Nutritional Considerations with Rheumatic Disorders

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

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

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

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

- Ten percent of the world's population and 25% of Americans have some degree of arthritis and approximately four million Americans are disabled by this disease.
- The Arthritis Foundation puts the cost of arthritis in America at $25,000 per minute, or $13 billion dollars per year in lost wages, lost time at work, medical care and lost taxes.
- Fourteen million work days are lost each year by arthritis victims.
- Every year 3 billion dollars are spent on medical care for American arthritics.
Possible Etiologies

- Psychological stress
- Abnormal biochemistry (diabetes mellitus, gout, scurvy, etc.)
- Infectious organisms/agents
- Concussion
- Allergic reactions
- Autoimmunity
- Tumors (attacking joints)
- Nutritional imbalances/deficiencies
Stages of Rheumatoid Arthritis
Stage I (Rheumatoid)

- PATHOLOGIC PROCESS
  - Presentation of antigen to T-cells
- SYMPTOMS
  - Probably none
- PHYSICAL SIGNS
  - None
- RADIOGRAPHIC CHANGES
  - None
Stage II

- PATHOLOGIC PROCESS
  - T-cell proliferation
  - B-cell proliferation
  - Angiogenesis in synovial membrane

- SYMPTOMS
  - Malaise
  - Mild joint stiffness and swelling

- PHYSICAL SIGNS
  - Swelling of small joints of hands or wrist or pain in hands, wrists, knees and feet.

- RADIOGRAPHIC CHANGES
  - None
Stage III

- **PATHOLOGIC PROCESS**
  - Accumulation of neutrophils in synovial fluid.
  - Synovial cell proliferation without polarization or invasion of cartilage.

- **SYMPTOMS**
  - Joint pain and swelling
  - Morning stiffness
  - Malaise and weakness

- **PHYSICAL SIGNS**
  - Warm swollen joints, excess synovial fluid, soft tissue proliferation within joints, pain and limitation of motion and rheumatoid nodules.

- **RADIOGRAPHIC CHANGES**
  - Soft tissue swelling
Stage IV

• PATHOLOGIC PROCESS
  – Polarization of synovitis into centripetally invasive pannus.
  – Activation of chondrocytes.
  – Imitation of enzyme proteinase (degradation of cartilage)

• SYMPTOMS
  – Joint pain and swelling
  – Morning stiffness
  – Malaise
  – Weakness
Stage IV (Continued)

• PHYSICAL SIGNS
  – Warm swollen joints more pronounced
  – Excess synovial fluid
  – Soft tissue proliferation within joints
  – Pain and limitation of motion
  – Rheumatoid nodules

• RADIOGRAPHIC CHANGES
  – MRI reveals proliferative pannus; radiographic evidence of periarticular osteopenia.
Stage V

• PATHOLOGIC PROCESS
  – Erosion of subchondral bone
  – Invasion of cartilage by pannus
  – Chondrocyte proliferation
  – Stretched ligaments around the joints

• SYMPTOMS
  – Joint pain and swelling
  – Morning stiffness
  – Malaise
  – Weakness
  – Loss of function and early deformity (ulnar deviation at metacarpophalangeal joint)
Stage V (Continued)

- PHYSICAL SIGNS
  - Warm swollen joints more pronounced
  - Excess synovial fluid
  - Soft tissue proliferation within joints
  - Pain and limitation of motion
  - Rheumatoid nodules
  - Instability of joints
  - Flexion contractures, decreased range of motion, extra-articular complications

- RADIOGRAPHIC CHANGES
  - Early erosions and narrowing of joint spaces
Substances Active in Rheumatoid Arthritis

- Substance P
- Substance K
- Cytokines
- T-lymphocytes
- Macrophages and Fibroblasts
- Neutrophils
- Transforming growth factor (TGF)
Rheumatoid Arthritis (Active Phase)

- Elevated plasma concentrations of inflammatory cytokines;
  - Interleukin-6 (IL-6), interleukin-1beta (IL-1beta), tumour necrosis factor-alpha (TNF-alpha) and acute-phase proteins.
  - Reduction of fat free body mass (FFM) with a loss mean of 15% of cell body mass (CM) and consequent reduction of muscle strength.

Clin Ter. 2005 May-Jun
Gut Inflammation

• Both in ankylosing spondylitis (ASP) and psoriatic arthritis (PsA), osteopenia is present in one-third of women and men, whereas osteoporosis mainly affects men, even in their 30s.

• Subclinical gut inflammation has been described in patients with AS or PsA. Joint involvement also occurs with other gastrointestinal diseases.

Rheumatol Int. 2010 Nov;30 such as celiac disease.
NSAIDs and Intestinal inflammation

- Recent advances in endoscopic techniques have revealed that aspirin and other nonsteroidal antiinflammatory drugs (NSAIDs) often cause mucosal lesions not only in the upper gastrointestinal tract, but also in the small intestine in humans.
- Gastric and duodenal lesions caused by NSAIDs can be treated with anti-secretory agents such as proton pump inhibitors or histamine H2-receptor antagonists; however, these drugs are ineffective in treating NSAID-induced lesions in the small intestine.

