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ROOTS OF LIFE

Formulating for Her: The Power of Minerals for Women's Health

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Minerals Matter

Nutrient groups necessary for complete body function:

- Water
- Vitamins
- Minerals
- Fats
- Protein
- Carbohydrate

HUMAN BODY COMPOSITION

4%
MINERALS

96%
CARBON
HYDROGEN
OXYGEN
NITROGEN

Minerals are essential to optimal health of women

- Minerals are essential *cofactors* for up to 1200 different enzymes in the human body (~30-40% of all enzymes)
- *Cofactors* are required for *optimal enzyme activity*
- ↓ *Cofactors* → ↓ effects of *coenzyme* (ie, vitamins) on enzyme activity (minerals need vitamins and vice-versa)
- *Optimal intakes of minerals* are required to achieve *optimal health*

The mineral market is growing

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$4.05b est. sales 2027*

+22.7%

YOY Mineral Category Growth**

* Source: Nutrition Business Journal 2024
** SPINS Natural Channel, Amazon, Convenience, Muti-Outlet 52 week Ending 12/29/24

Minerals have multiple benefits for women's health

Overall well-being

Energy

Immune health

Reproductive health

Hormonal balance

Peri-Menopause

Thyroid health

Pregnancy support

Active nutrition

Beauty-from-within

Bone strength

Let’s talk science…

Overall well-being & Energy

Iron

Essential for hemoglobin production(O_2); iron deficiency is a leading cause of fatigue, especially in women

Magnesium

Critical for ATP (energy) production; deficiency linked to muscle weakness & fatigue

