Nutrition News

Presented by:
Betsy Reynolds, RDH, MS

Presenter Disclosures for Betsy Reynolds, RDH, MS
Acts as a Key Opinion Leader for Philips/Discus

- In that capacity, she receives educational grant funding for presentation development
- She is not an employee of either company and has no vested interest in sales of any product manufactured or distributed by Philips/Discus

Ms. Reynolds has received financial reimbursement from Parkell, Inc. for authoring a CE article available at: www.parkell.dentalaegis.com and financial support to assist with presentation expenditures
She also received financial support for a recent presentation at the American Dental Association Annual Meeting from GC America

In Canada, it is estimated that more than 13% of total daily calories consumed come from added sugars—this estimate is conservative as it does not include sugars from fruit juice, honey etc.
Sugar-loaded beverages are the single greatest contributor of sugar in the Canadian diet–one can of soda contains 40 grams, or 10 teaspoons of sugar or 85% of an adult's added sugar intake limit for the day
Excess sugar consumption is associated with adverse health effects including heart disease, stroke, obesity, diabetes, high blood cholesterol, cancer and dental caries
Individuals who consume greater than or equal to 10% but less than 25% of total energy (calories) from added sugar have a 30% higher risk of death from heart disease or stroke when compared to those who consume less than 10%—for those who consume 25% or more of calories from added sugar, the risk is nearly tripled
On average, adult Canadians consume about 3,400 mg—roughly 1 ½ teaspoons—of sodium per day
This is significantly above the level recommended as the upper tolerable limit for health—which is 2,300 mg per day (approximately 1 teaspoon)
Most of the sodium Canadians consume (77%) comes from processed foods sold in grocery stores and food service outlets—only about 11% is added during preparation or at the table with the remainder occurring naturally in foods
Excess sodium consumption increases the risk of high blood pressure, heart disease and stroke
60% of adult Canadians (12 years or older) do not consume five or more servings of vegetables and fruit each day
Insufficient consumption of vegetables and fruit is one of the major risk factors of heart disease and stroke
Eating the recommended five or more servings of vegetables and fruit a day can reduce the risk of heart disease and stroke by about 20%
Eating 4 or more servings of vegetables and fruit daily can add more than two years to life expectancy--
Source: Heart & Stroke Foundation

Time to Review Our ABC's (and their fellow vitamins)

In 1911, Polish scientist Casimir Funk theorized that diseases such as beriberi and scurvy were caused by a lack of substances he dubbed 'vital amines'—shortened to 'vitamins'
He was the first to prove that these illnesses were not caused by exterior factors but were simply caused by dietary deficiencies

Fat versus Water Soluble Vitamins

Fat Soluble:

- A, D, E, and K

Water Soluble:

- B's and C

Vitamin A

Vitamin A, commonly known as retinol, is a group of fat-soluble vitamins that play crucial roles in the smooth operation of many life-sustaining processes

Vitamin A promotes good vision—especially important for seeing in the dark or in poorly lit areas—one of the first and most common signs of a vitamin A deficiency is night blindness and vision loss--Source: MedlinePlus

Without vitamin A, it is not possible to distinguish a wide array of colors

Vitamin A may even help prevent certain eye diseases that cause severe vision loss among young people--Source: All About Vision

Vitamin A is an antioxidant—it helps fight free radicals that cause potential eye infections--Source: All About Vision

Vitamin A also protects the mucus membranes that covering the eyes—which acts to decrease the risk of infection by acting as a barrier to viruses and bacteria

Vitamin A drops have demonstrated positive impact on dry eye syndrome—according to All About Vison, eye drops formulated with vitamin A are just as effective at treating dry eyes as expensive prescription eye drops

Vitamin A drops can also help treat certain types of eye inflammation and ongoing research is being conducted to determine the effectiveness of vitamin A to treat conditions such as retinitis pigmentosa, peripheral vision loss, Stargardt's disease and other conditions

Besides ensuring healthy vision, this nutrient is also required for bone growth, cell division, and cell differentiation

The team says their findings also suggest a synthetic form of vitamin A may have the potential to reverse type 2 diabetes—something they plan to address in future research

Vitamin A has been called an 'anti-infective agent' for its role in fending off infections and illnesses—this nutrient enhances immune function by aiding in the production lymphocytes and other white blood cells

Vitamin A targets the body's epithelial tissues—helping these tissues grow and repair themselves

Vitamin A plays important roles in repair of epithelium and other tissues, protein synthesis, cholesterol regulation and maintenance of healthy gingiva

Dietary Vitamin A is classified as being either plant- or animal-derived

Animal Sources:

- In animal foods, vitamin A is found as retinol—one of the most important forms of vitamin A—which is usually converted into retinal and retinoic acid
- Some important sources include beef, chicken, eggs, fish, cheese and seafoods

Plant Sources:

- In plants, vitamin A is found as provitamin A carotenoids—some important carotenoids are carotene (alpha and beta carotene) and cryptoxanthin

Humans get their carotenoid fix from apricots, cantaloupes, mangos, oranges, apples, watermelons, plums, blackberries, peaches, kiwis and several other fruit sources

Among the vegetables, carrot, pumpkin, broccoli, peas, **spinach**, sweet potato, turnip, tomatoes, wheat germ, escarole, collards, dandelion greens, and mustard greens are all rich sources of vitamin A

Spinach improves eyesight!

