WINTER EDITION, 2007/2008

Nutrition Update:
Reminder for all: **10 Easy Steps to Success:**

1. Drink your water
2. Pay attention to protein intake (=Energy) 60-80grams/day)
3. Daily multivitamin-Over the counter prenatal
4. 1000-2400 mgm Calcium Citrate/day spread throughout the day, not all at once! This means two pills 2-4 times per day.
5. Iron for any female and any iron deficient male.
6. Daily probiotic of your choice (tame the gas monster!)
7. ADEKS's daily (dry source of maintenance dose)
8. Annual labs to look for any deficiencies
9. Annual follow-up with your bariatric surgical team!
10. Healthy Happy lifestyle for life

SPRING-SUMMER EDITION, 2007

Vitamin D:

Vitamin D …The Silent Epidemic
Studies are showing that in some bariatric practices (1), there is already a 60% vitamin D depletion in the preop population. The African American population has a 91% vitamin D depletion.

What is vitamin D?
Vitamin D is actually a hormone with receptors in most if not all cells in the body. It affects: cell growth and cell proliferation. Vitamin D is manufactured in our skin from a reaction with ultraviolet light from the sun. Being "fatty" in nature, dietary forms of vitamin D are absorbed together with fats from food in the jejunum and ileum. Vitamin D acts upon the digestive system directly by making it more permeable to calcium, meaning helping calcium to be absorbed more easily. It also regulates blood calcium levels and deposits calcium in bones.

Vitamin D specializes in how the body affects:

- Bone health
- Muscle function
- Improves balance and muscle performance
- Plays a role in insulin release
- Inhibits cancer (reduces tumor growth in rats)
- Is a regulatory function in the immune system.
- Helps prevent periodontal disease

How do we get vitamin D? Mostly through sunshine. It has been said that if you live higher than the longitude of Los Angeles, CA or Atlanta, GA, that you do not get enough vitamin D from the sun. Sunblock and melanin also can prevent vitamin D absorbtion from the sun. Obesity in itself will prevent absorption through adipose tissue. As a BMI is higher, more deficiency in vitamin D is shown. As we age we absorb less vitamin D. People of darker skin will absorb less ultra violet ray.

Food Sources: The only food that has natural vitamin D is fish, fatty fish such as salmon and mackerel. Food like milk, orange juice, yogurt, breakfast cereals and butter spreads may be fortified with vitamin D. Lactaid milk and non-fat milk are fortified with water soluble vitamin D. The 3rd source of vitamin D is supplements.

Vitamin D 2-Egrocalciuferol, most common commercial form because it is readily prepared from plant materials but it is only 20% as effective. Prescriptions written by medical personnel are for vitamin D 2.
Vit D 3- cholecalciferol, most potent form. It comes from animals and humans cholesterol. Being fatty in nature, we must make sure our patients take a dry or "water" soluble form, as they are malabsorbing fat. This is true with RNY as well.

There is a complex interaction between D3 and PTH (parathyroid hormone). When both hormones are adequate, they work together to stimulate bone synthesis. A low D causes an increase of PTH which then stimulates a "pathway" by which more bone is broken down and lost, sometimes through urine causing kidney stones.(2) Primary care physicians often recognize this as too much calcium on board, when actually our patients may need more calcium and more Vit D.

Treatment of Vit D deficiency and maintenance:

- Most labs lower limit of 32 is too low. Less than 40 will be treated by PacLap
- PTH is often elevated
- Alkaline phosphatase is elevated
- Phosphorus-low

Per Your Labs & PacLap's recommendations:

- 50,000 IU's D3 (water soluble) weekly to daily.
- Calcium citrate 1000-2400 mg daily
- Bone Density Scan if have PTH above 70.

While weight loss surgery can provide enormous health benefits, they are not a good trade off for a broken hip. We should understand the importance of getting enough vitamin D from sun, food and **supplements**. Regular follow-up and annual labs should help to reduce incidence of deficiency.

■(1)Carlin A. Prevalence of vitamin D depletion among morbidly obese patients seeking gastric bypass surgery. SOARD 2006 98-103

■(2) Jacques J. Vitamin D. Beyond Change.Dec 2006
■(3)Liebman B. Are you D deficient? Nutrition Action. Nov 2006
■(4) Institute of Medicine, Food and Nutrition Board
■*(5) Journal of Nutrition* 2007 137: 447-452
Title: *"High Prevalence of Vitamin D Insufficiency in Black and White Pregnant Women Residing in the Northern United States and Their Neonates."*
Author: Bodnar, Lisa M. et al.

