Can Better Health and Wellness Improve the Effectiveness of Ergonomics?

How personal nutrition relates to improving ergonomics by traditional methods (engineering and medical)

by

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Major Ergonomic Problems

• **Back Pain** (L5/S1 low-back disorders, etc.)
  - 30% of people in pain now
  - 80% in pain at some time during lifetime

• **Hand/Wrist Pain** (carpal tunnel syndrome, etc.)
  - 20% of people in pain now
  - 75% in pain at some time during lifetime

**Summary:** Sooner or later nearly everyone (including you) has problems.

**Details:** Musculoskeletal Disorders and Workplace Factors: A Critical Review of Epidemiologic Evidence for Work-Related Musculoskeletal Disorders of Neck, Upper Extremity, and Low Back NIOSH Pub 97-141

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Ergonomic Solution Methods

• **Engineering** (traditional)
  - Proactive: prevents future injuries
  - Use in all cases

• **Medical** (traditional)
  - Reactive: attempts to fix past injuries
  - Use when body cannot heal itself

• **Nutrition** (new approach & no harm in trying)
  - Can be useful both proactively & reactively
  - Reactive: injury not too bad (body can heal itself)
  - Proactive: stronger body to prevent injury
  - Can use in all cases (no harm in trying it)
Traditional Engineering Solutions

• Engineering-based Ergonomics Projects

**Step 1: Engineering Analysis at Your Site**
- Analysis via video cameras, risk-factor checklists, and selected on-site measurements of forces, postures, repetition rates, distances, and duration to identify at-risk workstations & tasks characterized by ergonomic stressors.

**Step 2: Recommendations for Improvement**
- Next, recommendations for improvement of at-risk workstations and tasks are made by changes in designs, tools, layouts, equipment, and work methods.

**Step 3: Implementation & Training**
Traditional Engineering Solutions

• Engineering-based Ergonomics Projects
  - Over 1,200 assistance actions by Dr. Davis for companies.
  - Engineering is important (OSHA strongly recommends) to solve problems at root-causes, not just treat symptoms.

• Example: “This ergonomics project went extremely well. Dr. Joe Davis worked positively with each individual employee. Employees state that they are less fatigued when they go home. One employee said that it is nice to go home and have a cup of coffee and be able to hold the cup without her hand shaking.”
(quote from Personnel Manager of a company in Statesville, NC)
Traditional Engineering Solutions

• Designs, Tools, Equipment, Work Methods
  - Effective solutions, but only for people not already in pain.
  - Engineering solutions need a pain-free worker to do work.
  - What can be done for people hurting & in pain?

- Use a turntable with fixture to hold the work; select a tool that reduces wrist deviations.
- Round or pad edges of guards, containers, or work tables.
- Raise worker with platform and use in-line tool to reduce wrist bending.
Traditional Medical Solutions

• Medications (nonsteroidal anti-inflammatory drugs), Splints (wrist braces), and Exercises (stretches) - Treat symptoms (not causes) so problems and pain usually return
Traditional Medical Solutions

• Cortisone Injections
  - Treat symptoms (not causes) so problems usually return in 6 months

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Traditional Medical Solutions

• Surgeries
  - Treat symptoms (not causes) so about half of patients still in pain.

Note: Surgery often fails to produce any lasting help. Studies show that only 53% of patients typically get good results. (from http://www.carpaltunnelhealth.info/surgery.html)
Traditional Medical Solutions

• Chiropractic
  - Good for ensuring proper alignment of spine & joints
  - Very important if prior injury (neck whiplash in car, etc.)

Note: Body cannot heal by nutrition (discussed next) alone if spine/joints out of alignment, so chiropractic solutions can be very important.
Nutrition-based Solutions

• **Medicine** (drugs, surgery, etc.) offers **external solutions** (typically 50% effective) for ergonomics problems
  - Attempts to solve via major interventions
    (look at carpal tunnel surgery photo)

• **Nutrition** enables body to heal itself via **internal solutions** for ergonomics problems
  - Stronger body at cellular foundation level
Nutrition-based Solutions

• Based on Expert Knowledge
  - PhD engineering/biomechanics (Davis)
  - PhD nutrition (NCSU faculty)

• Also… Based on Simple Logic
  - Chain is no stronger than its weakest link.
  - Body is no stronger than its weakest cell.

