

Women and Loose Ligaments: The Relaxin-Collagen-Estrogen Issue

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It is natural for women to have increased ligamentous laxity and flexibility compared to men. This excessive laxity is the reason there is an increased incidence of patellar subluxations (knee joint issues), ligament sprains, and joint discomfort (especially hips, pelvis and lower back) seen in females, and especially female athletes. Why is this, and what are the implications for musculoskeletal health?

In short, women experience the double whammy of **Estrogen** and the hormone, **Relaxin**, the latter of which negatively effects important **Collagen** integrity at connective tissue and nerve-rich bone surface areas (periosteum). So, what does this mean?

Relaxin is a hormone only secreted by females, the highest levels being during the middle of the luteal phase (ovulation) of the menstrual cycle (days 20-23). During pregnancy, there is an increase in Relaxin to allow the loosening of ligaments so that the baby can pass through the birth canal. Therefore, **ligament laxity is normal during pregnancy**. However, the baby's position in the pelvic region during pregnancy, the lax ligaments to allow delivery, and the mother carrying her baby on her hip after the baby is born all contribute to a resultant **sacroiliac laxity** and lower back pain so common in women.

Relaxin's effects also include the production and remodeling of **collagen** (a dense fibrous strengthening and binding material that increases the elasticity and relaxation of muscles, tendons, and ligaments around bones and joints). **However, Relaxin has a direct negative effect on the strength of collagen**. And herein lies the problem, as explained below.

A continuous mass of collagen runs from each bone's surface, across joints through ligaments and joint capsule to the neighboring bones. Likewise, collagen extends from the periosteum (bone surface) into tendons; extends around and through muscles as the muscular fascia; recollects as another tendon; and inserts on another bone. With such responsibility at hand, it is of concern if a hormone like **Relaxin** actually **decreases** the effectiveness of what collagen is supposed to do — to create optimal structural/skeletal tensile strength to support movement and weight! For example, ligament laxity is especially present during pregnancy (and specific days in the menstrual cycle, as mentioned above) when the risk of ankle sprains and ligamentous injuries is highest.

So, where does **Estrogen** fit into the equation? That's easy — every articular (joint) cartilage has **Estrogen** receptors located on it. **Estrogen** is known to have a direct negative effect on cartilage and ligamentous tissue growth and repair, period, and especially in post-menopausal women.

The net effect of all of this is that the joints of females, even females who have no pain whatsoever, are not normal. They cannot possibly be normal because of all the negative effects of **Estrogen** and **Relaxin** as instigators. Because of the **double whammy of Estrogen and Relaxin**, women have increased ligamentous laxity and flexibility compared to men.

What are the Implications for Musculoskeletal Health?

It is worth knowing the health cycle of ligaments and cartilage to understand that **healing of ligaments, tendons and cartilage is a long slow process**. Expectations for rapid healing, especially among women, should be replaced with a good long-term wellness restoration plan. Why?

The turnover time (or half-life) of ligaments and cartilage is about one to two years. This means that about half of the cartilage or ligaments is regenerated about every 300 to 700 days. This is a very, very slow rate, given that most of our body recreates itself cell-by-cell within 30-90 days! Furthermore, if optimal remodeling of an injured ligament or tendon does occur, recovery is only about 80% of original! Consequently, our healing expectations need to be realistic given how our body attempts to restore itself from injury or disease.

There's a basic reason why healing is slower for connective tissues

Fibroblastic cells, which make the invaluable collagen, and **chondrocytes** that make cartilage tissue, are stable cells. This means they do not proliferate easily, unlike muscles loaded with red blood cells. The fibroblasts and chondrocytes are located at the fibro-osseous junction. This is where ligaments attach to bone or directly on the outside of the cartilage. This is an extremely nerve-rich area, and is the source of most felt pain and discomfort when injured.

In fact, most pain sensitivity at bone and joint areas is experienced via this hierarchy: the periosteum (outside of bone where ligaments attach and which is very nerve-rich), ligaments, tendons, fascia, and lastly, muscle. A theory is that the previously mentioned **fibroblast** and **chondrocyte** cells need to be stimulated to proliferate and aid in repair and remodeling.

