

## Minerals

Here are a couple of definitions of what constitutes a major vs trace mineral:

- Anything under 0.1% of body weight
- Anything at 0.1% or over is

Here is another definition:

There are seven of them: (by importance)

Stored/found in bone:

- 1.
- 2.
- 3.

Electrolytes (form ions in water):

- 4.
- 5.
- 6.

The odd ball one (part of amino acids):

- 7.

Four most common elements: They are not classified as essential because they are all of our macronutrients are made of.

- 1.
- 2.
- 3.
- 4.

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## Minerals

Here are a couple of definitions of what constitutes a major vs trace mineral:

Anything under 0.1% of body weight is a trace mineral.

Anything at 0.1% or over is a major mineral

Here is another definition: Minerals essential at 100mg a day or more for adults are classified as major minerals

There are seven of them: (by importance)

Stored/found in bone:

1. Calcium (Ca)
2. Phosphorus (P)
3. Magnesium(Mg)

Electrolytes (form ions in water):

4. Sodium (Na)
5. Potassium(K)
6. Chloride(Cl)

The odd ball one (part of amino acids):

7. Sulfur(S)

Four most common elements: They are not classified as essential because they are all of our macronutrients are made of.

1. Hydrogen(H)
2. Oxygen (O)
3. Carbon(C)
4. Nitrogen(N)

## Calcium (Ca)

Amount in the body:

Our mythical 150 lbs man:

Distribution in the body

- Bones:
- Teeth:
- Circulation:

What kinds of things does calcium do:

- 1.
- 2.

Calcium is needed for muscle contract, magnesium is needed for muscle relaxation. (Think calcium release with rigor mortis)

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We continue to build bone until our mid-30's.

Osteoporosis –

SV –

What is the SV recommendation for calcium intake:

Best dietary source is:

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## Calcium (Ca)

Amount in the body: 1.5% or 2% we'll say 2% The most abundant of the minerals.

Our mythical 150 lbs man as 3 pounds of calcium

Distribution in the body

- Bones: 98%
- Teeth: 1%
- Circulation: 1%

What kinds of things does calcium do:

1. Nerve conduction
2. Muscle contraction

Calcium is needed for muscle contract, magnesium is needed for muscle relaxation. (Think calcium release with rigor mortis)

- Blood clotting – calcium is found in a couple of steps in the clotting cascade.
- Hormone production

We continue to build bone until our mid-30's. After that we lose bone mass.

Osteoporosis – a condition with deficient calcium in the bones leading to easier breaking of bones. (Decreased muscle mass)

SV – Doc's "safe value". The upper limits for an adult male. (Less than a therapeutic value) A high normal for a man.

What is the SV recommendation for calcium intake: 1500 milligrams

Best dietary source is: milk

## Calcium (Cont)

Any acid food :

Steroid drugs and calcium:

Doses of steroids as small as 10mg/day require:

Role of Vitamin D and calcium

Problem with some cholesterol drugs

Synthroid – (artificial thyroid hormone)

Homeopathy –

Malox & Roloids and aluminum:

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## Calcium (Cont)

Any acid food (soda, high protein diet) diet, these tend to rob us of calcium. Minerals from the bones are used to buffer the acid.

Steroid drugs and calcium – are bones are constantly being broken down and rebuilt. With steroids, this breakdown effect is increased. Bone breakdown greatly exceeds bone restructuring.

Doses as small as 10mg/day require – of steroids probably will require long term additional calcium supplementation.

Role of Vitamin D and calcium – for bones to utilize calcium, you need to have vitamin D involved. “It tells the bones how to use calcium.”

Problem with some cholesterol drugs - Some cholesterol drugs block the absorption of calcium and fat soluble vitamins.

Synthroid – (artificial thyroid hormone) Once you start on synthroid, you end up taking it forever (generally). Over a long period of time, it causes excessive bone loss as well.

“Homeopathy – each disease has it's own vibrational level. In homeopathy theory, you have to give the body something to cancel out the vibrational level to cure a disease.”

