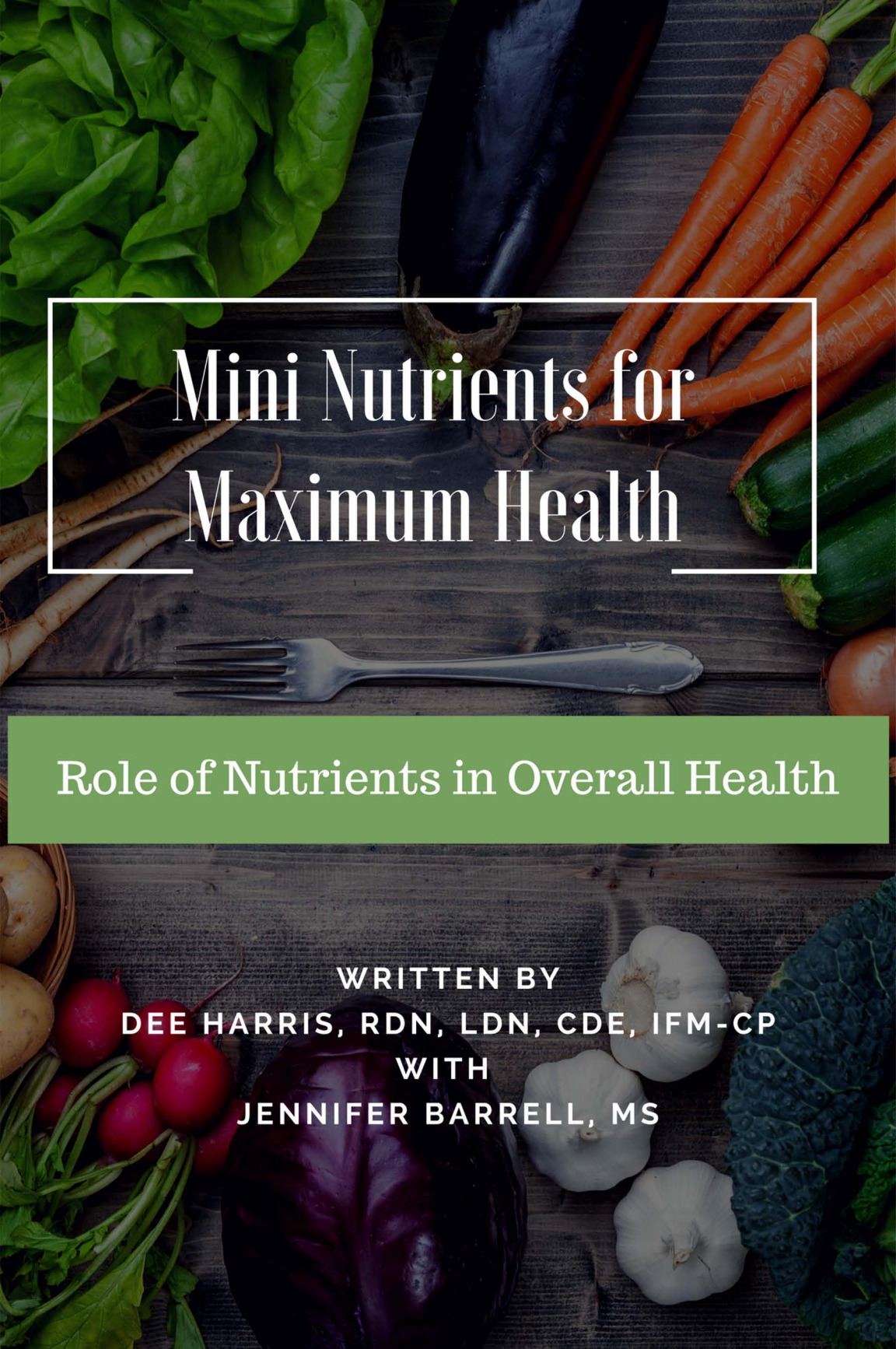

Mini Nutrients for Maximum Health

Role of Nutrients in Overall Health

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Introduction

DID YOU KNOW THAT EVERY function in your body depends on micronutrients and antioxidants? Most of us just think of meals as being proteins, fats and carbohydrates, but often disregard the importance of our tiny friends. Our bodies function on tiny nutrients such as vitamins, minerals and antioxidants. You might say you have your own biological firepower that makes things run. The dictionary defines micronutrients as "a chemical element or substance required in trace amounts for the normal growth and development of living organisms." Micronutrients are vital to all cells, and deficiencies, or even insufficiencies, can lead to disease. Micronutrients are substances that are necessary in small amounts in the body, but do big things. Many are produced in the body, such as CoQ10, but others, like vitamin C are not. We depend on food to get many of these tiny substances, which is why a "healthy diet" is essential to optimal health.

Micronutrients differ from macronutrients. Macronutrients are fat, carbohydrate and protein. Micronutrients are the small substances buried within the major food groups. They include all minerals such as zinc, magnesium, iodine, iron, calcium, boron, and chromium, just to name a few.

They also include vitamins such as all the B vitamins: thiamin, riboflavin, niacin, pantothenic acid, folate, biotin, inositol, and B12. Other vitamins essential for health are fat-soluble vitamins: A, D, E, and K. Another water-soluble vitamin, besides the B vitamin group is vitamin C. We also like to consider antioxidants, which are the colors that make up foods, and contribute to overall health.

There has never been a deficiency of a drug or toxin in our body. In fact, many drugs can strip us of certain nutrients. An example is CoQ10, which our body usually makes unless we are on a statin medication. Statin drugs, or cholesterol lowering medications, can deplete CoQ10 status causing many side effects.[1] CoQ10 acts as an antioxidant by protecting the cells from oxidative damage, as well as assisting in cell growth and maintenance. An easy way to see if your medications are causing micronutrient deficiencies or insufficiencies is the online tool at www.mytavin.com. Simply enter in each medication you are taking and you will get a list of potential deficiencies.

Exposure to toxins, toxic substances (toxicants), bacteria and viruses also affect our micronutrient status. Toxicants, which are unnatural substances - think pesticides, also affect our ability to absorb nutrients by contributing to gut disorders. To eliminate toxicants, we need more of many nutrients including B vitamins, minerals and antioxidants. For example, there is evidence that chronic yeast infections or candida overgrowth causes zinc deficiencies.[2] That's a big deal considering that zinc is very important in digestion, energy production, immune system and detoxification.

[1] Caso, G., Kelly, P., McNurlan, M. A., & Lawson, W. E. (2007). Effect of coenzyme q10 on myopathic symptoms in patients treated with statins. The American journal of cardiology, 99(10), 1409-1412.

[2] K Walencik, P., Watly, J., & Rowinska-Zyrek, M. (2016). Fungal Zinc Homeostasis–A Tug of War Between the Pathogen and Host. Current Medicinal Chemistry, 23(32), 3717-3729.

Knowing the importance of nutrients, it goes without saying that there is a link between diseases and health symptoms associated with deficiencies in micronutrients. In this book, I am presenting the link, based on scientific evidence, between common medical conditions and selected nutrients associated with those conditions. While we depend on our diet to provide us with the essential nutrients that we need, there are many reasons why we fall short. In many cases, we cannot get the correct form or amount of the nutrient we need from our food, thus we rely upon pharmaceutical grade supplementation to fill in the gaps.

2

Wellness & Micronutrients

THERE ARE MANY REASONS WHY people are not getting adequate amounts of nutrients including: poor diet choices, medication interactions, lifestyle, stress levels, genetic variation, just to name a few. In a world filled with toxicants, our need for special nutrients to help us detoxify increases. We may think we are getting certain nutrients from our fruits and vegetables, but modern agriculture has decreased the minerals in the soil, thus leading to lower availability for our health. Ensuring a diet rich in all of the micronutrients encourages health at the cellular level. If we can give each cell the correct amount of the right fuel, they can do their jobs without compromising parts of the system as a whole.

Eating is not just "filling the tank." It is important to realize that all food translates information on a cellular level in the body. Our food choices will dictate how our cells will live, die and reproduce. The health of the cell determines how it protects the precious DNA inside each cell. It dictates how much energy each cell generates. When we don't give the body the proper fuel and nutrients, it will affect the cells, and ultimately affect the organ systems, causing symptoms and eventually disease is possible.

At the point of having symptoms, whether it is inflammation in joints or migraine headaches, it affects your quality of life. The standard approach is to address the symptoms; however, only addressing or muting the symptoms could catch up over time, allowing them to progress fully into a diagnosis. In choosing the route of the conventional approach, you may be put on stronger medications that have more side effects, many of which strip you of certain nutrients. The bottom line is that you still haven't found the root cause of why your health started deteriorating in the first place. In this book, we focus on various conditions and what nutrient deficiencies or insufficiencies contribute to both the etiology of the condition as well as how repletion of these nutrients can help the body heal and, in many cases reverse conditions.

The good news is that all cells in our body have the ability to regenerate, if given the proper nutrients and tools to do so. The cells in the gut regenerate quickly, for example. Many plans begin with reducing inflammation by eliminating the thing(s) that makes you inflamed such as food sensitivities or an inflammatory diet high in sugar and unhealthy fats. The next step is to improve nutritional status and target nutrients that the condition may need more of in order to heal. When in doubt, we test with routine blood work, specialty blood work, urinary metabolites, stool and / or genetic assessment.

Simple steps to encourage more nutrients:

1. Eat the rainbow. Look at your snacks and meals as a chance to include color into your life! Micronutrients are packed into all healthy choices of all food groups: proteins, healthy fats, fruits, vegetables, nuts and seeds.
2. Try to include a minimum of 10-12 servings of plant foods everyday. Aiming to have 3-4 servings of plant food with each meal should encourage enough phytonutrients to reach that goal. Servings include usually 1 small piece of fruit, or half of a larger piece of fruit, ½ cup of cooked vegetables and 1 cup of raw leafy greens.
3. Diversity is key. Vary your food choices on a daily basis.
4. Sources are endless. Consider your lifestyle, interest and time. Healthy food preparation doesn't have to be a chore. If you don't know how to cook, start with an online menu/ food delivery service such as www.sunbasket.com.
5. Maximize combinations – Explore new flavors by using herbs and spices. Start collecting recipes from friends and family. Consider new flavors from other parts of the world.
6. Be creative – There are great recipes online to start. Don't be afraid to add your own flair! Try a healthy smoothie with organic fruit and greens with an organic protein powder, nut butter and ice blended for a quick on-the-go breakfast.

3

Determining Nutrient Insufficiency

YOU MIGHT ASK, "How do I know I have a nutrient deficiency?" or "What nutrients am I low in?" When you start to explore the workings of your body, it is a good idea to do some diagnostics. Just like a car with engine problems, the mechanic will run a series of tests. Our bodies are much more complicated than even the most expensive cars, and yet, many ignore symptoms and eat a nutrient deficient diet. Yes, we pay more attention to our cars than we do our health, in many cases. Unfortunately, we can't trade our bodies in for a new model. We only get one body, so it is important that we learn how to best care for it so we can live long, healthy, happy lives.

Begin by taking an inventory of your lifestyle. Have you been eating a high fat, high sugar diet? Do you consider yourself stressed? How many medications are you on? Are you exposed to toxicants regularly? There are many nutrient questionnaires online to help you navigate.

Testing can be as simple as an annual physical wellness panel. Conventional medicine physicians usually look at lab ranges above or below standard ranges on the lab. Or they may not order comprehensive lab

panels. Usually conventional doctors aren't looking for nutritional deficiencies, unless your vitamin D level is dismally low. Many subtle health changes and patterns are hidden in a standard wellness panel. For example, if your alkaline phosphatase is low or low normal, you may be deficient in zinc. If we combine that with changes in neutrophils and/ or lymphocytes, you may be looking at a chronic infection. These levels may be within standard range, but out of optimal range. If your homocysteine is high, it could mean that you need folate in higher doses and/or in an absorbable, methylated form. It is best to have a functional practitioner read or assess your labs, and help establish an effective supplement and nutrition plan.