Zinc

Supports mitochondrial function & energy metabolism

Selenium

Protects against oxidative stress, supporting sustained energy via Thyroid

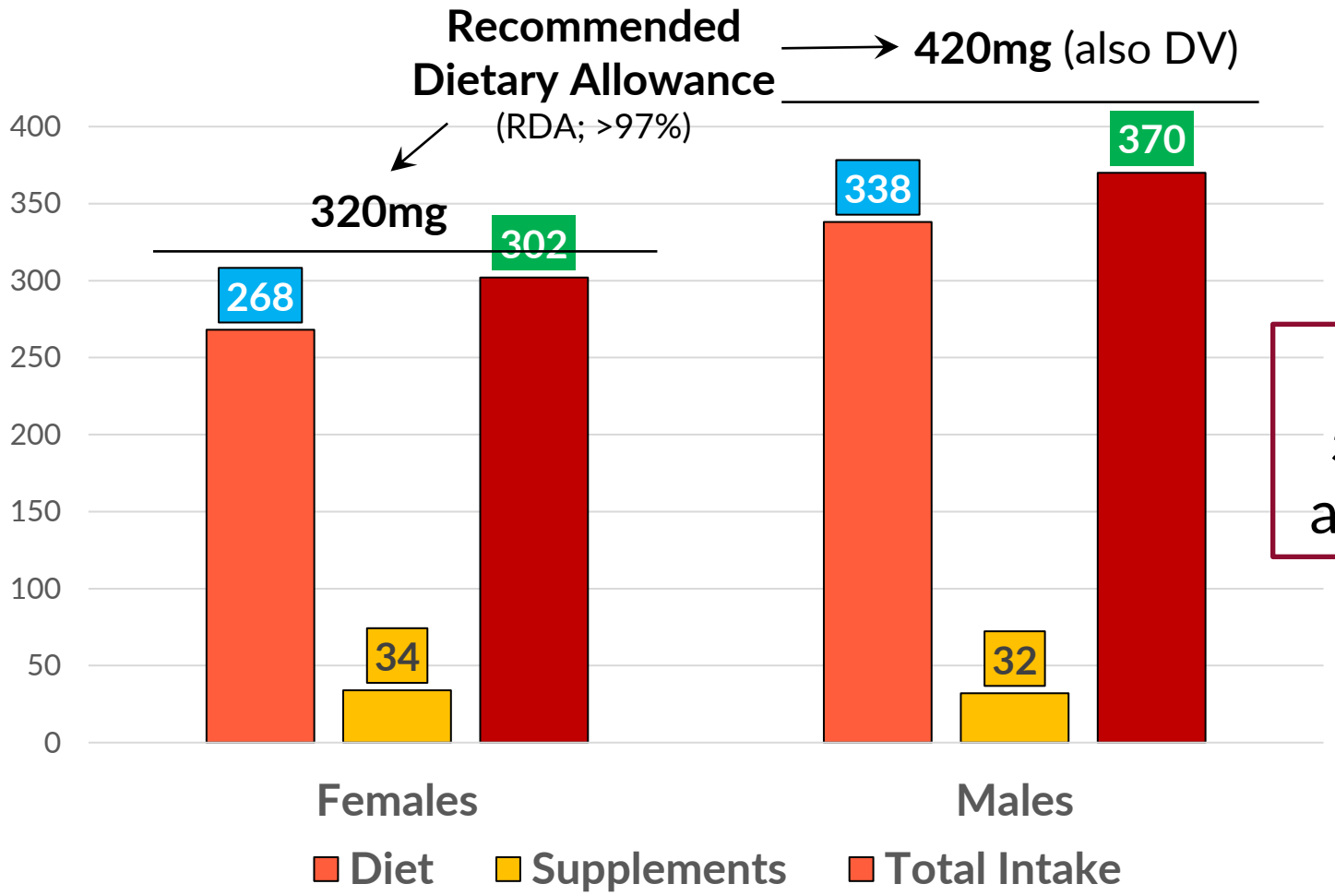
Magnesium

- **Essential cofactor for 300+ enzymes** – especially energy metabolim [as it binds directly to ATP (Mg-ATP) stabilizing its phosphate groups (ie, β+ γ); thereby, increasing its ability to interact with ATPase's active site 10-fold (~80% of all ATP in cell exists in Mg-ATP)]

- **Involved in 600+ reactions** including non-enzymatic reactions:
  - Stabilizing cell membranes
  - Glucose metabolism (via stabilizing cell membranes → ↑ passive diffusion)
  - Regulating ion channels (think nerve and muscle function)
  - Cognition (as cofactor as well as indirect via synaptic plasticity, BDNF)
  - Relaxation (binds/activates GABA receptors)
  - Sleep (helps relaxation which helps regulate melatonin)

Magnesium – Dietary Intakes/Deficiency

(Food + Supplements)



Key Take-Away:
50-60%+ women are deficient in Mg

Reference: **Omofuma** OO, Fang D, Yell N, et al.. *Trends in reported calcium and magnesium intake form diet and supplements by demographic factors: NHANES, 2003-2018*. **J Acad Nutr Diet**. 2024;124:1288-1301.

Magnesium Deficiency/Supplementation

- **Inadequate intakes ↑ risk:**
  - Anxiety
  - Depression
  - Dementia
  - Diabetes (T2D)
  - CVD (esp women)
  - Fatigue
  - Hypertension
  - Immunosuppression
  - Muscle loss/cramping
  - Osteoporosis
  - Respiratory issues
  - Sleep issues
  - Vasoconstriction
- **Supplementation improves:**
  - Blood glucose + insulin
  - Bone health
  - Circulation
  - Cognition
  - Heart health
  - Immunity
  - Lung function
  - Mood
  - Muscular status/performance
  - Sleep
  - **PMS symptoms**
  - **Menopausal symptoms**

Immune Health

Defense mechanisms

Minerals are essential to a healthy immune system to keep one healthy as well as being anti-inflammatory

Important for innate and adaptive immune defense

Minerals are essential for optimizing both innate (cellular) and adaptive immunity (humoral, Ab)

Most important minerals for optimizing immunity:

Se, Zn, Mg, Cu

Women are disproportionately affected by autoimmune diseases, accounting for roughly 80% of cases.

