



INE | INSTITUTE OF
NUTRITIONAL
ENDOCRINOLOGY

Micronutrients: Strontium

Dr. Ritamarie Loscalzo



Medical Disclaimer: The information in this presentation is not intended to replace a one-on-one relationship with a qualified health care professional and is not intended as medical advice. It is intended as a sharing of knowledge and information from the research and experience of Dr. Ritamarie Loscalzo, drritamarie.com, and the experts who have contributed. We encourage you to make your own health care decisions based upon your research and in partnership with a qualified health care professional. This presentation is provided for informational purposes only and no guarantees, promises, representations or warranties of any kind regarding specific or general benefits, have been or will be made by Dr. Ritamarie Loscalzo, her affiliates or their officers, principals, representatives, agents or employees. Dr. Ritamarie Loscalzo is not responsible for, and shall have no liability for any success or failure, acts and/or omissions, the appropriateness of the participant's decisions, or the use of or reliance on this information.



Strontium General Info

- ✓ Silvery metal, non-radioactive element
- ✓ About 99% of the strontium in the human body is concentrated in the bones
- ✓ Radioactive strontium-89 is given intravenously for prostate cancer and advanced bone cancer
- ✓ Strontium chloride is the most common form of strontium found in dietary supplements
- ✓ Body contains 320 to 400 mg of strontium



Strontium Uses/Functions

- ✓ Strontium chloride hexahydrate is added to toothpaste to reduce pain in sensitive teeth
- ✓ Strontium ranelate can increase bone formation and prevent bone loss when used in postmenopausal women with osteoporosis
- ✓ A radioactive form of strontium may kill some cancer cells
- ✓ Might boost the formation of collagen and cartilage in joints
- ✓ Fewer dental caries (cavities) in some population groups who drink public water that contains relatively high levels of strontium



Strontium Safety

- ✓ Strontium is **LIKELY SAFE** when taken by mouth in amounts found in food; the typical diet includes 0.5 to 1.5 mg/day of strontium
- ✓ The prescription form of strontium, known as strontium-89 chloride, is also **LIKELY SAFE** when given intravenously (by IV) under the supervision of a healthcare provider
- ✓ Toothpastes (Sensodyne-SC) that contain strontium are also **LIKELY SAFE** and have received safety approval from the U.S. Food and Drug Administration (FDA)
- ✓ Taking another prescription form of strontium known as strontium ranelate by mouth for up to 56 months is **POSSIBLY SAFE**; strontium ranelate might cause side effects such as stomach pain, diarrhea, and headache in some people
- ✓ Taking very high doses of strontium by mouth is **POSSIBLY UNSAFE**; High doses of strontium might damage the bones



Strontium Precautions & Warnings

- ✓ **Paget's disease (a bone disease):** The bones of people with Paget's disease seem to take up more strontium than normal
- ✓ **Kidney problems:** Strontium is eliminated by the kidneys and can build up in people with poor kidney function
- ✓ **Blood clotting disorders:** Strontium ranelate is associated with a small increased risk of blood clots



Strontium Precautions & Warnings: Pregnancy

- ✓ **Pregnancy and breast-feeding:**
Strontium is **LIKELY SAFE** during pregnancy and breast-feeding when taken by mouth in food amounts or when used in toothpaste (Sensodyne-SC)
- ✓ Strontium-89 is **LIKELY UNSAFE** during pregnancy and breast-feeding; it's a radioactive material that might harm the fetus; may also pass into breast milk and could harm a nursing infant



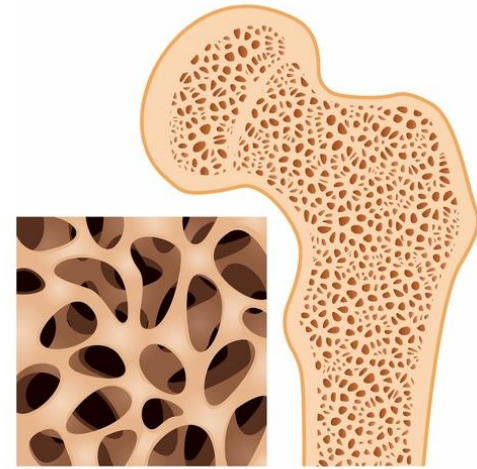
Strontium and Bone Strength

- ✓ Strontium increases bone density and both trabecular and cortical strength, making bones denser and thicker, but they lack ductility and tensile strength
- ✓ Tensile strength is the ability of a material to resist stretching and pulling and is different from compressive strength
- ✓ Compressive strength is the ability to resist compression or crushing
- ✓ Bone compressive strength is always much greater than tensile strength; tensile strength must therefore be of primary concern