  Example: Cancer in one cell can destroy the body.
  Example: Weak cell on edge of muscle can initiate a tear that spreads across a muscle and causes injury.
Nutrition-based Solutions

• Plus… Based on Experience
  - Ergonomic PROBLEMS

  “I was diagnosed with bilateral carpal tunnel, bilateral forearm tendinitis/tenosynovitis, resolved DeQuervain's stenosing tenosynovitis, and resolved lateral epicondylitis. These conditions were caused by improper positioning and set up of my computer station and phone system. I was placed on permanent disability as a result...”

Sandy of Dallas, OR 11/23/02
sandyherb@msn.com
Nutrition-based Solutions

• Plus… Based on Experience
  - Ergonomic SOLUTIONS (medical)

“The medications I was taking consisted of 600 mg of Neurontin 3 times a day, Diclofenac SOD 100ERTAB 1 to 2 per day for pain and 50mg of Ultram as needed for pain. I received physical therapy, with little relief, and wore splints including the thumb support. My days consisted of occasional and sometimes constant either wrist burning, thumb pain, shooting pains from my wrists up my arm and/or pain in my elbows as well as the right side of my neck and shoulder.”

Sandy of Dallas, OR 11/23/02
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Nutrition-based Solutions

• Plus… Based on Experience
  - Ergonomic SOLUTIONS (nutrition)

“The (one supplier of nutritional products) I take are, Aloe, BioFuel, GetGoN, BIO 3, Flexicare, CalMag 100, and Cell Care. I don't get shooting pains anymore, my wrists seldom burn but ache when I type too much and my thumbs are the same as my wrists depending on use. I don't need the Ultram and I have cut back to 1½ tablets 3 times a day of the Neurontin (with my doctor's permission). The most important relief for me has been ceasing of shooting pains & severe burning in my wrists.”

Sandy of Dallas, OR 11/23/02
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Nutrition-based Solutions

- Plus… Based on Experience
  - General health SOLUTIONS (nutrition)
  - Many problems (not just ergonomics) due to inadequate vitamins & nutrients

There are 1000’s of testimonials from people who have benefited from nutritional supplements that helped people stay youthful (fewer wrinkles, better skin tone, etc.) and overcome health problems including:

- Carpal tunnel syndrome, joint pain, arthritis, high cholesterol, chronic fatigue, headaches, migraines, heartburn, depression, stomach/intestinal disorders, premenstrual syndrome (PMS), menopause disorders, menstrual cramps, obesity, ADD, ADHD, and stress.

(sounds like “snake oil” cure-all, but evidence indicates it might work)
Nutrition-based Solutions

• Biomechanical Foundation
  - Biomechanics is the science of how the human body works mechanically from the cellular level up to the total body (how body parts move & function together)
  - The best way to make the total body stronger is to start at the “building block” level to strengthen cells and structures (muscles, etc.) via proper vitamins and nutrients
History of USDA’s Food Guidance

- **1916**: Food for Young Children
- **1940s**: 1940s
- **1950s-1960s**: 1950s-1960s
- **1970s**: 1970s
- **1992**: 1992
- **2005**: 2005

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Nutrition-based Solutions

- OLD Food Pyramid from US Dept. Agriculture (USDA) & US Health & Human Services (HHS)

(difficult & expensive to do every day)
Nutrition-based Solutions

- **NEW** Food Pyramid from US Dept. Agriculture (USDA) & US Health & Human Services (HHS)

Steps to a Healthier You

**What is the Food Guide Pyramid?**

The Pyramid is an outline of what to eat each day. It’s not a rigid prescription, but a general guide that lets you choose a healthful diet that’s right for you.

The Pyramid calls for eating a variety of foods to get the nutrients you need and at the same time the right amount of calories to maintain or improve your weight.

from http://www.mypyramid.gov/

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Food Groups are Color Coded

- **Fruit Group**: Focus on fruits
- **Vegetable Group**: Vary your veggies
- **Milk Group**: Get your calcium-rich foods
- **Grain Group**: Make half your grains whole
- **Meat & Bean Group**: Go lean with protein

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Grains

- Old Food Guide: 6-11 Servings/day
- New Food Guide: 6 oz. per day of which 3 oz. from whole grains

- What is 1 oz. of grain?
  - ½ cup brown rice
  - ½ cup oatmeal
  - 3 cups popcorn
  - 1 cup whole wheat cereal
  - 1 slice whole wheat bread
  - 5 whole wheat crackers

