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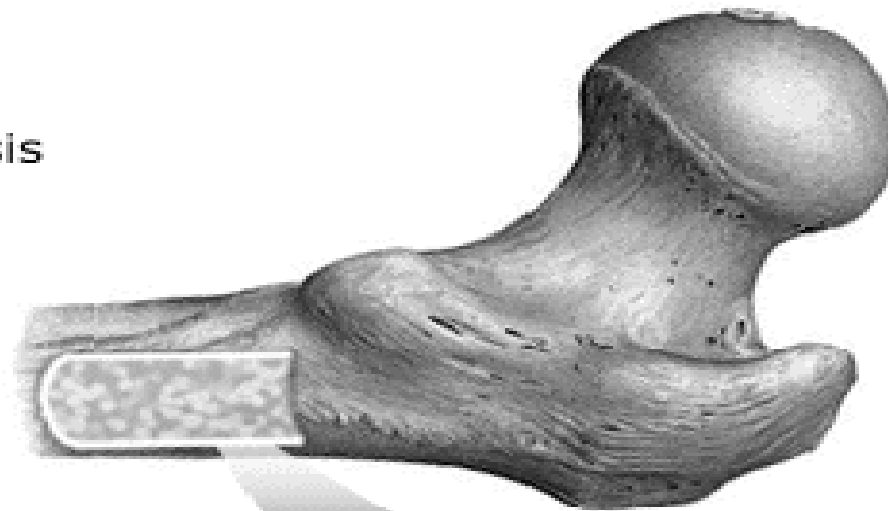
BONE HEALTH

TOPICS

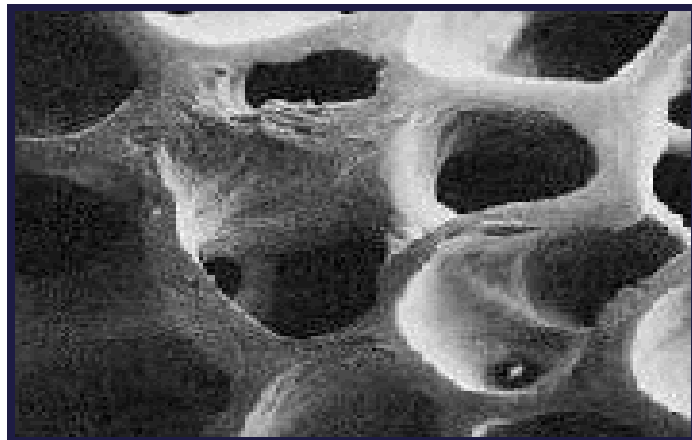
- ✘ A view of our bones health
- ✘ Factors that influence bone health
- ✘ Major nutrients that influence bone health
- ✘ Bottom line

BONE HEALTH SPECTRUM

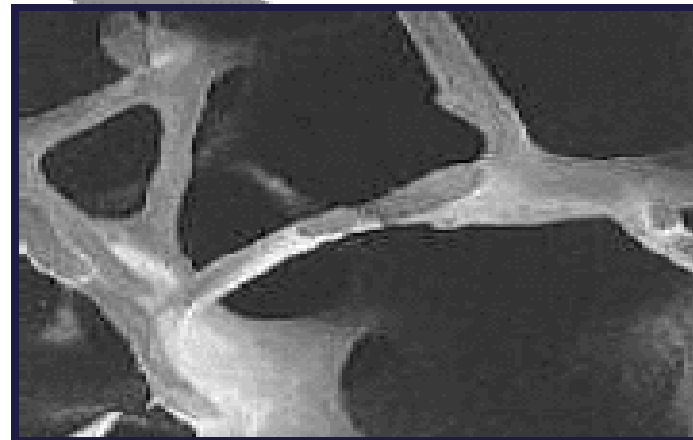
Section of bone
showing osteoporosis



Normal Bone



Osteoporotic Bone



Reproduced from *J Bone Miner Res* 1986;1:16-21 with
permission of the American Society for Bone and Mineral Research

BONE DENSITY



Normal



Thinning



Osteoporotic

BONE DENSITY ASSESSMENT

✘ <http://courses.washington.edu/bonephys/opbmd.html>

- + Dual Energy Xray Absorptiometry (DEXA)
- + Ultrasound
- + Quantitative Computed Tomography (QCT)
- + Other