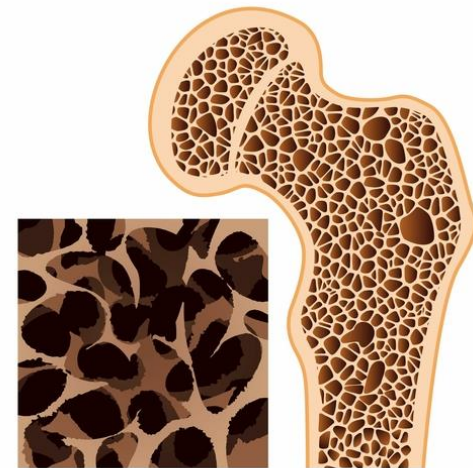


Strontium Mayo Clinic Study

- ✓ 22 individuals with severe (and painful) osteoporosis
- ✓ Part of the group took 1,700 milligrams of strontium daily
- ✓ Another group took the same amount of strontium with estrogen and testosterone
- ✓ In the "hormones plus strontium" group, 9 of 10 people experienced marked improvement of their symptoms, and the other one had moderate improvement
- ✓ In the strontium-only group, 18 of 22 had marked improvement, and the other four had moderate improvement



Healthy bone



Osteoporosis



Strontium Osteoporosis Research

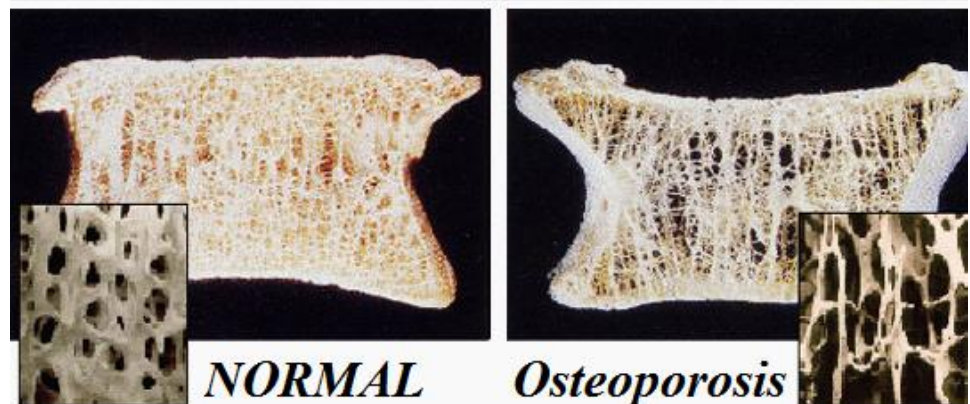
In a three-year, randomized, double-blind, placebo controlled study using 680 milligrams of strontium daily, women suffering from osteoporosis had a **41 percent reduction in vertebral fractures** compared with placebo. The overall vertebrae density in the strontium group increased by 11.4 percent compared to a 1.3 percent *decrease* in the placebo group.

Strontium Ranelate Reduces the Risk of Nonvertebral Fractures in Postmenopausal Women with Osteoporosis: Treatment of Peripheral Osteoporosis (TROPOS) Study. J Clin Endocrinol Metab. 2005 May; 90(5):2816-22. Epub 2005 Feb 22.



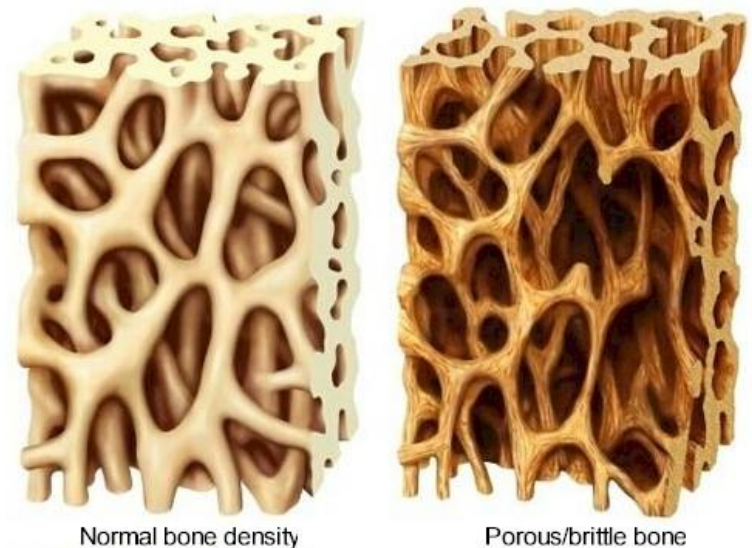
Strontium Osteoporosis Research

- ✓ 353 women who had already experienced at least one osteoporosis-related vertebral fracture took varying levels of strontium ranelate or a placebo. In the group who took 680 milligrams of strontium daily, there was a **3% increase in lumbar bone mineral density per year**, significantly greater than placebo. At the end of the second year of the study, there was a significant decrease in fractures in the strontium group compared to placebo.