SUMMER EDITION, 2006

Vitamin D Deficiency Before Bariatric Surgery

Pre-surgery blood tests done at one bariatric program showed over 50% of pre-op patients are mildly to severely deficient in vitamin D. A deficiency is now considered a blood level of 20 or less. When vitamin D levels are insufficient, calcium absorption is decreased which may lead to osteopenia and/or osteopororsis. Low vitamin D levels can also lead to hyperparathyroidism, a condition that occurs when the parathyroid gland produces too much parathyroid hormone. Hyperparathyroidism can cause fatigue, disorientation, and depression as well as bone loss and kidney stones.

A study done by the Journal of Clinical Nutrition (2000) examined the link between obesity and vitamin D deficiency. The study found a greater than 50% decrease in bioavailablity of vitamin D from sunlight in obese subjects. Because vitamin D is a fat-soluble vitamin, it is deposited in fat stores and is no longer available for use by the body. By decreasing fat stores, the vit D becomes more available for the body to use. Another cause of low serum vitamin D is a high or low level of vitamin A. The best test for diagnosing vitamin D deficiency is serum vitamin D 25 hydroxy.

Vit D deficiency is becoming a national problem. Fewer people, especially children, drink vitamin D fortified milk and are not going outside much. One study found that 55% of obese youth and 445 of non-obese youth had a vitamin D deficiency. People with dark skin are also at a much high risk as it may take five to ten times the exposure to sunlight to obtain enough vit D from the sun.

Rec Levels: Serum level of 32, some scientist's re serum level of 52. Experts recommend one MVI containing 400 IU's daily, plus a vit D supplement containing 400=1,000 IU's daily. The best type of vit D supplements is one containing D3. Bariatric patients should use a water-soluble form (dry vit D) if they are experiencing fat malabsorption from surgery since vit D needs fat to be absorbed. Good food sources of vit D are: fortified milk, fish, eggs, and cold liver oil.

It is important for all patients to be assed for vit D, parathyroid, (PTH) and vit A status before surgery,as it is normally correctable.

Sally Myers, RD CPT (Beyond Change June 2006)

SPRING EDITION, 2004

A patient who had Lap DS surgery 3/2000 wrote in about the difficulty of timing her calcium and iron supplemets. The following summary of the interchange:

Dear Pac-Lap:
I am trying to take 2400+mg. calcium and 300 mg Nu-Iron/day. My understanding is that no more than 500 mg of calcium can be absorbed in a 4-hr. period, and that iron must be taken 2 hrs. outside of calcium intake.

I start with 150mg. Nu-Iron; then I take the calcium 4x starting 2 hrs later: two 315 mg calcium citrate at 4-hr. intervals, followed by 150mg. Nu-iron 2 hours after last calcium dose. That's a 16 hr. time window, and I am having trouble getting the last iron dose in because often I am crashed out by then.

So I was thinking, maybe I can take calcium THREE times a day (3 pills for 945mg. total) instead of four. After all, I'm not going to absorb the whole 630-mg dose anyway; that's why I have to take 4200 mg., to compensate for the malabsorption. Right?.....
I am trying very hard to be compliant but it is difficult and frustrating given the lack if specificity in the advice…. I am looking at two options:
(1) taking 630 mg. calcium 4 times per day as I have been; or
(2) changing to 945 mg. calcium 3 times per day.

Response from Dr. Rabkin

Dear Patient:

In general, absorption of any nutrients is influenced by diet, particularly by the type of and concentration of other nutrients competing simultaneously to be absorbed. As you correctly point out, Calcium and Iron interfere with each other, so there is no single number to quantify the exact percentage of absorption. Annual labs are the best way to indentify what, if any vitamins and minerals are inadequately being supplied to your system.

Your question addresses how to schedule taking calcium and iron so that they least interfere with each other's absorption. The theory is that if you take them both together, the amount absorbed of each will be reduced. However in practice we look to over-supply the intestine and get enough of each elements absorbed by increasing the dose. That having been said, a high priority is to avoid having your life revolve around taking pills (unless there were no alternative).

So it comes down to finding a schedule that is comfortable for you and thereafter checking your labwork in 3 to 6 months to confirm that the schedule you have settled upon is doing an adequate job of supplying the nutrients you need. It's unfortunately a trial and error process, for most

people who have undergone the DS, the time for taking or amount to be taken of multi-vitamins, calcium and iron is not overly critical and our general recommendation suffice to maintain their lab values in a satisfactory range.

