Resveratrol and Bone Health

everesveratrol™
better, naturally.
There is an increasing need to minimise bone loss

Bone loss is a significant risk factor in the development of osteoporosis. Osteoporosis is a major public health problem affecting more than 200 million people worldwide. Globally, osteoporosis causes more than 8.9 million fractures annually. With people living longer, and staying physically active well into their later years, it is now more important than ever to find new and better ways to reduce the risk factors associated with osteoporosis. One in three consumers are concerned about osteoporosis and want to improve their bone health.
Bone health, a matter of balance

- Bone is a living and dynamic tissue that constantly grows, repairs and renews itself.
- Maintenance of healthy bones requires a balance between bone resorption and bone formation.
- Old bone is degraded by bone-resorbing cells (osteoclasts) and is replaced with new bone produced by bone-forming cells (osteoblasts). (Figure 1)
- However, the delicate balance between bone formation and bone resorption is lost with ageing, where bone resorption overtakes bone formation, which may result in low bone density and osteoporosis.
- Low-grade inflammation and hormonal changes can also lead to bone loss and osteoporosis.

**everesveratrol can help improve bone health**

Micronutrients, such as calcium and vitamin D, can influence bone formation and resorption. Resveratrol, a stilbenoid with anti-inflammatory and antioxidant properties, has been shown to have beneficial effects on bone loss in two clinical and numerous preclinical studies.

**Increases spinal bone density in humans**

Metabolic syndrome is a condition linked to low-grade inflammation that can reduce bone density and lead to osteoporosis. In a 2014 study, 74 middle-aged obese men with metabolic syndrome were supplemented for 16 weeks with either 1,000 mg or 150 mg of everesveratrol daily or with placebo. The study sought to investigate the effects of our resveratrol on bone turnover markers, bone mass and structure in obese men with metabolic syndrome.
Results

- After 16 weeks of everesveratrol supplementation, the data show a dose-dependent increase in spinal bone mineral density, with a significant effect observed for the 1,000-mg dose (Figure 2).
- A significant increase in bone specific alkaline phosphatase (BAP) was observed in as little as 4 weeks and BAP remained elevated throughout the study, indicating that our resveratrol supplementation had a beneficial effect on bone health biomarkers.
- Data suggest that resveratrol supplementation affects bone primarily by stimulating formation or mineralisation.

Figure 2: Supplementation with our resveratrol leads to a significant dose-dependent increase in bone mineral density. RSV, resveratrol. a, *p=0.043 (between-group difference). b, *p=0.009 (within-group difference).

Increases bone density in animal models of menopause

In a recent study, resveratrol at doses of 5, 25 and 45 mg/kg/d protected ovariectomised rats, a model for post-menopausal osteoporosis, from osteoporosis-induced bone mineral density reduction. (Figures 3 and 4)

Figure 3: 3D reconstruction images of micro-CT showing improved bone structure in resveratrol supplemented rats. Control group (a), ovariectomy (OVX) group (b), low-dosed resveratrol (RES) group (c), medium-dosed RES group (d), and high-dosed RES group (e).
Figure 4: Bone mineral density (BMD) after treatment with our resveratrol. bl, baseline; pt, post-treatment; OVX, ovariectomy; RES, resveratrol. a, p<0.05 vs control group. b, <0.05 vs OVX group. Resveratrol dose-dependently increases bone mineral density.

**Resveratrol has been shown to support bone health through different mechanisms**

1. **Resveratrol can maintain the balance between bone resorption and bone formation**

Resveratrol can have a beneficial effect on bone health by affecting the balance between bone resorption and bone formation. In a recent study, 24 obese non-diabetic men were randomly assigned to 500 mg everesveratrol or placebo supplementation three times daily for 4 weeks.12 Supplementation with our resveratrol led to a significant increase in bone-specific alkaline phosphatase, an important biomarker of bone formation. (Figure 5)

![Figure 5](image-url)  
*Figure 5: Plasma levels of bone-specific alkaline phosphatase, an important biomarker of bone formation, increased significantly in the everesveratrol group as compared to placebo.*

2. **Resveratrol has an antioxidant effect in bones**

Women experience a 2–3 fold increase in iron accumulation as a result of menopause.21 Men over 40 years of age are also at high risk of iron overload.22 Excess iron can lead to increased oxidative damage, which can subsequently cause bone loss.23 A recent study showed that resveratrol was able to restore the activity of natural antioxidant enzymes and reduce oxidative damage in the bones of iron-overloaded mice.23 Its effects were even greater on a number of parameters than those of N-acetyl-glucosamine (NAC), the antioxidant used as a positive control (Figure 6), suggesting that other mechanisms are also important. Resveratrol not only restored expression of several genes inhibited by excess iron, but it also increased the level of FOXO1 expression, an important gene regulating bone formation.23

![Figure 6](image-url)  
*Figure 6: Oxidative stress induces loss of FOXO1. Resveratrol reduces this loss and thereby reduces the oxidative damage induced by iron. NAC, N-acetyl-cysteine, a well-known antioxidant serving as a control. RES, resveratrol. a, p<0.05 compared to control. b, p<0.05 compared to iron-treated group.*

3. **Resveratrol has anti-inflammatory properties – a potential benefit for joint health**

The anti-inflammatory properties of resveratrol may have a potential role in improving joint health. Its activation of SIRT1 suppresses the NF-kB signalling pathway, a key mediator of inflammation in joints affected by arthritis.24,25 Resveratrol has also been shown to help protect cartilage in an animal model of osteoarthritis.26

**Resveratrol – a new ingredient for bone health**

- A key addition to calcium and vitamin D supplements
  - Many people take calcium and vitamin D supplements to help maintain healthy bones. Calcium is one of the most important and abundant minerals in bone. Vitamin D facilitates absorption of calcium.
    - Resveratrol may help support bone health in a different way
      - Research has shown that resveratrol stimulates osteoblasts and inhibits osteoclasts
      - Results from clinical studies suggest that resveratrol may help maintain the balance between bone formation and resorption
    - There is a limited choice of safe and affordable natural products supported by clinical evidence to help reduce the risk factors associated with osteoporosis
    - Resveratrol is an ingredient suitable for management of bone health
What is resveratrol?

Resveratrol is a stilbenoid, a natural polyphenol produced in several types of plants to protect against environmental stress factors. Resveratrol can be obtained from different sources such as grapes, red wine, peanuts and berries.

everesveratrol

Our resveratrol is manufactured using a unique and patented fermentation process resulting in a product with over 98% purity.

Uncompromised quality

- GRAS status in the US for dietary supplements and functional foods applications
- European Novel Foods approval by substantial equivalence
- Free from emodin or any other anthraquinones that may occur in other sources and cause digestive discomfort
- Pesticide-, herbicide-, PAH-, and allergen-free
- Not derived from chemical synthesis or from plant sources that may vary in quality
- Preferred Supplier Status from the National Animal Supplement Council (NASC)

A versatile ingredient

High-purity, odourless, tasteless and off-white, our resveratrol is ideally suited for a broad range of products, from capsules and soft-gels for dietary supplements, to more complex applications in foods, beverages, animal nutrition and personal-care products.

References


About Evolva

Evolva was founded in 2004 and today has operations worldwide. Based on a strong research foundation, we focus on producing high-value ingredients for use in applications for health, wellness, and nutrition. For more information, visit www.evolva.com

Evolva is advancing sustainable products that are in harmony with nature and biological diversity. We set aside 1% of our product-derived revenues to support the conservation of biodiversity as well as for science education in poorer countries.

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