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PRESENTATION

Nutritional Approaches to Treating GI Concerns in Persons with Ehlers-Danlos Syndrome







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GI Concerns in EDS



EDS affects the vital gastrointestinal physiologic processes of digestion, absorption, elimination, and gut-related immune function.

Gastrointestinal complications of EDS are:

- common.
- potentially disabling
- well-documented in existing literature.
- under-appreciated by clinicians.



GI Concerns in EDS



Abnormal connective tissue structure, growth, maintenance, or function in EDS may make the GI tract structurally abnormal, sluggish, painful, inflamed, and/or "leaky".

- **Dysmotility** (e.g., esophageal dysmotility, gastroparesis, slow colonic transit)
- **Functional Gastrointestinal Disorders** (e.g., Irritable Bowel Syndrome, Chronic Constipation, Rectal Evacuatory Dysfunction)

Autonomic nervous system abnormalities (dysautonomia) common in EDS may cause additional GI symptoms or complications.

• Fight or Flight vs Rest and **Digest**

Dysbiosis and **dysregulation of gut-related immune function** common in EDS may cause further inflammation, food intolerances, allergies, local or systemic autoimmune conditions, and additional GI or systemic issues.



Nutritional Deficiencies and Malabsorption in EDS

Nutritional deficiencies in EDS often occur in the setting of significant malabsorption.

• **Malabsorption in EDS is multifactorial,** with factors including intrinsic connective tissue abnormalities, functional gastrointestinal disorders with associated vomiting or diarrhea, dysautonomia ("Fight or Flight" vs. "Rest and Digest"), and inflammation in the setting of gut-related immune dysfunction or dysbiosis.

Nutritional deficiencies in EDS often occur despite:

- meeting recommended **dietary intake** goals.
- diligent oral supplementation.





First... Learn about Basic Human Nutrition!



Before applying any EDS-specific guidelines or recommendations regarding nutrition or supplementation, learn what makes a diet healthy for humans in general.

2020

VIRTUAL

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The **Ehlers**

Danlos

Society

The more you understand about basic human nutrition, the more likely you will be successful in taking informed control of your nutritional status and improving your health!

Nutrition is how our cells get what they need to survive. The ultimate goal of nutrition is to provide our cells with structural materials and fuel.

Nutrition includes dietary intake (foods, drinks, and supplements), digestion, and absorption.

How should foods be prepared – raw, steamed, roasted, grilled, microwaved, fermented, etc.? Does **food preparation** affect **nutritional content**?

Also: GMO vs Non-GMO, Organic vs Non-Organic, and Ethically Sourced Foods.



Proteins



Proteins can serve as a source of metabolic fuel, but in general proteins **provide amino acids for reassembly into other proteins**, e.g.:

- Structural Molecules (e.g., actin, myosin, collagen)
- Transport Molecules (e.g., hemoglobin)
- Membrane Proteins (e.g., channel proteins)
- Hormones (e.g., insulin)
- Enzymes (e.g., amylase, lactate dehydrogenase)

Nutritionally relevant amino acids are classified as essential, conditionally essential, or dispensible.

Protein-containing foods are classified as **complete** or **incomplete** with respect to essential amino acid content.

Individual protein requirements vary, for example, with **age**, and according to whether in a **catabolic** (breakdown) or **anabolic** (growth) state.



Complete Vs. Incomplete Proteins

 Dietary Protein is required for the body as there are 9 essential amino acids the body cannot create and must obtain from ones diet. Complete Proteins contain all 9 of these essential amino acids versus Incomplete Proteins which do not.
Complementary Proteins are combinations of two or more incomplete proteins that supply all 9 essential amino acids.

Complete Proteins:

- Animal Based:
 - 🖌 Meat
 - ✓ Poultry
 - 🗸 Dairy
 - Eggs
 - 🖌 Fish



Soy is the only known plant based complete protein



Complementary Proteins:

- Grains + Legumes/Vegetables
- Nuts/Seeds + Vegetables/Legumes











Carbohydrates serve as fuel.

• broken down to glucose (exception: fiber)

What about excess glucose?

- Small amounts are stored as **glycogen**.
- The remainder is converted to stored **fat**.

