Cherry blossoms are known as Sakura flowers in Japan and are considered a highly revered cultural symbol that reflects beauty and the season of spring, revealing the rebirth that happens as flowers bloom from the death of winter, and makes for a very apropos name of a botanical extract with anti-aging skin benefits. Sakura extract has potent bioactive compounds with beneficial effects on the skin, including anti-glycation, stimulation of fibroblast collagen production, moisturizing, whitening and other beautifying and anti-aging benefits. The most important compounds with bioactive effects include caffeoyl glucose (1-caffeoyl-O-\(\beta\)-D-glucopyranoside) and quercetin glucoside (quercetin-3-O-\(\beta\)-D-glucopyranoside). Sakura extract is an ingestible-cosmeceutical, or inside-out, beauty supplement ingredient and a topical hair care cosmetic ingredient.

**Glycation skin damage**

Glycation is the process by which excess sugars in the blood or in physiological fluids react with the internal proteins, including the skin, to form abnormal, toxic, inflammatory pigments known as AGEs (advanced glycation end products) and is also known as the Maillard reaction products. In addition, AGEs which are formed by the reaction of sugars with skin proteins such as collagen and elastin contribute to the progression of age-related diseases and diabetes (Dyer, 1993). Glycation of collagen and elastin in skin causes accumulation of AGEs, which results in intracellular damage from protein breakdown as the body tries to eliminate these toxic and abnormal substances. The accumulation of AGEs induces skin damage through the cross-linking of collagen fibers, which increases stiffness of the collagen network and eventually causes death of the skin fibroblasts. As collagen is damaged and skin becomes wrinkled and dull, the signs of aging progress much faster as a result of glycation and AGEs formation. “Anti-glycation” is an important approach in preventing aging while promoting healthy, youthful skin.

**Anti-glycation effects of Sakura**

Sakura extract has been found to reduce AGEs production and loss of skin fibroblast cells by carboxymethyl lysine (CML)-collagen induced apoptosis in studies by the Oryza Oil and Fat Co (Shimoda, 2011). In one of the studies, the bioactive components of Sakura extract and crude Sakura extract itself were added to a buffer solution containing D-glucose and bovine serum albumin at 60 °C and left to stand for 2 days. Crude Sakura extract at a low concentration of only 100μg/mL was able to significantly inhibit the production of AGEs. The major bioactive component, caffeoyl glucose, significantly inhibited the production of AGES at an even lower concentration of 10μg/mL. The flavonoid glycosides components present in the extract had the strongest inhibitory potency.

**Inhibition of fibroblast apoptosis**

Accumulation of AGEs in skin triggers skin damage and fibroblast cell death (Alikhani, 2005). The effect of crude Sakura extract and its bioactive components was also tested on fibroblast programmed cell death (apoptosis) due to the accumulation of glycated-collagen byproduct known as carboxymethyl lysine (CML)-collagen. Sakura extract and some of its isolated bioactive constituents, including caffeoyl glucose and quercetin glucoside, decreased caspase activity, which shows that apoptosis is suppressed.

**Anti-inflammatory effect**

An anti-inflammatory effect of Sakura extract on nitric oxide (NO) production from RAW264 cells was shown in an experiment. The Sakura extract from a concentration range of 10 to 100 μg/mL suppressed NO production induced by the pro-inflammatory lipopolysaccharide. Caffeoyl glucose, a component of Sakura extract, also suppressed NO production at a concentration range of 1 to 100 μg/mL (Hitoe, 2011).

**Anti-aging clinical study**

A double-blind, placebo-controlled clinical study of Sakura extract was used to evaluate the effect on skin appearance and beauty as related to aging. Twenty Japanese women between the ages of 30 and 60 with skin conditions participated. Subjects were given either 150 mg/day of Sakura extract or a placebo made with dextrin (150 mg/day) for 8 weeks, which was ingested after every meal to help control the effect of the glucose from the meal on aging parameters.

The results of the study found that Sakura extract caused a reduction of skin AGES, suppressed loss of skin elasticity, reduced pigmentation and reddish areas, suppressed increase in pore area, reduced the dryness of skin, and improved skin smoothness. Skin AGES decreased approximately 7% in 8 weeks with Sakura extract as compared with placebo, which decreased AGES by only 3%. Normally, AGES are reported to increase 1.5- to 2.5-fold during the aging timespan between 20 and 80 years old (Lutgers, 2006). Subjects with more than 2-fold AGES had a decrease of 8%, while subjects with less than a factor of 2
AGEs showed no changes. Sakura extract was found to decrease skin AGEs in subjects with high AGEs value. In addition, the formulation containing Sakura extract has been reported to improve various skin troubles (Yonei, 2013).

**Skin elasticity**
Elasticity in the placebo group decreased by approximately 13%, but with Sakura extract, the reduction was only 6%. The effect was without significance, though Sakura extract was found to suppress reduction of skin elasticity caused by seasonal changes.

**Pore size**
Evaluating the change in pores, no significant change was observed in the Sakura extract group. However, with the placebo group, there was a 20% increase in pores area, while Sakura extract was found to suppress increase in pores area.

**Moisture**
Significant decreases in skin moisture were observed in both groups (see Figure 1). The decrease in moisture in the Sakura extract group was 13%, while placebo showed a larger value of 16%. This test was performed from October to December, a dry season. The decrease in skin moisture seems is affects by air humidity. However, the decrease in the skin moisture of the Sakura extract group was less than placebo which shows a moisture retention benefit.

**Hair care**
A hair care benefit of Sakura extract was determined by treating hair with 2% surfactant solution and washing with running water, followed by treatment with 1% ammonia solution and 3% H₂O₂ for 40 minutes at 30 °C. The procedure was repeated 3 times to prepare the damaged hair. The damaged hair was soaked in 1% Sakura extract solution for 10 minutes at 40 °C and then washed and dried with both a towel and a dryer. The procedure was repeated 10 times and the appearance of hairs was compared. Hair feel was improved with Sakura extract by its ability to suppress increase in roughness of hair surface based on less damage of the cuticle. The extract also had a significant effect on hair moisture retention measured by secondary evaporating water loss.

**Cosmetic safety and acute toxicity (LD50) tests**
Mice given Sakura extract group at a dose of 2,000 mg/kg under a fasting condition and observed for 14 days did not show fatality, abnormalities in weight gain compared with control group, or abnormalities in organs upon autopsy. Cosmetic safety tests all passed for mutagenicity (Ames test), skin irritation test, alternative method (EpiSkin method), eye irritation test, patch test, and repeated insult patch test (RIPT).

**References**
- Shimoda H. et al., Effect of cinnamoyl and flavonol glucosides derived from cherry blossom glowers on the production of advanced glycation end products (AGEs) and AGE-induced fibroblast apoptosis. Phytotherapy Res. 2011; 25: 1328-35.