- A Harvard study found that people who consumed the highest levels of the carotenoids lutein and zeaxanthin (found in leafy green vegetables like spinach) had a 40% lower likelihood of advanced age-related macular degeneration than those that ate the very lowest amounts--Source: Juan Wu MS; Harvard T.H. Chan School of Public Health; lead author; results appearing in JAMA Opthalmology; as reported in BottomLine; 15 Mar 2016

KEY: Cooking and storing of these fruits and vegetables may result in substantial loss of vitamin A

- While cooking vegetables, it should be kept in mind that steamed or baked vegetables are more likely to retain the essential vitamins than the fried ones
  It is very important to cover them while storing in refrigerators

Headliners: Could vitamin A deficiency be a cause of type 2 diabetes?; As reported by Honor Whiteman for MNT (Mediacl News Today); posted 19 JAN 2015; accessed 5 APR 2016 at: http://www.medicalnewstoday.com/articles/288199.php

A study published in The Journal of Biological Chemistry claimed to have identified a potential driver of type 2 diabetes: vitamin A deficiency

According to the researchers, vitamin A boosts beta cell activity—meaning lack of the vitamin may play a role in the development of type 2 diabetes --Source: Dr. Lorraine Gudas; senior author; chairman; Department of Pharmacology; Weill Cornell

'How the removal of vitamin A causes the death of the beta cells that make insulin in the pancreas is an important question we want to answer. These beta cells in the pancreas are exquisitely sensitive to the dietary removal of vitamin A. No one has found that before. Our study sets the platform to take these studies further into preclinical and clinical settings.'--Source: Gudas et at

Meet the B's

The vitamin B family contains EIGHT vitamins and four related substances that work closely with each other

The Numbers Game:

- The first B vitamin to be discovered was called 'water soluble B'—but then riboflavin was discovered so 'water soluble B' became 'B1' and riboflavin was given the 'B2' label
- Everything was just dandy until 1926—researchers discovered that B1 was actually TWO vitamins—thiamin and niacin
- Because riboflavin already was dubbed 'B2', thiamin kept the 'B1' designation and niacin became 'B3'
- As vitamin research continued, scientists found a number of substances that they thought were new B vitamins—their errors are what make up the 'phantom B's' or missing numbers in the B vitamin lineage
- With all of this confusion, it is easy to understand why most professionals prefer to use the B vitamin NAMES versus the numbers

Vitamin B1: Thiamin(e)

Thiamine's main job is to aid in converting carbohydrates into energy and heat the body can use

Thiamine is also VERY important in keeping the brain and nervous system up and running—without this B vitamin, glucose absorption in neural tissue falls by 50%!

Thiamine is essential for cardiac health as well—it keeps the heart beating strongly, evenly and regularly

Thiamine is also needed for normal functioning of the nervous system—'stress formulations' of vitamins often contain thiamin

Common Sources of Thiamine:

- Brown rice
- Most nuts
- Meats (beef, poultry, pork)
- Beans
- Enriched flour, breads, pasta and breakfast cereals
- Raisins
- Potatoes
- Oranges

Most people do not need to take a thiamine supplement—minimum daily requirements are low and, even though thiamin is not stored, dietary sources are so varied that meeting the body's needs is easy for most people to do

Some Important Exceptions:

- Age: Nearly half of all people 65+ of age are deficient
- Pregnancy / Lactation: Extra thiamin is needed because of maternal 'loss' to the baby
- Frequent dieters / fasters: <1500 calories daily or a highly restricted diet may lead to deficiency
- Diabetes: Too much thiamin may be excreted
- Kidney dialysis: Physician consultation and monitoring is critical
- **Alcoholics: Wernicke-Korsakoff Syndrome**

Wernicke-Korsakoff syndrome—occasionally referred to as 'wet brain'—is a subtype of beriberi (a severe deficiency of Vitamin B1)

As opposed to other types of beriberi, Wernicke-Korsakoff is usually caused as a direct result of chronic alcoholism

Headliners: Study Shows Vitamin B1 May Help Women with Drinking Problems Moderate Their Consumption; Results appearing in Drug and Alcohol Dependence; as reported by David Martin for University of Kansas Medical Center; posted 07 APR 2014; accessed 5APR 2016 at: http://www.kumc.edu/news-listing-page/role-of-thiamine-supplements-in-treating-alcoholism-.html

'We know that thiamine deficiency causes big problems in alcoholics. The underlying theory of the study was maybe if we improve neurological functioning and some of these neurological problems caused by thiamine deficiency, then alcoholics might make better decisions about their drinking and have greater control over their alcohol use.'--Source: Ann Manzardo, Ph.D., M.S.C.R., assistant professor of psychiatry and behavioral sciences; University of Kansas; lead author of the study

The study used a manmade thiamine analogue called benfotiamine to achieve higher than normal thiamine doses—female participants who took benfotiamine reduced their drinking more than the participants who were given a placebo

The change in behavior was rapid—the women taking the supplements decreased their consumption by 45% within one month of treatment

Manzardo believes that restoring their nutrition levels gave the women a quick boost in mood and emotional status because thiamine deficiency can have negative effects on mood

'I don't think anybody is trying to assert that we are going to cure alcoholism with a vitamin pill. [But thiamine is]…something that's readily available and safe to use. It's something that's inexpensive and accessible to the population and would really benefit their overall health. Improving their physical health and mental functioning might provide that extra measure of resilience to fight the compulsion to drink again.'--Manzardo

Riboflavin (B2)

Riboflavin, simply put, provides the body with oxygen-based energy by working with other B vitamins to metabolize carbs, fats and proteins

The body's use of oxygen, while critical for energy production and overall metabolic activity, brings with it a constant risk—oxygen-containing molecules ('oxidants') can be highly reactive, and can inadvertently damage many structures in the body (cell membranes, blood vessel linings, joint tissue, etc.)

Glutathione is a small, protein-like molecule that is responsible for helping prevent this oxygen-based damage—like many antioxidant molecules, glutathione must be constantly recycled and it is vitamin B2 that allows this recycling to take place (riboflavin is a co-factor for the enzyme glutathione reductase that reduces the oxidized form of glutathione back to its reduced version)

Other Riboflavin Functions:

- Regulates cell growth and metabolism
- Sustains healthy red blood cells
- Maintains mucous membranes (including oral mucosa)
- Aids in antibody production
- Assists in keeping skin, eyes, nerves, nails, hair and memory function in optimal shape

When deficiency DOES occur: Angular cheilitis is likely

Sources of Riboflavin:

- Milk and other dairy products (generally considered the best source)
- Meat (especially liver)
- Vegetables (examples include asparagus, mushrooms, peas, broccoli, spinach, and sweet potatoes)
- Eggs
- Fortified breads, baked goods and pasta

Niacin (B3)

Niacin is one of the B-complex vitamins that impacts many bodily systems—more than 50 different processes in the body depend on niacin!