Other lab tests, which are usually found in a functional or integrative practitioner's office, include a Spectracell, which measures the level of nutrients inside a white blood cell showing what is absorbed. This is an extensive panel including all micronutrients except iodine. NutrEval by Genova also shows micronutrient status: how food and nutrients are being absorbed and utilized. Tests are available in either blood or urine. Both company websites provide a "find a practitioner" search function. Both companies do take some insurance in some instances, but it is best to check with your insurance company or practitioner first. Some states allow patients to order their own labs through a third party such as Directlabs.com. This website offers Genova testing at a cash price. AnyLabTestNow.com offers tests without a doctor's script at full price, including a Spectracell micronutrient assay. Because they are a franchise, locations may vary and it is best to call first for more information. All of this being said, it is always best to check with your practitioner, as testing may or may not be necessary.

Genetics also determines your nutrient needs. Genetic variants or SNPs may cause the gene not to work as efficiently in converting or utilizing nutrients in the body. How do you know? We encourage doing a 23 and Me ancestry test, then download the raw data and allow an interpretive company, such as Nutrahacker to do the analysis. It will tell you what to encourage and what to avoid, however there is much to consider when attempting to interpret genetic assessments of any nature. Nutrigenomics, the study of the interaction of genes and nutrients is complex and individualized. You should seek out the guidance of a trained practitioner to develop meal and supplement plans based on your genes.

4

Inflammation

Inflammation is the mother of all disease. Inflammation is the immune response to oxidative stress, injury and infections. Our immune system is triggered to protect us, but if the insult gets too overwhelming, we produce pro-inflammatory cells that can contribute to the development of chronic diseases. Once the cascade of inflammation begins, you may seek relief from the symptoms, which is important and necessary even. However, to put out the fire, it is important to seek the cause of the inflammation.

In autoimmune diseases, the inflammation often begins in the gut. The small intestine may be compromised, for multiple reasons, causing a reaction to foods. The body is now reacting to food that should be a friend, but sees it as a foe. A contributing factor is a condition called gut permeability or "leaky gut". Gut permeability happens when the small intestinal lining barrier becomes more permeable and allows larger proteins to go through before they are properly broken down.

Also seen in autoimmune diseases, is a phenomenon called molecular mimicry. This is where an organ tissue resembles a protein found in a food,

the reaction is triggered, and the inflammation cascade begins. A perfect example of this is in the autoimmune condition called Hashimoto Thyroiditis. If a person has this condition, the protein, gliadin, a protein portion of gluten (wheat, barley and rye) resembles the protein in our thyroid gland. The immune system sees gluten as the enemy and fights against it, but at the same time, it starts fighting against the thyroid, causing inflammation in the gland and changes in the function from hyperthyroid to hypothyroid. The key is getting rid of the exposure to the trigger, which is gluten. We can reduce the inflammation, just by eliminating it from the diet.

Another example of molecular mimic is a chemical called glyphosate, found in Round Up and used as a pesticide/herbicide. This is found in conventional foods and we, in the United States, are consuming large amounts of this. As a xanoestrogen, this is a molecular mimic to our natural estrogen, and may cause hormonal imbalances and inflammation in many. This is just one reason why we recommend seeking organic foods vs. conventional foods. For more information on organic foods, the Environmental Working Group (www.ewg.org) is a great resource.

There are many other causes of inflammation, but they all have a trigger. A poor diet again, does not provide the nutrients needed in squelching free radicals to prevent inflammation. Free radicals, or unstable molecules, create oxidative stress throughout the body. Think of it like rusting. Free radicals damage the DNA of our cells and ultimately our organ systems, causing inflammation. That is why it is imperative to have a diet high in antioxidants and other nutrients: to help prevent free radical damage. Exposures to chemicals, environmental toxins and heavy metals – mercury, lead, arsenic, cadmium, all cause oxidative stress. Also, if we have problems with detoxification pathways either because of genetic SNPs or a diet lacking in adequate amounts of protein, vitamins and minerals, we could be at higher risk for free radical damage and chronic diseases.

A diet packed with nutrients is key. Usually an elimination diet may be in order, especially in autoimmune conditions. You may consider a food sensitivity or gut permeability test to develop a more personalized plan. Meanwhile, eat and drink foods high in antioxidants such as green tea,

blueberries, walnuts and cruciferous vegetables (broccoli and cabbage family) as a start.

Here are some other nutrients, where deficiencies or insufficiencies may contribute to the inflammatory process:

Alpha lipoic acid: Protects endothelial cells and acts as an antioxidant neutralizing free radicals. ALA also encourages renewal of other antioxidants such as Vitamin C, E and glutathione.[1,2]

B6: Studies demonstrate that a deficiency or even low levels of B6 are linked with higher markers of general and specific systemic inflammation.[3,4]

Vitamin C: Similar to B6, low levels of Vitamin C correlate with higher levels of systemic inflammation. Intake of Vitamin C also increases glutathione status.[5,6]

CoQ10: Supplementation with CoQ10 has demonstrated effectiveness in altering genes that control the systems reaction to inflammation and in lowering inflammation markers.[7,8]

Vitamin D: Protects against chronic inflammation via adaptation of inflammatory responses. It also works against inflammatory cytokine growth (both monocytes and macrophages).[9,10]

Glutathione: Similar to Vitamin D, glutathione works against monocytes and macrophages (inflammatory cytokines). It also repairs cells that have been affected by inflammation. Perhaps most notable however, it is known as a recycling agent of Vitamin C and E.[11,12]

Magnesium: A deficiency in Mg may accelerate inflammation via encouraging a proliferation of damaging pro-inflammatory chemicals such as: cytokines, leukocytes and macrophages.[13,14]

Selenium: Lower levels (deficiency or sub-deficiencies) may encourage vascular inflammation and affect expression of genes that adjust the inflammatory response.[15,16]

Zinc: The need for zinc increases when the body is inflamed. Cytokines levels decrease with increased zinc levels. **[17,18]**

References

[1] Jones, W., Li, X., Qu, Z. C., Perriott, L., Whitesell, R. R., & May, J. M. (2002). Uptake, recycling, and antioxidant actions of α-lipoic acid in endothelial cells. Free Radical Biology and Medicine, 33(1), 83-93.

[2] Shay, K. P., Moreau, R. F., Smith, E. J., Smith, A. R., & Hagen, T. M. (2009). Alpha-lipoic acid as a dietary supplement: molecular mechanisms and therapeutic potential. Biochimica et Biophysica Acta (BBA)-General Subjects, 1790(10), 1149-1160.

[3] Ulvik, A., Midttun, Ø., Pedersen, E. R., Nygård, O., & Ueland, P. M. (2012). Association of plasma B-6 vitamers with systemic markers of inflammation before and after pyridoxine treatment in patients with stable angina pectoris. The American journal of clinical nutrition, 95(5), 1072-1078.

[4] Morris, M. S., Sakakeeny, L., Jacques, P. F., Picciano, M. F., & Selhub, J. (2010). Vitamin B-6 intake is inversely related to, and the requirement is affected by, inflammation status. The Journal of nutrition, 140(1), 103-110.

[5] Mah, E., Matos, M. D., Kawiecki, D., Ballard, K., Guo, Y., Volek, J. S., & Bruno, R. S. (2011). Vitamin C status is related to proinflammatory responses and impaired vascular endothelial function in healthy, college-aged lean and obese men. Journal of the American Dietetic Association, 111(5), 737-743.

[6] Mikirova, N., Casciari, J., Rogers, A., & Taylor, P. (2012). Effect of high-dose intravenous vitamin C on inflammation in cancer patients. Journal of translational medicine, 10(1), 189.

[7] Kim, H. (2011). Glutamine as an immunonutrient. Yonsei medical journal, 52(6), 892-897.

[8] Singleton, K. D., Beckey, V. E., & Wischmeyer, P. E. (2005). Glutamine prevents activation of NF-κB and stress kinase pathways, attenuates inflammatory cytokine release, and prevents acute respiratory distress syndrome (ARDS) following sepsis. Shock, 24(6), 583-589.

[9] Zhang, Y., Leung, D. Y., Richers, B. N., Liu, Y., Remigio, L. K., Riches, D. W., & Goleva, E. (2012). Vitamin D inhibits monocyte/macrophage proinflammatory cytokine production by targeting MAPK phosphatase-1. The Journal of Immunology, 188(5), 2127-2135.

[10] Querfeld, U. (2013). Vitamin D and inflammation. Pediatric Nephrology, 28(4), 605-610.

[11] Lubos, E., Kelly, N. J., Oldebeken, S. R., Leopold, J. A., Zhang, Y. Y., Loscalzo, J., & Handy, D. E. (2011). Glutathione peroxidase-1 deficiency augments proinflammatory cytokine-induced redox signaling and human endothelial cell activation. Journal of Biological Chemistry, 286(41), 35407-35417.

[12] Ramires, P. R., & Ji, L. L. (2001). Glutathione supplementation and training increases myocardial resistance to ischemia-reperfusion in vivo. American journal of physiology. Heart and circulatory physiology, 281(2), H679-88.

[13] Weglicki, W. B. (2012). Hypomagnesemia and inflammation: clinical and basic aspects. Annual review of nutrition, 32, 55-71.

[14] Sugimoto, J., Romani, A. M., Valentin-Torres, A. M., Luciano, A. A., Kitchen, C. M. R., Funderburg, N., ... & Bernstein, H. B. (2012). Magnesium decreases inflammatory cytokine production: a novel innate immunomodulatory mechanism. The Journal of Immunology, 188(12), 6338-6346.

[15] Kipp, A. P., Banning, A., van Schothorst, E. M., Méplan, C., Coort, S. L., Evelo, C. T., ... & Brigelius-Flohé, R. (2012). Marginal selenium deficiency down-regulates inflammation-related genes in splenic leukocytes of the mouse. The Journal of nutritional biochemistry, 23(9), 1170-1177.

[16] Cao, Y. Z., Reddy, C. C., & Sordillo, L. M. (2000). Altered eicosanoid biosynthesis in selenium-deficient endothelial cells. Free Radical Biology and Medicine, 28(3), 381-389.

[17] Cao, Y. Z., Reddy, C. C., & Sordillo, L. M. (2000). Altered eicosanoid biosynthesis in selenium-deficient endothelial cells. Free Radical Biology and Medicine, 28(3), 381-389.

[18] Wessels, I., Haase, H., Engelhardt, G., Rink, L., & Uciechowski, P. (2013). Zinc deficiency induces production of the proinflammatory cytokines IL-1β and TNFα in promyeloid cells via epigenetic and redox-dependent mechanisms. The Journal of nutritional biochemistry, 24(1), 289-297.

5

Gastrointestinal Health

GI ISSUES INCLUDE A WIDE array of complaints such as reflux, heartburn, abdominal pain, gas, bloating, diarrhea, and constipation. Gastric issues interfere with not only your quality of life, but also impede your body's ability to absorb and utilize nutrients. Many times, they are associated with food sensitivities and intolerances. We also know they may be caused by an imbalance of gut bacteria or the overgrowth of pathogenic bacteria. It is absolutely necessary to address gut disorders.

Some of the issues may start with low stomach acid, poor bile production, medications (especially using acid reducers over time), and stress. Poor food choices such as fried foods, fatty conventional meats, processed meats and diets low in fiber, and highly processed foods exacerbate the condition. We have seen some frustrated patients who have an endoscopy or colonoscopy and still don't have answers about their condition. It is important to consider that not every issue can be seen on a scope. You can't see gut permeability, food sensitivities or an imbalance of gut bacteria.

The answer lies in determining the cause of gastric inflammation and symptoms. Test suggestions may include conventional or functional assessments such as: comprehensive diagnostic stool analysis (by Genova Labs or Doctor's Data), food sensitivity testing, gut permeability testing (via Cyrex Labs or Dunwoody Labs), Lactulose/ Manitol breath test, or a new Cyrex blood panel for bacteria overgrowth.

We usually start with an elimination diet and eliminate all foods that may cause inflammation including: gluten, dairy, sugar and high fat diets. We may also give digestive support with deglycerated licorice, betaine HCL or in many cases organic apple cider vinegar in water, digestive enzymes and even bile salts, if needed. We encourage bitter foods and beets to encourage bile production. By adding fermented foods and soluble fiber, we can encourage healthy bacteria growth.

