CHAPTER 14

RESEARCH-SUPPORTED USES OF GOJI

Allergies

Usual dosage level: 2 - 4 oz. daily

In a study of goji berry reported in the *Journal of the Beijing Medical University* (1992), it was noted that goji reduced antibodies associated with allergy-type reactions, which was presumed to be accomplished through the mechanisms of promoting CD8(+) T-cells and regulating cytokines. Probably as a result of this activity, goji berry has also been reported to be a useful treatment for psoriasis.

Anti-Aging

Usual dosage level: 2 - 4 oz. daily

Goji's unique LBP polysaccharide complex has been found to be a powerful secretagogue (a substance that stimulates the secretion of rejuvenative human growth hormone by the pituitary gland).

Goji berries have been traditionally regarded as a longevity, strength-building, and sexual potency food of the highest order. In several study groups with elderly people, the berry was given once a day for three weeks. Many beneficial results were experienced. Nearly 70 percent of patients made impressive gains in their immune defense systems, with a tripling of T-cell transformation functions and a doubling of activity of white cell interleukin-2 (IL-2). The results also showed that spirit and optimism increased significantly in all patients. Additionally, nearly all patients reported improved appetite and better quality of sleep. More than 35 percent of the patients saw a marked recovery of sexual function.

Zhang (1993) studied the role of goji's unique LBP polysaccharides in fighting peroxidation, a primary cause of premature cell death. Dr. Zhang and his team measured the changes in the electrical parameters of

cell membranes after incubating living cells in a solution containing dangerous free radicals for six hours. They observed that the deadly effects of free radicals on the cells can be prevented and reversed by incubation with LBP polysaccharides.

Arthritis and Inflammatory Conditions

Usual dosage level: 4 oz. daily

The inflammatory free radical most often implicated in arthritis is known as the *superoxide anion*. Under normal conditions, the body is able to keep superoxide anions in check by producing the enzyme *superoxide dismutase* (SOD) to intercept and neutralize them before they can cause pain, inflammation and cell damage.

Extensive scientific research over the past 20 years has shown that, in acute and chronic inflammation, superoxide anions are produced at a rate that overwhelms the capacity of the body's SOD enzyme defense system to remove them. Such an imbalance results in superoxide-mediated damage.

Protective and beneficial roles of SOD have been shown in a broad range of diseases, both preclinically and clinically. The results from the latter studies prove the concept that superoxide anions have an important role in human disease, and that their removal by SOD does in fact result in beneficial outcomes.

One study in China found that the ingestion of goji resulted in a remarkable 40 percent increase of this extremely important anti-inflammatory enzyme.

Athletic Performance / Energy

Usual dosage level: up to 5 oz. daily

An animal study showed that goji's LBP polysaccharides induced a remarkable increase in exercise tolerance and stamina, and helped to eliminate fatigue. Goji LBP enhances glycogen storage (glycogen is the body's primary energy fuel).

Goji LBP also helps in post-workout recovery. It may limit sore muscles by increasing activity of the lactic acid removing enzyme *lactate dehydrogenase*. It also accelerates clearance of blood urea nitrogen, a toxin produced during exercise.

Blood Builder

Usual dosage level: 2 oz. daily

A study in China showed LBP facilitated stem cell proliferation and increased the number of monocytes in bone marrow. LBP helps the monocytes to convert to matured leukocytes.

The berry has also been used in a number of recent clinical trials for treatment of bone marrow deficiency conditions (low production of red blood cells, white blood cells, and platelets).

Another three-year clinical study investigated the effects of the goji berry on the immune, physiological and biochemical indexes of the blood of aged volunteers. The results indicated that the goji berry caused the blood of older people to revert to a markedly younger state.

Cancer Prevention

Usual dosage level: 2 oz. daily

Interleukin-2 (IL-2) is a crucial cytokine (cell protein) that induces potent antitumor responses in a variety of cancer models. Several plant polysaccharides have been shown to enhance the production of interleukin-2 (IL-2). Goji LBPs are particularly active in this regard; the enhancing effect of LBP on IL-2 activity was reported by the Institute of Pharmacology and Toxicology in Beijing (1989). In the U.S., IL-2 has been under study as an immune promoting factor since 1983, used for some cancers and for HIV infection.