Niacin improves circulation and has also been found to lower LDL cholesterol and triglyceride levels while raising HDL levels (by 15%-35%)

Since it is important for the production of deoxyribose nucleic acid (DNA), a deficiency of niacin can damage this primary genetic material—this is especially crucial with respect to cancer and its prevention

While most of the niacin the body needs comes from dietary sources, some niacin is made in the body from protein sources that are broken down into amino acids

One of the amino acids is tryptophan —the body uses half of the tryptophan supply for making some of the 50,000+ proteins it needs and the remaining half of the supply is converted into niacin

Common Sources of Niacin:

- Meats (beef, poultry, pork)
- Fish (flounder, salmon)
- Fortified cereals, rice, bread, & baked goods
- Nuts
- Whole grains
- Vegetables (peas, potatoes, asparagus, corn, sweet potatoes)
- Fruits (nectarines, tomatoes)
- Dairy products and eggs (good sources of tryptophan)

Niacin Deficiency Concerns:
Alcohol abusers: uptake of B vitamins is inhibited and dietary choices are bad
Strict vegans: high quality proteins such as whole grains and nuts are necessary
Pellegra: Although rare in developed countries, it still occurs in improvised areas

Most people get enough niacin and tryptophan from their diets and do not need supplementation
If needed, niacin supplementation must be monitored by a physician!!!!
Headliners: Vitamin B3 as a Novel Approach to Treat Fungal Infections; Martine Raymond et al; Institute for Research in Immunology and Cancer ('IRIC'); University of Montreal; appearing in Nature Medicine; reported by ScienceDaily; 7/8/10; accessed 8/2/10 at: www.sciencedaily.com/releases
Infections by Candida albicans represent a significant public health problem and a common complication in immunocompromised individuals—while some treatments are available, their efficacy can be compromised by the emergence of drug-resistant strains
In this study, a C. albicans enzyme ('Hst3')—essential for growth and survival of the yeast—was found to be inhibited by nicotinamide (a form of vitamin B3)
Both normal and drug-resistant strains of C. albicans were susceptible to nicotinamide—as are other pathogenic fungal species such as Aspergillus fumigatus
'There is an urgent need to develop new therapies to kill C. albicans because it is one of the leading causes of hospital-acquired infections and is associated with high mortality rates. Although many issues remain to be investigated, the results of our study are very exciting and they constitute an important first step in the development of new therapeutic agents to treat fungal infections without major side effects for patients.'--Raymond et al

Pantothenic Acid (B5)

Pantothenic acid (B5) is EVERYWHERE—every single food item contains this vitamin so deficiency is a non-issue
This nutrient has many important functions—B5 makes co-enzymes that help metabolize fats and carbohydrates, supports RBC's, aids in making vitamin D, and aids in managing the physical effects of stress
Potential Future Treatment Applications for B5:
Wound healing

- Preliminary animal studies suggest that vitamin B5 supplements may speed wound healing (especially following surgery)

Rheumatoid arthritis

- Preliminary evidence suggests that pantothenic acid supplements might help with symptoms of rheumatoid arthritis

Pyridoxine (B6)

Pyridoxine is required for the balancing of hormonal changes in women—and can be particularly beneficial for pre-menstrual fluid retention, severe period pains, emotional PMS symptoms, premenstrual acne and nausea in early pregnancy
Pyridoxine is also involved in the maintenance of nucleic acids RNA as well as DNA and has been linked to cancer immunity
As pyridoxine research continues, more functions and applications for this nutrient will no doubt be discovered—everything from infertility to cancer to kidney stone to depression to morning sickness prevention is being investigated with positive results

Common Sources of Pyridoxine (B6)

- High quality protein (chicken, pork, beef, and fish)
- Dairy products
- Eggs
- Fortified flour, corn meal, cereals, and baked goods
- Select fruits and vegetables (avocados, mangos, bananas, and potatoes)
- Whole grains
- Beans and lentils

Pyridoxine Interactions

Good Stuff:

- Riboflavin
- Vitamin C
- Magnesium
- Selenium

Bad Stuff:

- Alcohol
- Some prescription medications (BCP's, steroids, isoniazid, penicillamine)

B6 Tidbit: Adequate levels of magnesium are necessary for pyridoxine to work properly—green vegetables such as spinach are good sources of magnesium because the center of the chlorophyll molecule (which gives green vegetables their color) contains magnesium

CAUTION!!!!

- Dietary B6 is sensitive to freezing (the process can destroy up to 70% of pyridoxine) and most of this nutrient ends up in cooking water
- Solution: Use only the FRESHEST foods possible and cook them in as little liquid as necessary

Although food sources for pyridoxine are diverse, many people use dietary supplements to get enough B6

CAUTION!!!!

- Pyridoxine (B6) is one of the few water soluble vitamins that CAN cause overdose reactions resulting in reversible neurological symptoms (numbness/tingling in the extremities; trouble walking)

B6 Deficiency Concerns:

- Irritability, nervousness and insomnia accompanied by general weakness, skin changes (dermatitis and acne), asthma and allergies might develop when pyridoxine is in short supply
- Symptoms may include nails that are ridged, an inflamed tongue, osteoporosis, arthritis and kidney stones

Biotin (B7)

Biotin works closely with other members of the B vitamin family but it does not have to be ingested—all the necessary biotin is made from intestinal microbes

Because of its microbial origin, there is RARELY any deficiency issues—in fact, most people excrete more biotin than they take in through their diet

The exception: If a person is on long-term antibiotic therapy, intestinal bacteria is killed off—taking their biotin-making skills with them

Folic Acid (B9)

Folic acid is the synthetic form of B9 (found in supplements and fortified foods) while folate occurs naturally in foods

Folic acid is crucial for proper brain function and plays an important role in mental and emotional health

Studies have indicated that 15%-38% of people with depression have low folate levels in their bodies—those with very low levels tend to be the most depressed

