The Road to Medical Training

Naomi Pless
Medical training

College - 4 years

Medical school - 4 years

Internship - 1 year (sometimes on its own, sometimes as part of residency)

Residency 3 - 5 years (including internship)

Fellowship 1- 4 years
Premedical Course Requirements

- Biology
- Chemistry
- Physics
- Organic chemistry
- Calculus
- English
Osteoporosis

Normal:
BMD is within 1 SD of a “young normal” adult
(T-score at -1.0 and above)

Osteopenia:
BMD 1.0 and 2.5 SD below that of a “young normal” adult
(T-score 1.0 - 2.5)

Osteoporosis: BMD is 2.5 SD or more below that of a “young normal” adult (T-score at or below -2.5)

Patients who have already experienced one or more fractures are deemed to have severe or “established” osteoporosis.
Old definition of osteoporosis:

Presence of a fragility or low-trauma fracture, those occurring from a fall from a standing height or less, without major trauma (such as a motor vehicle accident).
The majority of patients who sustain fragility fractures have a T-score above −2.5

**National Osteoporosis Risk Assessment study**
2259 postmenopausal women with a fracture
82% with a fracture had a T-score above −2.5
67% with a fracture had a T-score of greater than −2.0

**Rotterdam study**
7806 individuals fifty-five years of age or older
Nonvertebral fractures with a T-score in the range between −1.0 and −2.5
56% (280 of 499) of the women
79% (115 of 145) of the men
There is a normal distribution shown in the diagram.

Very low T-score: 1 fracture/100 people (or 1/1,000)

Not very low T-score: 10 fractures/10,000 people
Merck claims
Fosamax reduces hip fractures by 50%

2027 postmenopausal women
with osteoporosis and a previous fracture
randomized to Fosamax and placebo

After 3 years:
Placebo 22 fractures 2.2%
Fosamax 11 fractures 1.1%

50% relative risk reduction
But 1.1% absolute risk reduction

Number needed to treat (NNT) analysis:
100 need treatment for 3 years to prevent 1 fracture

Translation
99 of 100 treated will receive no benefit
Risk factors for fracture

- Poor balance, reduced proprioception
- Weak muscles, less than 4 hours per day on your feet
- Dehydration, low blood pressure
  - Low body weight
  - Poor vision
- Low vitamin D levels
- Being thin, Caucasian or Asian
- Depression, anxiety, agitation, dementia
- Sedation (narcotics, anticonvulsants, psychotropics)
- Loose rugs, slippery surfaces, obstacles
  - Low light, bifocals
- Smoking, high alcohol intake, high caffeine intake
- High protein diet, high salt diet
- Malnutrition, anorexia
- Aluminum antacids, Prilosec and other PPIs
- Long term prednisone
- Too much thyroid replacement medication
  - Too much vitamin A
- Low hormone levels
  - Gastric bypass
- Low DEXA score
Risk factors for fracture – physical

Poor balance, reduced proprioception
Weak muscles
Less than 4 hours per day on your feet
Dehydration, low blood pressure
Low weight
Poor vision
Risk factors for fracture – psychological

Depression, anxiety, agitation, dementia

Sedation

(narcotics, anticonvulsants, psychotropics)
Risk factors for fracture – environmental

Loose rugs, slippery surfaces, obstacles
Low light, bifocals
Risk factors for fracture – Falls

Risk factors for fracture - physical
Poor balance, reduced proprioception
Weak muscles, less than 4 hours per day on your feet
Dehydration, low blood pressure
Low weight
Poor vision

Risk factors for fracture - psychological
Depression, anxiety, agitation, dementia
Sedation (narcotics, anticonvulsants, psychotropics)

Risk factors for fracture - environmental
Loose rugs, slippery surfaces, obstacles
Low light, bifocals
Risk factors for fracture – bone integrity

Risk factors for fracture - physical
- Low DEXA score
- Being thin, Caucasian or Asian
- Low hormone levels
- Low vitamin D levels
- Gastric bypass

Risk factors for fracture - lifestyle
- Smoking, high alcohol intake, high caffeine intake
- High protein diet, high salt diet
- Malnutrition / anorexia

Risk factors for fracture - medication
- Aluminum antacids, Prilosec and other PPIs,
- Long term prednisone use
- Too much thyroid replacement medication
- Too much vitamin A
Images courtesy of Ralph Müller, PhD, Switzerland
Bone protection

Avoid a high animal protein based diet
  Low salt diet
  Avoid high alcohol intake
  Avoid high caffeine intake
  Quit smoking

Weight bearing exercise (not-water based)
  Exercise with low weight weights
  Balance exercises

Miriam Nelson
Strong Women, Strong Bones
Strong Women Stay Young
Strong Women Stay Thin
Bone protection

- Vitamin D supplementation
  - Magnesium, vitamin K2
- Adequate plant based protein
- Plenty of fruits and vegetables
  - Consider vitamin B12

- Assess your home for fall risk
  - Adequate lighting

- Avoid aluminum based antacids
- Cut down or avoid Prilosec and other PPIs
- Avoid long term prednisone use unless absolutely medically necessary

- Be careful to not take more thyroid replacement medication then medically necessary
- Avoid vitamin A supplementation
Further Reading

How A Bone Disease Grew To Fit The Prescription
By Alix Spiegel on NPR All Things Considered
December 21, 2009

The Myth of Osteoporosis
by Gillian Sanson

Strong Women, Strong Bones
By Miriam Nelson