My advice therefore is to settle on a regimen for the next three months and then re-check your CBC, Iron, Calcium, and PTH at that time. I am assuming your Vitamin D is ok since at this moment I don't have your lab report to review. Over time you may even be able to reduce the amount of calcium citrate you take, depending on your labs improving into normal range. Bone density scans change slowly and a repeat would not be helpful in such short time frame. Hope this helps to resolve your questions,

John M. Rabkin, MD, FACS

WINTER EDITION, 2003

Vitamins

The exact role of **vitamin E** in metabolism is poorly understood. Its major function appears to be a "non-specific chain breaking antioxidant that prevents the development of free-radical reactions" (Institute of Medicine, 200). Antioxidants are thought helpful in boosting the immune responses. Some signs cited of vitamin E deficiency are retinal degeneration, peripheral neuropathy, ataxia, loss of vibratory sense, and in-coordination of limbs. The precise rate of vitamin E absorption is not known. Absorption is dependent on digestive enzymes. High intake of vitamin E can interfere with the functions of other fat-soluble vitamins. It may interfere with the function of Coumadin/Warfarin and decrease the absorption of vitamin K. Currently, there is no simple test for vitamin E deficiency. The greatest abundance of vitamin E in food sources is in vegetable oils such as sunflower, soy, safflower, olive, cottonseed, canola, and wheat germ.

Vitamin K is known to be involved with the blood coagulation system and also bone metabolism. We do know it is found in plants and absorbed in the jejunum and ileum. Digestive enzymes are helpful for absorption. Patients who have fat malabsorption as a result of surgery, or those on continued antibiotic therapy, (and/or oral anticoagulants drugs) may become vitamin K deficient. Pro Time is the test we use to identify Vitamin K deficiency.

More is not always better and as time goes on we will have more long-term studies available on what happens with mega doses of different nutrients. Our office policy is to **not** recommend you take a water-soluble form of Vitamin A, D, E and K **unless** a low Vitamin level is identified on our routine annual blood studies.

REMEMBER TO READ LABELS ON ALL VITAMIN BOTTLES AND LOOK AT HOW MANY SUPPLEMENTS ARE TO BE TAKEN FOR REQUIRED DOSE!

WINTER EDITION, 2003

Vitamin Efficacy/Cost Compare

Below is a condensed version on a Comparative Vitamin Study presented at the ASBS in Orlando, Florida, 1998, by Barbara Metcalf RN

Preliminary Study on availability, brands and costs of vitamins. Lab values tested were: Vit A, Vit B6, Vit B12, Vit D 25, Folate, Copper, Magnesium and Zinc. Patients ranged in ages: 27-64, and were anywhere from 2-5 years post op. Categories studied were:

#1 Pre-natals (Niferex Prenatal), #2 general multi's (Theragram M, Centrum, Costco, Multigenics, Children's Chewables andBody Wise) and #3 Non-compliant patients were taking general "multi" and 4 patients admitted to not being compliant.

Results: There was no significant difference between pre-natal vitamins and the general multi-vitamins. There were more vitamin B deficiencies in the general multi-vits category, and more Zinc deficiencies in the pre-natal category. There was also more vitamin D deficiency in the pre-natal group and showed that longer follow up was needed to show effect on non-compliance.

REMEMBER……..

Vitamins are either fat soluble or water soluble, Vitamin ADE& K are "fat soluble"……. Remember with the Duodenal Switch you are malabsorbing "fat" and more attention may be needed to these vitamins. If you are low in any of these vitamins, you must take a "water soluble" form…. That is available through specific brands such as: Twin Labs "Allergy A&D," "ADEK's", Aquasol, or ask your pharmacist for specific water soluble brand. Vitamin D can be easily absorbed through a few minutes of sunshine everyday. Yes, we can surprisingly find vitamin D deficiencies in our preoperative patients. We know for adequate Calcium absorption, vitamin D necessary. 1800-2400 mg/day Calcium citrate is recommended for our postoperative patients spread throughout the day. Yes, Iron can bind with Calcium and prevent some absorption, but it would be better taken with iron than not at all. Patients that have had Roux N Y gastric bypass must take vitamin B12. Some bariatric practices are reporting preop low Protein levels on preoperative patients. We need protein to cell tissue repair and the healing process to fight infection. Low Copper levels can mean that patients are drinking bottled water and missing the copper we often get in tap water. Dieticians tell us that it takes months to get low in vitamins, but years to build back up. Vitamin A & vitamin B6 can have toxic level as well.

