Insulin Resistance and Diabetes

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Causes of high insulin

- Eating processed high carbohydrate foods.
- Increased stress.
- Excessive caffeine intake.
- Abuse of alcohol.
- Nicotine.
- Excessive dieting.
- Lack of exercise.
- Decreased estrogen (female).
- Increased testosterone (female).
- Decreased testosterone (male).
- Insomnia.
- Increased DHEA.
- Hypothyroidism.
- Excessive progesterone (female).

Syndrome X

- Obesity.
- Hypertension.
- Hypertriglyceridemia.
- Hyperinsulinemia.
- Dysinsulinemia is the common link to all of these.

The Metabolic Syndrome

- Dyslipidemia.
- Abdominal obesity.
- Hypertension.
- Insulin resistance.
- Increased small dense LDL-C and apo B.
- Decreased HDL-C.
- Hyperinsulinemia and hyperproinsulinemia.
- High PAI-1.
- Hyperuricemia.
- Impaired glucose tolerance.

Diabetes

- People with hypertension have a two-fold higher prevalence of diabetes and obesity; half are insulin-resistant.
- People who are obese are twice as likely to have hypertension, hypertriglyceridemia, or type II diabetes.

Metabolic Syndrome

- Prevalence is 21.8%.
- 6.7 % among people age 20 to 29 and increases with age.
- 43.5% in people ages 60 to 69.

Metabolic syndrome and the risk of CVD

- Metabolic syndrome is associated with an increased risk of heart disease.

Insulin Resistance

The body does not respond to insulin normally—insulin impotence.

Symptoms of Insulin Resistance

- Acne.
- Ankle swelling.
- Burning feet.
- Constipation.
- Decreased memory or concentration.
- Depression.
- Fatigue.
- Fluctuating high blood pressure.
- Fuzzy brain.
- Infertility.
- Irregular menstrual cycles.
- Irritability.
- Loose bowel movements alternating with constipation.
- Water retention.
- Weight gain.

Medications to lower Blood Sugar

- Sulfonylureas lower blood sugar but raise insulin levels.
- Meglitinide drugs such as Prandin and Starlix also increase insulin secretion.
- Glucophage decreases the production of glucose by the liver.
- Actos and Avandia improve insulin sensitivity at the level of muscle and fat cells.

Drug nutrient interactions

- Metformin (Glucophage) reduces folic acid and vitamin B12. Therefore can raise homocysteine.
- Glipizide (Glucotrol) decreases CoQ10.
- Glimepiride (Amaryl) decreases CoQ10.
- Glyburide (Glynase) decreases CoQ10.

Reversing Insulin Resistance

- Healthy nutrition including supplementation with vitamins, anti-oxidants, and minerals.
- Stress management including enough sleep.

- Tapering off toxic chemicals and/or avoiding them completely.
- Exercise.
- HRT.

The way to a healthier metabolism

- Food is used to regenerate.
- Adequate intake of fibre.
- Use low glycemic index foods.

Glycemic index

- Change in glucose after food/change in glucose after white bread X 100.
- High glycemic index foods.
- Moderate glycemic index foods.
- Low glycemic index foods.

Insulin Resistance

- Chromium Picolinate (400-600ugms).
- Alpha Lipoic Acid (200-600mg).
- CLA (1,000-3,000mg).
- Zinc (25-50mg).
- Vitamin E (600-800IU).
- Taurine (1,000-3,000mg).
- Magnesium (400-800mg).
- Fiber (30-50gms).
- Biotin (4-8mg).
- Vanadium (20-50mg).
- Vitamin D (400-1,000IU).
- Coenzyme Q10 (30-200mg).
- B complex (50-100mg).
- Vitamin C (1,000-3,000mg).
- Manganese (5-10mg).
- Lentils, chickpeas, and broccoli all decrease insulin levels.

Chromium

- Chromium is a mineral that is not absorbed well into the body since it is molecularly a large mineral.
- It needs to be combined with another substance to allow it to enter the blood stream easily.
- Picolinate is a protein that is usually used for transport.
- Picolinate is found in living cells.
- Broccoli is the only food which contains a lot of chromium.