FRACTURE RISK ASSESSMENT TOOL (FRAX)

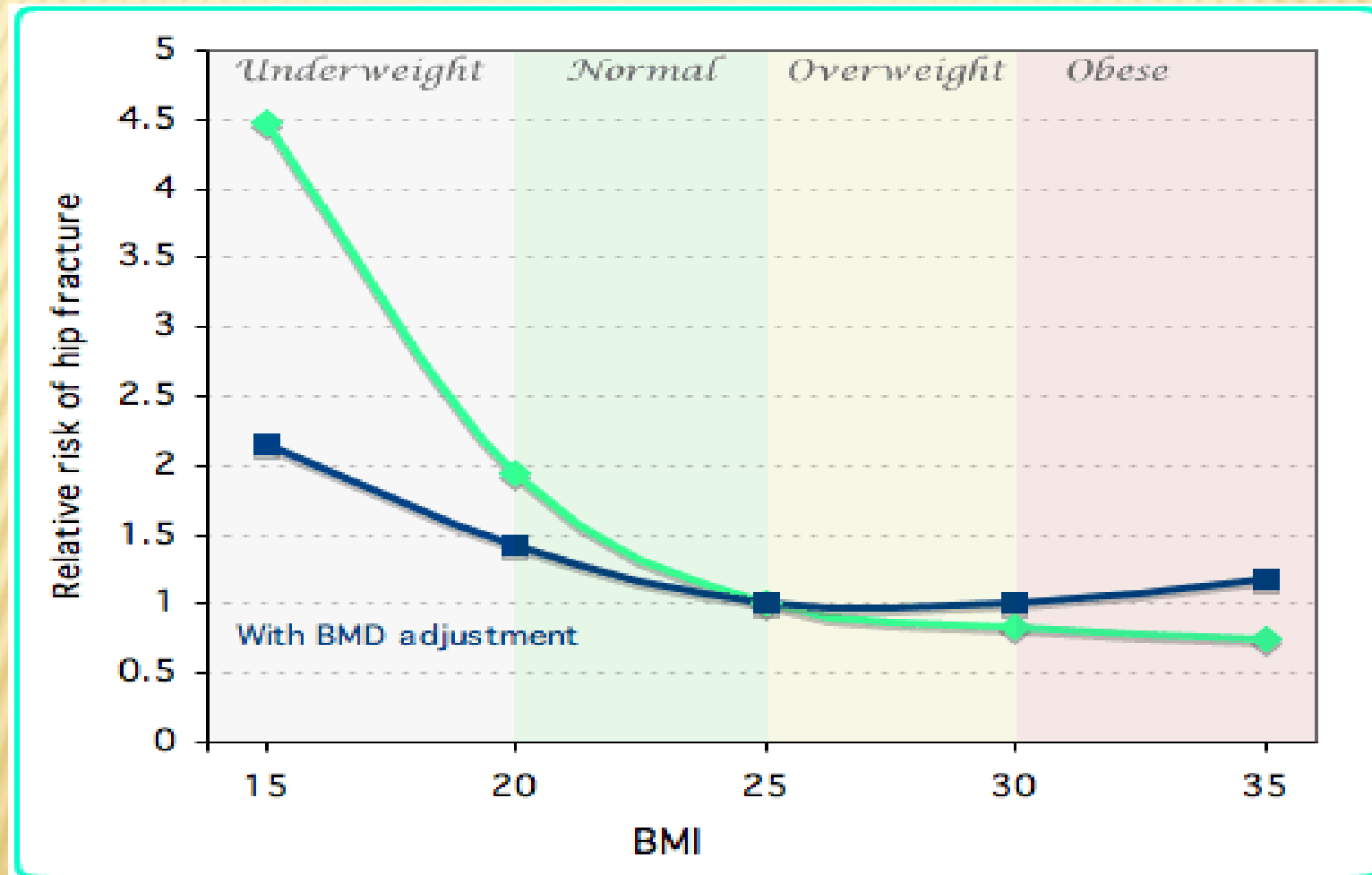
- ✘ Developed by World Health Organization (WHO) to evaluate fracture risk in 10 years from the present
- ✘ Developed from population studies from Europe, North America, Asia, Australia
 - + US options
 - ✘ Asian, Black, Caucasian or Hispanic
- ✘ <http://www.shef.ac.uk/FRAX/>