ture 626, 466 (2024)

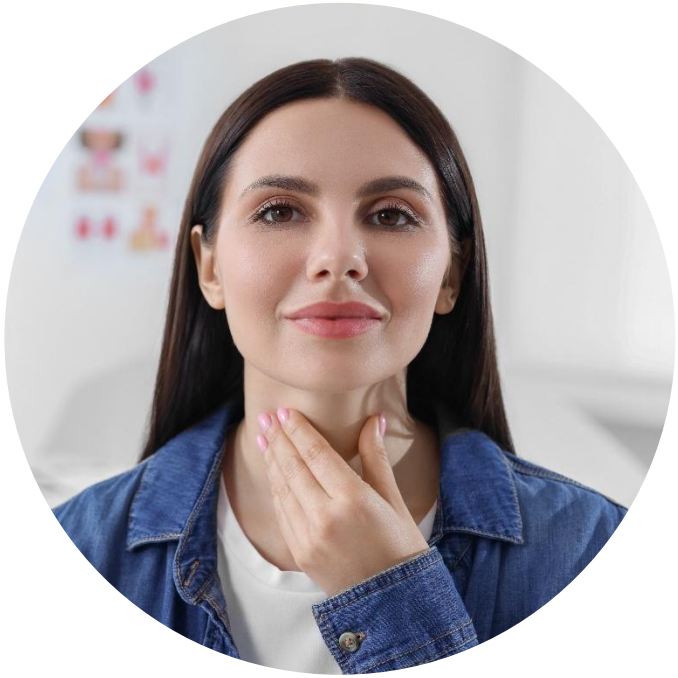
>2 BILLION

people do not consume enough minerals

Thyroid Health

Women are disproportionately affected by thyroid disorders, particularly hypothyroidism and hyperthyroidism (ie, 75-80%)

The role of minerals:



Selenium:

Helps convert inactive thyroid hormone (T4) into active thyroid hormone (T3)

Zinc:

Supports the production and metabolism of thyroid hormones via TRH

Magnesium:

Helps regulate thyroid hormone production via ATP + enzyme stabilization

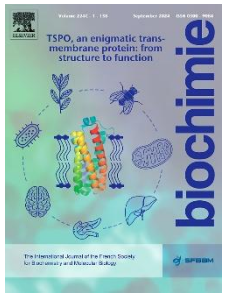
Iron:

Plays a role in thyroid hormone synthesis via TPO

High-selenium yeast for thyroid health

- Se is essential for healthy thyroid (eg, low Se status → ↑ risk for thyroid disorders 70%)
- Thyroid has the highest Se content than any other organ on a per gram basis
- Se supplementation of both 100+200µg Se/d (from high-selenium yeast; HSY) dose-dependently lowered TSH significantly in healthy individuals who had less than optimal intakes of selenium, as well as 200µg Se/d lowering TPO-Ab in those w/Hashimoto's
- High-selenium yeast supplementation was also shown to have a more robust effect on gene expression of key proteins than even SeMet.

The American Journal of CLINICAL NUTRITION



References:

Köhrle J. *The trace element selenium and the thyroid gland.* **Biochimie**. 1999 May;81(5):527-33.

Arthur JR, Nicol F, Beckett GJ. *Selenium deficiency, thyroid hormone metabolism, and thyroid hormone deiodinases.* **Am J Clin Nutr** 1993;57:236S-9S.

Winther KH, Wichman JEM, Bonnema SJ, Hegedus L. *Insufficient documentation for clinical efficacy of selenium supplementation in chronic autoimmune thyroiditis, based on a systematic review and meta-analysis*. **Endocrine** 2017;55:376-85.