Here are nutrients vital to a healthy gut:

B12: Provides relief for some people suffering with indigestion. Regular use of antacids can deplete the body of B12.[1,2]

Vitamin C: An antioxidant, vitamin C may become depleted when extensive GI inflammation is present. Vitamin C reduces gastric inflammation and promotes GI healing.[3,4]

Vitamin D: Protects beneficial flora, encourages gut barrier stability, and prompts adaptive immunity, which begins in the GI tract. Deficiency in Vitamin D is commonly seen in IBD patients.[5,6]

L-Glutamine: Glutamine fuels enterocytes - which are cells that make up the intestinal lining and are responsible for digesting water and nutrients. They require more glutamine than any other cell in the body to function. They are also responsible for maintaining tight barrier junctions, or protecting against intestinal permeability, i.e. leaky gut.[7,8,9]

K2: This vitamin is often deficient in those with chronic GI issues or disease. K2 is necessary for bone mineralization, therefore a deficiency (as caused by Crohn's) could impact bone formation.[10,11]

Magnesium: Those suffering from an irritable bowel or who commonly use antacids are prone to lower Mg levels.[12]

Selenium* Acts as a co-factor of L-glutamine and works to regulate inflammation and solidity of the intestinal barrier.[13]

References

[1] Oh, S. (2011). Proton pump inhibitors: Uncommon adverse effects. Australian family physician, 40(9), 705.

[2] Gümürdülü, Y., Serin, E., Özer, B., Aydn, M., Yapar, A. F., Kayaselçuk, F., ... & Boyacoglu, S. (2003). The impact of B12 treatment on gastric emptying time in patients with Helicobacter pylori infection. Journal of clinical gastroenterology, 37(3), 230-233.

[3] Aghdassi, E., Wendland, B. E., Steinhart, A. H., Wolman, S. L., Jeejeebhoy, K., & Allard, J. P. (2003). Antioxidant vitamin supplementation in Crohn's disease decreases oxidative stress: a randomized controlled trial. The American journal of gastroenterology, 98(2), 348-353.

[4] Cevikel, M. H., Tuncyurek, P., Ceylan, F., Meteoglu, I., Kozaci, D., & Boylu, S. (2007). Supplementation with high-dose ascorbic acid improves intestinal anastomotic healing. European Surgical Research, 40(1), 29-33.

[5] Ulitsky, A., Ananthakrishnan, A. N., Naik, A., Skaros, S., Zadvornova, Y., Binion, D. G., & Issa, M. (2011). Vitamin D deficiency in patients with inflammatory bowel disease association with disease activity and quality of life. Journal of Parenteral and Enteral Nutrition, 35(3), 308-316.

[6] Ly, N. P., Litonjua, A., Gold, D. R., & Celedón, J. C. (2011). Gut microbiota, probiotics, and vitamin D: interrelated exposures influencing allergy, asthma, and obesity?. Journal of Allergy and Clinical Immunology, 127(5), 1087-1094.

[7] Li, N., & Neu, J. (2009). Glutamine deprivation alters intestinal tight junctions via a PI3-K/Akt mediated pathway in Caco-2 cells. The Journal of nutrition, 139(4), 710-714.

[8] Rao, R., & Samak, G. (2012). Role of glutamine in protection of intestinal epithelial tight junctions. Journal of epithelial biology & pharmacology, 5(Suppl 1-M7), 47.

[9] Wang, B., Wu, G., Zhou, Z., Dai, Z., Sun, Y., Ji, Y., ... & Wu, Z. (2015). Glutamine and intestinal barrier function. Amino Acids, 47(10), 2143-2154.

[10] Nakajima, S., Iijima, H., Egawa, S., Shinzaki, S., Kondo, J., Inoue, T., ... & Nishida, T. (2011). Association of vitamin K deficiency with bone metabolism and clinical disease activity in inflammatory bowel disease. Nutrition, 27(10), 1023-1028.

[11] Schoon, E. J., Müller, M. C. A., Vermeer, C., Schurgers, L. J., Brummer, R. M., & Stockbrügger, R. W. (2001). Low serum and bone vitamin K status in patients with longstanding Crohn's disease: another pathogenetic factor of osteoporosis in Crohn's disease?. Gut, 48(4), 473-477.

[12] Pachikian, B. D., Neyrinck, A. M., Deldicque, L., De Backer, F. C., Catry, E., Dewulf, E. M., ... & Guiot, Y. (2010). Changes in intestinal bifidobacteria levels are associated with the inflammatory response in magnesium-deficient mice. The Journal of nutrition, 140(3), 509-514.

[13] Nagy, D. T., Fülesdi, B., & Hallay, J. (2013). Role of selenium in gastrointestinal inflammatory diseases. Orvosi hetilap, 154(41), 1636-1640.

6

Weight Management

THERE IS NOTHING MORE FRUSTRATING than going on a strict diet, limiting your intake, only to see minimal weight loss. Many of us have been on the yo-yo diet cycle, only to gain more weight back than the pounds we lost. Evidence now shows that a weight loss program is more than the simple equation of calories in versus calories out. There are many reasons why a person may not be able to lose weight.

There are multiple reasons why a person gains weight or has difficulty losing it. Of course, there is the poor diet and lack of exercise component, but it is more than that. In The Belly Fat Effect, Mike Mutzel lays out evidence based contributors for the stubborn weight issue. He concludes that imbalanced hormones, imbalance of gut bacteria and toxic exposures have a major effect on why people gain weight and can't take it off.

Much of it goes back to inflammation. Toxicants, and imbalances in the body, whether it be with hormones, bacteria or nutrients, all may ultimately cause inflammation. The laying down of fat, especially around the belly, actually causes more inflammation. Certain toxicants tend to get stored in fat cells. The more fat cell storage, the more toxic we are. Toxicants may also

resemble our hormones, especially estrogen, causing hormonal imbalance. That extra belly fat is extremely inflammatory and could be linked to heart disease and diabetes. It could cause changes in our gut hormones, such as insulin, leptin, and adiponectin, an important hormone that regulates metabolism. These hormones regulate appetite and blood sugar. Being overweight or obese, and especially carrying extra weight around the belly (called visceral fat) puts us at higher risk for diabetes, heart disease and breast, colorectal and prostate cancer.

Another factor encompasses gut bacteria. With an overgrowth of fungus, candida and pathogenic gut bacteria, we are less efficient in actually burning calories. Our gut bacteria actually create signaling messages from gut to brain controlling metabolic processes. The more efficient the gut bacteria are, the more success we have in managing our weight.

A weight management plan for healthy weight loss is not a diet but a lifestyle change. It may include a lower carbohydrate diet, moderate in protein and healthy fats. We discourage processed foods, artificial sweeteners and sodas. Stevia is acceptable for most people. We encourage eating foods that are organic. Again, see www.EWG.org for more information on the importance of eating organic foods. Although we personalize meal plans, for the average person, we generally encourage five or less servings of total carbohydrates per day. Snacks consist of nuts and seeds. We include unlimited non-starchy vegetables to get the most antioxidants and fiber in the diet.

Because all functions, including metabolic, are dependent on nutrients, here are some that affect our weight:

Alpha lipoic acid: Demonstrates both an anti-oxidative and anti-inflammatory effect via improving glucose uptake into cells. Enhancing glucose uptakes assists in burning carbohydrates regularly.[1,2]

Biotin: Helps regulate blood sugar and decrease insulin levels, thereby enhancing glycemic control.[3,4]

Carnitine: Assists in burning fat for fuel (improving energy levels) and in visceral fat reduction.[5,6]

Vitamin D: Carbohydrates may be poorly metabolized in a deficiency state**.** Also - there is evidence that certain genes, which are controlled via Vitamin D, may be responsible for the manner in which fat cells are formed.[7,8]

Inositol: May improve insulin resistance via augmentation of adiponectin levels.[9]

Magnesium: Glucose may be stored as fat if Mg levels are low. Repleating a magnesium deficiency may increase insulin sensitivity and inhibit fat absorption, enhancing overall metabolism.[10,11]

Zinc: Repletion of a zinc deficiency may increase leptin levels, a hormone, which signals satiety.[12,13]

References

[1] Zhang, Y., Han, P., Wu, N., He, B., Lu, Y., Li, S., ... & Li, Y. (2011). Amelioration of Lipid Abnormalities by α-Lipoic acid Through Antioxidative and Anti-Inflammatory Effects. Obesity, 19(8), 1647-1653.

[2] Ansar, H., Mazloom, Z., Kazemi, F., & Hejazi, N. (2011). Effect of alpha-lipoic acid on blood glucose, insulin resistance and glutathione peroxidase of type 2 diabetic patients. Saudi medical journal, 32(6), 584-588.

[3] Larrieta, E., de la Vega, M. L. L., Vital, P., Aguilera, A., German, M. S., El Hafidi, M., & Fernandez-Mejia, C. (2012). Effects of biotin deficiency on pancreatic islet morphology, insulin sensitivity and glucose homeostasis. The Journal of nutritional biochemistry, 23(4), 392-399.

[4] Albarracin, C. A., Fuqua, B. C., Evans, J. L., & Goldfine, I. D. (2008). Chromium picolinate and biotin combination improves glucose metabolism in treated, uncontrolled overweight to obese patients with type 2 diabetes. Diabetes/metabolism research and reviews, 24(1), 41-51.

[5] Galloway, S. D., Craig, T. P., & Cleland, S. J. (2011). Effects of oral L-carnitine supplementation on insulin sensitivity indices in response to glucose feeding in lean and overweight/obese males. Amino acids, 41(2), 507-515.

[6] Bernard, A., Rigault, C., Mazue, F., Le Borgne, F., & Demarquoy, J. (2008). L-carnitine supplementation and physical exercise restore age-associated decline in some mitochondrial functions in the rat. The Journals of Gerontology Series A: Biological Sciences and Medical Sciences, 63(10), 1027-1033.

[7] Rosenblum, J. L., Castro, V. M., Moore, C. E., & Kaplan, L. M. (2012). Calcium and vitamin D supplementation is associated with decreased abdominal visceral adipose tissue in overweight and obese adults. The American journal of clinical nutrition, 95(1), 101-108.

[8] Bailey, R., Cooper, J. D., Zeitels, L., Smyth, D. J., Yang, J. H., Walker, N. M., ... &

Nejentsev, S. (2007). Association of the vitamin D metabolism gene CYP27B1 with type 1 diabetes. Diabetes, 56(10), 2616-2621.

[9] Corrado, F., D'Anna, R., Di Vieste, G., Giordano, D., Pintaudi, B., Santamaria, A., & Di Benedetto, A. (2011). The effect of myoinositol supplementation on insulin resistance in patients with gestational diabetes. Diabetic Medicine, 28(8), 972-975.

[10] Takaya, J., Higashino, H., & Kobayashi, Y. (2004). Intracellular magnesium and insulin resistance. Magnesium research, 17(2), 126-136.

[11] Kishimoto, Y., Tani, M., Uto-Kondo, H., Saita, E., Iizuka, M., Sone, H., ... & Kondo, K. (2010). Effects of magnesium on postprandial serum lipid responses in healthy human subjects. British journal of nutrition, 103(04), 469-472.

[12] García, O. P., Long, K. Z., & Rosado, J. L. (2009). Impact of micronutrient deficiencies on obesity. Nutrition reviews, 67(10), 559-572.

[13] Jansen, J., Karges, W., & Rink, L. (2009). Zinc and diabetes—clinical links and molecular mechanisms. The Journal of nutritional biochemistry, 20(6), 399-417.

7

Type II Diabetes & Metabolic Syndrome

THE AMERICAN HEART ASSOCIATION states that high blood sugar increases risk for cardiovascular disease. Elevated blood sugar combined with high blood pressure, being overweight, high cholesterol is metabolic syndrome. Potential complications of diabetes can be devastating and include decreased circulation, neuropathy, kidney failure, blindness, heart disease, skin conditions and Alzheimer's. Therefore, it is important to address elevated blood sugar and a diabetes diagnosis doing everything you can to control blood sugar.

We usually prevent and manage elevated blood sugar, nutritionally with a low carbohydrate diet. All carbohydrates turn into sugar in the body, therefore it calls for insulin, a hormone released from the pancreas. When you need more insulin to get glucose or sugar into the cells it is called insulin resistance. That lack of efficiency causes blood sugar to rise. Certain nutrients make us more insulin sensitive, which is why we need to look at nutritional status to keep things working properly. Along with a lower

carbohydrate diet and exercise, and avoidance of chemicals in food (eating more organic products), we can help manage weight, lower blood sugar, and reduce blood sugar markers such as hemoglobin A1C.

