Case Study Review: Treating Your Common Patient Complaints

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March, 2011
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Dr. Ron Grabowski is a practicing Doctor of Chiropractic in Houston, Texas. He has presented over 500 seminars and lectures on nutrition throughout the United States and in Europe, publishing several articles and a textbook in clinical nutrition.

Receiving his Bachelor of Science degree in Nutrition from North Dakota State University, he went on to be awarded his Doctor of Chiropractic degree from Texas Chiropractic College in Pasadena, Texas in 1989 where he became a professor and postgraduate diplomate lecturer. His dietitian experience includes tenure at some of the leading hospitals in the nation - The New York Hospital, Memorial Sloan Kettering in New York City (affiliated with Cornell Medical Center), Memorial Care System and the University of Texas M.D. Anderson Cancer Center in Houston, Texas.

Dr. Grabowski has served on the State of Texas Governor's Childhood Obesity Taskforce and is a member of the American Dietetic Association, American Chiropractic Association and the Endocrine Society. In addition to his chiropractic practice, he has developed numerous vitamin and mineral formulas for supplement companies. Professional athletes, including those of Olympic standing, seek his expertise in nutrition consultation.

His research interests include nutritional support of the athlete and the use of supplements in clinical practice for the prevention and treatment of chronic diseases such as diabetes, heart disease, arthritis, fibromyalgia and gastrointestinal disorders.
Nutrient Deficiencies Common with Diabetes Mellitus

- Magnesium
- Chromium
- Zinc
- Vitamin B12
- Vitamin D
Drug Nutrient Interaction

- Metformin (Glucophage)
- Proton Pump Inhibitors
- $H_2$ Histamine Antagonists
Serum Vitamin B12

• Approximately 50 percent of patients with subclinical disease have normal serum B\textsubscript{12} levels.  AAFP – 2003

• B12 Deficiency has been associated with Metformin administration.
B12 Absorption
Clinical Manifestations of Vitamin $\text{B}_{12}$ Deficiency

- **Hematologic**
  - Megaloblastic anemia
  - Pancytopenia (leukopenia, thrombocytopenia)

- **Neurologic**
  - Paresthesias
  - Peripheral neuropathy
  - Combined systems disease (demyelination of dorsal columns and corticospinal tract)

- **Psychiatric**
  - Irritability, personality change
  - Mild memory impairment, dementia
  - Depression
  - Psychosis

- **Cardiovascular**
  - Possible increased risk of myocardial infarction and stroke.
Type I Diabetes Mellitus and Vitamin D

• It was observed by Hypponen et al that children receiving 2000 IU vitamin D from age 1 on decreased their risk of getting type 1 diabetes by 80%.  
  
  Lancet 2001
Magnesium and Diabetes Mellitus

• Previous studies have found inverse associations between calcium and magnesium intakes and the risk of T2D. *Diabetes Care* 2006

• In 2 large epidemiologic studies, higher magnesium intake was associated with a reduced risk of type 2 diabetes. *JAMA* 1997 & *Diabetes Care* 1997

• Magnesium deficiency has been associated with type 2 diabetes and may reduce insulin sensitivity and impair glucose tolerance. *AJCN-9/2003*

• In the United States, 25–39% of diabetic outpatients have low concentrations of serum magnesium. *Endocrinol Metab Clin North Am* 1995
Zinc and Chromium

• In pancreatic islets, insulin production is linked with zinc transport mediated by zinc transporter ZnT-8, a product of the SLC30A8 gene. Therefore, altered activity of ZnT-8 is expected to be associated with impaired glucose-induced insulin response and promote progression from glucose intolerance to diabetes.

• The intestinal absorption of zinc is lower in diabetic humans than in healthy control subjects. Diabetes 1990

• Chromium is associated with the Glucose Tolerance Factor (GTF).

• Chromium may reduce myocellular lipids and enhance insulin sensitivity in subjects with type 2 diabetes mellitus who do respond clinically independent of effects on weight or hepatic glucose production.

• Synergistic vs Antagonistic
Nutrient Deficiencies Common with Thyroid Conditions

- Selenium
- Zinc
- Asparagine
- Calcium
Selenium

• Associated with the deiodinases (I and II).
  – Thyroxine (T4) is converted to T3 (triiodothyronine) by the type I and type II iodothyronine deiodinases.
  – Selenium deficiency causes a 15-20% decrease in total thyroidal iodine, T4 and T3.

AJCN-1993
Selenium as an Antioxidant

• The selenoenzymes, glutathione peroxidase and thioredoxin reductase, are crucial to the protection of the thyroid from the hydrogen peroxide that is produced there to oxidize iodide for thyroid hormone synthesis.


• Protective effects of selenium on the thyroid are confirmed by the finding that supplementation with 200 µg/d of sodium selenite or selenomethionine decreased inflammation and thyroid autoantibody concentrations in patients with autoimmune thyroiditis, although, interestingly, a dose of 100 µg selenomethionine/d was ineffective. Biofactors-2003 & J Endocrinol 2006
Zinc and the Thyroid Gland

- Protein synthesis
- Involved in T3 binding to its nuclear receptor (Miyamoto et al. 1991).
- In a zinc depletion-repletion study conducted in humans, Wada and King (1986) observed that circulating TSH, total T4 and free T4 tended to decrease during the depletion phase, returning to control levels after zinc repletion.
- Zinc deficiency can indirectly affect thyroid hormone status by decreasing energy intakes.
Asparagine

• Associated with autoimmune disorders such as;
  – Hashimoto’s
  – Rheumatoid arthritis
  – SLE
  – Grave’s disease
Nutrient Deficiencies Common with Inflammatory Bowel Disease

- Glutamine
- Vitamin D
- Vitamin K
- Vitamin A
Glutamine (GLN)

- Nutritional interventions with key nutrients such as glutamine or antioxidants improve clinical outcomes. *Crit Care Med* 2006

- Glutamine sufficiency is crucial for the colonic epithelium to mount a cell-protective, anti-apoptotic, and anti-inflammatory response against inflammatory injury. *JPEN*-2011
Vitamin D

• Activated T and B lymphocytes have VDRs. $1,25(OH)_2D$ is a very effective modulator of the immune system.

