looked into as dietary source of cysteine, needed for glutathione production, an important element in anti-oxidant defense

Glutathione itself as an oral supplement is not well-absorbed

This may be helpful for autoimmune disease and myopathies but data is very limited, mostly presumed
Whey

- Typical doses are 20-30 grams daily.

- Very safe: reports of intestinal discomfort and fatigue with high doses; one case of liver injury in weightlifter also taking creatine supplement.
Other supplements

- Vitamins C and E: no good data
- L-carnitine: no good data
- Glutamine:
  - Because it inhibits muscle wasting and preserves muscle protein, it may help myotonic muscular dystrophy
  - Can raise methotrexate levels; no good data on myositis
Supplements that may do more harm than good

✿ Spirulina (*S. platensis*) and blue-green algae (*Aphanizomenon flos-aquae*)
- At least two patients with DM had a flare or onset of their disease after taking these
  - Lee A. *Arch Dermatol* 2004;140:723
  - Konno T. *Rinsho Shinkeigaku* 2011;51:330

✿ Echinacea (purple coneflower)
- Has produced flares of lupus, including kidney-related complications

✿ Alfalfa
- Has caused lupus-like symptoms in animals
- Sprouts and tablets have been linked to lupus in humans
There is hope...

Diets and supplements with some evidence regarding myositis
Gluten Sensitivity

- Association of myositis with gluten sensitivity described since at least 1976
- There have been reports of clinical improvement following a gluten-free diet in PM, DM and IBM
- Not all patients will have positive antibodies (anti-glutaminase/gliadin/endomysial, etc.)
Gluten Sensitivity

Symptoms can range from none to:
- Weight loss
- Abdominal cramping
- Bloating
- Loose stools
- Anemia
- Evidence of bone loss
- Vitamin E deficiency
Gluten sensitivity: Substitutions

- Brown rice
- Quinoa
- Buckwheat
- Millet
- Sorghum
- Teff
- Amaranth
- Tapioca

Many available as:
- Breads
- Pasta
- Cereals
- Flours
Creatine: Definitions and Clarifications

- **Creatinine**: metabolized end-product of creatine, found in blood, muscle and urine; *measured to assess renal function*

- **Creatine kinase (CK) or creatine phosphokinase (CPK)**: muscle enzyme involved in energy production; *measured to assess skeletal muscle inflammation or damage*, as well as in brain and heart muscle
Supplements: Creatine

- Taken as a daily *supplement* to improve muscle strength and/or mass
- A 2011 Cochrane review deemed it a worthwhile supplement with few side effects for those with DM and PM
- Most data was taken from a 2007 study done in the UK and Sweden (Dr. Ingrid Lundberg was a co-author)
  - Chung et al. *Arthr Rheum* 2007;57:694-702
Supplements: Creatine

Dosage used in the 2007 study:

- Start with 20 grams per day for 8 days (loading dose)
- Continue with 3 grams per day (maintenance dose)

- Noted improved performance, ability to undertake high-intensity exercise and endurance work
- Effect maintained over 5 months
Supplements: Creatine

- Safety: there were no side effects noted
- Previous concerns about renal (kidney) toxicity do not seem warranted, as long as there is no underlying renal disease
- Unfortunately, this does not seem to be effective for inclusion-body myositis (IBM)
Summary

Eat a varied diet of mainly fresh plant-based foods, lean (wild, organic?) protein, good fats

Avoid salt, bad fats, processed and high-glycemic foods

Focus on whole foods rather than supplements

Consider probiotics

Probably avoid spirulina and blue-green algae, possibly alfalfa, echinacea
Summary

- For all, but DM especially: check vitamin D level
- For anyone on MTX: take folic acid
- For PM, DM, IBM: consider gluten-free trial
- For PM, DM: consider creatine
- Stay hopeful for more data on coenzyme Q10, whey and curcumin-piperine, but maybe worth a try
Resources: General

- Center for Science in the Public Interest
  - www.cspinet.org
- American Society for Nutrition
  - www.nutrition.org
- Tufts University Healthletter
  - Healthletter.tufts.edu
Resources: Drug interactions

- http://drugs.com/drug_interactions
- http://www.healthline.com/druginteraction
Resources: Supplements

Consumer Labs (small fee to join)
consumerlab.com

Office of Dietary Supplements
dietary-supplements.info.nih.gov

Linus Pauling Institute (Oregon State U.)
http://lpi.oregonstate.edu/infocenter

National Center for Complementary and Alternative Medicine (NIH)
nccam.nih.gov
Resources: Books

Eat to Live by Joel Fuhrman, MD  
(general healthy eating); drfuhrman.com

The Happiness Diet, by Tyler Graham and Drew Ramsey, MD

Integrative Rheumatology by Randy Horwitz, M.D. and David Muller, MD

Wheat Belly by William Davis, MD  
(gluten sensitivity); www.wheatbellyblog.com

The Probiotics Revolution by Gary Huffnagle, PhD
Any questions?