

OBEISY TREATMENT: TESTS USED TO ASSESS METABOLISM, APPETITE AND ENERGY CONTROL OTHER CARDIOMETABOLIC MARKERS

Tests	Significance	Treatment
CRP	CRP is a marker of inflammation. Systemic inflammation has been linked to increased risk of CV disease, obesity, diabetes, Alzheimer's, among other conditions.	CRP levels can be reduced by use of statins, omega-3 supplements, increase poly-phenols in diet, Mediterranean style diet, weight loss if needed. The Jupiter Study showed benefits of a statin medication to lower levels of CRP and CV events, even without significant elevation of cholesterol.
Vitamin D Levels	<p>Vitamin D deficiency can lead to osteomalacia and/or osteoporosis; being a fat-soluble vitamin, vitamin D levels are often low in obesity. Other factors that increase risk of low vitamin D levels are: darker skin color, advanced age, insufficient sunlight exposure, living in northern states, use of sunblock, winter time. Other risks include some bariatric surgeries, pregnant and lactating states, malabsorption syndromes, use of anticonvulsants, use of anti AIDS/HIV medications, granulomatous disorders, lymphomas, primary hyperparathyroidism, nephrotic syndrome.</p> <p>Low vitamin D has been associated in some studies with muscle problems, HTN, diabetes, cancer, Alzheimer's disease, and other neurologic conditions.</p>	<p>Safe sun exposure (5-30 min/day, arms and legs, between 10am – 3pm).</p> <p>Vitamin D supplements.</p> <p>Food sources of vitamin D are :</p> <ul style="list-style-type: none"> • Animal meat: liver, beef, veal • Eggs (mainly the yolk) • Dairy products: milk, cheese, butter • Saltwater fish: herring, tuna, salmon, sardines (10-25% in farmed vs wild caught) • Mushrooms • Fortified foods: milk, yogurt, margarine, cheese, orange juice, breads, cereal
Vitamin B12 Levels	Vitamin B12 is essential for the metabolism of aminoacids: facilitates conversion of homocysteine to methionine (required for DNA synthesis), and conversion of methylmalonyl-CoA to succinyl-CoA (required for glucose and energy metabolism). Deficiency usually results from problems absorbing B12 in the gut, or strict vegan diets, and can lead to megaloblastic anemia and neurologic problems.	<p>If there is no absorption problems, oral B12 supplements can be used. If body cannot absorb B12, intramuscular injections are needed.</p> <p>Good food sources of vitamin B12 are meats, fish, shellfish, poultry, and milk.</p>
Homocysteine	High homocysteine can indicate deficiency of vitamin B12, B6, and/or folic acid. It can also be elevated from genetic factors, renal failure, high protein diets. Plasma levels greater than 15 mcg associated with premature CVD. Homocysteine appears to impair endothelial function, promotes smooth muscle growth, platelet adhesion, and therefore, promote atherosclerosis. Folate, B12, B6 replacement decreases homocysteine but has not conclusively shown to decrease CVD.	Treat the cause of elevated homocysteine: vitamin B12, B6 deficiency, folic acid deficiency, renal failure, dietary adjustments.