Functions Of Chromium

- Increases the absorption of zinc, copper, and iron.
- Burns calories.
- Increases physical endurance in athletes.
- Stimulates muscle development.
- Reduces bone loss.
- Helps raise DHEA levels.
- Increases immunoglobulins.
- Decreases cortisol.
- Raises HDL.
- Decreases total cholesterol and LDL.
- Helps hold onto calcium to prevent osteoporosis.
- Aids in fat loss.
- Helps regulate blood sugar by making insulin work more effectively.
- Decreases food cravings.

Causes Of Chromium Loss

- Antacid use.
- High carbohydrate diet.
- Exercise.

Factors That Increase Chromium

- Amino acids.
- Vitamin C.
- Physical trauma.

Chromium

- Dosage:
  - Decrease sugar cravings: 200-300ugm.
  - Insulin resistance: 600ugm.
  - Muscle building: 1 200ugm.

Alpha Lipoic Acid

- Alpha lipoic acid is a nutrient that is both fat and water soluble.
- The body makes less alpha lipoic acid as it ages.

Functions of Alpha Lipoic Acid

- Greatly enhances the power of all other antioxidants in the body.
- Increases levels of vitamins E and C, glutathione, and coenzyme Q10.
- Main role is to help burn glucose.
- Improves memory.
- Helps prevent cataracts.
- Lowers levels of copper and calcium if toxic.
- Stimulates the sprouting of new nerve fibers on nerve cells.
- Lowers glucose and insulin levels, reduces insulin resistance, and improves insulin sensitivity.
- Is an antioxidant.
- Improves the immune system.
- Protects collagen in the skin from cross-linking and causing wrinkles.
- Acts as a metal chelator for iron, copper, and cadmium.

- Is a cofactor of mitochondrial enzymes needed for energy production.
- Stops the adhesion of macrophages to the artery wall
- Stops NF kappa B activation in the cells which leads to heart disease.
- Increases glutathione by 30 to 70%.
- Modulates gene expression.

Alpha Lipoic Acid
- Is present in potatoes, spinach, and red meat.
- It takes 7 pounds of spinach to produce just 1 mg of lipoic acid.

Alpha Lipoic Acid is used in the treatment of:
- Diabetes mellitus.
- Hepatitis C.
- Maintaining memory.
- Psoriasis.
- Eczema.
- Burns.
- Skin cancer.
- Immunosuppression.
- Multiple sclerosis.
- Lou Gehrig's disease.
- Parkinson's disease.
- Rheumatoid arthritis.
- Lupus.
- Scleroderma.
- Macular Degeneration.
- Cataracts.
- AIDS.
- Coronary heart disease.
- Circulatory disorders.
- CVA.
- Atherosclerosis.
- Diabetic neuropathy.

Alpha Lipoic Acid
- Any dosage above 600mg a day may cause hypothyroidism.
- Dosage:
  - Memory maintance: 100mg.
  - Insulin resistance: 200mg.
  - Hepatitis C: 600mg.

CLA
- CLA is a naturally occurring fatty acid.
- Functions of CLA:
  - Helps fight cancer.
  - Is an antioxidant.
  - Lowers cholesterol.
  - Builds immune system.
  - Improves insulin sensitivity.
  - Aids in weight loss.
- Dosage:
  - Preventive: 100-500mg.
  - Insulin resistance: 2,000mg.
  - Weight Loss: 3,000-4,000mg.

Taurine
- Taurine is an amino acid. It requires zinc to help it function properly.
- In an adult, taurine is a conditionally essential amino acid and is made from methionine and cysteine.
- In children, it is an essential amino acid and must be taken in.
- Taurine is required for normal brain development.
- Stress depletes the body of taurine.

Functions Of Taurine
- Lowers blood pressure.
- Boosts antioxidant defense.
- Supports immune system.
- Strengthens the heart muscle.
- Stabilizes heart rhythm.
- Prevents blood clots.
- Aids in glucose metabolism by increasing the activity of the insulin receptor.
- Improves sensitivity to insulin.
- Is a natural diuretic.
- Improves lung health.
- Protects cell membranes from damage.
- Detoxifies toxic substances.
- Needed for kidney function.
- Needed for the formation of bile acids.
- Is an inhibitory neurotransmitter.
- Helps modulate calcium movement.
- Aids wound healing.
- Stabilizes membranes.
- Improves fat metabolism in the liver.

