



Betsey Newcomb, OT www.BoneHealth4U.com

Osteoporosis is a disease characterized by low bone mass and bone matrix deterioration leading to increased fragility and risk of fracture.
(World Health Organization 2011)

Who is effected by Osteoporosis???

- **Affects ALL populations:**
babies through elderly
- **Knows no boundaries** regarding age, gender, lifestyle or ethnicity or any other factor
- **Affects over 55% of persons aged 50+** men & women (Reference National Osteoporosis Foundation 2002)

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How can we identify those patients who are at risk for fractures in our clinics??



- Diagnosed with Osteoporosis or Osteopenia?
- Un-Diagnosed Compression Fracture?
- Skeletal Fragility/Low Bone Mass?
- Prevent the next fracture!

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NON-MODIFIABLE RISK FACTORS

- Female
- Family History
- Post-Menopausal – Natural or Surgical
- Advanced Age
- Caucasian or Asian
- Delayed Puberty/Irregular Menstrual Cycles
- Early Menopause
- Men over age 75
- Nulliparous-having had no children
- Small Boned
- Weight less than 125 lbs

MODIFIABLE RISK FACTORS

- Smoking
- High Alcohol Intake
- Caffeine (more than 2-5 cups/day)
- Sedentary Lifestyle/Over-Exerciser
- Men-Low Testosterone
- High Protein Diet (Meat)
- Low Calcium Diet
- Eating Disorders – Gluten/Dairy Allergies, Celiac, Bulimia
- Nutrition
- High Sodium Diet – Packaged foods

DISEASES AND CONDITIONS

AIDS/HIV
Ankylosing spondylitis
Blood and bone marrow disorders
Breast cancer
Chronic obstructive pulmonary disease (COPD), including emphysema
Cushing's syndrome
Depression
Diabetes
Eating disorders, especially anorexia nervosa
Female athlete triad (includes loss of menstrual periods, an eating disorder and excessive exercise)
Gastrectomy
Gastrointestinal bypass procedures
Hyperparathyroidism
Hyperthyroidism
Inflammatory bowel disease, including Crohn's disease and ulcerative colitis, food allergies
Kidney disease that is chronic and long lasting

Liver disease that is severe, including biliary cirrhosis
Lupus
Lymphoma and leukemia
Malabsorption syndromes, including celiac disease
Multiple myeloma
Multiple sclerosis
Organ transplants
Parkinson's disease
Polio and post-polio syndrome
Poor diet, including malnutrition
Premature menopause
Prostate cancer
Rheumatoid arthritis
Scoliosis
Spinal cord injuries
Stroke
Thalassemia
Thyrototoxicosis
Weight loss

NOTE

This list may not include all diseases and conditions that may cause bone loss.

MEDICATIONS

- Aluminum-containing antacids
- Antiseizure medicines (only some) such as Dilantin® or Phenobarbital
- Aromatase inhibitors such as Arimidex®, Aromasin® and Femara®
- Cancer chemotherapeutic drugs
- Cyclosporine A and FK506 (Tacrolimus)
- Gonadotropin releasing hormone (GnRH) such as Lupron® and Zoladex®
- Heparin
- Lithium
- Medroxyprogesterone acetate for contraception (Depo-Provera®)

- **Methotrexate**
- **Proton pump inhibitors (PPIs)** such as Nexium®, Prevacid® and Prilosec® . New study just showed increased Dementia.
- **Selective serotonin reuptake inhibitors (SSRIs)** such as Lexapro®, Prozac® and Zoloft®
- **Steroids** (glucocorticoids) such as *Cortisone and Prednisone* (*> or = 5mg. For 3 or more months*)
- **Tamoxifen®** (premenopausal use)
- **Thiazolidinediones** such as Actos® and Avandia®
- **Thyroid** hormones in excess
- **** Using 4 or more prescription drugs increases fall risk (Fuller GF, 2000)**
NOTE - This list may not include all medicines that may cause bone loss.