GREATER RISK OF OSTEOPOROSIS

- × Females
- × White/Caucasian
- × Post menopausal women
- × Older adults
- × Small in body size or underweight
- × Not physically active
- × Smoker
- × Consume lots of caffeine or alcohol
- × Persons treated for hormone related cancers

WEIGHT STATUS

[HTTP://COURSES.WASHINGTON.EDU/BONEPHYS/](http://courses.washington.edu/bonephys/)



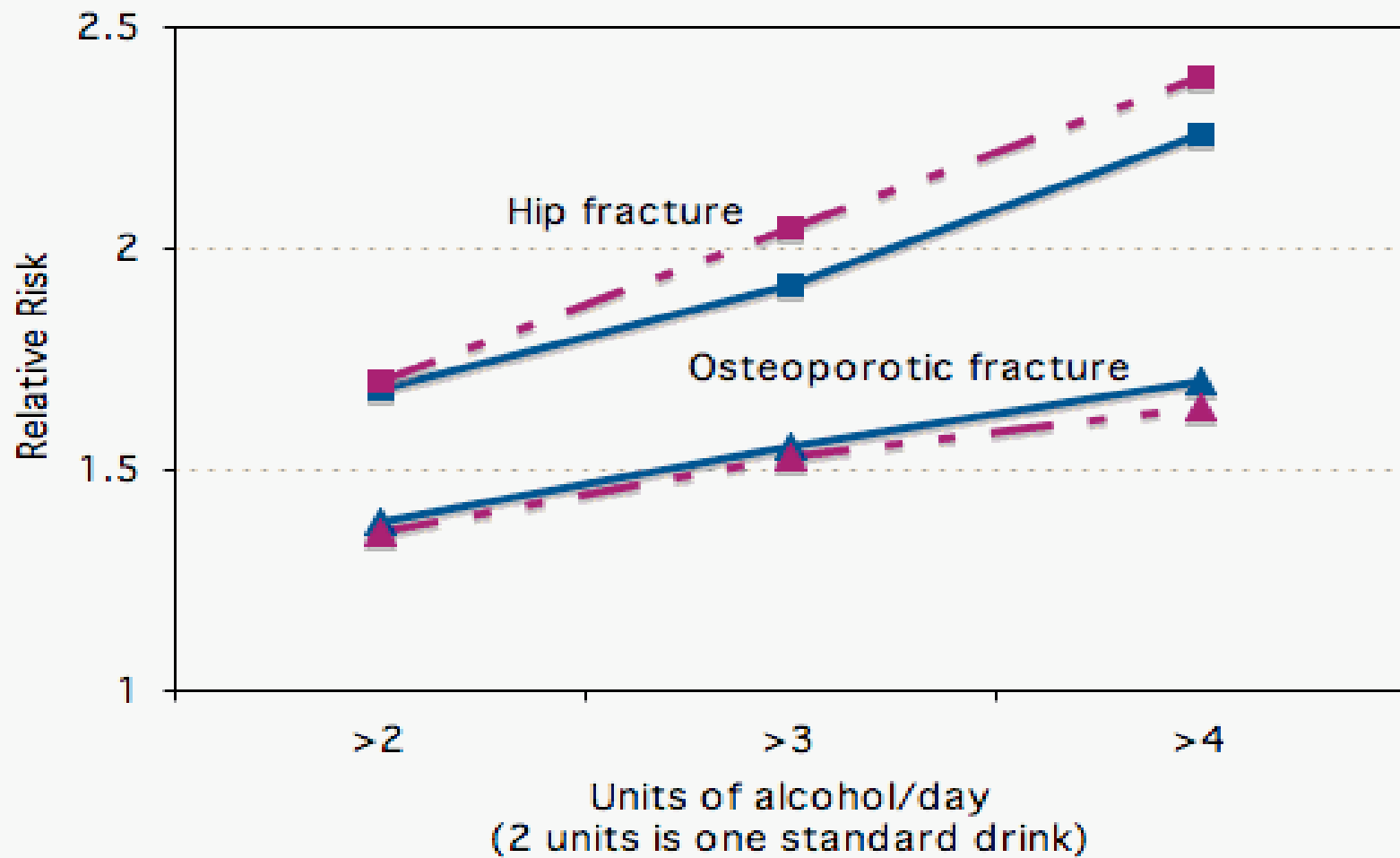
http://www.cdc.gov/healthyweight/assessing/bmi/adult_bmi/english_bmi_calculator/bmi_calculator.html