- All postoperative patients must take a daily multivitamin, 1000-2400 mg Calcium Citrate and Iron if a female. (B12 if a RNY patient)

- All postoperative patients must have annual labs drawn and an evaluation will be mailed to you from the office or discussed at your office visit. (If you don't receive our office evaluation –we don't have your labs!)
- Bone- Density scans are recommended for our patients 45 and over or with an elevated PTH level. Some bariatric practices are reporting osteopenia and osteoporosis in pre-op patients! Annual Lab Forms may be downloaded from our website or mailed to you.

SUMMER/FALL EDITION, 2003

Nutritional Markers Following Duodenal Switch Procedure
Robert A, Rabkin, MD, John M. Rabkin, MD, Pacific Laparoscopy, San Francisco, CA

Background: Laparoscopic Duodenal Switch Procedure (LapDS) combines moderate malabsorption and moderate restriction. CBC and chemistries are obtained at routine intervals.

Methods: Data were collected from 345 sequential LapDS patients operated on over 26 months. Parameters related to iron and calcium metabolism and to hepatic function were combined pre-operatively, at one year and at two years.

Results: Hemoglobinsm iron, calcium, albumin, and total protein levels were decreased but remained with the reference range. Changes in iron were not significant ($p=0.08$) and all patients below the normal range were menstruating women. Parathormone was increased above the reference range. Alkaline phosphatase remained within the normal range and there was no significant change in values for aspartate aminotransferase, alanine transaminase, and bilirubin.

Conclusion: In contrast to pure malasorptive procedures, Lap DS is not associated with significant nutritional deficiencies. Exceptions are risk of iron deficiency for menstruating women and reduced calcium absorption in the presence of elevated Parathormone levels, indicating the importance of iron and calcium supplementation in selected patients. Improvements in hepatic chemistries were not statistically significant.

SUMMER/FALL EDITION, 2003

VITAMINS A AND D

There are 4 fat-soluble vitamins including A, D, E and K. This edition will focus on Vitamin A and D. Next edition will look AT Vitamin E and K. Fat is needed to absorb fat-soluble vitamins and fat malabsorption can cause deficiencies of these important nutrients. Vitamins are important for maintaining health and preventing disease.
Due to the altered anatomy and a low calorie post-operative diet, no one really knows what the RDA (recommended daily amounts for an obesity surgery is. We do see vitamins deficiencies prior to surgery and this is probably due to poor eating habits. All our patients have a pre-

operative baseline blood panel, which includes vitamins, and minerals that need to be monitored annually.

Vitamin A is a fat-soluble vitamin also known as retinol (fat-soluble animal source) and beta carotene (water soluble plant source). It has 3 primary functions: to provided growth and development, to improve and maintain normal vision, and to fight against infection and boost immunity. 90% of vitamin A is stored in the liver so the body can meet needs when intake is low for a short period of time. Deficiency of vitamin A can cause anemia, which is correctable by supplementing vitamin A, iron or both. Possible symptoms of deficiency could include night blindness, skin type eczema, weight loss, poor bone growth and diarrhea. Toxicity is rare, but if taken in excess, you could experience headaches, hair loss, and have anorexia. Common food sources of vitamin A: cod liver oil, beef, liver, eggs, any dark green red or orange vegetable like sweet potatoes, pumpkins, broccoli, and apricots. Alcohol can decrease vitamin A stores. Vitamin
A levels can decrease transiently after an operation but return to normal after recovery and supplementation. Vitamin A can be lost during cooking as well. The recommendation for bariatric patients with fat malabsorption is 10,000 IU of water-soluble form of Vitamin A such as Aquasol. Some patients maybe low in Vitamin A and high in Vitamin D so taking these vitamins separately maybe necessary. Vitamin D can be toxic. Toxicity of vitamin A can cause birth defects, liver problems, and possibly contribute to osteoporosis. This still needs to be clarified with more studies. Toxicity usually starts occurring with 30,000 IU's but could occur with less depending on the individual. Manufacturers are not complying to the recommendation by the National Academy of Science to supply 80% vitamin A in a supplement being beta-carotene and not retinol to avoid issue. Vitamin A is a correctable deficiency.