Other studies from China show that goji berry inhibits the gene mutation induced by TA98 and TA100. Some scientists believe that goji may be a very good supplement to prevent liver cancer because it exerts liver protection and anticancer effects at the same time.

Cancer Management

Usual dosage level: 4 - 8 oz. daily

In one of the most positive studies yet conducted with goji, 79 advanced cancer patients were treated with the drug LAK/IL-2 combined with goji LBPs in a clinical trail studied by Cao GW et al (1994) at Second Military Medical University in Shanghai, China.

Their initial results indicated an amazing regression of cancer in patients

with malignant melanoma, renal cell carcinoma, colorectal carcinoma, lung cancer, nasopharyngeal carcinoma and malignant hydrothorax. The response rate was an astonishing 40.9 percent for the patients treated with LAK/IL-2 plus goji LBP, while the response rate for patients treated with LAK/IL-2 alone was only 16.1 percent. They also observed that the remission of cancers in patients treated with LAK/IL-2 plus goji lasted significantly longer than those treated without goji.

Their results indicated that goji berry polysaccharides can be used as an adjuvant in cancer therapy.

Another study from China showed LBP increased the sensitivity to radiation therapy and enhanced the immune system for cancer patients.

In one study on a group of cancer patients, the goji berry triggered an increase in both lymphocyte transformation rate and white blood cell count (measures of immune function).

The effect and the mechanism of LBP on inhibiting the growth of human leukemia HL-60 cells were examined. LBP could inhibit the growth of these leukemia cells, and also could induce their death (apoptosis).

Lewis Lung cancer cells were transplanted in C57 BL mice, and the anticancer effects of both goji polysaccharides and radiation were measured. Following the test, it was concluded that goji enhanced the effects of radiation in combating Lewis Lung cancer.

Cardiovascular Health

Usual dosage level: 4 oz. daily

The accumulation of lipid peroxides in the blood can lead to cardiovascular disease, heart attack, atherosclerosis and stroke. Our blood contains the antioxidant enzyme superoxide dismutase (SOD) to fight against lipid peroxidation, but levels of SOD decrease as we age. In a clinical study, goji berry consumption was accompanied by a remarkable 40 percent increase in SOD levels, and a decrease in lipid peroxides of an impressive 65 percent.

In another study, vital red blood cells were protected by flavonoids found in goji berries. The protective effects of the total flavonoids of *Lycium barbarum* goji berries on lipid peroxidation in liver mitochondria and

red blood cells of rats induced by oxygen radicals was investigated by Huang Y et al (1999) in China. They observed that the mitochondria lipid peroxidation was significantly inhibited by the total flavonoids of *Lycium barbarum* and the fluidity of mitochondria membrane was also protected effectively. The shape of red blood cell has remained intact for those with the addition of total goji berry flavonoids, while the shape of the control red blood cells was significantly damaged by oxygen radicals.

Diabetes (adult-onset, non insulin-dependent)

Usual dosage level: 2 oz., twice daily

Goji has been used in China for the treatment of adult-onset diabetes for many years, as it is said to balance blood sugar and insulin response.

Gastrointestinal Disorders

Usual dosage level: 3 oz. immediately before meals

The Mongolian Institute of Traditional Medicine reported that goji has been used in the treatment of atrophic gastritis, which is defined as weakened digestion due to reduced stomach activity. Patients consumed 10 grams of the whole fruits each time, three times daily before meals for two months and longer with excellent results.

Hypertension (high blood pressure)

Usual dosage level: 3 oz. daily

The effects of *Lycium barbarum* polysaccharides (LBP) on endothelial function were observed by Jia YX et al (1998) in China. Their results showed that the increase of blood pressure in the hypertensive rats could be prevented significantly by the treatment with goji LBP.

Immunity

Usual dosage level: 2 - 4 oz. daily

In a review of research on the goji berry appearing in *Recent Advances in Chinese Herbal Drugs*, Dr. Zhou Jinhuang points out that polysaccharides from goji berries enhance cell-mediated and humoral immune responses.