WEIGHT-BEARING PHYSICAL ACTIVITY

- ✘ These types of exercises promote bone health:
 - + Walking
 - + Jogging, or Running
 - + Tennis or Racquetball
 - + Field Hockey
 - + Climbing, Hiking
 - + Jumping rope
 - + Basketball, Soccer
 - + Dancing
 - + Weight lifting

ALCOHOL

[HTTP://COURSES.WASHINGTON.EDU/BONEPHYS/](http://courses.washington.edu/bonephys/)



NUTRIENTS THAT INFLUENCE BONE HEALTH

× Calcium

× Vitamin D

× Magnesium

× Zinc

× Manganese

× Vitamin A

× Vitamin K

× Fiber

× Protein

× Acid/Alkaline
Foods

CALCIUM

- ✘ 95 to 99% of the body's total calcium content is in the bones
- ✘ Has been shown to prevent bone loss
- ✘ Is one of the primary acid-buffering minerals
- ✘ A diet that lacks a variety of nutrients or is high in fat or protein may decrease the absorption of calcium

CALCIUM RECOMMENDATIONS

Recommended Calcium Intakes

Ages	Amount mg/day
Birth–6 months	210
6 months–1 year	270
1–3	500
4–8	800
9–13	1300
14–18	1300
19–30	1000
31–50	1000
51–70	1200
70 or older	1200
Pregnant & Lactating	1000
14–18	1300
19–50	1000

Do not exceed 2,500 mg
of calcium per day
(tolerable upper intake
level)

Source: Dietary Reference Intakes for Calcium, National Academy of Sciences, 1997Calc

Adults with osteoporosis or post-menopausal women who are not on estrogen therapy 1,500

DAIRY PRODUCTS ARE NOT THE ONLY OPTIONS FOR CALCIUM SOURCES



SOURCES OF CALCIUM

<u>Food</u>	<u>Calcium (mg)</u>
✘ Milk, 1 cup	300
✘ Yogurt, 1 cup	200 to 500
✘ Cheese, cheddar, 1 oz	200
✘ Almonds, 1/4 cup	90
✘ Kale, cooked, 1/2 cup	50
✘ Legumes, 1/2 cup	40 to 80
✘ Tofu, 1/2 cup	135
✘ Seaweeds, 1 oz	250 to 450

SOURCES OF CALCIUM

✘ Resources

+ <http://ods.od.nih.gov/factsheets/calcium.asp#h3>

+ <http://www.vrg.org/nutrition/calcium.htm>

+ <http://www.whfoods.com/genpage.php?tname=nutrient&dbid=45>

KEY POINTS ABOUT FOOD SOURCES OF CALCIUM

- ✘ Vary your calcium sources
- ✘ Plants can be effective calcium sources
- ✘ Don't routinely rely only on spinach, chard or rhubarb for calcium sources as high in oxalic acid (oxalate) – which inhibits absorption of calcium

CALCIUM SUPPLEMENTS

- ✘ Calcium supplements should be used to compliment your calcium-rich food choices
- ✘ Estimate how much calcium you consume via your diet, then determine how much supplemental calcium you need so that combination of your diet and your supplement = your calcium requirements
- ✘ Need to look at “elemental calcium” content on label
- ✘ Take no more than 500 mg at one time as your body can only absorb ~500 mg at once
- ✘ Look for USP label on supplement bottle

CALCIUM SUPPLEMENTS

- × Calcium carbonate and calcium citrate are most common sources of calcium
 - + Calcium carbonate
 - × Inexpensive
 - × Must be taken with a meal
 - × May not be well absorbed if you take medications that influence stomach acids
 - + Calcium citrate
 - × Take anytime
 - × Better absorption

MEDICATIONS AND CALCIUM

- ✘ Don't take calcium at the same time that you take:
 - + Bisphosphonates
 - + Thyroid medication
 - + Some antibiotics
 - + Some anti-seizure medications
 - + Aluminum-containing antacids (i.e. Maalox™ or Mylanta™)