RISK FOR FRACTURE

- History of Previous Fracture**
- Vision Problems**
- Deconditioning/Hypokinesia**
- Balance Problems**
- Tall Slim Build**
- Hip Fracture in Immediate Family-especially of the mother**
- Inability to get out of a chair unaided**
- Being on one's feet less than 4 hours per day**

FIRST SIGNS

- Fracture** - minimal trauma/fragility fracture
 - (e.g., Colles Fracture, Compression Fracture, Rib Fracture. Any fracture that occurs due to a fall from standing body height is a fracture of minimal trauma)
- Hyper-Kyphosis**
- Loss of body height**
- Transparent skin**
- Periodontal disease**
- Back Pain**
- Protruding Abdomen**

BMD / DEXA - T Score

0 to -1.....Normal Bone

-1 to -2.4.....Osteopenia

-2.5 & Below.....Osteoporosis

Below -2.5 in presence of fracture...
.....Severe Osteoporosis

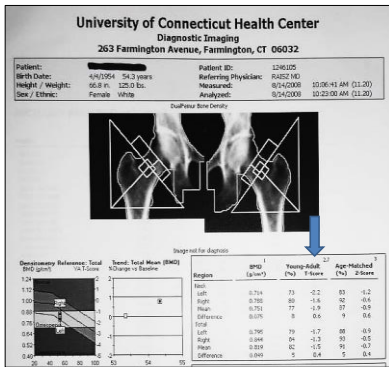
Z Score Men under 50, Children, Pre-Menopausal

DEXA/BMD Hip Bone Density Report

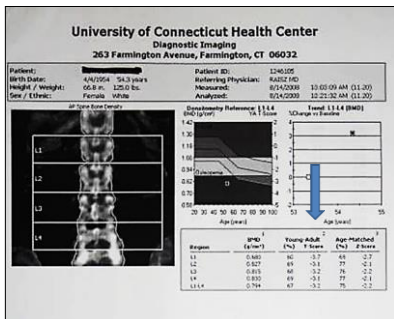
• Low dose x-ray performed of the lumbar spine, hip (shown here) or wrist.

T-score

• Compared to the reference standard of a healthy thirty-year-old of the same sex and ethnicity to determine future risk of fracture.



BMD/DEXA Vertebral Column Bone Density Report A/P View



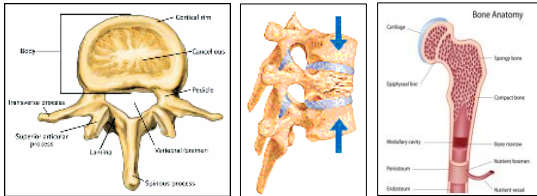
**COMPRESSION
FRACTURES
T 12 / L1**



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Why are some bones more likely to break than others?

**Cortical Bone
vs.
Trabecular Bone**



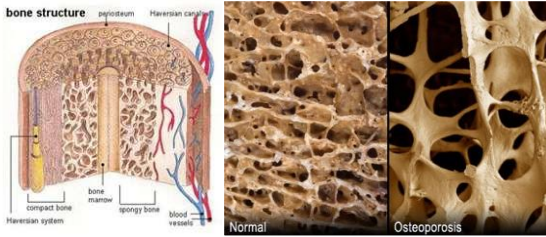
**BONE
STRENGTH**

- **Bone Density**
- **Bone Quality**
 - **Architecture**
 - **Mineralization**
 - **Micro damage accumulation**

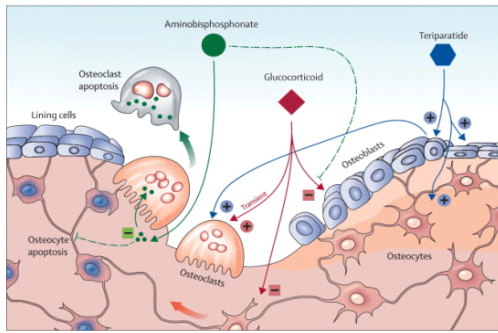
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INSIDE the BONES