Many nutrients are associated with insulin resistance.
Watch for the potential deficiencies instigated
with various diabetes medications.

B12: A deficiency is common in diabetic patients taking metformin. [1]

L-Carnitine: Supplementing with L-carnitine can augment glucose management and conservation thereby improving insulin sensitivity. It can also help with neuropathic pain.[2,3,4]

Chromium: Insufficient chromium can reduce insulin resistance. Via a dose-dependent response chromium supplementation can help glucose uptake into the cells.[5,6]

Vitamin C: Supplementation can lower HbA1c levels, as well as fasting glucose levels and post-meal levels.[7,8]

Vitamin D: There is evidence that having the vitamin D (CYP27B1) gene SNP may be linked to diabetes. Ensuring adequate Vitamin D can curb inflammation as well. As a preventative measure, supplementation with vitamin D can lower risk of type I and type II diabetes.[9,10]

Mg: Insulin sensitivity is decreased with Mg deficiency. Some emerging studies are finding that Magnesium supplementation concurrent with Chromium is more effective in lowering insulin sensitivity and inflammation.[11,12]

Zinc: Zinc plays multiple roles in the prevention and management of diabetes. It acts as a protector of pancreatic B-cells and is required in the creation and management of insulin. Low zinc levels may encourage genetic expression of certain genes linked to type II diabetes.[13,14]

References

[1] Wulffele, M. G., Kooy, A., Lehert, P., Bets, D., Ogterop, J. C., Burg, B., ... & Stehouwer, C. D. A. (2003). Effects of short-term treatment with metformin on serum concentrations of homocysteine, folate and vitamin B12 in type 2 diabetes mellitus: a randomized, placebo-controlled trial. Journal of internal medicine, 254(5), 455-463.

[2] Molfino, A., Cascino, A., Conte, C., Ramaccini, C., Fanelli, F. R., & Laviano, A. (2010). Caloric restriction and L-carnitine administration improves insulin sensitivity in patients with impaired glucose metabolism. Journal of Parenteral and Enteral Nutrition, 34(3), 295-299.

[3] Roxas, M. (2007). Acetyl-L-carnitine in diabetic polyneuropathy: experimental and clinical data. Alternative Medicine Review, 12(4), 387-388.

[4] Sima, A. A., Calvani, M., Mehra, M., & Amato, A. (2005). Acetyl-L-carnitine improves pain, nerve regeneration, and vibratory perception in patients with chronic diabetic neuropathy. Diabetes care, 28(1), 89-94.

[5] Hua, Y., Clark, S., Ren, J., & Sreejayan, N. (2012). Molecular mechanisms of chromium in alleviating insulin resistance. The Journal of nutritional biochemistry, 23(4), 313-319.

[6] Cefalu, W. T., Rood, J., Pinsonat, P., Qin, J., Sereda, O., Levitan, L., ... & Wang, Z. Q. (2010). Characterization of the metabolic and physiologic response to chromium supplementation in subjects with type 2 diabetes mellitus. Metabolism, 59(5), 755-762.

[7] Dakhale, G. N., Chaudhari, H. V., & Shrivastava, M. (2011). Supplementation of vitamin C reduces blood glucose and improves glycosylated hemoglobin in type 2 diabetes mellitus: a randomized, double-blind study. Advances in pharmacological sciences, 2011.

[8] Dakhale, G. N., Chaudhari, H. V., & Shrivastava, M. (2011). Supplementation of vitamin C reduces blood glucose and improves glycosylated hemoglobin in type 2

diabetes mellitus: a randomized, double-blind study. Advances in pharmacological sciences, 2011.

[9] Liu, E., Meigs, J. B., Pittas, A. G., McKeown, N. M., Economos, C. D., Booth, S. L., & Jacques, P. F. (2009). Plasma 25-hydroxyvitamin D is associated with markers of the insulin resistant phenotype in nondiabetic adults. The Journal of nutrition, 139(2), 329-334.

[10] Bailey, R., Cooper, J. D., Zeitels, L., Smyth, D. J., Yang, J. H., Walker, N. M., ... & Nejentsev, S. (2007). Association of the vitamin D metabolism gene CYP27B1 with type 1 diabetes. Diabetes, 56(10), 2616-2621.

[11] Takaya, J., Higashino, H., & Kobayashi, Y. (2004). Intracellular magnesium and insulin resistance. Magnesium research, 17(2), 126-136.

[12] Dou, M., Ma, Y., Ma, A. G., Han, L., Song, M. M., Wang, Y. G., ... & Zhang, Y. (2016). Combined chromium and magnesium decreases insulin resistance more effectively than either alone. Asia Pacific journal of clinical nutrition, 25(4), 747-753.

[13] Cruz, K. J. C., de Oliveira, A. R. S., & do Nascimento Marreiro, D. (2015). Antioxidant role of zinc in diabetes mellitus. World journal of diabetes, 6(2), 333.

[14] Shan, Z., Bao, W., Zhang, Y., Rong, Y., Wang, X., Jin, Y., ... & Liu, L. (2014). Interactions between zinc transporter-8 gene (SLC30A8) and plasma zinc concentrations for impaired glucose regulation and type 2 diabetes. Diabetes, 63(5), 1796-1803.

8

Cardiovascular

When we discuss the health of the heart, we are referring to the entire vascular system, including the heart. Think of this system as many roads carrying blood that nourishes all cells with nutrients and oxygen. These roads also carry toxins from the cells to be eliminated from the body. The lining of the blood vessels is called the endothelium and is where all coronary artery disease originates. When the lining of the endothelium is damaged, it becomes stiff and inflamed. Heart conditions and high blood pressure start with inflammation. Inflammation is related to oxidative stress for many reasons including lifestyle, lack of exercise, lack of antioxidants in the diet and poor nutrition that leads to nutrient deficiencies.

Dr. Mark Houston, a functional cardiologist, delves into a full description of cardiovascular disease in his book What Your Doctor May Not Tell You About Heart Disease. He discusses the impact of oxidative stress and inflammation, nutritional support in the prevention of heart disease.

It is important to have labs checked annually with an expanded lipid profile that includes particle size and number. It is also important to check homocysteine levels. Homocysteine is a marker of inflammation in the

arteries. Elevated homocysteine levels may be associated with your ability to convert the B vitamin, folate to the active form for your body to use. An elevated homocysteine level may be associated with a genetic variant enzyme that helps the body to convert. This is why, after testing, we may recommend a methylated form of folate. Elevated homocysteine may also be associated with B6, B12 and choline deficiencies.

Antioxidants are especially important in the prevention and management of heart disease. Antioxidants, found in all food groups, help lower overall inflammation. Studies have shown that a Mediterranean style diet, which incorporates healthy foods high in vegetables and fruits, nuts, seeds, olive oil and fish, has been effective in addressing cardiovascular concerns. This diet is moderate in carbohydrates. In contrast, a standard American diet is rich in sugar, refined carbohydrates, unhealthy fats, and food additives- all of which contribute to inflammation.

Here are some key nutrients and what they do to help maintain a healthy heart and vascular function:

Biotin: Higher amounts of biotin have been found to reduce systolic blood pressure by relaxing smooth muscle tissue.[1]

B Vitamins: Low levels of B6 are associated with hypertension. B6 lowers homocysteine levels. Homocysteine stiffens arteries and elevates blood pressure.[2]

L-carnitine: Has a similar mechanism of action as ACE inhibitors. L-carnitine lowers angiotensin, which constricts arteries. It also plays a pivotal role in fat metabolism, which helps to explain its effect on angiotensin.[3]

Chromium: Lowers blood sugar.

Copper: Copper deficiency can cause hypertension. Sufficient copper intake can keep blood vessels properly dilated.[4]

CoQ10: Depletion is associated with hypertension. Supplementation can lower systolic and diastolic blood pressure by strengthening the chemical bonds within the blood vessel walls. [5]

Cysteine: A powerhouse antioxidant, it acts as a vasodilator exhibiting anti-hypertensive effects.[6]

Folate: Enhances endothelial function.[7]

Magnesium: Low levels of magnesium correlate with hypertension. Proper amounts of magnesium are needed for blood vessel dilation.[8]

Oleic Acid: One of the main beneficial components in olive oil. Oleic acid prevents inflammation by protecting the endothelial cells.[9]

Vitamin C: Is a natural antioxidant with anti-inflammatory properties. Vitamin C neutralizes free radicals, acts as a vasodilator, augments and protects levels of nitric oxide and assists the body's natural abilities to reduce stress tension.[2,10]

Vitamin D: Assists in maintaining smooth blood vessels and lowers blood pressure effects from calcium intake and transport. [2,11]

Zinc: A deficiency in zinc can cause the blood cells to tighten. Zinc is required for managing angiotensin and endothelin- 2 enzymes necessary for maintaining low blood pressure.[12]

References

[1] Watanabe-Kamiyama, M., Kamiyama, S., Horiuchi, K., Ohinata, K., Shirakawa, H., Furukawa, Y., & Komai, M. (2008). Antihypertensive effect of biotin in stroke-prone spontaneously hypertensive rats. British journal of nutrition, 99(04), 756-763.

[2] Houston, M. C. (2002). The role of vascular biology, nutrition and nutraceuticals in the prevention and treatment of hypertension. J Am Nutraceut Assoc, 1, 5-70.

[3] Ruggenenti, P., Cattaneo, D., Loriga, G., Ledda, F., Motterlini, N., Gherardi, G., ... & Remuzzi, G. (2009). Ameliorating Hypertension and Insulin Resistance in Subjects at Increased Cardiovascular Risk. Hypertension, 54(3), 567-574.

[4] Alarcon, O. M., Guerrero, Y., Ramírez, D. F. M., D'Jesús, I., Burguera, M., Burguera, J. L., & Di Bernardo, M. L. (2003). Effect of cooper supplementation on blood pressure values in patients with stable moderate hypertension. Archivos latinoamericanos de nutricion, 53(3), 271-276.

[5] Rosenfeldt, F. L., Haas, S. J., Krum, H., Hadj, A., Ng, K., Leong, J., & Watts, G. F. (2007). Coenzyme Q10 in the treatment of hypertension: a meta-analysis of the clinical trials. Journal of human hypertension, 21(4), 297-306.

[6] Han, W. Q., Zhu, D. L., Wu, L. Y., Chen, Q. Z., Guo, S. J., & Gao, P. J. (2009). N-acetylcysteine-induced vasodilation involves voltage-gated potassium channels in rat aorta. Life sciences, 84(21), 732-737.

[7] Mangoni, A. A., Sherwood, R. A., Swift, C. G., & Jackson, S. H. D. (2002). Folic acid enhances endothelial function and reduces blood pressure in smokers: a randomized controlled trial. Journal of internal medicine, 252(6), 497-503.

[8] Jee, S. H., Miller, E. R., Guallar, E., Singh, V. K., Appel, L. J., & Klag, M. J. (2002). The effect of magnesium supplementation on blood pressure: a meta-analysis of randomized clinical trials. American journal of hypertension, 15(8), 691-696.

[9] Ferrara, L. A., Raimondi, A. S., d'Episcopo, L., Guida, L., Russo, A. D., & Marotta, T. (2000). Olive oil and reduced need for antihypertensive medications. Archives of Internal Medicine, 160(6), 837-842.

[10.] Juraschek, S. P., Guallar, E., Appel, L. J., & Miller, E. R. (2012). Effects of vitamin C supplementation on blood pressure: a meta-analysis of randomized controlled trials. The American journal of clinical nutrition, 95(5), 1079-1088.

[11]. Lind, L., Hänni, A., Lithell, H., Hvarfner, A., Sörensen, O. H., & Ljunghall, S. (1995). Vitamin D is related to blood pressure and other cardiovascular risk factors in middle-aged men. American journal of hypertension, 8(9), 894-901.

[12] Little, P. J., Bhattacharya, R., Moreyra, A. E., & Korichneva, I. L. (2010). Zinc and cardiovascular disease. Nutrition, 26(11), 1050-1057.