Strontium Osteoporosis Research

- ✓ 2002 randomized, double-blind, placebo-controlled trial
- ✓ 160 post-menopausal females who did not have osteoporosis were asked to take a placebo or varying amounts of strontium daily
- ✓ Compared to the placebo group, women who took 340 milligrams strontium a day had a **significant increase in bone mineral density in two years' time**
- ✓ All groups also took 500 milligrams of calcium daily, but no hormones or vitamin D



Adverse Effects of Strontium

- ✓ Nausea
- ✓ Skin irritation
- ✓ Blood clots
- ✓ Fainting
- ✓ Strontium competes with calcium absorption
- ✓ Strontium causes the outer cortical bone to become thicker, actually reducing tensile strength; this increases the risk of fractures
- ✓ Strontium is denser than calcium; it is difficult to assess actual bone improvement in a DEXA scan



Strontium Supplementation

Prevention: 200-400 mg per day

- ✓ Strontium citrate
- ✓ Strontium lactate
- ✓ Strontium carbonate
- ✓ Strontium gluconate
- ✓ Strontium ranelate: a prescription drug where the ranelate molecule is a patentable synthetic chemical
- ✓ Strontium chloride
- ✓ Strontium sulfate



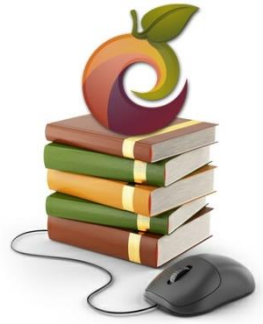
Food Sources of Strontium

- ✓ Unrefined whole grains
- ✓ Seafood
- ✓ Spinach
- ✓ Lettuce
- ✓ Carrots
- ✓ Peas

- ✓ Beans
- ✓ Celery
- ✓ Root vegetables
- ✓ Spices
- ✓ Leafy greens



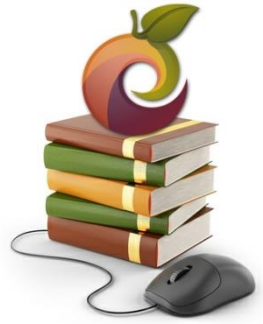
Strontium Resources: 1



- ✓ Greenwood, Norman N.; Earnshaw, Alan (1997). Chemistry of the Elements (2nd ed.). Butterworth-Heinemann. p. 112. ISBN 0-08-037941-9.
- ✓ <http://www.drritamarie.com/go/StrontiumDemystified>
- ✓ Boivin, Deloffre, Perrat, et al.. Strontium distribution and interactions with bone mineral in monkey iliac bone after strontium salt administration” Journal of Bone and Mineral Research. 11:1302-1311. 1996.
- ✓ Jiang, Arlot, Genant, et al.. “Histomorphometric and μ CT analysis of bone biopsies from postmenopausal osteoporotic women treated with strontium ranelate.” Journal of Bone and Mineral Research. Feb; 23 (2): 215-22. 2008
- ✓ Picking a bone with contemporary osteoporosis management: Nutrient strategies to enhance skeletal integrity. Clinical Nutrition (Epub ahead of print, 2006 October 12).



Strontium Resources: 2



- ✓ The effects of strontium ranelate on the risk of vertebral fracture in women with postmenopausal osteoporosis.” New England Journal of Medicine 350 (2004): 459 - 68.
- ✓ Strontium ranelate reduces the risk of nonvertebral fractures in postmenopausal women with osteoporosis: Treatment of Peripheral Osteoporosis (TROPOS) study. Journal of Clinical Endocrinology and Metabolism 90 (2005):2816 - 22.
- ✓ Strontium in Finnish foods. International Journal for Vitamin and Nutrition Research 52 (1982): 342 - 50.
- ✓ Gaby AR. Preventing and Reversing Osteoporosis. Rocklin, CA: Prima Publishing, 1994, 85–92 [review].
- ✓ Strontium ranelate: a dual mode of action rebalancing bone turnover in favour of bone formation. Curr Opin Rheumatol. 2006 Jun;18 Suppl 1:S11-5.

 <http://www.drritamarie.com/go/StrontiumEfficacySafety>