<p>Methylmalonic Acid</p>	<p>An indicator of vitamin B12 deficiency. Can help assist in the diagnosis of B12 deficiency, when B12 level are equivocal. Elevated levels with B12 deficiency, but normal levels with B6 or Folic acid deficiency.</p>	<p>Treat vitamin B12 deficiency.</p>
<p>Folic Acid: reflects recent dietary intake</p> <p>RBC Folate: reflects tissue or stored folate. Not affected by recent diet</p>	<p>Before absorption, folate has to be transformed by enzymes called conjugases: folate acid deficiency can be caused by conditions that impair conjugases activity, such as zinc deficiency, alcohol, and certain foods (legumes, lentils, cabbage, oranges).</p> <p>Certain medications can also cause folic acid deficiency (phenytoin, primidone, Methotrexate, Sulfasalazine, Triamterene, Metformin). Folic acid is essential for amino acid (protein) metabolism and synthesis of DNA. Folate deficiency can lead to megaloblastic anemia.</p>	<ul style="list-style-type: none"> • Folate: natural reduced form found in foods • Folic acid: oxidized form found in fortified foods and supplements • Food sources: Mushrooms, green vegetables, peanuts, legumes, lentils, fruits, liver, fortified foods
<p>Serum Magnesium: reflects magnesium levels in the blood</p> <p>RBC Magnesium: reflects intracellular magnesium. More accurate to assess storage and function</p>	<p>Magnesium is an essential substance for the function of many metabolic enzymes and cell membrane transporters. Low magnesium levels can cause muscle dysfunction (weakness and cramps), low potassium, and has also been associated with insulin resistance.</p>	<p>Oral magnesium replacement.</p> <p>Food sources: pumpkin and squash seed kernels, Brazil nuts, bran cereal, halibut, quinoa, spinach, almonds, cashews, soybeans, pine nuts, white and black beans, pollock.</p>
<p>Urine F2-Isoprostanes (F2-IsoPS)</p>	<p>F2-Isoprostanes (prostaglandin-like compounds derived from free radical-catalyzed peroxidation of arachidonic acid) allows to assess oxidative stress. It has been shown to be increased in association with a number of atherosclerotic risk factors, including cigarette smoking, hypercholesterolemia, diabetes mellitus, and obesity. In addition, recent evidence suggests their quantification may represent an independent marker for atherosclerotic risk. A recent study, termed the Biomarkers of Oxidative Stress Study (BOSS), sponsored by the NIH, concluded that the IsoPs are the best index of oxidative injury. Oxidized tissues and cells do not function well leading to poor metabolism. Oxidation promotes inflammation, poor glucose control, slow metabolism, atherosclerosis, and weight gain.</p>	<p>Promote intake of polyphenols, antioxidant vitamins and minerals, and avoid factors that increase formation of free radicals: overeating, excessive sunlight, heavy metals, excess sugar, trans fats, charbroiled foods, smoking.</p> <p>Strict assessment and management of other CV risk factors.</p> <p>Potential interventions to reduce oxidative stress include: smoking cessation, healthy weight loss, promote diets rich in polyphenols, gamma-tocopherol, omega-3s; and reduce intake of alpha-tocopherol, iron, omega-6s, saturated fats, trans fats and high fructose foods.</p>

Uric Acid	A marker of gout. However, levels can also be elevated in obesity and insulin resistance. High insulin levels reduce the clearance of uric acid by the kidneys. Ketogenic diets can also increase uric acid levels, since ketones interfere with renal excretion of uric acid. High uric acid can precipitate gout attacks, cause kidney stones, increase blood pressure.	Low purine diet, limit alcohol, medications when indicated. Uric acid levels need to be monitored closely during a ketogenic dietary intervention.
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Mediterranean Diet

Mediterranean style diet, rich in vegetables, is particularly beneficial because these nutrients are low in calories, carbohydrates, and fat while they are high in fiber, vitamins, minerals, and antioxidants. Mediterranean diet has anti-inflammatory properties.

Research has shown that Mediterranean diet reduces the risk of heart disease, overall cardiovascular mortality, reduces the risk of cancer and cancer mortality, reduces the risk of Parkinson's and Alzheimer's disease, protects against diabetes.

Main recommendations are to base every meal on fruits, vegetables, grains (mostly whole), olive oil (to be used as the main source of fat), beans, nuts, legumes, seeds, herbs, and spices; consume fish and seafood often (at least twice a week, unless contraindicated); consume moderate daily to weekly, portions of poultry, eggs, cheese, and yogurt; meats and sweets are to be consumed less often (consumption not encouraged).

Mediterranean diet typically includes moderate amount of wine (<5 ounces/day for women and men over age 65, and <10 ounces/day for men under age 65), unless contraindicated by history of substance/alcohol abuse/dependence, heart, and/or liver disease.