(1 oz. from any above, need 6 oz.)
Vegetables

- Old Food Guide:
  - 3-5 Servings
- New Food Guide:
  - 3 cups per day; variety of colors

- What is 1 cup of veggies?
  - 2 cups of leafy greens
  - 2 stalks of celery
  - 1 cup of green beans
  - 1 whole tomato

(1 cup from any above, need 3 cups)
Fruits

• Old Food Guide:
  – 2-4 Servings
• New Food Guide:
  – 2 cups per day

• What is 1 cup of fruit?
  – 1 banana
  – 1 cup Fruit Cocktail
  – 1 small Apple
  – 2 small oranges
  – 1 large peach
  – 2 large plums

(1 cup from any above, need 2 cups)
Dairy

• Old Food Guide:
  – 2-3 Servings

• New Food Guide:
  – 3 cups per day
    • Emphasis on low-fat and fat-free dairy
    • Look for calcium-rich (to avoid brittle bones)

• What is 1 cup of dairy?
  – 1 cup of yogurt
  – 1 cup of milk
  – 1.5 oz hard cheese
  – 2 oz. processed cheese
  – 2 cups cottage cheese

(1 cup from any above, need 3 cups)
Meat and Beans

- Old Food Guide:
  - 2-3 servings/day
- New Food Guide:
  - 5.5 to 6.5 oz./day

What is 1 oz. of meat/beans?
- 1 egg
- ¼ cup dried beans
- ½ oz. of nuts
- 1 oz. of lean meat
- 2 tbsp. of hummus

(1 oz. from any above, need ~ 6 oz.)
Oils

• Old Food Guide:
  – “Use Sparingly”

• New Food Guide:
  – 6-7 teaspoons/day
    • Emphasis on healthy fats!

• What is 1 tsp. of oil?
  – 1 tsp. of olive oil
  – ½ Avocado
  – 2.5 tsp. of Mayo

(1 teaspoon from any above, need 6 to 7 teaspoons)
Facts about Oils & Fat!

Good Fats:
- nuts
- olives
- some fish
- avocado
- olive oil
- safflower oil
- soybean oil
- sunflower oil

Bad Fats:
- butter
- beef fat (tallow, suet)
- chicken fat
- pork fat (lard)
- stick margarine
- shortening

How are oils different from solid fats?

All fats and oils are a mixture of saturated fatty acids and unsaturated fatty acids. Solid fats contain more saturated fats and/or trans fats than oils. Oils contain more monounsaturated (MUFA) and polyunsaturated (PUFA) fats. Saturated fats, trans fats, and cholesterol tend to raise "bad" (LDL) cholesterol levels in the blood, which in turn increases the risk for heart disease. To lower risk for heart disease, cut back on foods containing saturated fats, trans fats, and cholesterol.

http://www.mypyramid.gov/pyramid/oils_how.html
Focus on fruits. Eat a variety of fruits—whether fresh, frozen, canned, or dried—rather than fruit juice for most of your fruit choices. For a 2,000-calorie diet, you will need 2 cups of fruit each day (for example, 1 small banana, 1 large orange, and ½ cup of dried apricots or peaches).

Vary your veggies. Eat more dark green veggies, such as broccoli, kale, and other dark leafy greens; orange veggies, such as carrots, sweet potatoes, pumpkin, and winter squash; and beans and peas, such as pinto beans, kidney beans, black beans, garbanzo beans, split peas, and lentils.

Get your calcium-rich foods. Get 3 cups of low-fat or fat-free milk—or an equivalent amount of low-fat yogurt and/or low-fat cheese (1½ ounces of cheese equals 1 cup of milk)—every day. For kids aged 2 to 8, it’s 2 cups of milk. If you don’t or can’t consume milk, choose lactose-free milk products and/or calcium-fortified foods and beverages.

Make half your grains whole. Eat at least 3 ounces of whole-grain cereals, breads, crackers, rice, or pasta every day. One ounce is about 1 slice of bread, 1 cup of breakfast cereal, or ½ cup of cooked rice or pasta. Look to see that grains such as wheat, rice, oats, or corn are referred to as “whole” in the list of ingredients.

Go lean with protein. Choose lean meats and poultry. Bake it, broil it, or grill it. And vary your protein choices—with more fish, beans, peas, nuts, and seeds.