Low levels of folic acid have also been associated with a poor response to antidepressants—however, more research is needed to understand the link

It aids in the production of DNA and RNA and is especially important when cells and tissues are growing rapidly (such as in infancy, adolescence, and pregnancy)

Low dietary intake of folate may increase the risk of developing breast cancer—particularly for women who drink alcohol

Pregnant women require more folic acid—lower levels of folic acid during pregnancy are associated with low birth weight and increased risk of neural tube defects, including cleft palate, spina bifida, and brain damage

Sources of Folic Acid:

- Spinach***
- Dark green leafy greens
- Other vegetables (asparagus, turnip, beets, Brussels sprouts)
- Beef and chicken liver
- Brewer's yeast
- Whole grains, wheat germ, and bulgur wheat
- Beans (kidney, white, lima, mung)
- Salmon
- Milk

In Canada, folic acid is added to all white flour, enriched pasta and cornmeal products

Folic Acid (B9) Deficiency:

- Mild folic acid deficiency is fairly common—alcoholism, irritable bowel syndrome, and celiac disease can cause folic acid deficiency
- Also, certain medications may lower levels of folic acid in the body

  Drugs that Lower Levels of Folic Acid:
  - Antacids, H2 blockers, proton pump inhibitors
  - Carbamazepine
  - Nonsteroidal anti-inflammatory drugs (NSAIDs)
  - Sulfasalazine
  - Triamterene
  - Birth control medications
  - Anticonvulsants for seizures (namely, phenytoin and carbamazapine)
  - Certain cholesterol-lowering medications

Tetracycline

Folic acid should not be taken at the same time as tetracycline because it interferes with the absorption and effectiveness of this medication—ALL vitamin B complex supplements act in this way and should therefore be taken at different times from tetracycline

Folic acid deficiency can cause poor growth, tongue inflammation, gingivitis, loss of appetite, shortness of breath, diarrhea, irritability, forgetfulness, and mental sluggishness

Cobalamin (B12)

Cobalamin differs from all other vitamins in that it is highly complex, contains an inorganic element (cobalt) and only microbes can make it

A substance made in the stomach ('intrinsic factor') must be present to absorb B12 from the intestinal tract in a complicated series of reactions that depend on gastric, GI and pancreatic involvement

Gastric conditions including various stomach diseases that impair release of B12 from food or production of intrinsic factor (such as gastrectomy, antacid medications or gastritis), pancreatic deficiency states which impair formation of the B12/intrinsic factor complex, ileal disease (e.g. Crohn's disease), bacterial overgrowth in the bowel, and other miscellaneous causes of malabsorption can lead to cobalamin deficiency ('pernicious anemia')

Pernicious Anemia

- Occurs when stomach cells are not able to make intrinsic factor, and the body cannot absorb vitamin B12
- Symptoms include weakness, pale skin, diarrhea, weight loss, fever, numbness or tingling sensation in the hands and feet, loss of balance, confusion, memory loss, and moodiness

B12 is available only from animal sources (vegan alert!) —the only reliable vegan sources of B12 are foods fortified with B12 (including some plant milks, some soy products and some breakfast cereals) and B12 supplements

Dietary Sources for Cobalamin (B12)

- Animal products (meat, fish, eggs)
- Fortified foods
- Dairy foods (cheese, milk, yogurt)
- Supplements

Headliners: German Company Introduces First Toothpaste with Vitamin B12; Dental Tribune International; 5/11/12; Accessed on 4/7/15 at: http://www.dental-tribune.com/articles/news/europe/8337_german_company_introduces_first_toothpaste_with_vitamin_b12.html

The German Vegetarian Union and LOGOCOS (a natural cosmetics manufacturer) recently introduced SANTE toothpaste containing B12:

SANTE toothpaste allows B12 to be absorbed through the oral mucosa

Because the toothpaste is vegan, GMO-free and not tested on animals, the product is designed to appeal to those individuals who shun animal-based products—vegetarians are prone to vitamin B12 deficiencies

It also contains a complex of active ingredients effective against caries (including sodium fluoride [optional] and xylitol)

Vitamin B12 is not sensitive to heat nor light, and thus remains preserved in toothpaste for a long period

According to the manufacturer's website, SANTE Dental Medical Toothpaste with Vitamin B12 reduced vitamin B12 deficiencies in test subjects with regular use—those who used the toothpaste demonstrated a 60% increase in vitamin B12 after only four weeks of application—Source: Accessed on 4/7/15 at: http://sante.logona-cosmetics.co.uk//home/sante/sante-oral-care/dental-medical-toothpaste-vitamin-b12/346-dental-medical-toothpaste-vitamin-b12.html

Folic acid (B9), when taken in high doses, can mask the symptoms of a vitamin B12 deficiency—for that reason, anyone planning to take B9 supplements should check with their physician FIRST to determine their B12 levels

Mega doses of vitamin C can destroy cobalamin—take supplements at least one hour apart!

Vitamin B12 supplements in high doses (either given as injections or orally) are prescribed to treat pernicious anemia—a dangerous condition that should always be treated by a physician

Final BZZZZZ on the B's

Headliners: Nitrous Oxide Administration; Nili N Alai, MD, FAAD et al; updated 1/12/12; acce3ssed at: http://emedicine.medscape.com/article/1413427-overview#showall on 6/25/12

Nitrous oxide is known to interfere with vitamin B12 and folate metabolism—in patients with pre-existing vitamin B deficiencies, nitrous oxide / oxygen sedation in the dental setting should be avoided
As a commonly abused inhalant drug, it can be habit-forming—and long-term use has been associated with many systemic complications

Oral Conditions Associated with Vitamin B Deficiencies:

- Glossitis suggests cobalamin (B12) deficiency
- Glossitis and cheilosis suggest pyridoxine (B6) deficiency
- Gingivitis, stomatitis, and glossitis may indicate niacin (B3) deficiency

