

Strontium, The Greatest Mineral You Never Heard Of

In the very late 1700s, when the Industrial Revolution was gathering steam across Europe, the demand for metals to produce machine parts and tools was increasing, as well as the demand for metallic ingredients to produce industrial chemicals. In the small town of Strontian along the west coast of Scotland, they had been operating a mine whose primary mineral yield was lead. A host of other minerals could also be found in the lead ores, namely barium. Barium was a very dense mineral that was used mostly for eliminating oxygen in order to produce vacuum tubes.

A chemist named Adair Crawford was studying varying properties of barium throughout the United Kingdom and noticed something unusual about the barium ore in Strontian. It had a strange yellowish metallic substance within it that possessed different properties than any of the other barium ores he had encountered before and proposed that it could be a new element. Three years later, it was named *Strontites* by Professor Thomas Hope of the University of Glasgow.

It was not officially recognized as an element, however, until it was isolated in 1808 by the renowned bio-chemist Sir Humphry Davy, famous for his discovery and isolation of chlorine, sodium, calcium, and other alkaline earth metals. He used electrolysis to isolate this new element and in keeping with the other alkaline earth metals, changed the name to *Strontium*.

Since its full fledged recognition as an element, a myriad of uses were found

for this highly reactive element, including paint dyes, fireworks, television tube treatment, and even for certain medicinal uses, but these were primarily restricted to cancer treatments where it was used as a targeting agent. For nearly a hundred and fifty years, the idea that this mineral might actually be vital to human health was hardly considered.

It wasn't until mid-20th century that certain discoveries revealed that strontium might actually play a role in maintaining the health of bones and teeth. The first clue was found by a French researcher who discovered that a lack of strontium in the diet created abnormal skeletal and tooth development in rodents.

This discovery opened that door to new research avenues to explore that role that strontium played in skeletal development. One of the earliest human trials of the effects of strontium on bone health was conducted at the Russell Sage Institute of Pathology by Ephraim Shorr and Anne Carter in 1942. They gave a group of people 1700mg per day of strontium lactate and then followed them from three to four months and up to several years. The results were powerful.

The primary result was that strontium greatly benefited people with osteoporosis by improving their ability to retain essential minerals like phosphorus and calcium. It was even shown that strontium could increase the maximum amount of calcium that an individual could absorb and retain and prevent them from reaching a calcium "plateau" .

The most inspiring result, however, was that those people with osteoporosis experienced relief from many of their symptoms. They had significantly less bone pain, they felt

stronger, and they engaged in more physical activity. Though this study was done without a control group, was not double blind placebo controlled, there was little doubt that strontium had great potential for greatly improving bone health in individuals of all types. The real question now was, "How does it do it?"

It was not until scientific advances in bone analysis were made that any real progress could be made in answering that question, though several hypothesis had been made. By the mid-1980s, the technology had finally been developed that could accurately measure bone density in a living person.

Using these methods, several small pilot studies laid the groundwork work and showed strong promise for strontium, clearing the path for European researchers to conduct the first large scale, double-blind placebo-controlled studies on the effects of strontium on bone density in both healthy individuals and those with skeletal diseases.

The first study took 353 women and divided them into four categories. Every group quit any osteoporosis medications and took calcium and vitamin D3 supplements, along with either a strontium supplement in 170, 340, or 680 mg/day, or a placebo. The study lasted for three years.

It was not until two years after the study ended, and the study was un-blinded, that anyone knew which patients were taking the strontium, or at what dosage. The word used to describe the results was "powerful". Effectively, the study showed that taking strontium increased bone mass, and the greater the dosage: the greater the increase in bone mass. The women who consumed the

placebo, with just calcium and D3 did have an increase in bone mass, approximately 0.5% per year. The women who took the strontium supplements experienced much greater gains. Those taking the 170mg/day dosage reported a gain of 1.35%. 1.65% on 340mg/day and a whopping 2.97% per year on 680mg/day.

Those results reflected the gains in bone mass detected in the lower spine. The bone mass measurements taken from the hip bone also tell an interesting story. The women on the placebo, despite taking calcium and D3 experienced a loss in hip bone mass of 0.57% per year. Again, the results of the strontium supplementation showed remarkable improvement. On the lowest dosage, 170mg/day, the women showed a gain in bone mass of 0.24% per year. At 680mg/day, the gain soared to 3.05% per year!

The research doesn't stop there. A much larger second study was conducted on over 1600 women with osteoporosis who again took calcium and D3 supplements as well as either a strontium placebo, or a 680mg dosage of strontium over the course of three years.

After the study was un-blinded, the results were strong again in favor of strontium. As expected, strontium again increased bone mineral density. The women on the placebo suffered a loss of BMD in their lower spine of 1.3% over the three year period while the women on the strontium experienced a strong gain in BMD of 14.4%!

Due to the length of the study, they were also able to evaluate strontium's effects on fracture risk. At the beginning of the study, nearly 90% of

the women had suffered at least one vertebral fracture. At the end of the trial, it was discovered that the strontium group had suffered 41% less vertebral fractures than the placebo group. Though the risk level itself effect may be debated, or attributed to chance and circumstance, the possibility that strontium could reduce the likelihood of fracture simply as a fringe benefit to increased bone density is too good to pass up.

What science has determined is reason for strontium's effectiveness is its effect on the two enzymes that play the greatest role in bone repair and development: osteoblasts and osteoclasts. Osteoblasts are "bone builders". The bones in your body now are not made of the same bone that you had when you were a kid. Just like every cell in your body dies and gets replaced by a new one, the same goes for your bone tissues. Osteoblasts are responsible for creating new bone tissue.

Osteoclasts, on the other hand, have the important job of removing old and worn bone tissue to make way for the osteoblasts to replace it with newer stronger bone. Where this turns into a problem is that as we get older, the balance between these two enzymes becomes altered and our osteoblasts become inhibited, especially in women during and after menopause when their hormonal changes impact these enzymes. With osteoblasts under producing, and osteoclasts over consuming, the result is that the body is consuming its own bones faster than it is replacing them.

Many of the contemporary osteoporosis medications attempt to resolve this problem by inhibiting the osteoclasts which simply means that the same bone tissue will simply get worn out without getting replaced, and

is simply a method of deferring the problem in an attempt to delay the inevitable.

Strontium does two things: it inhibits osteoclasts from consuming old bone tissue (similar to osteoporosis medications), and it stimulates osteoblasts activity, which increases the rate of new bone tissue formation. This is something that neither calcium supplements, nor most osteoporosis medications can do.

While there are some new medications that attempt to stimulate osteoblasts activity, strontium has not been found to have any harmful side effects even at doses of 1700mg/day, unlike most medications. This means strontium may be the safest and most effective osteoporosis option that currently exists.

It's important to know, however, that calcium and strontium supplements should not be taken together, not because it is not safe, but because they are both absorbed through the same pathway in the digestive tract and they cancel each other out and you will not get the benefits of either nutrient.

Even though supplement forms of strontium have not shown any side effects, every person is unique and should consult a qualified medical professional before making any major changes to their diet, or supplement regimen.



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