Know the limits on fats, salt, and sugars. Read the Nutrition Facts label on foods. Look for foods low in saturated fats and trans fats. Choose and prepare foods and beverages with little salt (sodium) and/or added sugars (caloric sweeteners).

Key food group messages from Dietary Guidelines & MyPyramid

Focus on fruits.

Vary your veggies.

Get your calcium-rich foods.

Make half your grains whole.

Go lean with protein.

Know the limits on fats, salt, and sugars.

(difficult to do all that every day)
Other Food Pyramids

The Traditional Healthy Vegetarian Diet Pyramid

The Traditional Healthy Mediterranean Diet Pyramid

Daily Beverage Recommendations:
- 6 Glasses of Water

Daily Recommendations:
- Wine in moderation
- Eggs
- Sweets
- Meat

Weekly Recommendations:
- Egg whites, soy milk & dairy
- Nuts & seeds
- Plant oils

Monthly Recommendations:
- Olive oil

Whole Grains

Fruits & Vegetables

Legumes & Beans

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Nutrient Losses in Food

• Soil depletion has reduced the nutrition in our foods. For example, USDA tests found for spinach:

In 1936, fresh spinach (100 grams) had vitamins = 158 mg

In 1965, fresh spinach (100 grams) had vitamins = 27 mg

Today, fresh spinach (100 grams) has vitamins = 3 mg

The nutrient content of food is reduced even further during processing, transport, and storage. Refining processes and cooking reduce nutritional value by destroying 20% to 50% of vitamins, most of enzymes, some amino acids, and leaches out minerals.

Sources: United States Senate Document 264 & U.S. Department of Agriculture
Nutrient Losses in Food

Most Deficient Nutrients in the American Diet
- Calcium
- Magnesium
- B-complex vitamins
- Antioxidants such as vitamin C, vitamin E, beta-carotene (vitamin A precursor), and selenium
Why Need Nutrition Supplements?

• To replace nutrients deficient in food or lost during food processing and preparation

• Impossible to eat a balanced diet every day

• Everybody has different nutritional needs
  – Nutrient requirements depend upon age, gender, physical condition, health status, etc.

• Nutrient absorption differs among people

• Many health problems are either caused or aggravated by nutritional deficiencies

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Journal of American Medical Association (JAMA) says that everyone should take vitamins. "Most people do not consume an optimal amount of all vitamins by diet alone. Pending strong evidence of effectiveness from randomized trials, it appears prudent for all adults to take vitamin supplements."
Nutrition-based Solutions

- Journal of American Medical Association (JAMA) says that everyone should take vitamins

“Recent evidence has shown that sub-optimal levels of vitamins, even well above those causing deficiency syndromes, are risk factors for chronic diseases such as cardiovascular disease, cancer, and osteoporosis. A large proportion of the general population is apparently at increased risk for this reason.”
Nutrition-based Solutions

Bad if not enough of a good thing (vitamin)

- **Symptoms of not getting enough vitamin A**
  - Visual impairment & eventual blindness, body’s ability to fight infection is weakened so more prone to diseases and death from severe infections

- **Symptoms of not getting enough vitamin B**
  - Upset stomach, muscular problems, headaches, anxiety, moodiness

- **Symptoms of not getting enough vitamin C**
  - Tiredness, muscle weakness, joint and muscle aches, bleeding gums

- **Symptoms of not getting enough vitamin D**
  - Soft/bowed bones at young ages & weak/brittle bones in old age

- **Symptoms of not getting enough vitamin E**
  - Nerve damage, loss of reflexes, muscle weakness, loss of balance

- **Symptoms of not getting enough vitamin K**
  - Easily bruised, frequent nose bleeds, gastrointestinal bleeding
Nutrition-based Solutions

Too much of a good thing (vitamin) is bad too

- Anything (salt, vitamins, etc.) can be harmful in excess
  - Fat soluble vitamins (A, D, E, K) stay in body longer & prone to overdose
  - Water soluble vitamins (B group, C) excess is readily excreted via kidneys

- Symptoms of vitamin A overdose
  - Tiredness, upset stomach, decreased appetite, vomiting, joint soreness, irritability, headache, dry/cracked lips & skin, hair loss, yellow skin

- Symptoms of vitamin D overdose
  - Extreme thirst, metal taste in mouth, poor appetite, weight loss, bone pain, tiredness, sore eyes, itching skin, vomiting, diarrhea, urge to urinate