"Good" vs. "Bad"

• Glycemic Load and Glycemic Index





Carbohydrates



| Carbohydrate Classification | | | | | | | | | |
|-----------------------------|---|---------------------------------------|---|--|--|--|--|--|--|
| | Dietary Carbohydrate | Sub-group | Components | | | | | | |
| | Sugars (1-2 monosaccharides) | Monosaccharides (1 monosaccharide) | Glucose, fructose, xylose, galactose, ribose | | | | | | |
| | | Disaccharides (2 monosaccharides) | Sucrose, lactose, maltose | | | | | | |
| | Polyols (Sugar Alcohols) | | sorbitol, mannitol, malitol, erythritol, xylitol | | | | | | |
| | Oligosaccharides (3-9 monosaccharides) | | maltodextrins, raffinose, fructo- oligosaccharides | | | | | | |
| | Polysaccharides | Starch | Amylose, amylopectin, glycogen | | | | | | |
| | (************************************** | Non-starch | Cellulose, pectins, inulin, fructans, dextrins, dextrans, gums | | | | | | |



Lipids (Fats and Oils)



Lipids serve as **fuel**.

- stored energy
- "Good" Fats
- **Saturated** Fats: <10% of calories per day
- Monounsaturated Fats
- **Polyunsaturated** Fats: Omega 6 and Omega 3













Micronutrients Vitamins and Minerals



Vitamins: organic molecules

- Essential (e.g., B12) vs Conditionally Essential (e.g., D)
- Fat Soluble (A, D, E, K) vs Water Soluble
- also: "vitamin-like" nutrients (e.g., choline)

Minerals: chemical elements

- Essential originate in the earth and cannot be made by living organisms.
- **Bioavailability** of minerals in foods and supplements can vary dramatically.

Enough (RDA) vs Too Much (TUL)

Complex interrelationships exist between micronutrients.









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| 4 | 19 K | 20 Ca | 21 Sc | 22 Ti | 23 V | 24 Cr | 25 Mn | 26 Fe | 27 Co | 28 Ni | 29 Cu | 30 Zn | 31 Ga | 32 Ge | 33 As | ³⁴ Se | 35 Br | 36 Kr |
| 5 | 37 Rb | 38 Sr | 39 Y | 40 Zr | 41 Nb | ⁴² Мо | 43 Tc | 44 Ru | 45 Rh | 46 Pd | 47 Ag | 48 Cd | 49 In | ₅₀ Sn | 51 Sb | 52 Te | 53 | 54 Xe |
| 6 | 55 Cs | 56 Ba | 57 La | 72 Hf | 73 Ta | 74 W | 75 Re | 76 Os | 77 Ir | 78 Pt | 79 Au | 80 Hg | 81 TI | 82 Pb | 83 Bi | 84 Po | 85 At | 86 Rn |
| 7 | 87 Fr | 88 Ra | 89 Ac | 104 Rf | 105 Db | 106 Sg | 107 Bh | 108 Hs | 109 Mt | 110 Ds | 111 Rg | Uub | 113 Uut | 114 Uuq | 115 Uup | | | |



What is Wrong with our Diet?

The Western Diet

 "In particular, food staples and food-processing procedures introduced during the Neolithic and Industrial Periods have fundamentally altered 7 crucial nutritional characteristics of ancestral hominin diets: 1) glycemic load, 2) fatty acid composition, 3) macronutrient composition, 4) micronutrient density, 5) acid-base balance, 6) sodium-potassium ratio, and 7) fiber content." – *Am J Clin Nutr* 2005;81:341–54.

The Modern Food Industry

- misplaced focus on nutrient content, rather than focusing on how nutritious foods are as a whole
- "Better Living Through Chemistry"





Eat to Minimize Autonomic Dysfunction

Vitamins

Water

- Drink isotonic fluids to rehydrate and support intravascular volume.
- Avoid excessive amounts of hypotonic fluids.
 - Eight glasses of water per day is a myth!

Protein

- What about intake of proteins high in catecholamine precursors?
 - How does excess of phyenylalanine and tyrosine affect dysautonomia?