Symptoms Of Taurine Deficiency
- Anxiety.
- Seizures.
- Hyperactivity.
- Impaired brain function.

Magnesium
- Is involved in over 300 enzymes used in the body.
- Half of the magnesium in the body is found in bones.

Functions Of Magnesium
- Growth.
- Pregnancy.
- Sleep.
- Wound healing.

- Heart function.
- Muscle relaxation.
- Nerve function.
- Skeletal muscle function.
- Steroid hormone production.
- Bone building.
- Decreases blood vessel constriction.
- Fatty acid synthesis and oxidation.
- Protein synthesis.
- Energy production.
- Removes excess ammonia.
- Improves glucose uptake by insulin.
- Aids survival post bypass surgery.
- Enhances the function of brain antioxidants.
- Prevents the production of chemicals in the body which increase inflammation.
- Acts as a natural tranquilizer.
- Is a natural anticonvulsant.
- Maintains heart rhythm.
- Increases HDL.
- Important in immune function.
- Improves muscle strength and endurance.
- Relaxes electrical impulses.

Symptoms of Magnesium Loss

- Muscle cramps.
- Muscle twitches.
- Back, neck pain/or spasm.
- TMJ pain.
- Muscle soreness.
- Chest tightness.
- Weakness.
- Decreased appetite.
- Irritability.
- Fatigue.
- Depression.
- Anxiety.
- Insomnia.
- Hyperventilation.
- Confusion.
- Memory loss.
- Chest tightness.

Causes of Magnesium Loss

- Diarrhea.
- Trauma.
- Surgery.
- Extreme athletic competition.
- Alcoholism.
- Excessive sugar intake.
- Fiber excess.
- Caffeine intake.
- Trans fatty acids.
- Phosphates in soft drinks.
- Stress.
- Digoxin use.
- Foods high in oxalic acid (almonds, cocoa, spinach, tea.
- Laxatives.
- Asthma medications (beta-agonist, epinephrine)
- Diuretics (except potassium sparing).
- Antibiotics (gentamicin, carbenicillin, amphotericin B).
- Drugs for chemotherapy (cis-platinum, vinblastine, bleomycin).
- Cyclosporine.
- Steroids.

Magnesium deficiency has been associated with:

- Seizures.
- Psychosis.
- Delirium.
- Tremors.
- MI/CV disease.
- Heart arrhythmia.
- PMS.
- Osteoporosis.
- Abnormal calcium deposits.
- Poor wound healing.
- Hypertension.
- Difficulty swallowing.
- Problem pregnancy.
- Hypoglycemia.
- Excitability.
- Aggressive behavior.
- Alcoholism.
- Anxiety.
- ADD.
- Dementia.
- Depression.
- Fatigue.
- Learning disabilities.
- Schizophrenia.
- Constipation.
- Urinary spasm.
- Photophobia.
- Cold hands and feet.
- Loud noise sensitivity.
- Numbness.
- Agoraphobia.
- Tingling.
- Palpitations.
- Salt craving.

- Carbohydrate craving.
- Endometriosis.
- Mental confusion.
- Diabetes.
- Lupus.
- Migraine headaches.
- Stress.
- Autism.
- Insomnia.
- MVP.

Magnesium

- Dosage: 600-800mg.
- Side effects: diarrhea.
- Severe toxicity: drowsiness, lethargy, weakness.

Magnesium is used in the treatment of:

- Diabetes.
- MVP.
- MI.
- Cardiac arrhythmias.
- Angina.
- CHF.
- Cardiomyopathy.
- Claudication.
- Low HDL.
- Calcium-oxalate kidney stones.
- Asthma.
- Osteoporosis.
- Migraine headaches.
- PMS.
- Urinary symptoms.
- Hypoglycemia.
- COPD.
- Pregnancy.
- HTN.
- Sickle cell disease.
- Restless leg syndrome.
- Spasms.
- CFS.

Summary

- Ideas concerning nutrients have changed over the years.
- At first they were used to prevent disease, now they are used to optimize physiological function.
- Diet, prevention, and treatment of insulin resistance and diabetes has changed as well.
- With these new tools, we can better optimize our patient's care.