- Symptoms of vitamin E overdose
  - Poor ability to clot blood and that poses a bleeding risk

- Symptoms of vitamin K overdose
  - Jaundice (yellow skin & eyes), anemia (low count of red blood cells)
Nutrition-based Solutions
Avoiding Vitamin Overdose

• National Institutes of Health (NIH) report in May 2006
  - Over half of U.S. adults use vitamins & supplements
  - NIH says “We don’t know a great deal” & called for more research
  - Know that calcium & vitamin D together help strengthen bones
  - Concerns mainly about people taking super-doses (more than 3X RDA)
  - Main culprits: Too much niacin (B3) can damage liver;
    excess vitamin A can cause fatigue and other problems;
    excess vitamin E can cause inhibit clotting so bleeding occurs
  - Take vitamins that are labeled at/near 100 percent of RDA
    (not super-doses exceeding 3X of recommended daily amount, RDA)

Note: USDA is replacing RDA with Dietary Reference Intake (DRI)

Office of Dietary Supplements (ODS) of National Institutes of Health (NIH)

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Nutrition-based Solutions

• Pill Vitamins are not same as Liquid Vitamins
  - Pill vitamins are difficult for body to absorb
  - Pills absorb only 20% (1996 PDR, p. 1542)
  - Typical liquid vitamins absorb 2X-3X to 40-60%
  - Special patented liquids absorb 90% to 100%
    (maximum “bio-availability”)

• Not all Liquid Vitamins are the Same
  - Lit search for best vitamins
  - Many suppliers: Biometrics, BodyBalance, SeaSilver, etc.
  - Select best one based on attributes of excellence
Attributes of Excellence for Vitamins

• FDA & OTC inspected/approved (now optional) facility
  - Pharmaceutical cleanliness vs. made in bathtub
  Note: 6/1/07 news article says FDA rules coming soon due to China poisons

• Bio-availability for absorption
  - Typical liquids (absorb 40-60%) vs. pills (20%)

• Patented technologies for maximum absorption
  - Micellization (absorb 90-100%), etc.

• Longevity in business
  - Many years vs. new start-up

• Customer feedback
  - Web search “company name” + “bad” or “complaint”

• Cost
  - Compare different supplier costs (typically $1 per day)

• Low Risk of Overdose
  - Less than 3X the RDA (recommended daily amount)
## Nutrition-based Solutions

### Attributes of Excellence for Vitamins

<table>
<thead>
<tr>
<th></th>
<th>Company 1</th>
<th>Company 2</th>
<th>Company 3</th>
</tr>
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<tbody>
<tr>
<td>FDA &amp; OTC approved</td>
<td>yes</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>Bio-availability (~ 50%)</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Patented absorb (~ 100%)</td>
<td>yes</td>
<td>no</td>
<td>no</td>
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<tr>
<td>Longevity of company</td>
<td>10 yrs</td>
<td>5 yrs</td>
<td>7 yrs</td>
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<tr>
<td>Customer feedback</td>
<td>no complaints</td>
<td>some</td>
<td>some</td>
</tr>
<tr>
<td>Cost (typically $1 / day)</td>
<td>lowest cost</td>
<td>varies</td>
<td>varies</td>
</tr>
<tr>
<td>Low risk of overdose</td>
<td>less than 3X RDA</td>
<td>varies</td>
<td>varies</td>
</tr>
</tbody>
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Nutrition-based Solutions

• Other Nutritional Supplements
  - Special supplements are sometimes needed

*Example*: Joint pain (wrist, elbow, shoulder, back, etc.) is a common problem often caused by synovial fluid (lubricating oil) that has aged. Synovial fluid can be rejuvenated by nutrition supplements that have been micellized for better absorption.
Nutrition-based Solutions

Summary of Nutrition Solutions

- Either be diligent (and it’s expensive) to eat all foods everyday per USDA food pyramid, or take vitamins (recommended by AMA)

- You are “what you absorb” (liquids vs. pills) (not “what you eat” but passes out with wastes)

- Liquid vitamins strengthen body at cell level so total body stronger to fight health problems
Summary

• **Engineering** *(traditional)*
  - Proactive: prevents future injuries
  - Use in all cases

• **Medical** *(traditional)*
  - Reactive: attempts to fix past injuries
  - Use when body cannot heal itself

