INE | INSTITUTE OF NUTRITIONAL ENDOCRINOLOGY

Micronutrients: Boron

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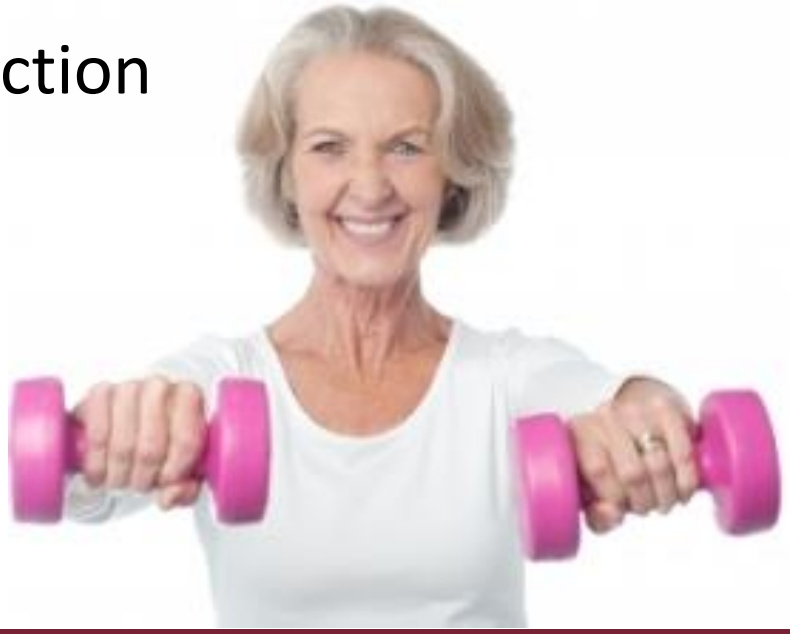
Medical Disclaimer: The information in this presentation is not intended to replace a one-on-one relationship with a qualified health care professional and is not intended as medical advice. It is intended as a sharing of knowledge and information from the research and experience of Dr. Ritamarie Loscalzo, 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.

Boron Basics

- ✓ Needed in trace amounts (.5 mg to 3 mg)
- ✓ Necessary for healthy bones and muscle growth
- ✓ Assists in the production of natural steroid compounds within the body
- ✓ Necessary for the metabolism of calcium, phosphorus, and magnesium
- ✓ Enhances brain function and promotes alertness
- ✓ Plays a role in how the body utilizes energy from fats and sugars
- ✓ Used to be used (until 1920's) as boric acid (borax) to preserve foods

Boron Functions - 1

- ✓ Helps to prevent postmenopausal osteoporosis and to build muscle
- ✓ **Mediates inflammation:** Reduces both COX-2 and LOX enzymes, decreases leukotrienes, and increases removal of reactive oxygen species and possibly reduces T cells
- ✓ Helps to preserve cognitive function



Boron Functions - 2

- ✓ Role in cell membrane function and stability
- ✓ Role in embryogenesis
- ✓ Enhances estradiol action on bone and promotes absorption of minerals
- ✓ Decreases blood glucose and triglycerides
- ✓ Has been shown to shrink prostate tumor size, lower blood levels of PSA, and may help prevent prostate cancer

Digestion and Absorption of Boron

- ✓ 85% of ingested Boron thought to be absorbed by passive diffusion
- ✓ Absorbed and excreted as $B(OH)_3$
- ✓ Found in blood as $B(OH)_2$ (boric acid) $B(OH)_3$ (orthoboric acid) and $B(OH)_4^-$ (borate anion)
- ✓ Found mainly in bone, teeth, nails, and hair
- ✓ 70% excreted in urine, 13% or less in feces, and small amounts in sweat

Boron Interactions

- ✓ Boron might increase estrogen levels in the body
- ✓ Boron supplements can lower the amount of magnesium that is flushed out in the urine
- ✓ Supplemental boron might reduce blood phosphorus levels in some people

Boron Deficiency

- ✓ Deficiency is rare
- ✓ Deficiency accentuates vitamin D deficiency
- ✓ Osteoporosis and osteopenia
- ✓ Studies have shown that in areas of the world where the level of boron in the soil is low there are a greater number of people suffering from arthritis

Boron RDA

- ✓ **There is no RDA for Boron**
- ✓ Diets high in boron provide 3.25 mg of boron per 2000 kcal per day
- ✓ Diets low in boron provide 0.25 mg of boron per 2000 kcal per day
- ✓ The Tolerable Upper Intake Level (UL) is:
  - ➢ 3 mg per day for children 1 to 3 years old
  - ➢ 6 mg per day for children 4 to 8 years old
  - ➢ 11 mg per day for children 9 to 13 years old
  - ➢ 17 mg per day for adolescents 14 to 18 years of age
  - ➢ 20 mg per day for adults and pregnant or breast-feeding women over 19 years of age

Dietary Sources of Boron

- ✓ Apples
- ✓ Carrots
- ✓ Grapes
- ✓ Dark green leafy vegetables
- ✓ Almonds
- ✓ Raw nuts
- ✓ Pears
- ✓ Whole grains

Boron Content in Foods (mg/kg)

Range .5 to 3.5 mg per day

Fruits	
Apple, red with peel, raw	2.73
Cherries, dark	1.47
Dates	9.2
Prunes	27
Raisins	25
Vegetables	
Beans, green	0.46
Broccoli, flowers	1.85
Broccoli, stalks	0.89
Lettuce, iceberg	<0.015
Nuts	
Almonds	23
Hazelnuts	16

Boron Cautions

- ✓ Don’t take more than 3 to 6 milligrams of supplemental boron daily unless it is prescribed by a health care professional
- ✓ Boron is toxic in high doses but is not carcinogenic or mutagenic
- ✓ Boric acid, borates, and other compounds containing boron are potentially toxic if ingested or absorbed through non-intact skin

References

- ✓ *Advanced Nutrition and Human Metabolism*: Gropper, Smith And Groff (suggested textbook for Nutrient part of the course)
- ✓ http://www.drritamarie.com/go/BoronForYourBones
- ✓ http://www.drritamarie.com/go/MedlinePlusBoron