Malox & Roloids and aluminum: When the body is given a choice, it will take aluminum into the bone over calcium. (Tums has take out their aluminum we think)

## Calcium (Cont)

Post-menopausal women and estrogen:

Older men and testosterone

Smoking and drinking will interfere with:

Good sources of calcium:

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Elemental calcium:

Also, calcium needs to go thru

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## Calcium (Cont)

Post-menopausal women and estrogen: Estrogen controls the rate of calcium loss from the bones. Without estrogen, a women can loose as much as 50% of her bone loss during the first 3-5 years post-menopausal. (This isn't that common, but it can happen...) A women can loose up to three percent of her bone mass the first year after menopause.

Older men and testosterone – Men have a similar problem. Testosterone helps to maintain the calcium level in the bones. On the plus side, the testosterone loss is more gradual, so the effect is not as great.

Smoking and drinking will interfere with: Insert your nutrient here.

Good sources of calcium:

- 8oz glass of milk 300mg
- 1oz slice of cheese:100mg
- 1 cup of beans: 100+mg
- ½ cup of tofu: 100+ mg
- ½ cup of turnip greens: 100+ mg

Elemental calcium: is that part of the supplement that is available for absorption. As an example. A label may say 500mg may only have 10% elemental calcium. This means that the most you get is 50mg of calcium.

Also, calcium needs to go thru an acid stomach to be dissolved and absorbed. A high pH stomach will not absorb as much calcium. Those on antacids may not get the same benefit. So, calcium should always be taken with a meal.

## Calcium (Cont)

Adding to the problem is that calcium has a history:

Considerations involved in picking calcium supplement?

- 1.
- 2.
- 3.

### Calcium Carbonate

- 1.
- 2.
- 3.

### Calcium Phosphate (aka tribasic calcium phosphate)

- 1.
- 2.

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## Calcium(Cont)

Adding to the problem is that calcium has a history of being contaminated with many heavy metals, toxins, etc...

Considerations involved in picking calcium supplement?

1. Percent of elemental calcium.
2. Ease of absorption.
3. History of contamination.

Let's look at a variety of products and what they have to offer.

### Calcium Carbonate

1. 40% elemental calcium – the most of any calcium supplement.
2. The least expensive
3. Virtually indissoluble, and passes right through the body. It's absolutely useless

### Calcium Phosphate (aka tribasic calcium phosphate)

1. 39% elemental
2. Has way too much phosphorus

(The more phosphorus you take, the more calcium you lose... )

## **Calcium (Cont)**

### **Calcium Citrate**

- 1.
- 2.
- 3.

### **Calcium Lactate**

- 1.
- 2.

### **Calcium Gluconate**

- 1.
- 2.

### **Calcium Glubonate**

- 1.
- 2.

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## **Calcium (Cont)**

### **Calcium Citrate**

1. 21% elemental calcium.
2. It dissolves very easily, even in high pH stomach acid (a plus for older patients with decreased stomach acids)
3. Works well with acid blockers. (Tagamet, etc...)

When most people come in with a stomach problem, they will say they have acid reflux, etc... In fact, they probably don't have enough acid.

### **Calcium Lactate**

1. 13% elemental
2. It has the same positive benefits as calcium citrate

### **Calcium Gluconate**

1. 9% elemental
2. Nothing special to recommend it.

### **Calcium Glubonate**

1. A syrup with only 6.5% element
2. Extremely expensive.

## **Calcium (Cont)**

The following should not be taken.

### **Bone Meal**

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### **Oyster Shell Calcium**

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## **Calcium (Cont)**

The following should not be taken.

### **Bone Meal**

- a 5gram serving contains 1500 milligrams
- it has a repeated history of lead contamination

### **Oyster Shell Calcium**

- This is calcium carbonate, virtually impossible to absorb.
- A bad history of contamination with mercury and cadmium.
- People with shellfish allergies can have a bad reaction to this stuff.

## **Phosphorus (P)**

- 1.
- 2.

Deficiency and Phosphorus:

Western:

Mothers milk gives you

If you have a patient with a phosphorus deficiency:

You probably have a maximum window of 90 days for all supplementation before the body adapts to it. Switch to something else after that...