Carbohydrates

- Eat low glycemic load foods and strive for a low glycemic index.
- Limit "bad carbs": concentrated sugars, rapidly digested starches.
 - What about aspartame (i.e., a phenylalanine derivative) as a sugar substitute?

Lipids

Limit "bad fats" which contribute to insulin resistance.

- Some vitamins are particularly relevant to autonomic function.
 - e.g., POTS occurs with significant frequency in persons deficient in B12.

Minerals

- Liberalize salt(s).
- Some minerals are particularly relevant to autonomic function.
- e.g., Magnesium acts as an alpha adrenergic blocker.

Other Things

Minimize histamine load.





Eat to Minimize Gut-Related Immune Dysfunction

Recognize even minor **food intolerances** in addition to **true food allergies**, **cell-mediated reactions** (e.g., eosinophilic esophagitis, mast cell disorders), or specific **antigen-induced immune reactions** (FPIES) when they exist, and adjust diet accordingly!

- This includes exploring **cross-reactivity** (e.g., latex cross-reactivity manifesting as intolerance to avocado, banana, kiwi, apple, carrot, potato, tomato, etc.)
- Consider use of a **food journal** to recognize reactivity to things in diet.
- Consider proactive avoidance of notoriously inflammatory foods (e.g., wheat, eggs, noncultured dairy, corn).

Strive for normobiosis, as it assists in support/regulation of epithelial and lymphoid function.

Address comorbid dysautonomia and GI dysfunction.





Eat to Foster Normobiosis

Inclusions and Increases

- prebiotics: e.g., inulin, FOS, XOS, GOS, lactulose, chicory root, jerusalem artichoke, dandelion greens, garlic, leeks, onion, asparagus, bananas
- probiotics: e.g., kefir, yogurt, miso, tempeh, kimchi, sauerkraut
- antioxidants and fiber.
- Keep diet rich in:
 - fresh greens and vegetables, and certain fruits.
 - ancient grains: e.g., buckwheat, amaranth, chia, millet, quinoa, sorghum, taro.
 - beans, peas, chickpeas, lentils, nuts and almonds.

In some cases, broad-spectrum antibiotics (e.g., Rifaximin) with multi-strain probiotics (e.g., VSL#3) are warranted.

Supplement vitamin D and omega fatty acids if deficient





Eat to Foster Normobiosis

Exclusions and Limits

- Avoid refined carbohydrates.
- Limit daily intake of fructose to less than 25g/day.
- Eliminate sugar substitutes: sugar alcohols (e.g., xylitol, sorbitol), natural sugar substitutes (e.g. stevia, agave), artificial sweeteners (e.g., aspartame).
- Eliminate artificial colors/flavors, preservatives, stabilizers, and emulsifiers.
- Minimize intake of saturated fats.
- Eliminate or minimize casein, gluten, and zein (i.e., dairy, wheat, and corn).
- Avoid heavily fried, grilled, and toasted food.
- Reduce intake of cured meat.
- Limit alcohol consumption.
- Eliminate polypharmacy where possible.

In the future, will refractory dysbiosis in EDS be an accepted / approved clinical indication for fecal transplant?





Eat to Support Digestion, Absorption, and Metabolism

Water

 Ensure adequate hydration status, as water is mandatory for numerous chemical reactions and physical processes required for digestion

Proteins

 Recognize and address allergies and intolerances to food proteins (e.g., gluten, casein, zein).

Carbohydrates

- **Foster normobiosis** to assist in digestion of resistant starches.
- Consider minimizing intake of FODMAP foods.

Lipids

• **Foster normobiosis** to optimize short chain fatty acid production and enhance lipid metabolism in the gut (e.g. bile salts, sterols).

Vitamins

• **Foster normobiosis** to optimize synthesis of B vitamins, vitamin K, folate, and biotin and absorption of vitamin A, D, E, and K.

Minerals

• Foster normobiosis to assist with absorption of minerals such as Ca, Mg, Fe.

Other Things

- **Foster normobiosis** in order to metabolize xenobiotics.
- Consider glutamine.
- Consider diamine oxidase (DAO)





Supplementation is Commonly Required

When possible, get vitamins and minerals from food!

