



MicroNutrient
Testing



Nutritional Considerations with Obesity and Bariatric Surgery

Presented by Dr. Ron Grabowski

January 25, 2010



SPECTRACELL LABORATORIES
ADVANCED CLINICAL TESTING



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STATISTICS



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- ✓ **Two-thirds (190 million) of Americans are overweight or obese.**
- ✓ **Childhood obesity has tripled in the last 30 years.**
- ✓ **In the United States it is estimated that approximately 8% of the population is in the Class 3 obesity range.**
- ✓ **Class 3 obesity is defined as a BMI of greater than 40 kg/m².**
- ✓ **Class 3 obesity is associated with premature death and an increased risk for diabetes, hypertension, hypercholesterolemia, heart disease, osteoarthritis, sleep apnea and gallbladder disease.**



OBESITY



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- ✓ Obesity is associated with chronic low-grade inflammation.
- ✓ Moderately elevated CRP concentrations have been associated with obesity.
 - Women > Men

J Clin Invest – 2005
Diabetes Care - 1999

RESEARCH



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- ✓ **Studies demonstrate that between 25% and 60% reductions in all-cause, cardiovascular, and cancer mortality are associated with significant weight loss.**

Am J Epidemiol. 1995
NEJM – 2007

CURRENT TREATMENT RECOMMENDATIONS



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- ✓ Pharmacologic agents
- ✓ Dietary modifications (low-calorie)
- ✓ Behavioral modification
- ✓ Exercise
- ✓ Surgery



DIETARY INTERVENTION



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- ✓ Statistics reveal an initial weight loss of less than 15% of the starting weight and weight reductions decrease to zero at the five years.

Ann N Y Acad Sci – 1987



MEDICATION AND BEHAVIORAL THERAPY



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- ✓ Have shown to report an average long-term weight reduction of only 4 to 7 kg.

Ann Intern Med – 2003

BMJ – 2001

CMAJ – 1999

Int J Obes Relat Metab Disord. – 1997



Bariatric Surgery



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✓ NIH Recommendations

BMI of greater than 40 kg/m².

BMI greater than 35 kg/m² with additional serious medical problems.

✓ Types

Roux-en-Y gastric bypass (RYGBP)

Laparoscopic adjustable gastric banding

✓ Statistic

10-fold increase in bariatric surgeries during the past decade.

AJM – 10/2008



BARIATRIC SURGERY AND NUTRITIONAL CONSIDERATIONS



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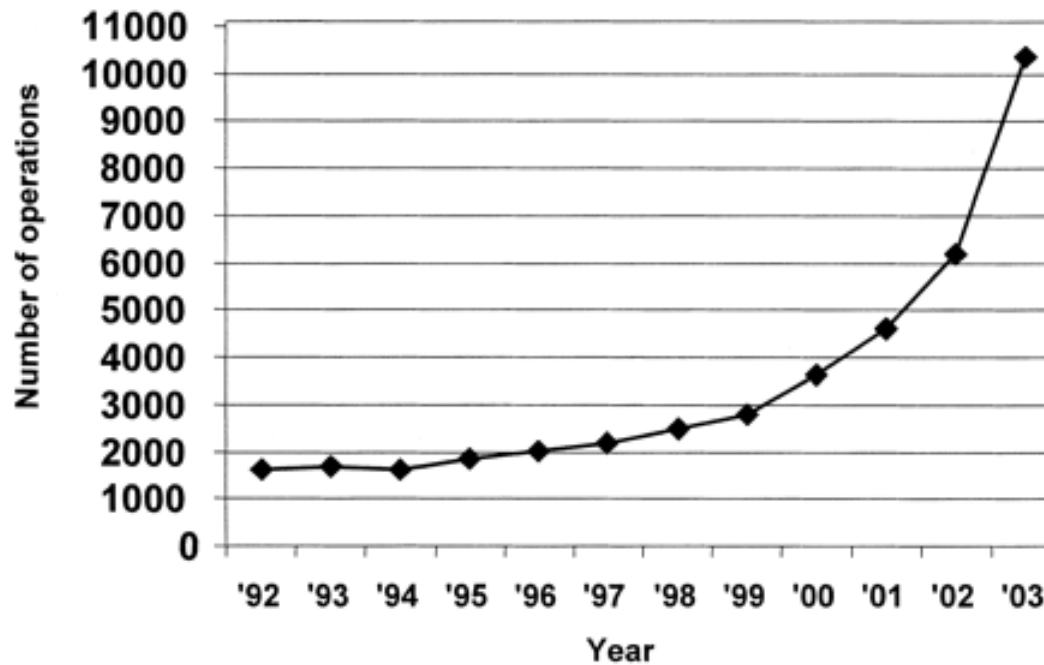
- ✓ Malabsorption
 - Macronutrient considerations
 - Micronutrient considerations
- ✓ Diagnostics for Nutritional Status
 - Plasma or Serum
 - Intracellular (Functional)

WEIGHT LOSS SURGERY



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Increased U.S. Demand for WLS*



NUTRITIONAL DEFICIENCIES FOLLOWING BARIATRIC SURGERY



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- ✓ Protein
- ✓ Iron
- ✓ Vitamin B12
- ✓ Folate
- ✓ Calcium
- ✓ Vitamin A
- ✓ Vitamin D
- ✓ Vitamin E
- ✓ Vitamin K

Obes Surg. (2/2005)

ROUX-EN-Y GASTRIC BYPASS



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493 PATIENTS (318—1 yr. follow up & 141—2 yr. Follow up)