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## **Phosphorus (P)**

1. 80% is in the bones
2. 20% evenly spread throughout every cell in the body.

There's virtually no way to have a deficiency.

Western: You need equal amounts calcium and phosphorus. You are probably get twice as much phosphorus without even trying.

Mothers milk gives you 2.3 calcium to 1 phosphorus.

If you have a patient with a phosphorus deficiency: get them to a doctor.

*Use muscle testing – you can use muscle tightness as well. Self testing about 50% of the time...*

*You probably have a maximum window of 90 days for all supplementation before the body adapts to it. Switch to something else after that...*

## Magnesium (Mg)

Used for:

- 1.
- 2.
- 3.

Magnesium supplements need to be titrated.

Larger amounts of Mg

SV recommendation:

Remember

The only people would usually need this form of supplementation.

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Good sources

- 
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Poorest sources

Magnesium

Good magnesium supplements:

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## Magnesium (Mg)

1. Therapeutic doses for asthma
2. For diabetes
3. For heart rhythm problems

Magnesium supplements need to be titrated. – it needs to be given in small doses first, before working up to larger doses.

Larger amounts of Mg may cause diarrhea.

SV recommendation: 500 mg – total diet intake.

Remember, this is needed for muscle relaxation.

The only people would usually need this form of supplementation.

- Those losing lots of fluid (kidney disease)
- People taking diuretic drugs.

Good sources

- Beans
- Tofu

Poorest sources Meats and refined foods.

Magnesium – it came from a Greek island.

Good magnesium supplements:

- Magnesium aspartate
- Magnesium glycinate
- Magnesium citrate

## Ratios

As with Ca and P, Ca and Mg need the proper ration. \_\_\_\_Ca to \_\_\_\_P to \_\_\_\_Mg

Too much

Mg tends to

## Electrolytes.

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An electrolytes is defined as

There are no daily requirements for these because

You can only be deficient in these if you are

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## Ratios

As with Ca and P, Ca and Mg need the proper ration. 2Ca to 2P to 1Mg

Too much phosphorus and you loose calcium.

Mg tends to help you retain calcium.

## Electrolytes.

- Na
- K
- Cl

An electrolytes is defined as – a mineral that will dissolve in water and carry an electrical charge. (They will form Ions in water)

There are no daily requirements for these because every cell contains all three.

You can only be deficient in these if you are starving or eating synthetic foods.

## **Sodium (Na), Potassium (k), and Chlorine (Cl)**

The minimum Na requirement is:

A teaspoon of salt is

You can only be deficient:

The only one that can become severe:

Clinical signs of deficiency

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- 
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Good foods

- 
- 
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Na to K:

Average:

What about Cl?

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## **Sodium (Na), Potassium (K), and Chlorine (Cl)**

The minimum Na requirement is 500mg /day

A teaspoon of salt is 3000mg of sodium

You can only be deficient if the patient has diarrhea or is v omitting.

The only one that can become severe is K. (If they are sweating). Medically, Lasix, a diuretic can cause Potassium to be deficient

Clinical signs of deficiency

- Nausea
- Weakness
- Muscle cramps

Good foods

- ½ avocado 550 mg
- banana 450 mg
- baked potato w/ skin 800mg

Na to K: 1 Na to 5 K

Average: 1K to 2Na

What about Cl? Don't worry about it.

## **Sulfur (S)**

The body contains:

Sulfur is found in:

## ***Sulfur (S)***

The body contains  $\frac{1}{4}$  of 1% of sulfur

Sulfur is found in a number of important amino acids.

## Trace Minerals

Those that might be deficient:

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

Those that can't be deficient:

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.

The most important thing to remember about trace minerals is that:

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## Trace Minerals

Those that might be deficient:

1. Chromium (Cr)
2. Copper (Cu)
3. Iodine (I)
4. Iron (Fe)
5. Manganese (Mn)
6. Molybdenum (Mo)
7. Selenium (Se)
8. Zinc (Zn)

Those that can't be deficient:

1. Boron (B)
2. Cobalt (Co)
3. Nickel (Ni)
4. Silicon (Si)
5. Tin (Sn)
6. Vanadium (V)

The most important thing to remember about trace minerals is that they are extraordinarily easy to OD on. You can easily reach toxic levels of each of them.