Pregnancy Support

Supplementing pregnant moms with low selenium levels 60-100µg/d selenium (from HSY) resulted in healthier pregnancies:

- 60% reduced risk of preterm births[1]
- 65% reduced risk of experiencing an intrauterine growth restriction (IUGR)[2]
- 70% reduced risk of developing preeclampsia[3]
- Se supplementation also reduced the risk of high blood sugar levels, oxidative damage and inflammation

Lactation Support

Supplementing lactating moms with 100µg of Se (from both inorganic + organic forms) found that those ingesting Se (from HSY) had significantly higher levels of selenium in their blood and breast milk, than women ingesting inorganic selenium.[4]

References:

1 **Tara** F, Rayman MP, Boskabadi H et al. *Selenium supplementation and premature (pre-labour) rupture of membranes: a randomized double-blind placebo-controlled trial*. **J Obstet Gynaecol** 2010;30:30-4.

2 **Mesdaghinia** E, Rahavi A, Bahmani F et al. *Clinical and metabolic response to selenium supplementation in pregnant women at risk for intrauterine growth restriction: randomized, double-blind, placebo-controlled trial.* **Biol Trace Elem Res** 2017;178:14-21.

3 **Rayman** MP, Bath SC, Westaway J et al. *Selenium status in UK pregnant women and its relationship with hypertensive conditions of pregnancy.* **Br J Nutr** 2015;113:249-58.

4 **Kumpulainen** J, Salmenpera L, Siimes MA et al. *Selenium status of exclusively breast-fed infants as influenced by maternal organic or inorganic selenium supplementation.* **Am J Clin Nutr** 1985;42:829-35.

Formulating tips…

Form Matters:

Organic vs Inorganic Minerals

- **Greater bioavailability:**
  - Organic > Inorganic
  - HSY 1.5-2x > bioavailability than inorganic forms
  - Some organic minerals > other organic minerals (eg, Zn from bisglycinate was shown to be 43% more bioavailable than from zinc gluconate)[1]

- **Greater bioefficacy**: SelenoExcell (HSY) clinically resulted in positive effects, while similar clinicals using SeMet did not
  - NIH funded clinical found 200µg Se/d (SelenoExcell) ↓ cancer mortality 50%,[2] while SELECT study (200µg Se/d; SeMet) found no such effect.[3]
  - Selenium supplementation (SelenoExcell) reduced DNA damage 33%, while no such effect was found we SeMet.[4]

References:

1 **Gandia** P et al. *A bioavailability study comparing two oral formulations containing zinc (Zn bis-glycinate vs. Zn gluconate) after a single administration to twelve healthy female volunteers.* **Int J Vitam Nutr Res**. 2007;77:243-8.

2 **Clark** LC et al. *Effects of selenium supplementation for cancer prevention in patients with carcinoma of the skin. A randomized controlled trial. Nutritional Prevention of Cancer Study Group.* **JAMA**. 1996;276:1957-63.

3 **Lippman** SM et al. *Effect of selenium and vitamin E on risk of prostate cancer and other cancers: the Selenium and Vitamin E Cancer Prevention Trial (SELECT).* **JAMA**. 2009;301:39-51.