Vitamin D is often referred to as the sunshine vitamin because it is photosynthesized through skin. Two major forms of vitamin D used by the human body are D2 and D3. These substances are metabolized to become the active form of vitamin D which is 1,25-dihydroxyvitamin D. Vitamin D functions like steroid hormone. The primary function of vitamin D in the intestine is increased absorption of calcium and phosphorus, which is absorbed, mainly in the duodenum and jejunum. The body uses vitamin D to help shuttle calcium across the intestinal wall into the blood. About 50% of dietary vitamin D is absorbed (remember our patients are not absorbing this much). The largest amount is absorbed in the distal small intestine. Natural exposure to sunlight maintains adequate levels for most of the world population. This can be obtained by ten minutes of summer sun exposure daily on the face and hands. No vitamin D is obtained from sun exposure during the winter months in latitudes above or below 40 degrees North or South. Remember sunscreen also decrease Vitamin D absorption. Conditions that can cause malabsorption of vitamin D include but are not limited to fat-malabsorptive surgeries like distal gastric bypass, biliopancreatic diversion, **duodenal switch**, low iron, level, steroid use, disorders of the liver, Parathyroid glands, or kidneys, lack of exposure to sunlight, and anti-seizure medication. Vitamin D toxicity is most likely due to use of dietary supplements. The lowest safe level of intake is unclear. Signs of toxicity are high calcium with possible calcification of heart, kidney, lungs, hypertension, anorexia, nausea, weakness and kidney disease. Deficiency in adults leads to osteoporosis. "Higher vitamin D intake substantially improves calcium absorption," according to Creighton University where a recent study was done on osteoporosis research. Another recent study, was in England and published in March 2003, showed that researchers

found that people between the ages of 65 and 85 who took vitamin D supplements suffered 22% fewer bone fractures than those who didn't. Makers of low vitamin D are low-normal serum calcium with a low-normal phosphorus and an elevated serum PTH. These markers along with bone mineral density tests are considered to be the most valuable indicators of vitamin D status. We recommend all of our patients have a baseline bone density test done at age 45. Best sources of vitamin Din the diet are milk, fish liver oil, fatty fish, and fortifies margarine and cereals. Adequate intake for men and women age 19-50, pregnancy, and lactation is 200 IU daily. Ages 51-70: 400IU. Ages 71 and over: 600IU. Something that always needs to be considered is as our patients reach the age of 65 and older, their nutrients needs will increase with the decreased ability of cells to absorb nutrients.

Sally Myers, RD CPT
Leslie Patterson-Jaroch, MS,RD,LD,CNSD
Beyond Change

Next month: Vitamin E and K

REMEMBER TO READ LABELS ON ALL, VITAMIN BOTTLES AND LOOK AT HOW MANY SUPPLEMENTS ARE TO BE TAKEN FOR REQUIRED DOSE!

The Role of Vitamins and Minerals 2003

We strongly encourage you to take your daily multivitamin/mineral supplement, but have you ever thought about why? Sure, your body id unable to completely break down all vitamins and minerals in food, therefore you supplement. Yeah, they are good got you. Did you ever wonder just why? Here is a brief of what vitamins and minerals fo for your body:

Vitamin A: Promotes good eyesight and helps keep the skin and mucous membranes resistant to infection.

Vitamin B1 (thiamine): prevents beriberi. Essential to carbohydrate metabolism and health of nervous system.

Vitamin B2 (**riboflavin):** Protects the skin, mouth, eyes, eyelids, and mucous, membranes. Essential to protein and energy metabolism.

Vitamin B6 (pyridoxine): Important in the regulation of the central nervous system and in protein metabolism. If too high can potentially cause nerve pain.

Vitamin B12 (cobalamin): Needed to form red blood cells and is essential to the health of the nervous system.

Niacin: Maintain health of skin, tongue, digestive system.

Folic Acid (folate): Required for normal blood cell formation, growth, and reproduction and for important chemical reactions in body cells.

Vitamin C (ascorbic acid): Maintains collagen, a protein necessary for the formation of skin, ligaments and bones. It helps heal wounds and mend fractures and aids in resting some types of viral and bacterial infections. If taken with iron, can help iron absorbtion.

Vitamin D: Important for bone development, bone strength, and the immune system.

Vitamin E (tocopherol): Helps protect red blood cells and is important for wound healing.

Vitamin K1: Necessary for the formation of prothrombin, which helps blood clot. Also made by intestinal bacteria.

Calcium: works with phosphorous in building and maintaining bones and teeth and is critical in the cellular processes in our muscles.

Phosphorus: Performs more functions than any other mineral and plays a part in nearly every chemical reaction in the body.

Iron: necessary for the formation of myoglobin, which is a reservoir of oxygen for muscle tissues, and hemoglobin.Which transports oxygen in the blood.