Vitamin C

Vitamin C is the body's main antioxidant vitamin
It is necessary for more than 300 different purposes—one of which is to make collagen
Unlike most other animals, humans (as well as guinea pigs) cannot synthesize L-ascorbic acid (vitamin C) and require dietary supplies of this nutrient in order to maintain healthy collagen and happy fibroblasts
The clinical manifestations of vitamin C deficiency are primarily due to abnormal collagen synthesis—collagen lacking hydroxyproline is more fragile and contributes to the clinical manifestations of this nutritional insufficiency

Pathological Manifestations of Vitamin C Deficiency ('Scurvy') include:

- Purpura (especially on the backs of the legs) due to vessel wall fragility
- Osteoid matrix is defective
- Bone resorption is increased
- Perifollicular hyperkeratotic papules surrounded by hemorrhagic halos (central hairs are often 'corkscrewed')
- Bleeding into the joints causes painful hemarthroses
- Scorbutic rosary
- Woody edema caused by bleeds into the muscles
- Cardiac complications
- **Anemia**
  Anemia from scurvy develops in about 75% of patients and results from blood loss into tissue, coexistent dietary deficiencies (especially folate), altered absorption and metabolism of iron***, GI blood loss and intravascular hemolysis
  Vitamin C enhances iron absorption by reducing dietary iron from the ferric form to the ferrous form—an ascorbic acid deficiency may reduce the availability of intracellular iron

Oral Manifestations of Scurvy

- Gingival swelling with purplish, spongy edema
- Gingival bleeding
- Friable tissue
- Infections common

Typically, scurvy carries an excellent prognosis if diagnosed and treated appropriately—a supplement of 250 mg ascorbic acid by mouth four times daily in addition to a diet rich in FRESH fruit and vegetables generally relieves symptoms within two weeks

Risk for Scurvy in Canada?

Headliners: Scurvy in Toronto?; Source: Vitamin C deficiency in a population of young Canadian adults. Cahill L, Corey PN, El-Sohemy A. Am J Epidemiol. 2009 Aug 15;170(4):464-71; posted on Aileen Burford-Mason website; accessed on 5 April 2016 at: http://aileenburfordmason.ca/newsletter-articles/in-brief/scurvy-in-toronto/#sthash.n253xrkq.dpuf

Researchers at the University of Toronto analyzed blood levels of ascorbic acid (vitamin C) in 979 young (20-29 years) non-smoking men and women who were participating in the Toronto Nutrigenomics and Health Study

Results showed that53% of study participants had adequate, 33% suboptimal, and 14% deficient levels of serum ascorbic acid

While low serum levels of ascorbic acid were often a sign of poor dietary intake of vitamin C, the investigation found that was not the only factor

The study participants who were deficient in vitamin C were within in the range usually associated with scurvy—the researchers noted that the vitamin C deficient group also had significantly higher waist circumference, body mass index, blood pressure, and elevated C-reactive protein (CRP)

CRP is a plasma marker for inflammation and is the only marker of inflammation that independently predicts the risk of a heart attack

In a University of California-Davis, researchers discovered that men and women who ate a little more than half a pound of cherries a day had a 25% reduction in C-reactive protein

Those same cherries have additional benefits in that their nutritive make-up can be used for the body to build and repair joint cartilage

Patients at Risk:

- Infants fed only cow's milk during first year of life
- Adults 55+ years of age (especially males; 'tea-and-toast diets')
- Cigarette smokers
- Pregnant and lactating women
- Thyrotoxicosis (excess thyroid hormone)
- Anorexia
- Type 1 diabetes
- Diseases of the small intestine (Crohn, Whipple, celiac disease; also gastric bypass) NOTE: Vitamin C is absorbed in the small intestine
- Boiling fruit products
- Low SES
- Chronic inflammation

Headliners: Spanish Baby Develops Scurvy After Parents Feed Him Almond Milk-Only Diet; Source: As reported by Carmen Chai; Health Reporter; Global News; posted 22 JAN 2016; accessed 5 APR 2016 at: http://globalnews.ca/news/2471956/spanish-baby-develops-scurvy-after-parents-feed-him-almond-milk-only-diet/

A baby boy was born with a normal body weight of about seven pounds and, for the first 2.5 months, he subsisted on a typical cow's milk-based formula

Because he developed a skin rash, doctors decided to change his formula to avoid allergies—they recommended that the baby be fed an almond milk-based formula with almond flour, sesame powder, brown rice malt, brown rice, millet and probiotics

But a month later, on the plant-based diet, the baby's health declined: he became lethargic, irritable, and could not stand
Radiographs revealed that his legs were thin and fracturing—revealing an obvious lack of vitamin C, D, calcium and iron
'This case demonstrates that scurvy is a new and severe complication of improper use of almond drinks in the first year of life. When plant-based beverages are the exclusive diet in the first year of life and not consumed as a supplement to formula or breastfeeding, it can result in severe nutritional problems.'--Dr. Isidro Vitoria, the case study's lead investigator

Deficiency Concern:

- Because cigarette smoke breaks down vitamin C, even 'passive' smokers need extra C

Just some of Vitamin C's Health Benefits:

- Protects against dementia
- Treats lead poisoning
- Prevents osteoporosis
- Slows Parkinson's disease
- Relieves symptoms of Peripheral Artery Disease ('PAD')
- It is vital for wound healing, supports the immune system, and acts as a cancer preventative
- Additionally, studies have demonstrated that taking 1,000mg of vitamin C daily can raise sperm count by as much as 100%!

And the list goes on and on and on and on and on and on…

Common sources of Vitamin C (Ascorbic acid)

- Fruits (citrus, apples, berries, melons)
- Vegetables (broccoli, brussels sprouts, greens, turnips)

Eating five servings of fresh fruits and vegetables daily will easily meet most people's need for C

Salad Bar Alert!!!