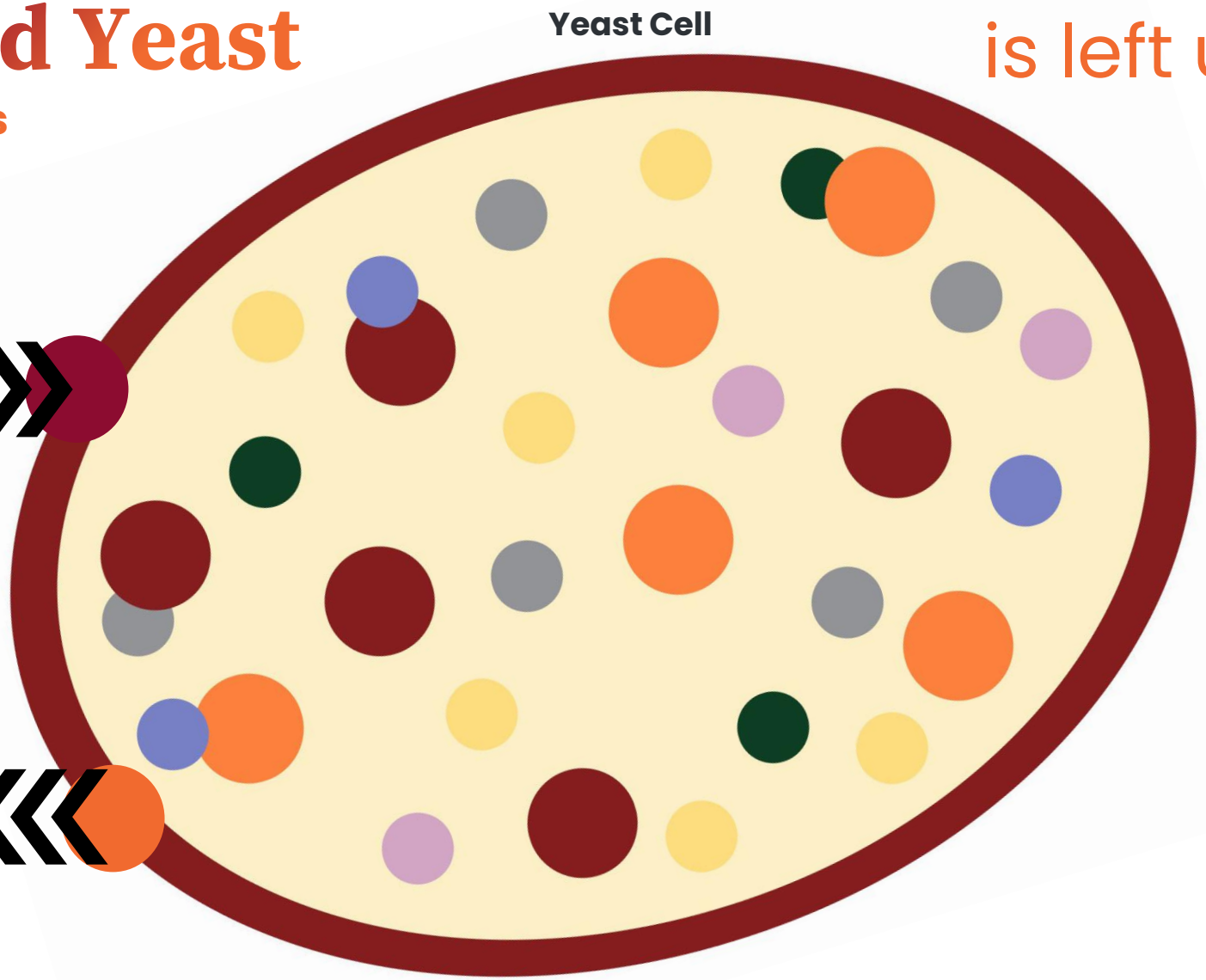
4 **Richie** JPJr et al. *Comparative effects of two different forms of selenium on oxidative stress biomarkers in healthy men: a randomized clinical trial.* **Cancer Prev Res** . 2014;7:796-804.