9

Fatigue

WE ALL KNOW HOW DEBILITATING fatigue is. If you have ever pulled an "all nighter" studying for an exam, you know how exhausted you are the next day. And, despite trying to cram for a test, your brain retains less because of lack of sleep. Being exhausted over a period of time impacts cognitive function and activities of daily living, even after one night's sleep it is called chronic fatigue. Many people suffer from fatigue without it being chronic. Symptoms include feeling achy, drained, irritable, an inability to focus and difficulty in competing tasks. There are many possible reasons why people are fatigued which includes sleep apnea, chronic diseases, medications, prolonged stress, lack of sleep, lack of exercise, toxicant exposures. In fact, even food sensitivities may cause fatigue.

Like all other conditions, we need to seek a root cause and triggers. Many times, we start with an elimination diet (ie. no gluten, no dairy, no sugar) to rule out food sensitivities and decrease inflammation. Boosting the antioxidants is also important. Nutrient status is key as vitamins (especially the B vitamins) are especially involved in energy production. We consider

SNPs in genes that could pre-dispose us to poor detoxification processes, cause inflammation and decrease energy production in cells. A stress management plan is also effective. This may include mindful eating, rhythmic deep belly breathing, and meditation.

Some nutrients that are key in combating fatigue include:

B complex: B vitamins are required to break down food into usable energy. B1, B2, B3, B5, B6 and B12 are necessary in mitochondrial respiration. Folate is also imperative in the mitochondrial respiratory chain.[1,2,3]

L-carnitine: Has demonstrated efficacy in multiple trials in combating mental and physical fatigue. L-carnitine transports fatty acids into the mitochondria for energy usage.[2,4,5,6]

CoQ10: A plethora of studies has shown positive results with CoQ10 supplementation in attenuating chronic fatigue symptoms via its role in the metabolism of mitochondrial energy.[2,7,8]

Vitamin D: Lower than optimal levels are common in patients experiencing fatigue. A deficiency in vitamin D reduces muscle strength.[9,10]

Magnesium: Mg is required for the storage of ATP. Patients deficient in Mg demonstrate increased energy levels, as the nutrient is repleted.[2,11,12]

References

[1] Imbalance, A. (2009). Nutrients and botanicals for treatment of stress: adrenal fatigue, neurotransmitter imbalance, anxiety, and restless sleep. Alternative Medicine Review, 14(2), 114-140.

[2] Werbach, M. R. (2000). Nutritional strategies for treating chronic fatigue syndrome. Alternative Medicine Review, 5(2), 93-108.

[3] Shimizu, T., Hoshino, H., Nishi, S., Nozaki, S., & Watanabe, Y. (2010). Anti-fatigue effect of dicethiamine hydrochloride is likely associated with excellent absorbability and high transformability in tissues as a vitamin B 1. European journal of pharmacology, 635(1), 117-123.

[4] Malaguarnera, M., Cammalleri, L., Gargante, M. P., Vacante, M., Colonna, V., & Motta, M. (2007). L-Carnitine treatment reduces severity of physical and mental fatigue and increases cognitive functions in centenarians: a randomized and controlled clinical trial. The American journal of clinical nutrition, 86(6), 1738-1744.

[5] Vermeulen, R. C., & Scholte, H. R. (2004). Exploratory open label, randomized study of acetyl-and propionylcarnitine in chronic fatigue syndrome. Psychosomatic medicine, 66(2), 276-282.

[6] Hershman, D. L., Unger, J. M., Crew, K. D., Minasian, L. M., Awad, D., Moinpour, C. M., ... & Wade III, J. L. (2013). Randomized double-blind placebo-controlled trial of acetyl-L-carnitine for the prevention of taxane-induced neuropathy in women undergoing adjuvant breast cancer therapy. Journal of Clinical Oncology, 31(20), 2627-2633.

[7] Mizuno, K., Tanaka, M., Nozaki, S., Mizuma, H., Ataka, S., Tahara, T., ... & Kajimoto, O. (2008). Antifatigue effects of coenzyme Q10 during physical fatigue. Nutrition, 24(4), 293-299.

[8] Maes, M., Mihaylova, I., Kubera, M., Uytterhoeven, M., Vrydags, N., & Bosmans, E. (2008). Coenzyme Q10 deficiency in myalgic encephalomyelitis/chronic fatigue

syndrome (ME/CFS) is related to fatigue, autonomic and neurocognitive symptoms and is another risk factor explaining the early mortality in ME/CFS due to cardiovascular disorder. Neuro endocrinology letters, 30(4), 470-476.

[9] Berkovitz, S., Ambler, G., Jenkins, M., & Thurgood, S. (2009). Serum 25-hydroxy vitamin D levels in chronic fatigue syndrome: a retrospective survey. International journal for vitamin and nutrition research, 79(4), 250-254.

[10] Shinchuk, L., & Holick, M. F. (2007). Vitamin D and rehabilitation: improving functional outcomes. Nutrition in Clinical Practice, 22(3), 297-304.

[11] Moorkens, G., Vertommen, J., Meludu, S., Noe, M., & De Leeuw, I. (1997). Magnesium deficit in a sample of the Belgian population presenting with chronic fatigue. Magnesium research: official organ of the International Society for the Development of Research on Magnesium, 10(4), 329-337.

[12] Huskisson, E., Maggini, S., & Ruf, M. (2007). The role of vitamins and minerals in energy metabolism and well-being. Journal of international medical research, 35(3), 277-289.

10

Mood Disorders

WHEN YOU ARE DEPRESSED OR ANXIOUS, you may think it is all in your head. Neurotransmitters are chemical messengers that affect mood, pleasure and sleep. They are made up of amino acids, which are building blocks of protein and they are dependent on many nutrients for optimal functioning. We need good gut function to absorb the proteins needed to make neurotransmitters. Healthy gut bacteria play a crucial role, as well as many vitamins and minerals. Serotonin, for example, is a natural mood stabilizer and is linked to depression if levels are low. It is estimated that about ninety percent of serotonin is made in the gut, so in instances with poor gut function, there is higher risk for depression.

Julia Ross author of The Mood Cure, gives tools to self test neurotransmitter imbalances and strategies to improve mood disorders. We start with a healthy diet with adequate protein and nutrients. Managing stress is important to lower cortisol levels. Some techniques include: meditation, deep breathing, yoga, Heart Math (www.heartmath.com),

journaling or free writing, etc. In many cases, amino acid therapy is indicated under the care of a functional practitioner.

Here are important micronutrients for mood:

B Vitamins: (B3, Inositol, B6, B12): Deficiencies in the B vitamins can cause anxiety or other mood disorders. The B's act either as cofactors in the production of GABA, serotonin and dopamine or they act as enhancers for these neurotransmitters reducing symptoms of depression and/or anxiety.[1,2,3,4]

Vitamin D: Vitamin D is a hormone precursor. Low levels of Vitamin D are linked to anxiety-related behaviors and depression-like symptoms.[5,6]

Folate: Contributes to an increase of dopamine, serotonin and norepinephrine, which have a relaxing or uplifting effect on mood. Adequate folate is necessary for anti-depressant meds to be effective.[7,8]

Mg: Sufficient Mg is required for proper functioning of the hypothalamus-pituitary adrenal axis (think brain-gut stress axis). A lack of Mg can also cause harm to the mood regulators. Multiple studies have demonstrated Mg acting as anti-anxiety and anti-depressant.[9,10,11,12]

Selenium: Plays a key role in the regulation of selenoproteins- which is thought to contribute to their therapeutic effect in the relief of anxiety and depressive symptoms. Studies are currently being done on repleating selenium and postpartum depression.[13,14,15]

Zinc: Assists in the regulation of neurotransmitters, improving the efficacy of anti-depressants and in reducing anxiety.[16,17,18]

Copper: Too much or too little copper can affect mood. A deficiency can cause anxiety symptoms.[19]

Chromium: Not only does chromium help with blood sugar regulation, but it improves serotonin levels, alleviating depression. **[20,21]**

Antioxidants: Act as protectors for our brain from oxidative stress. Oxidative stress can change how neurotransmitters act, causing depression or symptoms like depression. Some neuroprotective antioxidants include Vitamin A, C, E, alpha lipoic acid, CoQ10, glutathione and cysteine.[22,23]

References

[1] Benjamin, J., Levine, J., Fux, M., Aviv, A., Levy, D., & Belmaker, R. H. (1995). Double-blind, placebo-controlled, crossover trial of inositol treatment for panic disorder. American Journal of Psychiatry, 152(7), 1084-1086.

[2] Imbalance, A. (2009). Nutrients and botanicals for treatment of stress: adrenal fatigue, neurotransmitter imbalance, anxiety, and restless sleep. Alternative Medicine Review, 14(2), 114-140.

[3] McCarty, M. F. (2000). High-dose pyridoxine as an 'anti-stress' strategy. Medical Hypotheses, 54(5), 803-807.

[4] Prakash, R., Gandotra, S., Singh, L. K., Das, B., & Lakra, A. (2008). Rapid resolution of delusional parasitosis in pellagra with niacin augmentation therapy. General hospital psychiatry, 30(6), 581-584.

[5] Högberg, G., Gustafsson, S. A., Hällström, T., Gustafsson, T., Klawitter, B., & Petersson, M. (2012). Depressed adolescents in a case-series were low in vitamin D and depression was ameliorated by vitamin D supplementation. Acta Paediatrica, 101(7), 779-783.

[6] Armstrong, D. J., Meenagh, G. K., Bickle, I., Lee, A. S. H., Curran, E. S., & Finch, M. B. (2007). Vitamin D deficiency is associated with anxiety and depression in fibromyalgia. Clinical rheumatology, 26(4), 551-554.

[7] Imbalance, A. (2009). Nutrients and botanicals for treatment of stress: adrenal fatigue, neurotransmitter imbalance, anxiety, and restless sleep. Alternative Medicine Review, 14(2), 114-140.

[8] Miller, A. L. (2008). The methylation, neurotransmitter, and antioxidant connections between folate and depression. Alternative Medicine Review, 13(3), 216-227.

[9] Nechifor, M. (2009). Magnesium in major depression. Magnesium research, 22(3), 163-166.

[10] Eby, G. A., & Eby, K. L. (2010). Magnesium for treatment-resistant depression: a review and hypothesis. Medical hypotheses, 74(4), 649-660.

[11]Sartori, S. B., Whittle, N., Hetzenauer, A., & Singewald, N. (2012). Magnesium deficiency induces anxiety and HPA axis dysregulation: modulation by therapeutic drug treatment. Neuropharmacology, 62(1), 304-312.

[12] Eby, G. A., & Eby, K. L. (2006). Rapid recovery from major depression using magnesium treatment. Medical hypotheses, 67(2), 362-370.

[13] Benton, D., & Cook, R. (1991). The impact of selenium supplementation on mood. Biological psychiatry, 29(11), 1092-1098.

[14] Mokhber, N., Namjoo, M., Tara, F., Boskabadi, H., Rayman, M. P., Ghayour-Mobarhan, M., ... & Shakeri, M. T. (2011). Effect of supplementation with selenium on postpartum depression: a randomized double-blind placebo-controlled trial. The Journal of Maternal-Fetal & Neonatal Medicine, 24(1), 104-108.

[15] Werner, E., Miller, M., Osborne, L. M., Kuzava, S., & Monk, C. (2015). Preventing postpartum depression: review and recommendations. Archives of women's mental health, 18(1), 41-60.

[16] Cope, E. C., & Levenson, C. W. (2010). Role of zinc in the development and treatment of mood disorders. Current Opinion in Clinical Nutrition & Metabolic Care, 13(6), 685-689.

[17] Nowak, G., Siwek, M., Dudek, D., Ziêba, A., & Pilc, A. (2003). Effect of zinc supplementation on antidepressant therapy in unipolar depression: a preliminary placebo-controlled study. Polish journal of pharmacology, 55(6), 1143-1148.

[18] Maes, M., Vandoolaeghe, E., Neels, H., Demedts, P., Wauters, A., Meltzer, H. Y., ... & Desnyder, R. (1997). Lower serum zinc in major depression is a sensitive

marker of treatment resistance and of the immune/inflammatory response in that illness. Biological psychiatry, 42(5), 349-358.