- Up to HALF of vitamin C content is lost when fruits and vegetables are prepared in advance and left out for a few hours

Freezing fruits and vegetables preserves some vitamin C—canning fruits and vegetables, however, destroys ascorbic acid and the sugars added to canned fruits can be VERY unhealthy

Vitamin D

Vitamin D is essential for keeping bones and teeth healthy by regulating the body's absorption and utilization of calcium and phosphorous
Current research is touting this nutrient as a 'miracle vitamin' for functions it performs that go WAY beyond regulation of calcium and phosphorous

Headliners: Vitamin D Crucial to Activating Immune Defenses; Carston Geisler; researcher; Department of International Health, Immunology, and Microbiology; University of Copenhagen; as reported in ScienceDaily; 3/8/10; accessed 8/2/10 at: www.sciencedaily.com/releases

Scientists have discovered that vitamin D is crucial to activating immune function—specifically, without sufficient intake of the nutrient, T-cells are not able to react and fight off serious infections

A bit of background: In order for T cells to detect and kill pathogens, they must first be 'induced' to transform into an active lymphocyte
Study authors found that the T cells rely on vitamin D in order to activate—otherwise, they remain dormant to pathogenic challenge if sufficient levels of serum vitamin D are lacking
When a T cell is exposed to a pathogen, it extends a signaling device or 'antenna' that acts as a vitamin D receptor—if the receptor cannot find vitamin D to lock and load, nothing happens

'Scientists have known for a long time that vitamin D is important for calcium absorption and the vitamin has also been implicated in diseases such as cancer and multiple sclerosis, but what we didn't realize is how crucial vitamin D is for actually activating the immune system—which we now know.'--Study authors

'[The findings] could help us to combat infectious diseases and global epidemics. They will be of particular use when developing new vaccines…and suppressing the body's natural defenses in situations where this is important—as is the case with organ transplants and autoimmune disease.'--Geisler

Promising work has been done in proving vitamin D may be an important factor in reducing risk for colon, breast and prostate cancers

Many adults lose some of their hearing as they grow older—more than 25% of people over 65 have some hearing loss—and research is finding that a shortage of vitamin D may contribute to auditory loss

- It is possible that taking vitamin D supplements can help restore some hearing—a physician's consult is necessary

Recent studies have indicated that vitamin D may help prevent autoimmune diseases such as MS, rheumatoid arthritis, psoriasis, and type 1 diabetes

Several studies have demonstrated that vitamin D deficiency is implicated in rheumatoid arthritis('RA') development

KEY POINT: 'Public health measures are already under way to address many of the environmental risk factors that have been implicated in RA risk, including interventions that **encourage smoking cessation** and efforts focused at optimizing levels of physical activity, **vitamin D intake**, and **oral hygiene**.'--Dr. Ted Mikuls; University of Nebraska Medical Center; editorial comment appearing in the 5/2010 issue of Arthritis & Rheumatism

Vitamin D requires the sun!

For the billions of people worldwide who get enough sun exposure—a few minutes daily—vitamin D is not a vitamin at all because it is not needed in the diet!

A little background: Vitamin D (cholecalciferol) is made in the skin when a form of cholesterol (7-dehydrocholesterol) reacts with UVB ultraviolet light with wavelengths between 290 and 315 nanometers

Since UVB is absorbed by the atmosphere, more vitamin D is made when the sun is high—15 minutes of summer sun in a bathing suit makes 100 times the adequate daily intake

Since vitamin D is stored for long periods of time—it is, after all, fat soluble—this same one time sun exposure may be enough to last for 100 days!

Caution: UVB does NOT penetrate glass—all that time spent in traffic does not count unless the top is down

Another caution: Using a sunscreen with an SPF of 8+ will block UVB from skin making vitamin D production impossible

Even in higher latitudes, ten minutes of sun on the arms and face just three times weekly in the spring, summer, and fall will provide enough vitamin D for the whole year

Dietary Sources of Vitamin D

- Fish (salmon, tuna and other oily fish)
- Fortified milk (#1 food source for vitamin D)

Vitamin D Deficiency Concerns:

- Over 65+ (the elderly make 50% of vitamin D in their later years)
- Insider (no outdoor time=deficiency)
- Kidney or Liver disease (conversion of inactive vitamin D is blocked)
- Cholesterol-lowering drugs (physician consult is warranted)
- Anti-seizure meds (Dilantin and phenobarbitol interfere with how vitamin D is utilized)

- Vegetarian (very little vitamin D in plant foods)
- Alcohol abuse (blocks ability to absorb vitamin D)

Headliners: How Patients with a Broken Heart Could Be Helped By a Daily Dose of the Sunshine Vitamin; As reported by Ben Spencer; Medical Correspondent; The Daily Mail; published 4 April 2016; accessed 5 April 2016 at: http://www.dailymail.co.uk/health/article-3522865/How-patients-broken-heart-helped-daily-dose-sunshine-vitamin.html

Affecting 23 million people worldwide, heart failure is caused by heart failing to properly pump blood around body—a condition that tends to strike after a heart attack

Researchers at the University of Leeds have found that taking vitamin D3 increases the heart's pumping power by a third

The authors suspect it is because vitamin D regulates calcium levels—when the heart contracts, calcium enters the heart cells, and when the heart relaxes, calcium leaves again

In heart failure patients, the calcium is not forced out on each relaxation, clogging the cells and stopping the heart from pumping properly—the investigators speculate vitamin D may help the heart clear calcium from the cells

Heart failure patients often struggle to produce enough vitamin D—partly because people's ability to make vitamin D reduces with age and because heart failure patients struggle to spend much time outdoors

The study participants who took vitamin D saw an increase in the volume of blood pumped out from the heart by 26% to 34%—in the placebo group, there was no change in cardiac function

'It is the first evidence that vitamin D3 can improve heart function of people with heart muscle weakness–known as heart failure. These findings could make a significant difference to the care of heart failure patients.'--Source: Dr. Klaus Witte; study leader; consultant cardiologist; Leeds Teaching Hospitals

Vitamin E

Vitamin E is a family of different compounds—all working together to protect the body against roaming free radicals

The 'family' is divided into two branches: the **tocopherols** and the **tocotrienols**

Tocopherols

- Alpha-tocoperol****
- Beta-tocopherol
- Gamma-tocopherol
- Delta-tocopherol

Alpha-Tocopherol

Form of vitamin E that is found in the largest quantities in blood and tissue

Powerful antioxidant (has a spare hydrogen atom to neutralize free radicals)