Micronutrient deficiencies are often:

- evident in persons with EDS (e.g., magnesium, vitamin B6, vitamin D, vitamin B12, vitamin C).
- known to exacerbate symptoms associated with EDS and the secondary conditions arising from EDS.
- challenging to address especially when malabsorption is apparent and may even require parenteral repletion.

If you are taking a supplement by prescription or under advice of a clinician, it is considered a "drug", and its dose may be higher than the recommended allowances established by governing bodies such as the FDA.

Some supplements commonly used in specific situations (e.g. quercetin for mast cell issues) are not recognized as a nutrient essential for humans and have no established recommended intake.

Persons taking supplements must be certain to indicate them when a medical history is taken, so that clinicians can take drug interactions into account.





Supplementation is Commonly Required

Persons with EDS often need a clinician to assist in detecting and correcting nutrient deficiencies caused by malabsorption.

- **Consider specialized testing** to identify deficits of micronutrients or deficits of nutrients not always accurately assessed with routine laboratory testing (e.g.,, magnesium).
- **Pursue parenteral repletion of nutrients** for persons with EDS refractory to increased dietary intake or oral supplementation of deficient nutrients.

Repletion of deficiencies should not be expected to bring immediate results, as the conditions they cause may require weeks, months or even years to improve.

- Patient expectations affect compliance.
- Repletion of deficiencies may not fully reverse developmental or chronic conditions.

While National Guidelines are established for nutritional standards, without specific research, how these guidelines may need to be modified specifically for persons with EDS is presently unclear. In some cases, persons with EDS may require more than the established RDAs of certain nutrients.





Volume 78, Issue 3 September 2003

Restrictive Diet Risks



Bioavailability of iron, zinc, and other trace minerals from vegetarian diets Janet R Hunt

The American Journal of Clinical Nutrition, Volume 78, Issue 3, 1 September 2003, Pages 6335-6395, https://doi.org/10.1093/ajcn/78.3.6335 Published: 01 September 2003



FIGURE 1. Contrast between the relative trace element content and the trace element bioavailability of experimental nonvegetarian (\Box) and vegetarian (\Box) diets. Data are from references 7–9.





A Tangled Web of Individualized Needs





Dysautonomia can cause or aggravate not only GI dysfunction (as "Fight or Flight" overpowers "Rest and Digest"), but also immune dysfunction.

Similarly, GI dysfunction can cause or aggravate immune dysfunction and dysautonomia.

... and immune dysfunction can cause or aggravate dysautonomia and GI distress.

Each individual is unique. For example:

- allergies and food intolerances
- nightshade intolerance
- MTHFR polymorphism
- gut dysmotility (e.g., gastroparesis)

This is where it gets challenging and often requires a truly multi-disciplinary approach!



Eat food. Not too much. Mostly plants.





Diet & Supplement Guidelines for Persons with EDS





Helpful Smartphone Apps





When Nutritional Approaches are Not Enough

What if you are eating a complete, nutritionally balanced diet, but you **still demonstrate nutritional deficiencies**?

What if you **just can't eat** (e.g., due to nausea, pain, dysphagia, gastroparesis, dysmotility, reflux, comorbid eating disorder, or otherwise)?

These are situations in which GI concerns can not be addressed simply through nutritional approaches, and **clinical management according to established and up to date standards of care is imperative**. Interventions may include and are not limited to Cognitive Behavioral Therapy, swallowing therapy to assist with dysphagia or texture aversions, prescription medications, enteral or parenteral nutrition or supplementation (e.g., feeding tubes, intravenous infusions, intramuscular injections, total parenteral nutrition), interventional procedures, implanted devices, or surgeries.





"You are NOT what you eat.

More accurately, you are an incredibly unique, complex combination of factors including not only what you **eat** (and what your food eats), but also what your ancestors ate, what your gut biome can help you to **digest**, what you can successfully **absorb**, and what your **metabolism**, which is influenced by both nature (i.e. genetics, epigenetics, and congenital factors) and nurture (e.g. diet, lifestyle, and environment), can effectively utilize, minus whatever waste and toxins you can **eliminate**."

- Heidi A Collins, MD



Research Regarding EDS and Nutrition is Desperately Needed.





Online Resources by Heidi A Collins, MD https://tinyurl.com/hacmdeds







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