Nutrient Deficiencies

- ✓ Vitamin A deficiency – 11%
- ✓ Vitamin C – 34.6%
- ✓ Vitamin D – 7%
- ✓ Vitamin B1 – 18.3%
- ✓ Vitamin B2 – 13.6%
- ✓ Vitamin B6 – 17.6%
- ✓ Vitamin B12 – 3.6%

Am Surg – Dec 2006



INCIDENCE OF NUTRITIONAL DEFICIENCIES



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RYGBP Surgery:

- ✓ Vitamin B12 – 10-50%
- ✓ Iron – 10-50%
- ✓ Folic acid – 0-40%
- ✓ Vitamin D – 80% (pre and post-surgery)
 - Secondary hyperparathyroidism

Curr Opin Clin Metab Care – 2006

Am Fam Physician - 2003



GENDER & ETHNICITY



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- ✓ African American patients had higher number of deficiencies than white patients.
 - 1 year – Vitamins A, D, B1
 - 2 year – Vitamins B1 and B6
- ✓ Women had higher number of deficiencies than men.
 - 1 year – Vitamin C

Am Surg – Dec 2006



MORBID OBESITY & NUTRITIONAL STATUS



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**Are we addressing all of the deficiencies or
just the most common?**



VITAMIN D & OBESITY



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- ✓ The most common vitamin deficiency associated with obesity.
- ✓ Deficiency has been associated with increased risk of such diseases as diabetes, cardiovascular disease, depression, osteoporosis and cancers.
- ✓ Secondary hyperparathyroidism are known to be prevalent in obesity.

Diabetes Care-2004

Arch Intern Med – 2007

Curr Opin Clin Nutr Metab Care – 2007



VITAMIN D DEFICIENCY



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- ✓ Diabetes mellitus
- ✓ Hypertension
- ✓ Cardiovascular disease
- ✓ Common Cancers
- ✓ Infectious diseases
- ✓ Autoimmune diseases

AJCN – 4/2008



VITAMIN D LABORATORY VALUES



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Deficiency – 25 (OH) D <50 nmol/L or 20 ng/mL

Insufficiency - 51-74 nmol/L or 21-29 ng/mL.

Sufficient - > 30 ng/mL.

Intestinal calcium absorption is maximized – 80 nmol/L or 32 ng/mL.

Intoxication - >375 nmol/L or 150 ng/mL.

NEJM – 2007 and J Am Coll Nutr - 2003



VITAMIN B6 & OBESITY



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✓ Deficiency associated with:

- Depression
- Stroke
- Colorectal neoplasia

✓ Alkaline phosphatase (ALP) hydrolyzes pyridoxal-5'-phosphate and is a major determinant of vitamin B6 concentrations.

✓ Elevated concentrations of ALP have also been reported in obese patients.

Curr Opin Clin Nutr Metab Care – 2001
Am J Clin Pathol - 2006



VITAMIN C & OBESITY



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Deficiency associated with;

- ✓ All-cause mortality
- ✓ Myocardial infarction
- ✓ Gallbladder disease

Lancet – 2001

Arch Intern Med - 2000

Low plasma levels have been related to a central fat distribution independent of BMI.

AJCN-2005



C-REACTIVE PROTEIN & NUTRITIONAL STATUS



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Patients with moderately elevated CRP concentrations had significantly lower mean concentrations of vitamin A, B-6, and C than did patients with lower CRP concentrations.

AJCN – 2/2008



SYSTEMIC INFLAMMATION



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Associated with reduced levels of:

- Vitamin A
- Riboflavin (B2)
- Pyridoxine (B6)
- Vitamin C
- Transport proteins (albumin)
- Turnover of antioxidants



NUTRITIONAL SUPPLEMENTATION



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- ✓ **Standard Multivitamin supplementation is not sufficient to prevent nutritional deficiencies after RYGBP.**
- ✓ **Approximately 60% of patients following RYGBP required one or more nutritional supplements 6 months post surgery and all patients needing them after 2 years.**
- ✓ **The prevalence of vitamin D and calcium deficiency increases significantly with the length of the RYGBP.**

AJCN – 5/2008



CASE #1 STUDY



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44 year old female

Gastric banding procedure

Chief Complaints:

- Muscle weakness, myalgia, fatigue and allergies

SpectraCell Results: (12/22/06)

- **Deficient:** Glutathione, Oleic acid and fructose sensitivity.
- **Marginal:** B12, Pantothenate, Asparagine, Vitamin D, Calcium, Zinc, Magnesium



CASE STUDY#2



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46 year old female

Gastric banding procedure

Chief Complaints:

- Alopecia, fatigue and muscle cramps

SpectraCell Results: 11/04/2009

- **Deficient:** B2, Asparagine, Oleic acid, Vitamin K2 and Spectrox – 65%.
- **Marginal:** Biotin and Chromium

CASE STUDY #3



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45 year old female

RYGBP – 2000

Chief Complaints:

Fatigue, muscle spasms and headaches.

PMHx: Hypothyroidism, Depression, Fibromyalgia.

**Medications: Zyrtec, Levoxyl, Ambien, Cymbalta, Wellbutrin, Klonopin,
Lovaza**

SpectraCell:12/22/2009

- **Deficient:** Vitamin D, Vitamin E, Vitamin K2 and Spectrox- 48.0%.
- **Marginal:** B6, Serine, Pantothenate, Fructose, Cysteine and Vitamin C.





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Thank you for attending the webinar.
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