Protects membranes and low density lipoproteins

'Natural' tocopherol is made from vegetable oil (safflower, soybean) and 'synthetic' vitamin E is manmade

Natural vitamin E is much more active, is better absorbed and stays in the system longer

Label Alert! Natural vitamin E is called 'd-alpha-tocopherol' and the synthetic version is called 'dl-alpha-tocopherol'

Tocotrienols

- Same 'flavors' as tocopherols
- Much more potent antioxidants
- Rapidly eliminated from the body but can be absorbed through the skin (lotion)
- Excellent topical medicament to reduce scarring

Common Sources:

- Vegetable oils (safflower)
- Nuts (almonds, hazelnuts, peanuts)
- Wheat germ
- Some fruits (apple, mango)
- Some vegetables (sweet potato, asparagus)

Among the Benefits of Vitamin E:

- Lowers cardiovascular risk (some controversy)
- Immune booster (especially in the elderly)
- Alzheimer's preventative***
- Aids in cognition

Headliners: High Blood Levels of Vitamin E Reduces Risk of Alzheimer's; Dr. Francesca Mangialasche; lead researcher; Aging Research Center ('ARC'); Karolinska Institutet ; Stockholm, Sweden; in conjunction with the Institute of Gerontology and Geriatrics; University of Perugia, Italy; study published in the Journal of Alzheimer's Disease; July 2010

According to researchers, high levels of several vitamin E components in the blood were associated with a decreased risk for Alzheimer's Disease ('AD') in advanced age—suggesting that vitamin E may help prevent cognitive deterioration in elderly people

'Vitamin E is a family of eight natural components, but most studies related to Alzheimer's disease investigate only one of these components…We hypothesize that all the vitamin E family members could be important in protecting against AD.'--Dr. Magialasche et al

The study found that subjects with higher serum levels of all the vitamin E family forms had a reduced risk—a whopping 45%-54%!—of developing AD

'Elderly people as a group are large consumers of vitamin E supplements, which usually contain only [one type of] tocopherol and this often at high doses. Our findings need to be confirmed by other studies, but they open up for the possibility that the balanced presence of different vitamin E forms can have an important neuroprotective effect.'--Dr. Mangialasche et al

Vitamin E Deficiency:

True vitamin E deficiency is rare—however, consumption of inadequate levels of vitamin E is common in the U.S.

Approximately one third of adults were found to have blood levels of vitamin E at levels so low as to increase cardiovascular risk--Blake S: Vitamins & Mineral Demystified. McGraw-Hill Companies, Inc. (New York). 2008. p. 117

Vitamin E Deficiency Conditions to Consider:

- Cystic fibrosis (fat digestion is impaired which affects vitamin E absorption)
- Crohn's disease (intestinal uptake is compromised)
- Liver disease (use of vitamin E is impaired)
- Low fat / low calorie diet (fat in the diet is necessary for vitamin E absorption)

Vitamin K

Originally identified for its role in the process of blood clot formation—'K' is derived from the German word 'koagulation'—vitamin K is essential for the functioning of several proteins involved in physiological processes that encompass, but are not limited to, the regulation of blood clotting

Although vitamin K is a fat soluble vitamin, the body stores very small amounts that are rapidly depleted without regular dietary intake

Perhaps because of its limited ability to store vitamin K, the body recycles it through a process called the vitamin K-epoxide cycle—this cycle allows a small amount of vitamin K to be reused many times for protein carboxylation and reduces the amount of vitamin K needed in the diet

Vitamin K is capable of opposing many of the leading causes of death in modern-day Americans—including atherosclerosis, osteoporosis, diabetes, and cancer—because it has the unique ability to activate proteins involved in these conditions

Headliners: The Surprising Longevity Benefits of Vitamin K; Source: As reported by Judy Ramirex; LifeExtension; posted 9/2014; accessed on 5 April 2016 at: http://www.lifeextension.com/magazine/2014/9/the-surprising-longevity-benefits-of-vitamin-k/page-01

A 2014 study on vitamin K confirmed that ample vitamin K intake can apparently increase longevity in people with cardiovascular disease ('CVD')—in a group of more than 7,000 people at high risk for CVD, people with the highest intake of vitamin K were 36% less likely to die from any cause at all during the study compared with those having the lowest intake

This protection even extended to those with initially low vitamin K intake who boosted their consumption during the course of the study

Vitamin K activates blood-clotting proteins by making a small but vital chemical change in protein structure—specifically on the protein building block called glutamic acid

By the turn of the 21st century, scientists had learned that vitamin K produces similar changes to glutamic acid molecules to activate a handful of other vital proteins—collectively called 'Gla-proteins'—in the body

With the discovery of the Gla-proteins, scientists learned that vitamin K is vital for much more than the healthy clotting of blood

According to 2014 research, 16 different vitamin K-dependent Gla-proteins have been identified—and they all depend on vitamin K to activate them in order to carry out their intended role

For example, the Gla-protein in bone—osteocalcin—is responsible for making sure calcium is deposited in bones and matrix Gla-protein (found in arterial walls) prevents calcium from being deposited in arteries

Vitamin K occurs naturally as two chemically distinct forms called vitamin **K1 (phylloquinone)** and vitamin **K2 (menaquinones)** respectively

There is also a synthetic form called vitamin K3 or menadione

K1 is the major dietary source for vitamin K as it is synthesized by plants—it accounts for 90% of vitamin K intake in most people

- Dietary sources of vitamin K1 include green leafy vegetables—collards, green leaf lettuce, kale, mustard greens, parsley, romaine lettuce, spinach, Swiss chard and turnip greens—as well as cruciferous vegetables such as broccoli, Brussels sprouts, cauliflower and cabbage

Source: U.S. National Library of Medicine

Vitamin K2 occurs as a family of different compounds which are only synthesized by bacteria—they have the same nucleus and individual members are named according to their different side chain lengths

Vitamin K2 can be broken into two additional categories:

- MK-4 (menaquinone-4): a short-chain form of vitamin K2 found in butter, egg yolks, and animal-based foods
- MK-7 (menaquinone-7): longer-chain forms found in fermented food

Warning: In supplements, look for MK-7—the MK-4 found in supplements is synthetic

'Vitamin K1 exclusively participates in blood clotting — that's sole purpose. K2 on the other hand comes from a whole different set of food sources, and its biological role is to help move calcium into the proper areas in your body, such as your bones and teeth.'--Source: Dr. Kate Rheaume-Bleue; naturopathic physician; author: Vitamin K2 and the Calcium Paradox: How a Little Known Vitamin Could Save Your Life

In Japanese culture the fermented soybean food called Natto is an enormously rich source of MK-7

All infants, regardless of sex, race, or ethnic background, are at higher risk **for Vitamin K Deficiency Bleeding** ('**VKDB**') until they start eating regular foods (usually at age 4-6 months) and until the normal intestinal bacteria start making vitamin K

This is because:

- At birth, babies have very little vitamin K stored in their bodies because only small amounts pass to them through the placenta from their mothers
- The 'good bacteria' that produce vitamin K are not yet present in the newborn's intestines
- Breast milk contains low amounts of vitamin K—exclusively breast-fed babies do not get enough vitamin K from the breast milk alone

Fortunately, VKDB is easily prevented by giving babies **a single vitamin K injection** just after birth—in order to provide for immediate bonding and contact between the newborn and mother, giving the vitamin K injection can be delayed up to 6 hours after birth

A **synthetic vitamin K ('phytonadione')** is often used in the newborn injection—and it has some folks concerned

One thing to keep in mind is that the liver of a newborn does not begin to function until 3 or 4 days after birth—as a result babies have very limited to no ability to detoxify the large dose of synthetic vitamin K and all other the ingredients in the injection (phenol, benzyl alcohol, propylene glycol, acetic acid, hydrochloric acid, lecithin, castor oil, etc.)

According to the manufacturer's insert:

> 'Severe reactions, including fatalities, have occurred during and immediately after intravenous injection of phytonadione [synthetic Vitamin K] even when precautions have been taken to dilute the vitamin and avoid rapid infusion ….'

Experts: Oral Vitamin K a Safer Option Than Injection

Even though oral Vitamin K is not as efficiently absorbed as when injected, '…very similar rates of protection against classical and late hemorrhagic disease can be achieved by giving repeated oral doses, either 1 milligram weekly or 25 micrograms daily. Undertaking this form of oral prophylaxis requires that parents accept responsibility for ensuring the course is completed.'--Source: According to the Cochrane Collaboration (an international committee of medical doctors of the highest caliber):

Final Tidbits:

Headliners: Vitamins Stored in Bathrooms, Kitchens May Become Less Effective; Lisa Mauer; associate professor; Food Science; Purdue Univerisity; study results appearing online in the Journal of Agricultural and Food Chemistry; accessed from ScienceDaily 8/2/10 at: www.sciencedaily.com/releases

High humidity present in bathrooms and kitchens could be degrading the vitamins and health supplements stored in those rooms—even if the lids are on tight

Crystalline substances—such as vitamins and other dietary supplements—are prone to a process called 'deliquescence' in which humidity causes a water-soluble solid to dissolve
'If you get some moisture present or ingredients dissolve, they'll decrease the quality and shelf life of the product and decrease the nutrient delivery. You can get complete loss of the ingredients…[Y]ou can get complete loss…[w]ithin a very short time—in a week—you can get complete loss of vitamin C in some products that have deliquesced.'--Mauer
'Opening and closing a package will change the atmosphere in it. If you open and close a package in a bathroom, you add a little bit of humidity and moisture each time. The humidity in your kitchen or bathroom can cycle up quite high, depending on how long of a shower you take, for example, and can get higher than 98%.'--Mauer
Researchers are urging consumers to toss any dietary supplement that shows signs of moisture uptake (liquid in the container) or browning (especially in children's vitamins)
Headliners: Health Canada Acknowledges 'Weak Evidence' for Approving Herbal, Vitamin Supplements (fifth estate); Anita Elash; reporting for CBC News; posted: 11/15/2015; updated 1/ 21/ 2016; accessed on 4/2/2016 at: http://www.cbc.ca/news/health/fifth-estate-vitamins-herbal-health-canada-1.3316208
About three-quarters of Canadians regularly take natural health products such as vitamins, minerals, fish oil and herbal remedies--Source: Ipsos-Reid survey; 2010
Annual sales in Canada total about $1.4 BILLION—supplements must be approved by Health Canada's Natural and Non-Prescription Health Products directorate before they go on sale
The approval rules were established in 2004 in response to concerns about the potential dangers of unregulated products and to consumer demand for greater choice
New proposals were implemented in early 2013—since then, Health Canada has approved more than 90% of applications for natural health products
At the same time, Health Canada decided not to take action on independent evidence that shows problems with contamination and adulteration of herbal supplements
Researchers tested 44 herbal supplements bought in Canada and the U.S. found that nearly 60% of the supplements contained ingredients not listed on the label and 32% were outright frauds--Source: Steven Newmaster et al; University of Guelph; study results appearing in BMC Medicine: 10/2013

Thoughts for the day:

Getting nutrients from food and beverage items is generally preferred over vitamin supplement
And when enjoying food, try '**Mindful Eating**'
The concept of being fully aware of what is going on inside of us and what is around us at any given moment is showing great promise in easing stress and other physical symptoms
Applied to eating and drinking, this slow and thoughtful approach could help people improve their nutrition, handle cravings, and lose weight
Mindful eating means:

- Taking the time to enjoy food—its traditions, pleasures, and ability to connect us socially
- Notice the colors, flavors, fragrances, and textures
- No cell phone, TV or other distractions
- Notice how you feel without self-criticism or judgement

Try this at home:

- Bite into a strawberry or other fresh fruit
- Close your eyes
- Really pay attention to the taste and texture
- Focus on how it feels to chew and to swallow
- Hold the fruit to your nose, inhale deeply, and enjoy the scent