• **Nutrition** *(new approach & no harm in trying)*
  - Can be useful both proactively & reactively
  - Reactive: injury not too bad (body can heal itself)
  - Proactive: stronger body to prevent injury
  - Can use in all cases (no harm in trying it)
Summary

• **Back Pain** (L5/S1 low-back disorders, etc.)
  - 30% of people in pain now
  - 80% in pain at some time during lifetime

• **Hand/Wrist Pain** (carpal tunnel syndrome, etc.)
  - 20% of people in pain now
  - 75% in pain at some time during lifetime

*Message:* Sooner or later nearly everyone *(including you)* has problems.
Summary

• **Engineering Solutions**
  - Solve root causes and prevent future problems but need solutions to help people already in pain

• **Medical Solutions**
  - External efforts to solve (typically 50% effective) & necessary when the body can’t heal itself

• **Nutrition Solutions**
  - Internal healing by body itself (best way) via vitamins and nutritional supplements (No harm in trying. Especially if still in pain now.)
Summary

• Questions?
Appendix

• Answers to questions that have been frequently asked in prior presentations

Q: What if I don’t take vitamins or nutrition supplements?

A: The only other way to get the vitamins and nutrients you need will be to be diligent (and it’s expensive) about eating all the foods every day as shown on the USDA food pyramid. If you don’t eat the right foods and if you don’t take vitamins, you will be at greater risk for ergonomics problems and other problems (heart, cancer, bones, etc.). (see JAMA article).
Appendix

• Answers to questions that have been frequently asked in prior presentations

Q: Are vitamins & nutrients all I need for healthy living?

A: No, vitamins/nutrients alone are not enough by themselves. Other factors influence health such as the following:
   - age, gender, strength, flexibility, regular exercise
   - adequate sleep, allow time for recovery from exertion
   - illness (diabetes, etc.), prior injuries, adequate water
   - body size/shape, obesity, alcohol, drugs, smoking
   - hobbies & sports
Appendix

• Answers to questions that have been frequently asked in prior presentations

Q: What are some ergonomic disorders that have been helped by taking vitamins and supplements?

A: Some are:

- Tendonitis - Inflamed tendon (connects muscle to bone)
- Tenosynovitis - Inflamed synovial sheath around tendons
- Epicondylitis - Sore/inflamed area on either side of elbow
- Carpal Tunnel Syndrome - Median nerve compression/pain
- Back Pain - Multiple causes (muscular, ligaments, discs, etc.)
Appendix

• Answers to questions that have been frequently asked in prior presentations

Q: What body parts benefit by vitamins/supplements?

A: Some are:

**Muscle** - Fibrous tissue that contracts to accomplish motion

**Tendon** - Elastic tissue that connects muscle to bone

**Ligament** - Inelastic tissue that connects bone to bone

**Bone** - Rigid and dense structural framework of the body

**Cartilage** - Tough fibrous tissue in joints, nose, ear, etc.

**Bursa** - Sac of lubricating fluid at friction points in joints
Appendix

• Answers to questions that have been frequently asked in prior presentations

Q: Please define ergonomics, biomechanics, and nutrition.

A: **Ergonomics** - The science of human work. The ultimate goal of ergonomics is to optimize the performance, health, safety, and comfort of people within human-machine-environmental systems. That is... To keep people safe, comfortable and productive while they perform work.

**Biomechanics** - The science of how the body works mechanically. That is… The study of forces produced by, acting upon, and acting within the human body.

**Nutrition** - The act or process of nourishing or being nourished. That is... All the processes by which an animal or plant takes in and utilizes food substances.
Appendix

• Answers to questions that have been frequently asked in prior presentations

Q: If I take vitamins, can I spend less on food?

A: Yes, because you’ll be satisfying daily needs via liquid vitamins, you can eat less expensive foods, and still be healthier. It’s expensive to eat all the right foods that are shown on the USDA’s food pyramid. So, by spending less on food, you can actually save more money on food than spent on vitamins-supplements (typically $1/day per item). In that way, you get your vitamins-supplements for free.
Appendix

• Answers to questions that have been frequently asked in prior presentations

Q: What companies supply liquid vitamins?
A: There are many suppliers.
   - Internet search for best vitamins (many suppliers)

Q: Are all liquid vitamins the same?
A: Not all liquid vitamins are the same.
   - Select best one based on attributes of excellence