Osteoporotic bone vs. normal bone
Disintegration of the trabecular structure and structure of the marrow

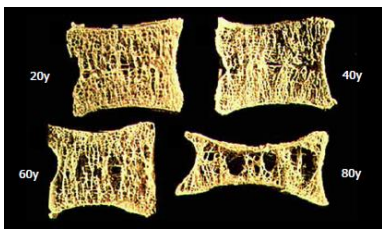


Bone Formation

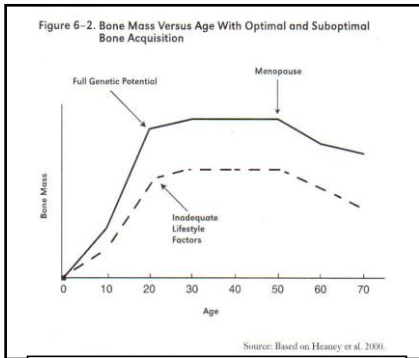


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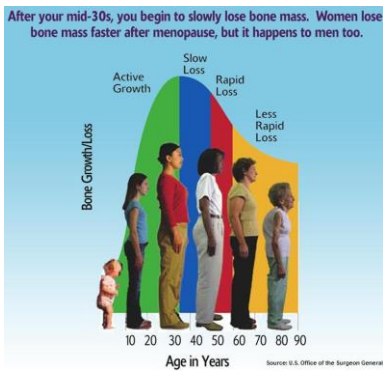
Bone Resorption Outpaces Formation



Expansion of marrow space by fat



Bone Health and Osteoporosis
A Report of the Surgeon General October 2004



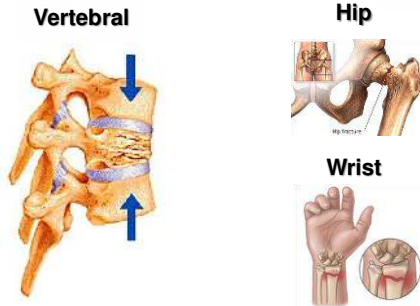
PEAK TIMES OF BONE GROWTH

***In Utero * In Adolescence**

OSTEOPOROSIS is a
PEDIATRIC CONDITION
that manifests in **ADULTHOOD**

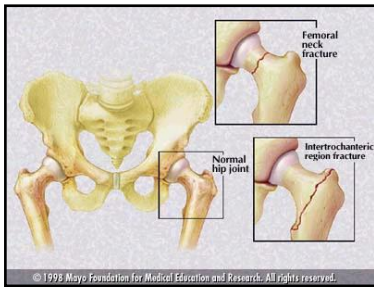
**WHEN DOES
PREVENTION
BEGIN ?**

Most Common Fractures Sites



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HIP FRACTURE

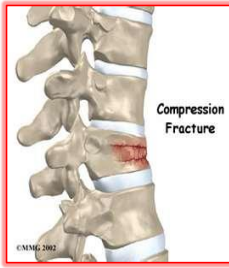


Most disabling/life threatening injury
Half of women with hip fractures die within one year of fracture

Know the Facts!

- Risk for women is 2-3X higher than for men.
- Mortality rate for men nearly 2X that of women.
- Older women falling backwards or sideways are more likely to fracture hips.
- Should a hip fracture occur, *half of injured never regain previous quality of life* ... may require assisted living, nursing home, etc.
- At 6 months following a hip fracture, only 15% can walk across a room unaided.

Vertebral Compression Fractures



- ❑ Bones of *anterior spine* usually *first* to show signs of osteoporosis
 - ❑ Most common fractures occurring with osteoporosis
 - ❑ Occur in 30-50% of people over age 50
 - ❑ Only 20% are painful...
 - ❑ 70-80% are SILENT!
 - ❑ Only 25-30% clinical attention
- Christiansen, Bouxsein, 2010