Curr Med Chem. 2012
Probiotics and Rheumatoid Arthritis

- Oral administration of L. casei together with CII and Gln more effectively reduced pain, cartilage destruction, and lymphocyte infiltration than the treatment of Gln or L. casei alone.
- This co-administration also decreased expression of various pro-inflammatory cytokines (interleukin-1β (IL-1β), IL-2, IL-6, IL-12, IL-17, tumor necrosis factor-α (TNF-α), and interferon-γ (IFN-γ)) and matrix metalloproteinases (MMP1, MMP3, and MMP13), while up-regulating anti-inflammatory cytokines (IL-4 and IL-10).
- These results are concomitant with reduced translocation of NF-κB into the nucleus and increased expression of the tissue inhibitor of MMP1 (TIMP1) and CII in chondrocytes.
Ankylosing Spondylitis and Inflammatory Bowel Disease

• Approximately 5 and 10% of cases of ankylosing spondylitis (AS) are associated with inflammatory bowel disease (IBD), either Crohn's disease or ulcerative colitis.

• A much larger percentage of AS patients have subclinical gut inflammation manifested either by endoscopic findings or by histology.

Best Pract Res Clin Rheumatol. 2006 Jun
Probiotics

• Direct Effects:
  – Production of inhibitory compounds (bacteriocins, short chain fatty acids, and others), by producing substrates that might promote the growth of colonizing microbes (secreted exopolysaccharides, vitamins, fatty acids, sugars from undigested carbohydrates and others), and by promoting immune responses against specific microbes.

• Indirect Effects:
  – Influence colonizing microbes by inhibiting attachment through stimulated mucin production, reinforcing gut barrier effects, and downregulation of gut inflammation, thereby promoting microbes that are associated with a healthier gut physiology.

J Clin Gastroenterol. 2011 Nov
Gout

- Alcohol consumption increased the risk of incident gout, especially beer and hard liquor.
- Several dietary factors increased the risk of incident gout, including meat intake, seafood intake, sugar sweetened soft drinks, and consumption of foods high in fructose.
- Diary intake, folate intake, and coffee consumption were each associated with a lower risk of incident gout and in some cases a lower rate of gout flares.
- Thiazide and loop diuretics were associated with higher risk of incident gout and higher rate of gout flares.

Curr Opin Rheumatol. 2011 Mar
Gout is a common and excruciatingly painful inflammatory arthritis.

- Emerging evidence suggests that gout is strongly associated with the metabolic syndrome and may lead to myocardial infarction, diabetes, and premature death.
- Gout has historically been considered a male disease but growing evidence suggests a substantial disease burden of gout among elderly women (up to 5% of women great than 70 years old)

Psoriatic Arthritis (PsA)

- A high prevalence of vitamin D insufficiency among PsA patients was found.

Arthritis Care Res (Hoboken). 2011 Oct
Psoriatic Arthritis

- The 25-OHD values are significantly lower in psoriatic patients than in control subjects.
- Low 25-OHD levels are negatively associated with C-reactive protein, an inflammatory activation marker, and with obesity.
- Psoriatic patients with a body mass index of 27 or more are likely to have vitamin D insufficiency.

J Am Acad Dermatol. 2012 Mar 1
Nutritional Considerations for Myalgia/Fibromyalgia

- Hypoglycemia
- Caffeine
- Alcohol
- Thiamin
- Magnesium
- CoQ10
- L–Carnitine
- Vitamin C
- Vitamin B12
- Vitamin D
- Biotin
- Selenium
- L-Tryptophan
- Zinc
Medications and Arthritis

- **Anti-inflammatory**
  - Aspirin
  - NSAIDs

- **Biologic Agents**
  - White blood cell modulators include:
    - abatacept (Orencia) and rituximab (Rituxan)
  - Tumor necrosis factor (TNF) inhibitors include:
    - Adalimumab (Humira), etanercept (Enbrel), infliximab (Remicade), golimumab (Simponi), and certolizumab (Cimzia)
  - Interleukin-6 (IL-6) inhibitors:
    - tocilizumab (Actemra)

- **DMARDs**
  - They are prescribed in addition to rest, strengthening exercises, and anti-inflammatory drugs.
  - Methotrexate (Rheumatrex) is the most commonly used DMARD for RA. Leflunomide (Arava) and sulfasalazine is also used.

- **Antimalarial**
  - hydroxychloroquine (Plaquenil)

- **Corticosteroids**
• Promotes the excretion of ascorbic acid
• Drug most likely to promote ascorbic acid tissue depletion
• May increase the vitamin C requirement by inhibiting leukocyte uptake and increase in urinary excretion
• Capable of producing folic acid depletion
• Chronic intake is a prominent cause of iron deficiency anemia.
Corticosteroids

- Can inhibit prostaglandin, thromboxane and leukotriene biosynthesis
- Can induce sodium retention
- Can induce potassium excretion
- Decreases the absorption of calcium and phosphorus
- Long term use can produce increased demands for folate, vitamin D, pyridoxine, ascorbic acid and protein.
Nutrient Relationships in Arthritis
Common Dietary Components

- Vitamins A and D, omega-3 and probiotics are now widely accepted to be essential to protect against many diseases with an inflammatory nature.