## **Selenium (Se)**

Selenium OD symptoms

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## **Iodine (I)**

Iodine:

## **Zinc(Zn)**

Zinc –

## **Flourine (F)**

Flourine deficiency:

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## **Selenium (Se)**

Selenium OD symptoms

- Fatigue, abdominal pain, nausea w/ diarrhea, nerve damage
- The only case of Selenium deficiency is in China in poor selenium sourced soil.

## **Iodine (I)**

Iodine deficiencies or excess can lead to goiter

## **Zinc(Zn)**

Zinc – in excess will make you unable to absorb calcium, excess zinc decreases your immune system instead of increasing it.

## **Flourine (F)**

Flourine deficiency – leads to flourosis, white chalky spots on your teeth.

## Iron (Fe)

Of the Trace elements

The chief function of iron is

Numbers of Iron deficiencies in women and children:

Who needs iron:

- 1.
- 2.
- 3.
- 4.
- 5.

The highest intake of Fe considered safe

The average amount in an American diet is

What is heme iron?

Non Heme iron –

Which is better absorbed –

Foods sources for iron:

SV

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## Iron (Fe)

Of the Trace elements Iron is the most likely to be deficient

The chief function of iron is as an element in hemoglobin.

1 in 10 is deficient in iron in women or small children.

Who needs iron:

1. Babies and toddlers growing very fast may suffer some degree of mental retardation if they don't get enough iron.
2. Teenage girls growing quickly and having their period (loosing iron)
3. Women who have heavy flows during their periods
4. Pregnant and nursing women.
5. Men or women who are very atheletic.

The highest intake of Fe considered safe is 75mg/day

This is by diet, not supplement.

The average amount in an American diet is 6mg per 100 calories consumed.

What is heme iron? - animal source iron.

Non Heme iron – iron from plant sources

Which is better absorbed – heme iron

Foods sources for iron: Liver is the best animal source.

SV – 15mg/day

## Iron (Cont)

The best three sources for iron supplementation

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General statements about Fe supplements:

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The most common side effect seen with excess Fe supplementation is:

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## Iron (Cont)

The best three sources for iron supplementation

- carbonyl iron
- ferrous sulfate
- ferrous gluconate

(Different peoples bodies will absorb these in different ways – nobodies knows why, one is probably the best for you...)

General statements about Fe supplements:

- time release and enteric coated are a waste of money. (Enteric coating means: can get through the stomach to the SI, w/o being touched by the stomach)
- The maximum safe amount by pill is 30mg/day
- Take between meals

The most common side effect seen with excess Fe supplementation is: constipation or diarrhea or both, and a black tarry stool. Some studies suggest that too much iron can lead to heart problems.

## **Iodine(I)**

Chief function:

Goiter:

Cretinism:

The best sources of Iodine are –

The risk of goiter:

The legal amount added is:

Too much will:

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## **Iodine (I)**

Chief function to combine with amino acid tyrosine to create the various thyroid hormones.

Goiter – an enlarged thyroid generally related to insufficient iodine intake.

Cretinism – dwarfism and mental retardation related to infants not getting enough iodine.

The best sources of Iodine are – seafood and seaweed like kelp. (one serving of seaweed will give you more than enough iodine for your needs)

the risk of goiter has been virtually wiped out with addition of iodine to table salt.

The legal amount added is: 70 micrograms per gram of salt.

Too much will inhibit the thyroid and can also lead to goiter.

## Chromium (Cr)

Four claims

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The SV for chromium is

Chromium chloride:

Good food sources include:

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## Chromium(Cr)

Four claims

- helps diabetics control blood suga
- claims it helps body builders build muscles faster
- help to lower cholesterol levels
- boosts production of anti-aging hormone dhea.

None of these have been proven.

The SV for chromium is 200mcg

Chromium chloride is not a good supplement. Not enough is absorbed.

Good food sources include:

- apples,
- broccoli
- corn beef
- eggs
- many other things