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 → EPA → 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

- Unclear 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)

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The “Clean Fifteen”: Lowest in Pesticides

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

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Salt

- Daily salt intake should be 1200 mg (over 70 years) – 1500 mg (under 50)
- *One* McDonald'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://reference.medscape.com/drug-interactionchecker
- 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?