Even at a dose of just 5-10 mg/kg daily for one week (equivalent to 2 - 4 oz. of standardized goji juice), LBP polysaccharides could increase activity of the body's most powerful disease-fighting immune cells (T-cells,

cytotoxic T-cells and natural killer cells) in laboratory animals.

Many studies have shown the goji berry to increase the lymphocyte transformation rate and improve the macrophage phagocytic function in animals.

LBP assists spleen lymphocyte transformation induced by Concavalin A.

LBP increases the antibody reaction to T-cell-dependent antigen (SRBC), which means that LBP selectively strengthens the T-cell immune response.

LBP enhances the T-cell immune response by increasing the number of E receptors on the surface of T-cells or increasing the numbers of T-cells directly.

LBP also can be used to reduce lead toxicity because it inhibits the reduction of T-cells and delayed allergy activity induced by lead.

One study was done on seniors in China. This study showed after taking goji berries, lysozyme, IgG and IgA in serum increased in all participants. The activity of interleukin 2 (IL-2) was found to increase 2.26 fold in two-thirds of the participants.

Infertility

Usual dosage level: 5 oz. daily for four months

Goji berries have long been used by Asian physicians for the treatment of infertility. However, the active ingredients and the mechanism of action remain unknown. Wang Y et al (2002) tried to explore this area by studying the effect of goji polysaccharides (LBP) on cultured sperm epithelial cells. They reported that LBP inhibited hyperthermia-induced structural damage in murine seminiferous epithelium, in vitro. They also found that the goji polysaccharides extended the life of the cells.

Oxidative stress was reported to be a major cause of structural degradation and cell death in testicular cells. Wang Y et al (2002) assayed the effect of LBP on ultra-violet (UV) light-induced lipid peroxidation and cytochrome c reduction by free radicals. They found that the polysaccharides of goji berry were potent inhibitors of both reactions. Their results demonstrated the anti-oxidant mechanism of action for the protective effect of LBP and provided a scientific basis for the traditional use of goji berry for treatment of infertility.

Liver Protection

Usual dosage level: 1 - 2 oz. daily

A new cerebroside was isolated from the goji berry that could protect the liver cells of rats from the toxicity induced by carbon tetrachloride. In a further study, Kim SY et al (1999) postulated that the *Lycium* cerebrosides may preserve hepatic mitochondrial levels of glutathione by scavenging reactive oxygen species produced and thereby reduce lipid peroxidation and cellular damage.

Obesity

Usual dosage level: 2 oz. morning, 2 oz. afternoon

The goji berry has also been tested as an anti-obesity drug. Patients were given a tea made of the berries each morning and each afternoon. Results were excellent with most patients losing significant weight.

In an animal study, it was shown that goji polysaccharides enhanced the conversion of food into energy, and reduced body weight.

Periodontal Disease

Usual dosage level: 1 oz. as mouth rinse

The effects of goji on attachment and growth of human gingival fibroblasts to root surfaces *in vitro* were investigated by Liu B (1992) at Fourth Military Medical University in Xian, China. His results revealed that LBP (goji polysaccharides), even at low doses, could improve attachment and growth of fibroblast on the planed diseased root surfaces to a certain extent. His results suggested that goji may improve the formation of new attachment of periodontal tissue.

Sexual Dysfunction

Usual dosage level: 3 - 4 oz. daily

The goji berry has been given to treat sexual impotence. It was reported that by taking the berry orally, it could markedly increase androgen levels in the blood, making patients feel more energetic.

The goji berry is also legendary for helping to spark the passions. In fact, an old Chinese proverb cautions men who are traveling far from their wives and families: "*He who travels one thousand kilometers from home should not eat goji!*"

Vision Improvement

Usual dosage level: 2 oz. daily

Goji berries were very popular for their vision improvement properties in ancient China. Modern Chinese scientists found goji berries able to reduce dark adapting time and improve vision under subdued light.

Physiologic scotoma (blind spots) decreased and vitamin A increased in patients after taking goji berries.