Form Matters:
Mineralized Yeast

Fermentation Process

Mineral replaces sulfur
selenium, chromium, or zinc

Sulfur released



No free mineral is left unbound

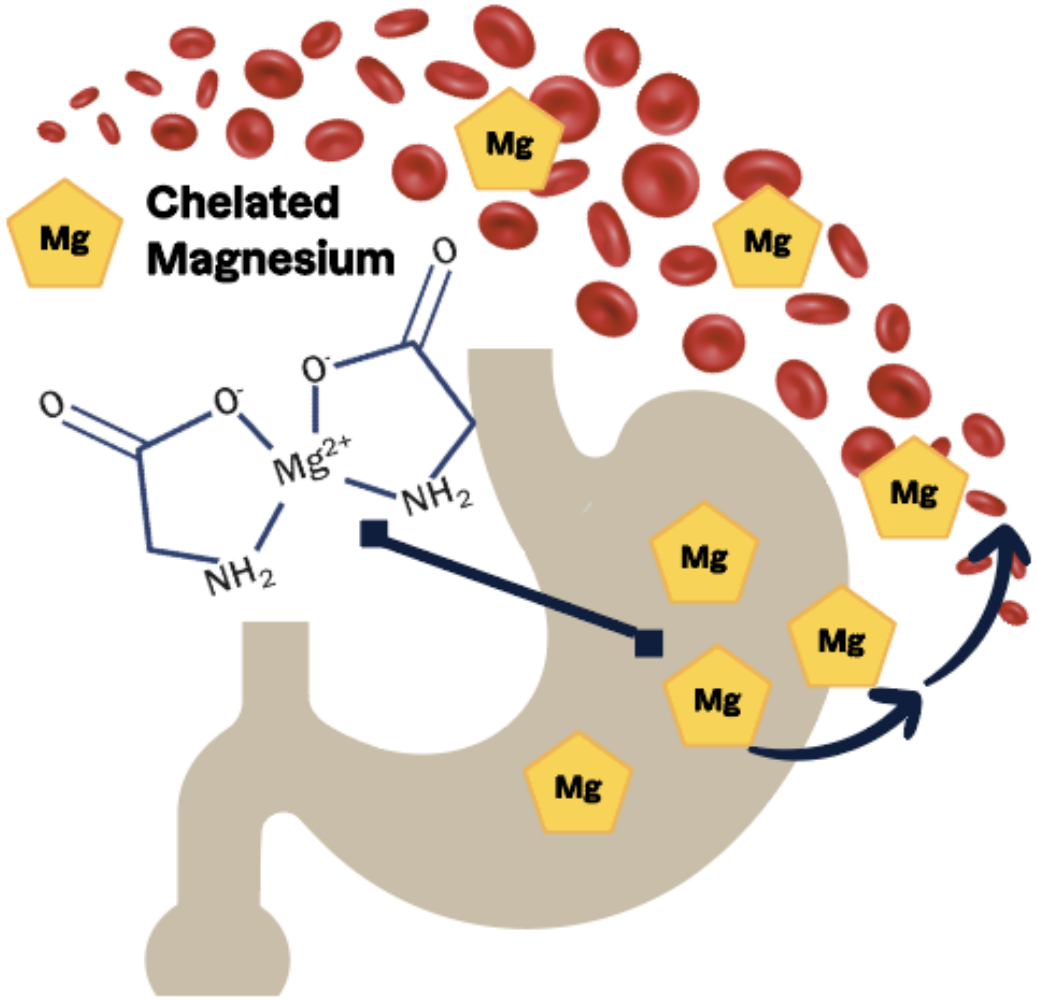
Yeast-bound minerals aid in the nutrient absorption across the epithelial lining of the digestive tract. They remain intact in the stomach's acidic environment.

- b vitamins
- phosphorous
- potassium
- magnesium
- amino acids

Barry Johnson, Wisdom River Research

Form Matters:
Chelated Minerals

Fully reacted chelated minerals remain covalently bonded and can be properly absorbed and used by the body. The binding sites of the mineral and amino acid are called ***ligands.*** The tension on this "grip" ('chela' = claw in Latin) is very important - too tight and the mineral never releases into the bloodstream; too loose and the mineral doesn't pass through the intestinal wall at an increased rate.



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Mineral forms in the market

ORGANICALLY BOUND FORMS	INORGANIC FORMS
Calcium Bisglycinate, Calcium Citrate Malate, Calcium Citrate	Calcium Carbonate, Calcium Phosphate
Ferrous (iron; Fe^{2+}) Bisglycinate Ferrous Gluconate	Ferrous Sulfate
High-Selenium Yeast Selenomethionine Selenocysteine	Sodium selenite/selenate
Zinc Bisglycinate, Zinc Yeast	Zinc Sulfate

Using the organic form typically costs less than $.01 per serving and delivers a more effective ingredient for your product