Injury to tissue stimulates them to some degree. This is the theory behind direct proliferative therapy, or Prolotherapy, where light dextrose-based injections are often given at the fibro-osseous junction. This causes a massive stimulation of **fibroblastic** and **chondrocyte** growth, with the net effect being supposed ligament and cartilage growth. For most people Prolotherapy is impractical, expensive, unapproved by the AMA or insurance companies, and the results for relief and health restoration are very mixed (often with a heavy dose of initial pain, discomfort and inflammation after the procedure).

Certain forms of exercise can stimulate cellular growth. Resistance bands, for example, are very effective at superficial and deep muscle, connective tissue, and joint levels. Water aerobics is also very beneficial.

Article about the periosteum:

<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2826636/>

(Glick, J. The female knee in athletics. Physician and Sports Medicine. 1973; 1:35-37.; Powers, J. Characteristic features of injuries in the knees of women. Clin. Orthop. Rel. Res. 979; 143:120-124.)

(Lutter, J.M., Lee, V. Exercise in pregnancy. In Pearl AJ, (ed.), The Female Athlete in Human Kinetics. Champaign, IL: 1993; p. 81-86.)

(Rosner, I. Estradiol receptors in articular cartilage. Biochem. Biophys. Res. Commun. 1982; 106:1378-1382.)

Implications for Use of Herbal & Natural Remedies & Strategies

Movement/exercise plus a generous daily intake of water are invaluable for moving oxygen to cells and body systems, as well as to assist in flushing out cellular debris and toxins via the Lymph system. ***Movement and generous water are especially important as we age.*** This is because our tissues naturally become drier as we age. Water deficiency (actually, a significant issue with most people) is one of the major reasons for connective tissue injuries, pain, discomfort and inflammation, and slow recovery.

Movement and water must be part of anyone's healing protocol because they importantly help transport herbal remedies (either orally or topical) to key body areas. Dietary adjustment is critical as well, especially to eliminate inflammatory foods. Another critical strategy is daily applications of a topical Magnesium spray for immediate 100% cellular absorption. We dedicate a large portion of our website and educational outreach to helping people understand how this Master Mineral is critical to healing, cellular health, pain and sleep assistance, depression and anxiety, etc. We also have created a line of five Magnesium Sprays.

The nature of herbs for musculoskeletal issues is to work on the cause of a connective tissue or joint injury. They act as catalysts during the **inflammation, repair and remodeling** phases of an injury. This means they may help to regulate restoration of fluids (as in the synovial and bursae membranes), provide micronutrients to tissues and joints, assist in adjusting of connective tissue tensions during healing, and more. Herbs also have phytonutrients that aid in symptomatic relief, such as pain and inflammation, and can be a very safe and effective replacement for pain medications and aids.

It is important to use herbs that support musculoskeletal health, and to use them in both topical and oral ways for optimal benefits.

For decades, we have specifically focused on a few key herbs that work very well for bone, joint, cartilage and tissue health. One herb, Solomon's Seal, is especially prized for its diverse effectiveness. We have also added to its effectiveness by combining it with other herbs (like Horsetail, Pleurisy Root, Gravel Root, etc.) to create a synergistic (additive) effectiveness. For example, our most popular tincture, Formula #6: All-in-One is a very potent, high dosage

combination of herbs from our other formulas with renowned effectiveness. So, consider a good oral tincture as part of your healing strategy.

The skin is our largest organ and its absorbent qualities allow it to be a transporting vessel for healing herbs prepared as salves, lotions or transdermal sprays. A deep penetrating topical salve is instant therapy, especially if rubbed in well and/or applying moist heat afterwards (simply a heating pad placed over a slightly damp cloth) for 45 minutes or so.

Our body almost entirely recreates itself cell-by-cell within 30-90 days (more or less!). This should be seen as a kind of “healing window” that we can partake in with a healing protocol. During this window of time there is a lot of cellular birth, death, waste and regeneration that can be greatly assisted by nutrient-rich herbs. The key is **BE REGULAR!**

Many people wonder why they have not healed sooner than expected. There can be a number of reasons (for example, related to diet, stress, previous injuries, disease, etc.), but a major factor is lack of consistent devotion to a healing strategy within a compressed period of time, like 30-90 days.

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