As calcium may inhibit absorption of these medications or the medication may interfere with the absorption of the calcium

VITAMIN D

- ✘ Vitamin D helps the absorption of calcium, but you don't need to ingest at the same time
- ✘ Natural vitamin D source – we make vitamin D on our skin from the sunshine
- ✘ Food sources of vitamin D are sparse
- ✘ Vitamin D supplements are common to help sustain a normal blood vitamin D level
- ✘ Have your “25-OH vitamin D” level checked in your blood

VITAMIN D

- ✘ Vitamin D requirements for adults:
 - + Currently under review: Suspect recommendation will be 1,000 units per day, instead of 200 to 400 units per day
- ✘ 2 vitamin D supplement choices:
 - + Cholecalciferol (D3) - made from sheep lanolin or some fish oil
 - ✘ Preferred, more bioavailable than D2
 - ✘ Don't take cod liver oil as vitamin D source due to excessive vitamin A content
 - + Ergocalciferol (D2) – made from plants

MAGNESIUM

- ✘ 60% of our body's magnesium content is in our bones
- ✘ Dietary Reference Index (DRI):
 - + ~320 mg/day (women), ~420 mg/day (men)
- ✘ Rich sources of magnesium:
 - + Dark green vegetables, legumes, nuts, seeds
 - + <http://ods.od.nih.gov/factsheets/magnesium.asp>
- Refined and processed foods are not good sources of magnesium

ZINC

- ✘ Zinc is present in many parts of the body including bone
- ✘ Dietary Reference Index (DRI):
 - + 8 mg/day (women), 11 mg/day (men)
- ✘ Food Sources:
 - + Oysters, shellfish, herring, legumes, milk, wheat bran
 - + <http://ods.od.nih.gov/factsheets/zinc.asp>

MANGANESE

- ✘ Highest content of manganese is in the bones
- ✘ Dietary reference index (DRI):
 - + 1.8 mg/day (women), 2.3 mg/day (men)
- ✘ Food sources:
 - + Beet greens, blueberries, whole grains, nuts, legumes, tea
 - + <http://www.whfoods.com/genpage.php?tname=nutrient&dbid=77>

VITAMIN A

- ✘ Several studies have shown an association between high vitamin A intake and a decrease in bone density
- ✘ Don't exceed the Dietary Reference Index (RDI) for vitamin A:
 - + 2,310 IU/day (women), 3,000 IU/day (men)
 - + <http://ods.od.nih.gov/factsheets/vitamina.asp>
- ✘ Common sources of excessive vitamin A
 - + Cod liver oil, supplements, juicing

VITAMIN K

- ✘ Helps preserve bone health
- ✘ Dietary reference index (DRI):
 - + 90 micrograms/day (women), 120 micrograms/day (men)
- ✘ Sources:
 - + Green leafy vegetables, broccoli, kale
 - + <http://www.whfoods.com/genpage.php?tname=nutrient&dbid=112>

FIBER

- ✘ Excessive intake of fiber may decrease calcium absorption
- ✘ However, most people don't get enough fiber
- ✘ Therefore, would not limit fiber intake – benefits are greater than risks
- ✘ Sources of fiber
 - + <http://www.wehealny.org/healthinfo/dietaryfiber/index.html>

PROTEIN

- ✘ The influence of protein on bone health is controversial
- ✘ Short-term studies have suggested that acute intakes of a low protein diet can decrease calcium absorption
- ✘ Cross-cultural studies, in fact, suggest that animal protein intake is positively associated with increased hip fracture incidence.

ACID/ALKALINE FOODS

- ✘ Chronic acidosis can lead to bone disease
- ✘ Eating foods that make your blood more alkaline can help protect your bones
- ✘ Fruits and vegetables can help make your blood more alkaline

BOTTOM LINE

- ✘ Maintain a healthy body weight
- ✘ Eat lots of fruits and vegetables
 - + 2 to 4 cups vegetables per day
 - + 1 to 3 cups fruit per day
- ✘ Eat other plants too
 - + Whole grains, legumes, nuts , seeds

Eat a whole foods diet

RECIPE IDEAS

- × whfoods.com
- × vrg.org
- × wholefoodsmarket.com
- × pccnaturalmarkets.com
- × allrecipes.com
- × cookusinterruptus.com
- × vegetariantimes.com