[19] Bousquet-Moore, D., Prohaska, J. R., Nillni, E. A., Czyzyk, T., Wetsel, W. C., Mains, R. E., & Eipper, B. A. (2010). Interactions of peptide amidation and copper: novel biomarkers and mechanisms of neural dysfunction. Neurobiology of disease, 37(1), 130-140.

[20] Docherty, J. P., Sack, D. A., Roffman, M., Finch, M., & Komorowski, J. R. (2005). A double-blind, placebo-controlled, exploratory trial of chromium picolinate in atypical depression: effect on carbohydrate craving. Journal of Psychiatric Practice®, 11(5), 302-314.

[21] Davidson, J. R., Abraham, K., Connor, K. M., & McLeod, M. N. (2003). Effectiveness of chromium in atypical depression: a placebo-controlled trial. Biological Psychiatry, 53(3), 261-264.

[22] Maes, M., Mihaylova, I., Kubera, M., Uytterhoeven, M., Vrydags, N., & Bosmans, E. (2009). Lower plasma Coenzyme Q 10 in depression: a marker for treatment resistance and chronic fatigue in depression and a risk factor to cardiovascular disorder in that illness. Neuroendocrinology Letters, 30(4), 462-469.

[23] Bodnar, L. M., & Wisner, K. L. (2005). Nutrition and depression: implications for improving mental health among childbearing-aged women. Biological psychiatry, 58(9), 679-685.

11

Pain Management

PAIN AFFECTS THE QUALITY OF OUR LIFE, limiting activities and affecting sleep, mood and in some cases, our relationships with the people around us. When we look at managing pain, we are looking at the quick fix to alleviate the pain. Pain is our body's signal telling us that there is something wrong. However, it is also associated with inflammation in the body.

There are foods that have anti-inflammatory properties that help in lowering the pain response. Try turmeric (curcumin), salmon for omega-3 fatty acids, and ginger. A diet that is high in antioxidants, or rich in colorful fruits and vegetables, may lower to alleviate the inflammatory response.

Other nutrients to consider are:

Alpha lipoic acid: Has well documented effectiveness in the treatment of neuropathic pain.[1]

Antioxidants (Specifically CoQ10, Vitamin C and Vitamin E): It is widely accepted that chronic pain can effectively managed with antioxidant supplementation: reducing neuropathic pain, lowering prescribed pain medication after surgeries and providing relief for statin-induced myopathy.[2,3,4,5]

Choline: Activates brain and spine receptors reducing perceived acute pain.[6,7]

Vitamin D: Studies have shown that some muscle or bone pain may be attributed to a deficiency of Vitamin D.[8,9]

NAC (glutathione): Lowers pain associated with neuropathy or inflammation.[1011]

Minerals (Magnesium): Blocks spinal cord pain receptors, reduces pain in post-surgery patients, works against free radicals. Various minerals may reduce arthritic, muscle or nerve pain.[12,13,14]

Omegas (or Oleic acid): Affects neurotransmitters with roles in pain signaling: acetylcholine, serotonin, dopamine and GABA.[1516]

References

[1] Tankova, T., Cherninkova, S., & Koev, D. (2005). Treatment for diabetic mononeuropathy with α-lipoic acid. International journal of clinical practice, 59(6), 645-650.

[2] Kirk, G. R., White, J. S., McKie, L., Stevenson, M., Young, I., Clements, W. B., & Rowlands, B. J. (2006). Combined antioxidant therapy reduces pain and improves quality of life in chronic pancreatitis. Journal of gastrointestinal surgery, 10(4), 499-503.

[3] Kanazi, G. E., El-Khatib, M. F., Yazbeck-Karam, V. G., Hanna, J. E., Masri, B., & Aouad, M. T. (2012). Effect of vitamin C on morphine use after laparoscopic cholecystectomy: a randomized controlled trial. Canadian Journal of Anesthesia/Journal canadien d'anesthésie, 59(6), 538-543.

[4] Kim, H. K., Kim, J. H., Gao, X., Zhou, J. L., Lee, I., Chung, K., & Chung, J. M. (2006). Analgesic effect of vitamin E is mediated by reducing central sensitization in neuropathic pain. Pain, 122(1), 53-62.

[5] Marcoff, L., & Thompson, P. D. (2007). The role of coenzyme Q10 in statin-associated myopathy: a systematic review. Journal of the American College of Cardiology, 49(23), 2231-2237.

[6] Wang, Y., Su, D. M., Wang, R. H., Liu, Y., & Wang, H. (2005). Antinociceptive effects of choline against acute and inflammatory pain. Neuroscience, 132(1), 49-56.

[7] Hamurtekin, E., & Gurun, M. S. (2006). The antinociceptive effects of centrally administered CDP-choline on acute pain models in rats: the involvement of cholinergic system. Brain research, 1117(1), 92-100.

[8] Turner, M. K., Hooten, W. M., Schmidt, J. E., Kerkvliet, J. L., Townsend, C. O., & Bruce, B. K. (2008). Prevalence and clinical correlates of vitamin D inadequacy among patients with chronic pain. Pain Medicine, 9(8), 979-984.

[9] Mascarenhas, R., & Mobarhan, S. (2004). Hypovitaminosis D-induced pain. Nutrition reviews, 62(9), 354.

[10] Schmidtko, A., Gao, W., König, P., Heine, S., Motterlini, R., Ruth, P., ... & Friebe, A. (2008). cGMP produced by NO-sensitive guanylyl cyclase essentially contributes to inflammatory and neuropathic pain by using targets different from cGMP-dependent protein kinase I. Journal of Neuroscience, 28(34), 8568-8576.

[11] Pathirathna, S., Covey, D. F., Todorovic, S. M., & Jevtovic-Todorovic, V. (2006). Differential effects of endogenous cysteine analogs on peripheral thermal nociception in intact rats. Pain, 125(1), 53-64.

[12] Arcioni, R., Palmisani, S., Tigano, S., Santorsola, C., Sauli, V., Romano, S., ... & Pinto, G. (2007). Combined intrathecal and epidural magnesium sulfate supplementation of spinal anesthesia to reduce post-operative analgesic requirements: a prospective, randomized, double-blind, controlled trial in patients undergoing major orthopedic surgery. Acta anaesthesiologica scandinavica, 51(4), 482-489.

[13] DiSilvestro, R. A., Marten, J., & Skehan, M. (1992). Effects of copper supplementation on ceruloplasmin and copper-zinc superoxide dismutase in free-living rheumatoid arthritis patients. Journal of the American College of Nutrition, 11(2), 177-180.

[14] Chariot, P., & Bignani, O. (2003). Skeletal muscle disorders associated with selenium deficiency in humans. Muscle & nerve, 27(6), 662-668.

[15] Akanmu, M. A., Adeosun, S. O., & Ilesanmi, O. R. (2007). Neuropharmacological effects of oleamide in male and female mice. Behavioural brain research, 182(1), 88-94.

[16] Lu, D. Y., Tsao, Y. Y., Leung, Y. M., & Su, K. P. (2010). Docosahexaenoic acid suppresses neuroinflammatory responses and induces heme oxygenase-1 expression in BV-2 microglia: implications of antidepressant effects for omega-3 fatty acids. Neuropsychopharmacology, 35(11), 2238-2248

12

Nutrients A-Z

Vitamin A is a fat-soluble vitamin essential for immune function, eyes, skin, cell growth and development**.** It can be found in milk, eggs, liver, fortified cereals, orange or green vegetables and fruits.

Alpha lipoic acid is an antioxidant found in every cell in the body. It is necessary for energy levels, blood flow to nerves, insulin sensitivity, and helping vitamin C and E be more effective. It can be found in spinach, broccoli, beef, and some organ meats.

Vitamin B1 (or thiamine) helps the body convert carbohydrates into useable energy. It assists in metabolizing fats, digestion, maintenance of skin, hair, eyes and is essential for the nervous and immune system, and liver function. It can be found in pork, organ meats, whole grain and enriched cereals, brown rice, wheat germ, bran, black strap molasses.

Vitamin B3 (or niacin) is one of the water-soluble B's commonly found in a B-complex. Most notable for assisting the liver in eliminating toxins this B vitamin also helps with digestion, improves circulation, sex hormones,

skin, hair and eyes. It can be found in beets, meat, poultry, organ meat, fish, nuts and seeds.

Vitamin B6 (or pyridoxine) is required for more than 100 enzyme reactions that occur daily in our bodies. It assists in red blood cell production, protein metabolism, reducing homocysteine levels, DNA/RNA, B12 absorption and immune function. It can be found in poultry, tuna, salmon, shrimp, beef liver, lentils, soybeans, seeds, nuts, avocados, bananas, carrots, brown rice, bran, wheat germ and whole grain flour.

Vitamin B12 (or cobalamine) is often associated with energy and one of the most commonly found deficiencies. B12 plays a major role in healthy nerve cells, brain function, nerve cells, DNA/RNA, red blood cell production and iron function. Common food sources include fish, meat, poultry, eggs, milk and milk products.

Biotin (or B7) is required for metabolizing fats, carbohydrates and amino acids -which are the building blocks for proteins. Biotin can be found in salmon, meats, vegetables, grains, legumes, lentils, egg yolks, milk, sweet potatoes, seeds, nuts and wheat germ.

Vitamin C is a powerful antioxidant and water-soluble vitamin. The list of vitamin C functions is extensive. Some widely accepted functions include tissue formation, protecting cells against oxidation or free radical damage, hormone messaging, blood clotting, cell membrane functioning, conducting nerve impulse information, muscle contraction and impulse signaling, iron absorption, and collagen formation. Food sources of this potent antioxidant include: broccoli, Brussel sprouts, cantaloupe, cauliflower, citrus, guava, kiwi, papaya, parley, peas, potatoes, peppers, rosehips, strawberries and tomato

Calcium is a mineral often associated with bone and teeth strength. It is also necessary for helping the heart, nerves and muscles. Calcium requires other nutrients to function properly. It can be found in dairy, molasses, Brazil nuts, broccoli, cabbage, dark leafy greens, hazelnuts, oysters, sardines and canned salmon.

Carnitine (L-carnitine) is a naturally occurring amino acid. It is necessary for energy, heart function, oxidizing amino acids for energy and metabolizing ketones. It can be found in red meat, dairy, fish, tempeh, wheat, asparagus, avocados and peanut butter.

Choline is an essential water-soluble nutrient made in the liver. It is necessary for brain development, nerve function, supporting energy levels and maintaining a healthy metabolism. It is commonly found shrimp, eggs, scallops, chicken, turkey, cod, salmon, beef and collard greens.

Chromium is a mineral that our bodies require small amounts for insulin function, augmenting fertility and metabolizing fats and carbohydrates. Food sources include whole grains, seafood, green beans, broccoli, prunes, nuts, potatoes and meat.

Copper is an essential trace mineral. It is used in bone formation, healing processes, taste sensitivity, energy processes, iron absorption and the metabolization of several fatty acids. It can be found in oysters, seeds, dark leafy vegetables, organ meats, dried legumes, whole grain breads, nuts, shellfish, chocolate, oats, blackstrap molasses.

CoQ10 (Coenzyme Q10) is a natural antioxidant made within our bodies. It prohibits LDL (the bad cholesterol) from oxidizing, assists in the production of energy and is essential for the heart, liver and kidneys. Foods high in this are oily fish, organ meats and whole grains.

Vitamin D is an essential fat-soluble vitamin. It is required for maintaining sufficient calcium and phosphorus levels, proper calcium absorption and bone mineralization. Sources include sunlight, egg yolk, milk, liver and fish.

Vitamin E is a fat-soluble vitamin that acts as an antioxidant. It supports immune function, protects cells against oxidation and cardiovascular disease, cataracts, and macular degeneration. Sources include wheat germ, liver, eggs, nuts, seeds, cold-pressed vegetable oils, dark leafy greens, sweet potatoes, avocados and asparagus.

Folate is a member of the water-soluble B vitamin family. It is essential in adolescence and pregnancy, iron function, reducing homocysteine and

acts with B12 to regulate red blood cell production. Common food sources include fortified grains, tomato juice, green vegetables, black-eyed peas, lentils and beans. It is worth noting that in supplementing, ensure taking the correct form: for many people that is methylfolate.

Vitamin K is a fat-soluble vitamin that is well- known for helping the blood clot. It also acts a key player in the formation of bone proteins and formation of glycogen to be stored in the liver. Food sources include kale, green tea, turnip greens, spinach, broccoli, lettuce, cabbage, beef liver, asparagus, watercress, cheese, oats and peas.

