One agent that is almost never considered as a “chondrocyte enhancing” agent is insulin-like growth factor-1 (IGF-1). IGF-1 is an anabolic mediator that stimulates articular chondrocyte matrix synthesis, augments articular repair and inhibits chondrocyte mediated matrix catabolism. Independent studies indicate that reduced growth and repair observed in degenerative cartilage disorders may be related to an inability of IGF-1 to exert its physiological and anabolic effects on chondrocytes.

According to Denko and Malemud, (Case Western Reserve University, 1999) “restoration of normal IGF-1 levels could play an important role in maintaining cartilage homeostasis in early osteoarthritis.” Animals treated with pentosan polysulfate (a chondroitin sulfate like molecule) and IGF-1 demonstrated a gross cartilage appearance that was normal; however, animals treated with pentosan polysulfate or IGF-1 alone showed gross signs of osteoarthritis pathology.

Research by Mobasheri presented in the Journal of Histology & Histopathology feels the published data shows endocrine factors or the lack thereof plays a significant role in osteoarthritis. In the symptomatic osteoarthritis patient, “There is a distorted growth hormone pattern.” Here’s how it unfolds in the osteoarthritic, “a reduction in IGF-1 (insulin-like growth factor) results in an increase in insulin-like growth factor binding protein (IGFBP) which binds the action of insulin-like growth factor -1. (IGF-1). In osteoarthritis cartilage the synthesis of insulin-like growth factor binding protein (GFBP) is three (3) times that of normal cartilage. However disruption of (IGFBP) restores anabolic response in human osteoarthritic chondrocytes.” And according to Arthritis Research Therapy, 6/28/04, downregulation of IGFBP through an increase in IGF-1 increases the cartilage matrix.

Dr. David Brownstein measured growth hormone (IGF-1) and then gave patients Gammanol Forte with FRAC (transferulic acid) 2, three times a day to 10 women ages 29-77 over a 5 week period. Interestingly, all 10 had their growth hormone increased and 8/10 had significant increases.

Enough scientific information has accumulated on both ferulic acid (FRAC) and gamma oryzanol to attribute beneficial properties to each. Both are potent dietary antioxidants, able to neutralize both superoxide and hydroxyl radicals. Serum lipid peroxide levels in menopausal women were normalized by oral gamma oryzanol supplementation, suggesting that a deficient antioxidant state was corrected. In addition to other antioxidants, ferulic acid (FRAC) has been shown to prevent carcinogenic nitrosamine formation in humans and inactivate some polycyclic aromatic hydrocarbon carcinogens in animals. Lipotrophic effects of gamma oryzanol have been studied intensively in Japan, where improvements in atherogenic indices were attributed to the phytosterol content. Anti-stress effects of gamma oryzanol and ferulic acid (FRAC) have been examined for humans with chronic gastritis, gastric ulcers, menopausal disturbances, head injuries, hormonal imbalances, stomatitis and other autonomic nervous system imbalances.

From animal studies, it appears that ferulic acid interacts with brain norepinephrine metabolism, possibly correcting deficiencies in norepinephrine. As a result, brain norepinephrine levels were normalized, with concomitant release of anti-stress hormones such as somatotropins and endorphins other studies have shown overall increases in lean muscle mass and strength.
Treatment Considerations:

Reduce Catabolic Factors as needed

1. Assess the presence of dysbiosis and/or lipopolysaccharide (LPS) in blood. Leaky gut is a major contributor to immune dysregulation often resulting in autoimmunity.

2. Increases in LPS increase cortisol. Increased cortisol increases IGFBP, insulin-like growth factor binding protein. Reduce cortisol with ADHS 3 bid. For serious cases, add Phosphatidylserine at night 3 at bedtime.

3. Normalize insulin. High levels of glucose will inhibit vitamin C transport into chondrocytes; (Note: LPS contributes to blood sugar dysfunction) therefore, evaluate blood sugar issues and assure minimum of 1000 mg per day in total supplementation. i.e., Bio-C Plus 1 bid.

4. Assure adequate thyroid function is present. Thyroid dysfunction increases IGFBP (insulin-like growth factor binding protein) and decreases IGF-1. (Note: LPS also inhibits healthy thyroid function therefore with thyroid symptoms optimize thyroid function.)

Increase Anabolic Factors as needed

1. Normal levels of IGF-1 are required for matrix molecule synthesis by chondrocytes, raise IGF-1 levels with Gammanol Forte with FRAC 2 tid.

2. Support pituitary/hypothalamus function to increase IGF-1, consider Cytozyme-PT/HPT 4 at bedtime.

3. Chondrocytes manufacture cartilage, therefore; assure chondrocytes are supplied proper nutrients. Aging results in a lowered ability to produce matrix molecules, glucosamine and chondroitin sulfate are proven to reduce progression of osteoarthritis and provide raw materials to feed chondrocytes. ChondroSamine-S 2-3 tid, reduce as flexibility increases and pain decreases.

4. Motion/Movement is an essential part of any therapy, because chondrocytes are isolated cells which are not furnished directly by a supply of blood vessels or lymphatics. They must obtain nutrients and get rid of waste products by diffusion and do not have a supply of nerves. Once the patient has been screened for more intense exercise, high intensity interval training has been shown to increase growth hormone by exercise.

5. Hydrate properly with filtered or pure water.

6. To assess pituitary using blood chemistry as a guide, if the TSH is <3.0 and hypothyroid symptoms are present, consider therapy at the pituitary level with Cytozyme-PT/HPT, Thyrostim and Iodizyme-HP.

Symptoms of thyroid hypofunction: fatigue, morning headaches that wear off during the day, increase in weight, sensitivity to cold, (rule out anemia and atherosclerosis), dry brittle hair, hair that falls out easily, dry, scaly or itching skin, reduced initiative, mental confusion, poor memory, low axillary temperature (below 97.8), muscle cramps at rest, reduced immune function, edema especially facial (myxedema), constipation, loss of outside portion of eyebrows, breast, ovarian or uterine cysts/fibroids, increase in serum lipids, increase or decrease in blood pressure, tinnitus, impaired hearing, depression, premature grey hair, red hair, type 1 diabetes, B-12/folate anemia, and vitiligo.
7. Growth hormone production at night is directed to muscle repair. Patient that says, “When I get up in the morning I’m hurting more than when I went to bed”. This patient is not repairing. Or if you give somebody an adjustment and they’re still sore a couple of day later, this is also a patient who is not repairing from normal physical stress. To increase hormonal repair:

   a. **Gammanol Forte with FRAC** 4 tablets at bedtime
   b. **Cytozyme PT/HPT** 2-3 tablets at bedtime

References:

2. Arthritis Res. Therapy, 6/28/04
3. Glucosamine, Chondroitin Sulfates & Arthritis trifold for quick overview chondroitin sulfate and glucosamine support and purity.
4. CD titled “Joint care and Repair.”