Formulating with minerals for women's products

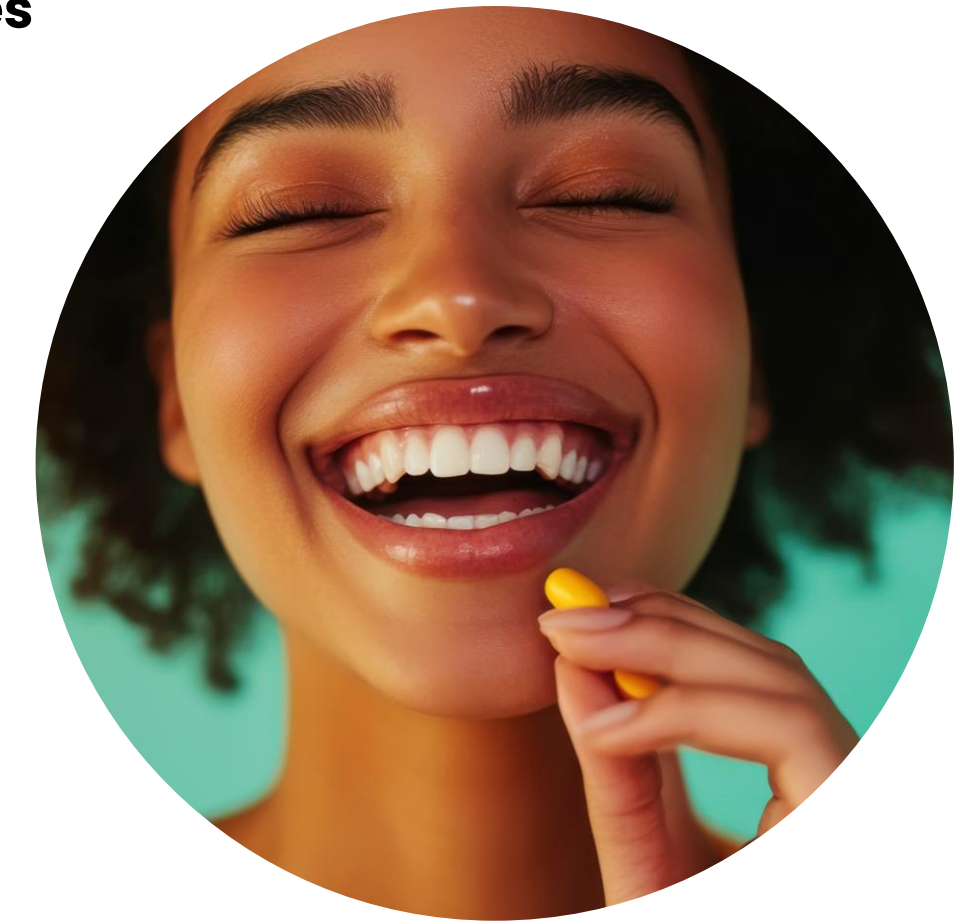
- Versatile and work in a variety of formats including capsules, tablets, gummies, powders, liquids, chews and functional foods and beverages

Dosage considerations: RDAs for Women throughout life stages

	Adolescence	Adults (19-50)	Pregnancy	Lactation	Menopause
Calcium	1,300mg	1,000mg	1000mg	1000mg	1,200mg
Iron	15 mg	18 mg	27mg	10mg	8mg
Magnesium	360mg	310 – 320mg	400mg	360mg	320mg
Selenium	55mcg	55mcg	60mcg	60mcg	55mcg
Zinc	9mg	8mg	11mg	12mg	8mg

Key takeaways:

- **Sales of mineral supplements is growing steadily**
- **Minerals are beneficial throughout all life stages of women**
- **Women are disproportionately affected by mineral-sensitive conditions** (e.g., thyroid, autoimmune), making targeted formulations crucial.
- **Form matters** – organically-bound minerals delivers higher bioavailability and bioefficacy



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THANK YOU!

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