• In a variety of animal models, it has been demonstrated that pretreatment with $1,25(OH)_2D$ is effective in mitigating or preventing the onset Crohn's disease. *Trends Mol Med* 2002
Vitamin K

- Approximately 50% of vitamin K is made from the normal flora.
- Antibiotics will often lower vitamin K levels.
- Vitamin K is associated with the Gla protein, which is essential for normal skeletal integrity.
Vitamin A

- Hypovitaminosis and fat-soluble vitamin deficiency have been reported in adults with inflammatory bowel disease (IBD).
- Epithelial regeneration requires vitamin A.
- Zinc is synergistic with Vitamin A.
Nutrient Deficiencies Common with Headaches

- Vitamin B12
- Vitamin B2
- CoQ10
- Magnesium
- Pantothenate
- Vitamin D
Mitochondrial Hypothesis of Migraine Headaches

Sangiorgi et al. – 1994
- Defect of reduced NADH, citrate synthase and cytochrome –c-oxidase platelet activities.

Okada et al – 1998
- Increase in lactic and pyruvic acid levels.

Sarkela – 2001
- NO radicals can be produced in this structure.
Magnesium and Migraines

• Current evidence suggests that up to 50% of migraine patients have lowered levels of ionized magnesium during acute attacks.
• Inhibit platelet aggregation.
• Serotonin receptors are altered.
• Nitric oxide synthesis and release are affected by magnesium status.
• Reduce the inflammatory eicosanoids.
Thiamin

- May prevent and decrease neuropathy.
- May decrease acute DM nephropathy.
- Required for the synthesis of acetylcholine.
- Pyruvate dehydrogenase (B1 dependent enzyme).
- Synergistic with magnesium.
- Requirement increases with CHO intake.

Diabetes - 2003
Coenzyme Q10

• Mitochondrial Relationship
  – Proton-electron translocation in mitochondria.
  – Protects mitochondria from oxidation.
  – Plays a role in permeability transition of the inner mitochondrial membrane.
  – Lowers serum lactate and pyruvate levels.
  – > 50% reduction post 3 months

• Dosage 150 mg/day
Riboflavin

• FMN and FAD
  – Electron transport chain
  – Synergistic with NAD and NADP

• Amitriptyline
  – Increases the renal excretion of riboflavin.

(Pinto & Rivlin-1987)
Vitamin B12

• Exerts a scavenging action against nitric oxide (NO).
  – NO has been shown to inhibit respiratory chain by binding to complex I & III, and cytochrome c oxidase.

• Homocysteine
  – Homocysteic acid
    • Excitotoxin
Methylation Pathway
Vitamin D Deficiency

- Serum vitamin D level shows a strong correlation with the latitude.

- There is a significant relation between the prevalence of both tension-type headache and migraine with the latitude.

- One year prevalence for migraine was also higher at higher latitude.

- Available data indicate increased frequency of headache attacks in autumn-winter and least attacks in summer.

- The profile of headache matches with the seasonal variations of serum vitamin D levels.

- The presence of vitamin D receptor, 1alpha-hydroxylase and vitamin D-binding protein in the hypothalamus further suggest a role of vitamin D deficiency in the generation of head pain.
Case Study #1

• 20 year old female
• Initial visit: January 2, 2008
• Chief Complaint: Migraine headaches and chronic sinusitis
  – History: PMS, three to four sinus infections per year, migraines for the past four to five years, depression and anxiety.
  – Surgery: Fractured fifth digit of right hand.
  – Examination: Cheilosis, dry skin. Neurological and orthopedic examination were WNL.
• Medications: Yaz (OCA) and OTC analgesics and anti-inflammatory
• SpectraCell: Vitamin B12, Pantothenate and Vitamin D. Spectrox - 57.5%
  – Marginal Values: Riboflavin, folate, choline, serine, CoQ10 and vitamin E
Case Study # 2

- 12 year old male
- Initial visit: 6/17/2009
- Chief Complaint: Migraine Headaches & Constipation
  - PMHx: ADHD
  - Examination:
    - Neurological and Orthopedic - WNL
    - Medications: Abilify, Miralax and Ritalin
    - SpectraCell:
      - Deficiencies: Vitamin B12, Pantothenate, Oleic acid, Magnesium and Chromium.
Case Study #3

- 41 year old female
- Family History: Diabetes mellitus and Hypothyroidism
- SpectraCell: (2/2011)
  - Deficiencies: Vitamin B3, Inositol, Oleic acid, Selenium, Vitamin E.
  - Abnormal Glucose Insulin Interaction
  - Spectrox: 54%
Case Study #4

- 69 year old female
- Family History: Type II Diabetes Mellitus
- SpectraCell results: (2/23/2011)
  - Chromium
  - Zinc
  - Magnesium
  - Glucose Insulin Interaction (abnormal)
Case Study #5

• 51 y.o female
• CC: Ulcerative colitis x 4 years
• Past Medical Hx:
  – Osteopenia
  – Cervical degenerative discopathy
  – Polymyalgia rheumatica
  – Anemia
• SpectraCell (12/2006)
  – Asparagine, Carnitine, Vitamin D and Calcium
  – Marginal values: Vitamin B12, Oleic acid, Serine
  – Spectrox: 79.4
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