- High-fat diets are documented to exert multiple deleterious effects, including fatty liver diseases.

Mol Med. 2012 Feb 10
Vitamin B6 and Arthritis

- Levels of the pro-inflammatory compounds interleukin-6 (IL-6) and tumor necrosis factor-alpha (TNF-alpha) significantly decreased following 12 weeks of supplementation with 100 mg of vitamin B6.

EJCN (2010)
Homocysteine and Ankylosis Spondylitis

- A study found a significant prevalence of hyperhomocysteinemia in Mexican patients with AS mainly associated to a worst functional impairment.

Rheumatol Int. 2008 Oct;28
Homocysteine and Rheumatoid Arthritis

- Hyperhomocysteinemia is found in 20%-42% of patients with RA.
- Methotrexate therapy is the most common causative factor.

Joint Bone Spine. 2008 Jul;75
Ascorbic Acid

- Inflammation enhances the excretion of this nutrient
- Is shown to have anti-inflammatory properties
- Is shown to have anti-histamine effects
- Plasma levels are decreased by oral contraceptives
Selenium

- Antioxidant
- Has definite anti-inflammatory abilities in the human body
- Synergistic with vitamin E
- Supplements have been approved by the FDA in the treatment of arthritis in dogs.
- A group of 26 girls with juvenile chronic arthritis were found to have selenium levels that were lower than normal.
Zinc

- Arthritis patients have shown to have lower than normal zinc levels.
- Can inhibit the inflammatory process by altering the release of histamine.
- Synergistic with copper.
- Has shown to inhibit leukotriene's release.
- In a double blind study using 24 arthritis patients, zinc supplements provided noticeable improvement in morning stiffness, joint swelling, walking time and the patient's own impression of their condition.
- Diet and supplements should not exceed a 10:1 zinc to copper ratio.
Copper

- Copper is synergistic with the zinc in the body.
- Microcytic anemia with neutropenia is often indicative of this deficiency.
- Deficiency may lower enkephalin level.
- Arthritis victims often have higher than normal copper levels in their arthritic joints.
- Superoxide dismutase (SOD) is a potent antioxidant enzyme system in the human body that "mops up" destructive electron spills. There are various types of SOD, some containing zinc, copper, molybdenum and manganese.
Manganese

- Have improved the symptoms of arthritis.
- Involved with the antioxidant superoxide dismutase.
British researchers have found a major improvement in patients with both osteoarthritis and rheumatoid arthritis when supplemented with these two nutrients.

Pantothenic acid is required in large amounts under stressful situations.

L-Cysteine is an essential amino acid and sulfur containing.

Pantothenic acid is used up more rapidly during high stress situations which may be useful in treating certain cases of arthritis.

Arthritics who were given injections of 50 mg of calcium pantothenic daily (500% of the U.S.R.D.A) blood levels rose to normal and relief from many symptoms of arthritis were reported.

Pantothenic acids significantly reduce the duration of morning stiffness, degree of disability and severity of pain in arthritics.
• Several small studies have found that fish oil at dosages of at least 3 g per day (one study used 18 g per day).
  – Significantly reduced morning stiffness and the number of tender, swollen joints in patients with rheumatoid arthritis.
  – Beneficial effects were more common in patients receiving higher dosages of fish oil and were not apparent until fish oil had been consumed for at least 12 weeks.
It has been reported that reducing dietary intake of omega-6 fatty acids while increasing consumption of omega-3 fatty acids reduces the inflammatory mediators of rheumatoid arthritis and, consequently, allows some patients to reduce or discontinue use of nonsteroidal anti-inflammatory drugs.
Predominant Essential Fatty Acids in Common Oils

- **Omega-6 oils**
  - Borage oil
  - Cottonseed oil
  - Grapeseed oil
  - Peanut oil
  - Primrose oil
  - Safflower oil
  - Sesame oil
  - Soybean oil*
  - Corn oil

- **Omega-3 oils**
  - Fish oil
  - Canola oil
  - Flaxseed oil
  - Walnut oil
  - Soybean oil*
Oleic acid (Omega-9)

- Obesity is a well known risk factor for developing non-insulin dependent diabetes mellitus.
- Adipose tissue has been shown to produce tumor necrosis factor-alpha, which has the ability to reduce insulin secretion and induce insulin resistance.
- Oleic acid was found to be effective in reversing the inhibitory effect in insulin production of the inflammatory cytokine TNF-alpha.

Lipids Health Dis. 2009 Jun
Commonly asked questions

1. Will I receive a copy of the presentation slides?  
   **YES**

2. Is the presentation being recorded?  
   **YES**

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