NAC (glutathione) is the master antioxidant and detoxifier within the body. It is known to decrease levels of inflammation, homocysteine, and lipoprotein a. It also decreases muscle fatigue and promotes overall immune function. It can be found in meats, ricotta, cottage cheese, yogurt, wheat germ, granola and oat flakes.

Magnesium is a mineral responsible for at least 300 biochemical reactions. It also works with muscle/nerve function, heart rhythm, strong bones, and regulates calcium, copper, zinc, potassium and vitamin D. Good sources include green vegetables, beans, peas, nuts, seeds and whole unprocessed grains.

Pantothenate is a water-soluble B vitamin. It is linked to RBC production, sex and stress-related hormones, immune function and healthy digestion. Food sources high in this B vitamin include meat, vegetables, whole grains, legumes, lentils, egg yolks, milk, sweet potatoes, seeds, nuts, wheat germ and salmon.

Selenium is an essential trace mineral. It is imperative in healthy immune, hormone and brain functioning. It can be found in wheat germ, butter, liver, cold-water fish, shellfish, garlic, whole grains, sunflower seeds and Brazil nuts.

Zinc is another essential mineral, which has the highest likelihood of deficiency. It supports enzyme function, the immune system, would healing, intestinal lining repair, DNA synthesis, and taste and smell. Common food sources include oysters, red meat, poultry, beans, nuts, seafood, whole grains, sunflower seeds and Brazil nuts.

References

1. Spectracell Laboratories. (2015) Nutrient Functions: Deficiency Symptoms.

2. The George Matelijan Foundation. (2017) The World's Healthiest Foods. Retrieved from: http://www.whfoods.com/index.php

3. Kohlstadt, I. (2012). Advancing Medicine with Food and Nutrients, Second Edition. Hoboken: Taylor and Francis

13

Supplements

As nutritionists, we always encourage food first when it comes to nutritional support. We can blend vegetables, make soups loaded with vegetables, protein and vegetable shakes to concentrate and boost antioxidants, vitamin minerals. Sometimes, we need to utilize pharaceutical grade neutraceuticles. These are produced in the highest quality, under strict standards to provide the safest and most effective supplements. We recommend a qualified professional assist you in creating your personal supplement plan. We have presented many supplements associated with health, but it is importatnt to be under supervision to replete so as not to have an imbalance.

Basic supplements on a daily basis are a great quality multivitamin and omega 3 fatty acids. If a conventional lab shows low or low normal vitamin D levels, vitamin D3 supplementation is indicated.

Here are things to look for when selecting supplements:

1. Independent Certification for Quality

- Therapeutic Goods Administration (TGA)
- NSF International (NSF)

2. Avoid artificial colors: We shouldn't have to "detox" our supplements. Food dyes have associated with attention deficit disorder. Studies also show carcinogenic and toxic effects of artificial food dyes.

3. Active forms of nutrients. I look for methylated folate and methylated B12 instead of the non-methylated forms.

4. Avoid sugar, artificial sweeteners, with the exception of stevia. Gummy supplements are, in many cases, lower in the nutrient and high in sugars.

5. How are supplements stored or shipped? Heat damages supplements.

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Recipes

Soups & Such

Bone Broth

This is a great gut-healing recipe. The healing proteins from the bone marrow may improve the immune response and give the gut the tools to heal. And it tastes good! Adding the dried kelp or seaweed adds an extra boost of minerals, especially iodine.

Begin with bones from poultry, fish, beef, lamb, shellfish, whole chicken or carcass (remove meat when cooked – after about 1 hour). Put in crockpot and cover with water.

Additional Ingredients:
1–2 T of lemon juice or vinegar
1–2 tsp salt

1/2 tsp pepper
2 Carrots,
1 onion cut in quarters
2 celery stalks
4 parsley sprigs
1 bay leaf
1/4 tsp sage, 1/2 tsp rosemary, 1/2 tsp thyme
1 sheet of kombu or dried kelp

Instructions:
Cook several hours (4–24) in a slow cooker on low.
Remove bones. Strain liquid and refrigerate. When the broth is cold, you can break off the fat on the top. Use as a base for other soups.

Green Turkey Sausage Soup

This recipe takes about 20 minutes from start to finish. It's chock full of protein and is a simple way to sneak in some greens!

Ingredients:

3 organic turkey sausage links

1/2 pound of chicken cubed (heavily sprinkled with tarragon, thyme, salt and pepper)

2 T coconut oil or ghee

1 small onion chopped

12 oz. cooked cannellini beans

3 medium sized small diced tomatoes

1 bag of spinach

2 cups chicken broth

1 1/2 tsp nutmeg

Directions:

1. Heat pan; add oil or ghee. Add chicken with herb sprinkling. Cook 3-4 minutes.
2. Add sausage (out of links and broken up), onions and nutmeg. Cook 3-4 minutes.
3. Add broth, beans and tomatoes; bring to a boil. Simmer until meat is cooked through.
4. Add spinach. Take pot off of heat.

Paleo Hummus

This is a flavorful recipe if you love hummus but don't love the carbs. This almond paleo hummus serves as a nice dip for raw veggies.

Yields: 2.5 cups

Ingredients:

2 cups of raw almonds, soaked for 12 hours, and then drained and rinsed.
2/3 cup raw of organic tahini
1/3 cup raw Extra Virgin olive oil
4 cloves of garlic
Juice of 2 small lemons
1 tsp of Himalayan Pink salt
1 tsp of black pepper
1/4 cup of organic sundried tomatoes
1/4 cup of chopped fresh parsley
1 small diced habanero or jalapeno pepper (omit if you don't like spicy)

Directions:

Combine all of the ingredients in a food processor and puree. You can't get much simpler than that!

Tip: Let the paleo hummus mixture sit in a refrigerator for a couple of hours before serving.

Guacamole

There is nothing more delicious than a creamy, spicy guacamole. Avocados are loaded with healthy fat and fiber. Dip veggies, dollop on grilled chicken or add it on top of a mixed salad. Yum!

Ingredients:

2 ripe avocados
1/2 Jalapeño pepper- seeded and chopped
2 T finely chopped sweet onion
1/4 tsp red pepper (to taste)
1/2 lime or lemon juiced
1 tsp cumin
1 tsp chili powder (to taste)
1/4 tsp Himalayan salt

Directions:

1. Smash insides of the avocado with a mortar and pestle (or a fork).
2. Add the rest of the ingredients and mix well.

Sunflower Seed Pâté

Here is a great recipe to give you lots of flavor and nutrients. Spread it on lettuce leaves to start a lettuce leaf wrap with some of your favorite fillings. This also makes a great appetizer dip or spread on a zucchini peel and roll for a great snack.

Ingredients:

1 cup sunflower seeds- soaked
1- cloves garlic
1/2 cucumber seeded
1/2 red pepper seeded and cut into cubes
2 T chopped onion
1/2 tsp celery salt
1/2 tsp dried oregano
1 T basil leaves chopped
1 T fresh parsley chopped
Himalayan salt and pepper to taste
Juice of 1/2 lemon

Directions:

Soak sunflower seeds for 1-4 hours. Drain, rinse and drain. Place all ingredients in food processor and blend until smooth.

Walnut Pesto

Looking for a power punch flavor? I love this on spiraled sautéed zucchini and topped with a piece of grilled chicken for an easy, low carb meal.

Ingredients:

2 cloves garlic
1/2-3/4 cups fresh basil
1/2 cup walnuts
3/4 cup olive oil
1/4 tsp Himalayan salt to taste
1/4 lemon juiced
1/4 tsp ground pepper to taste

Directions:

Place ingredients in food processor and process until evenly ground.

Salads & Dressings

Basic Salad Dressing

Making salad dressing can be simple and much healthier than the commercial alternatives. Most commercial dressings are loaded with preservatives, less healthy oils, and higher in sodium and sugars. With this formula, you can create your own signature flavor!

Ingredients:

1/3 cup acid – Chose one vinegar (balsamic, red wine, apple cider, raspberry, lemon, lime)

2/3 cup oil – Chose either (olive oil, coconut oil, hemp oil, walnut oil, pumpkin oil)

Seasonings: (dried spices should always be organic when possible)

- Oregano
- Basil
- Parsley
- Rosemary
- Thyme
- Chives
- Garlic
- Dried Mustard
- Himalayan Salt or Sea Salt
- Pepper
- Kelp powder
- Hemp Seeds for protein
- Pumpkin seeds for crunch

Directions:

Add spices to oil and acid mix. Either shake or put in a blender.

Greek Salad Dressing

Ingredients:
3 T red wine vinegar
3 T lemon juice
2/3 cup extra virgin olive oil
1 garlic clove crushed
1 tsp dried oregano
sea salt and pepper to taste

Directions:
Blend all ingredients with a whisk, food processor, or emulsion blender.

Walnut Dressing

This is a special dressing rich in flavor and packed with antioxidants. Drizzle it over a plate of arugula topped with sliced pears, goat cheese and crushed walnuts.

Ingredients:
1/2 cup walnut oil
1/4 cup champagne vinegar
1 shallot diced

Directions:
Blend all ingredients with a whisk, food processor, or emulsion blender.

Beet Salad

This is my go-to recipe when I think of a therapeutic salad for the liver gall bladder. Beets help with bile building and they contain lots of antioxidants. The bitter greens of arugula also help stimulate bile and maintain a healthy gall bladder.

Serves: two

Ingredients:

1 large beet (Clean and cut stems off about 1" from top. Roast for 1 hour or until tender to the touch. Let cool and peel off the skin. Slice beet.)
2 cups Arugula
1/4 thinly sliced red onion
1 orange – peeled and sectioned
2 oz. goat cheese
1/4 cup chopped walnuts

Directions:

1. Roast beet for 1 hour or until tender to the touch. Let cool and peel off the skin. Slice beet.
2. Assemble salad with arugula, onion, orange sections, sliced beets and goat cheese. Drizzle walnut dressing and top with chopped walnuts.

Romaine Boats with Curry Chicken Salad

A couple of little twists on a classic recipe, this chicken salad is healthy and tasty.

Curry Chicken Salad

Ingredients:

1 pound cooked boneless skinless organic chicken breast
2 stalks celery chopped
1/2 cup chopped fresh cilantro
lime juice to taste
Citrus Curry Dressing (see below)

Directions:

Chop chicken into small pieces. Place in a medium bowl. Add celery, cilantro and dressing. Stir well to combine and adjust seasoning with salt, pepper, and lime juice to taste.

Creamy Lime-Curry Dressing

Ingredients:

1/3 cup olive oil
1/3 cup raw cashews
1 T lime juice
1 T mild curry powder
1 T freshly grated ginger
1/2 tsp ground coriander seed
1/2 tsp salt
1/2 tsp white pepper

Directions:

Place cashews in a blender. Blend until reduced to a fine powder. Add remaining ingredients and blend thoroughly. You want the consistency of a creamy dressing. If it is too thick, add 1T of water or lime juice at a time until desired constancy is reached. Scoop chicken salad into whole romaine leaves. Top with olives, capers or tomatoes.

Vegetables & Sides

Black Bean and Tomato Quinoa with Citrus Dressing

Serves: four to six

Ingredients:

1 cup quinoa, rinsed several times and drained
2 tsp lemon zest
1 tsp fresh lemon juice
1 tsp fresh lime juice
2 T ghee, melted
1 T olive oil
1 tsp coconut sugar (or monk fruit syrup)
12 oz. cooked black beans
2 medium heirloom tomatoes, diced
4 scallions, chopped
1/4 cup chopped cilantro

Directions:

1. Cook quinoa according to package directions.
2. Wisk lemon zest, juice, ghee, olive oil, coconut sugar, 1/2 teaspoon salt, and 1/4 teaspoon pepper together in a small bowl. Set aside.
3. Fluff quinoa with a fork and toss with dressing. Add remaining ingredients and toss. Serve hot or room temperature.

Coconut Cauliflower Ginger Rice

The more ginger the better. This rice dish can be prepared ahead of time and stored in the fridge until ready to cook. Cooking time will lengthen however. Leftovers can be mixed with soft poached eggs for a healthy "no-fried" rice the next day.

Serves: two to four

Ingredients:

1 cup basmati rice

1 cup cauliflower rice

1 3/4 cups vegetable or chicken broth

6 oz. coconut milk

1 T garlic minced

2-4 T ginger minced

Himalayan sea salt to season

White pepper to season

Can be added for individual flavors-

- Parsley and cilantro chopped 2-4 T/bowl
- Tamari or Braggs/Rice wine vinegar: 2:1 ratio
- Sriracha chili paste to taste

Directions:

1. Preheat oven to 425F.
2. Sauté garlic and ginger in coconut oil or ghee until fragrant.
3. In a glass baking dish/pan add cauliflower rice, basmati, broth, coconut milk, garlic and ginger.
4. Cover with foil (can set in fridge all day if needed) and bake for 30-40 minutes. When you can smell the rice, it is done. If you think it is done, carefully take out of the oven, lift foil and look at rice. If it is soupy, put it back in and check every 5 minutes. If it is moist, take it out and rest on the counter until ready to serve.
5. Mix in parsley, salt, pepper, tamari and vinegar (and chili paste) to flavor.

Easy Every-Night Roasted Veggies

This is perfect for an easy, no-brainer way to prepare the rainbow. Be sure to make extra for leftovers served over a salad for lunch or chopped and in a frittata for brunch.

Ingredients:

Vegetables for roasting: Brussel sprouts, any color pepper, onions, carrots, zucchini, cauliflower, broccoli, asparagus

Coconut oil and/or Ghee

Himalayan sea salt, pepper

Seasonings: Mustard seed, cumin, coriander, thyme, oregano, rosemary

Lemon or lime juice

Directions:

1. Preheat oven to 425.
2. Chop vegetables in a similar size so roasting time will not vary too much. (If you are adding zucchini, add it after 5-10 minutes of roasting.)
3. Line vegetables in glass roasting dish, drizzle oil or ghee. Sprinkle with salt and pepper. Use other seasonings of your choice.
4. Roast vegetables for about 20-25 minutes depending on how crisp or tender your preference is. If they are too mushy, all of the nutrients may not be as bioavailable.
5. Squeeze fresh citrus juice after removing from the oven.

Pumpkin Tomato Curry

A perfect anti-inflammatory, soothing dish that can be served on its own or as an appetizer.

Ingredients:

1 acorn squash
1 butternut squash- cubed and roasted until soft, yet not mushy
1 medium yellow tomato chopped
1 medium to large red tomato chopped
1/2 cup chopped white onion
3 T minced ginger
1 T minced garlic

Spices
1 1/2 tsp curry powder
1 tsp coriander
1 tsp dry mustard
1/2 tsp Cumin
1/2 tsp red chili powder
1/2 tsp paprika
1/4 tsp turmeric
1/4 tsp cayenne pepper

2-4 cups chicken broth
6-8 oz. Coconut milk
3-5 tsp blend of coconut oil and ghee

Additional upgrade suggestions: freshly chopped cilantro, red chili pepper flakes, Himalayan sea salt and fresh lime juice.

Directions:

1. Heat 2 – 3 tsp of oil/ghee in a large pan. Add the onion. Cook on medium heat for 3-4 minutes.
2. Add the rest of the oil/ghee. Add all spices, garlic and ginger. Cook for 2-3 minutes until fragrant, stirring often.
3. Add pumpkin/squash blend and stir for 1-2 minutes.
4. Add broth, coco milk and tomatoes. Reduce heat to medium-low. Cover and simmer for ten minutes (maybe a bit longer) stirring occasionally.
5. Taste and adjust with upgrades.

Entrees

Korean Steak BBQ

This recipe is like dinner and a show. Besides being fun, it is a go-to for incorporating a variety of fermented or pickled foods. It is also pretty quick- as there is no need to marinate the meat. Sesame oil is not heat stable, so cooking with it at any temperatures is not a good idea.

Ingredients:

1.5 pounds flank steak

1/2 onion sliced thin (marinate in coconut sugar and pomegranate vinegar for a couple of hours)

1 pound mushrooms sautéed

1-2 heads Boston Bibb

Sauce:

1 1/2 T minced ginger

1 1/2 T minced garlic

1 tsp coconut nectar

3 T tamari

3 T rice vinegar

2 T sesame oil

1-2 T toasted sesame seeds

4 chopped scallions

Directions:

1. Marinate onions.
2. Cook mushrooms
3. Mix all sauce ingredients together. Set aside.
4. Wash lettuce.
5. Grill steak on low heat until desired temperature.

6. Serve all the above separately for guests to assemble as you eat. Traditionally, take one leaf. Take some meat- dip in the sauce and place in the leaf. Place some onions and mushrooms in the roll. Enjoy!

Additional toppings include anything pickled (daikon, bean sprouts, kimchi), or fermented, chili or kimchi paste, Dijon mustard, etc. Be creative!

Salmon Curry with Vegetables

I love this recipe for the anti-inflammatory properties and the all-encompassing flavors.

Ingredients:

Two 5 oz. pieces of wild salmon (skin on)
1/2 Napa Cabbage- chopped
2 heads bok choy- trimmed and coarsely chopped
1 fennel bulb- chopped
1 chopped onion
1 T grated ginger (Note- keep in the freezer and grate as needed)
1/4 tsp turmeric
1/4 tsp red pepper
1 T mustard
1/4 tsp cumin
Ground pepper and Himalayan salt
juice of 1/2 lemon
1/2 cup full fat coconut milk

Directions:

1. Roast Salmon at 325 for 10-15 minutes until cooked.
2. Heat 1 T coconut oil. Sauté onion and fennel in a pan, then add chopped cabbage, bok choy and fennel.
3. Add Ginger and spices. Cook until soft.
4. Add coconut milk. Cook and stir until thick.
5. Add lemon juice. Set aside.
6. To prepare plates: Place cooked vegetables in the middle of the plate. Top with Salmon. Sprinkle with a sprig of cilantro. May be served with rice.

Chicken and Pesto with Zucchini Spirals

Nothing is easier than this recipe! This one is loaded with flavor and healthy antioxidants. The spiral cut zucchini is a great substitute for pasta, which makes it paleo, gluten free and very low carbohydrate.

2 organic chicken breasts – pounded to ½ inch thick. Season with Himalayan pink salt, pepper and Italian seasoning. Sauté in pan, which is coated with 1 tablespoon of coconut oil. Let cook for 3-4 minutes per side or until done. Set aside.

Peel 2 medium zucchini squash. Cut both ends off and put in spiralizer. Create spiral cut zucchini. Heat 2 teaspoons of oil in sauté pan over medium heat. Add zucchini and cook, stirring frequently until just translucent. When done, add 2-4 tablespoons of walnut pesto (recipe provided under Soups & Such), Mix well. Add red pepper flakes to taste. Divide the zucchini and place on middle of plate. Top with cooked chicken breast. Top with a dollop of pesto. Sprinkle with parmesan cheese, if desired.

Other Delights

Gluten Free (Vegan) Pancakes

Serves: Yields 10-12 4″ pancakes

Ingredients:

1 cup of gluten free all-purpose flour (Bob's Red Mill or Cup for Cup are great)
1 T freshly ground flax seeds
2 T maple syrup
2 tsp baking powder
2 tsp ground cinnamon
1 tsp vanilla
1/4 tsp salt
1/4 cup of unsweetened applesauce
1 cup almond milk
1 banana sliced thin

Directions

1. In a medium size mixing bowl, mix together the dry ingredients: flour, flax, baking powder, cinnamon, and salt.
2. In another bowl, add the wet ingredients: vanilla, maple syrup, applesauce, and milk.
3. Mix until you get the lumps out of the batter. You don't want it to be too thick or too runny.
4. On a heated griddle or pan on your stovetop (medium heat), begin to cook pancakes using about ¼ cup of the batter for each one. Add a couple of thin slices of banana to each pancake as it is cooking.
5. Cook 2-3 minutes until they start to bubble.
6. Flip over and cook the other side.
7. Serve warm with fresh fruit toppings, freeze for later, or pack them up for lunch!

Healthy Smoothie

It is easy to get a nutritional power punch in one glass. This is a lower carbohydrate recipe that helps support overall health. Mix up the fruit with berries. Buy frozen organic fruit so you are always ready to make a health smoothie meal.

Serves: one

Ingredients:

1 cup liquid – water, unsweetened coconut or almond milk
1-2 scoop protein powder- organic whey, rice, pea, egg white, organic soy or hemp (aim for 15-25 gm protein)
1 Avocado or Sunflower seed butter to provide quality fat

Greens- 1 cup Kale, Spinach, or Romaine
1 cup berries or 1/2 cup peaches or dark cherries
Cucumbers
Squeeze fresh lemon
1 T freshly ground flax seed, flax oil, coconut or MCT oil

Directions:

Place ingredients into blender.
Blend thoroughly; serve immediately.

*Use organic ingredients whenever possible.

External Links

Finding Functional Practitioners

Institute for Functional Medicine https://www.functionalmedicine.org/
Acadamy4 Anti-aging Medicine https://www.a4m.com/

Test companies

Spectracell- https://www.spectracell.com/mnt/
Genova- https://www.gdx.net/
AnyLabTest Now!- https://www.anylabtestnow.com/ic
Cyrex-

Genetic testing

www.23andMe.com

Interpretation of Genetic testing
www.Nutrahacker.com
www.Promethease.com
www.nutrigemomix.com
www.strategene.com

Further Reading Suggestions

The Belly Fat Effect, by Mike Mutzel
The Mood Cure, by Julia Ross
What your Doctor May Not Tell You About Heart Disease,
Mark Houston, MD

General References

1. Spectracell Laboratories. (2015) Nutrient Functions: Deficiency Symptoms.
2. Caso, G., Kelly, P., McNurlan, M. A., & Lawson, W. E. (2007). Effect of coenzyme q10 on myopathic symptoms in patients treated with statins. The American journal of cardiology, 99(10), 1409-1412.
3. Houston, M. (2012). What your Doctor may not tell you about Heart Disease. Hachette UK.
4. Esposito, K., Marfella, R., Ciotola, M., Di Palo, C., Giugliano, F., Giugliano, G., ... & Giugliano, D. (2004). Effect of a Mediterranean-style diet on endothelial dysfunction and markers of vascular inflammation in the metabolic syndrome: a randomized trial. Jama, 292(12), 1440-1446.
5. Huang, P. L. (2009). A comprehensive definition for metabolic syndrome. Disease models & mechanisms, 2(5-6), 231-237.
6. Weismann, K., & Høyer, H. (1985). Serum alkaline phosphatase and serum zinc levels in the diagnosis and exclusion of zinc deficiency in man. The American journal of clinical nutrition, 41(6), 1214-1219.
7. Jones, M. P., Dilley, J. B., Drossman, D., & Crowell, M. D. (2006). Brain–gut connections in functional GI disorders: anatomic and physiologic relationships. Neurogastroenterology & Motility, 18(2), 91-103.
8. Mayer, E. A., Tillisch, K., & Gupta, A. (2015). Gut/brain axis and the microbiota. The Journal of clinical investigation, 125(3), 926-938.
9. Meier, U., & Gressner, A. M. (2004). Endocrine regulation of energy metabolism: review of pathobiochemical and clinical chemical aspects of leptin, ghrelin, adiponectin, and resistin. Clinical chemistry, 50(9), 1511-1525.

About the Author

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DEE HARRIS is a registered, licensed, and certified dietitian and nutritionist and a certified diabetes educator. She is also certified as a functional medicine practitioner through the Institute for Functional Medicine. Dee is the owner of D-Signed Nutrition, LLC, in Bonita Springs, FL.

Using food as medicine for multiple medical imbalances including, diabetes, cardiovascular, gastric, hormonal, and neurological disorders, she individualizes each patient's plan and supports them as they make lifestyle changes. Dee worked with Dr. David Perlmutter, author of Grain Brain, and Brain Maker, before he retired from practice in 2015.

She has been a contributor to several books and is frequently interviewed by local NBC and ABC news as well as E Bella, Naples Illustrated and Natural Awakenings magazines. Dee continues to spread her passion for health, wellness and healing through many lectures and classes as well as online health summits. Dee graduated from University of Georgia and completed her dietetic internship at Cornell Medical Center in New York.

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