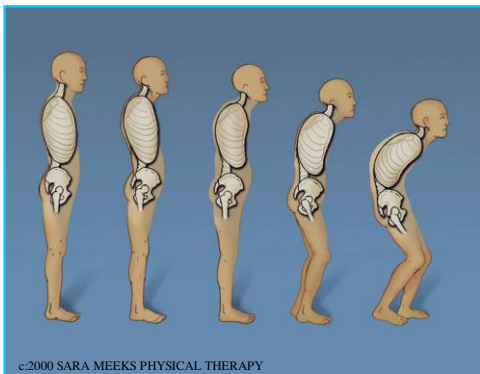
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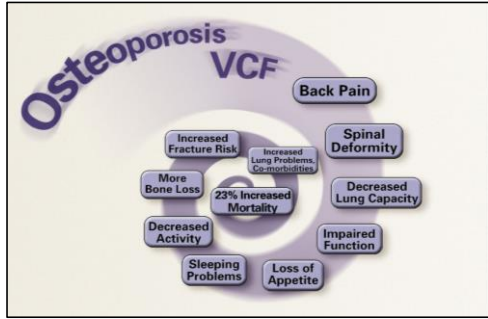
➤ After one vertebral fracture, the risk for having a 2nd vertebral fracture increases 5 fold!

➤ 1 woman in 5 will sustain a 2nd vertebral fracture within 1 year

- [International Osteoporosis Foundation 2005](#)
- [Report of the Surgeon General on Bone Health Oct 2004](#)

PATTERNS OF POSTURAL CHANGE©





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Common movements that increase force on the FRONT of the spine

AVOID



- Forward Bending
- Lateral Bending
- Trunk Twisting
- Any of the above simultaneously

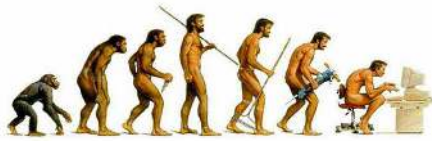


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QUESTIONS...???

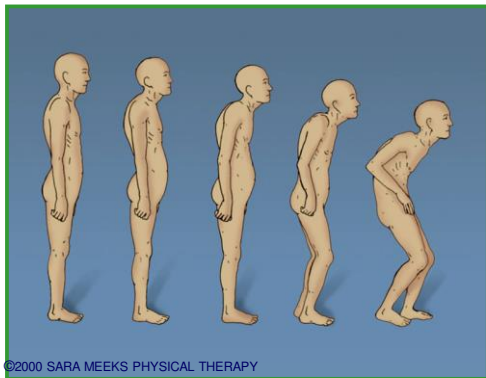


EVOLUTION?



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PATTERNS OF POSTURAL CHANGE



Posture starts at Birth...



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Sedentary or ACTIVE



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What does your posture tell about you?



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When is the optimal time and what is the optimal way to build bone?

- **Pre- or Peri-pubertal years** - optimal time for the greatest osteogenic response
- **Optimal dose of exercise** needed to enhance bone strength in children and adolescents is *unresolved...*
- **Activities should be dynamic, variable in nature, applied rapidly and intermittently, and that relatively few loading cycles are required.**

(Daly 2007), (Bailey 2008)

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Role of Activity in Bone Health

- **Odd Impact**



- **Weight Bearing Exercises**

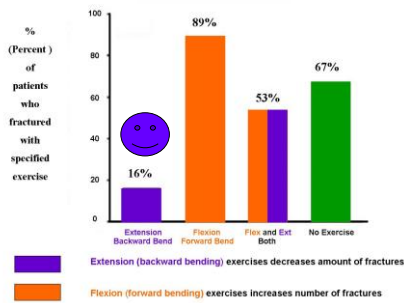


- **Start in Childhood and Adolescence**

Nilsson, 2009
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S.A.F.E. Exercise: Fewer Fractures with Backward Bending Extension Exercises

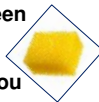
(Sinaki et al. 1984)



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Vertebroplasty

What would happen if you put a sponge between cement blocks?



What would happen if you placed a cement block between two sponges?

Fewer fractures with Back-Extensor-Strengthening Exercises following Vertebroplasty

(Huntoon 2008)



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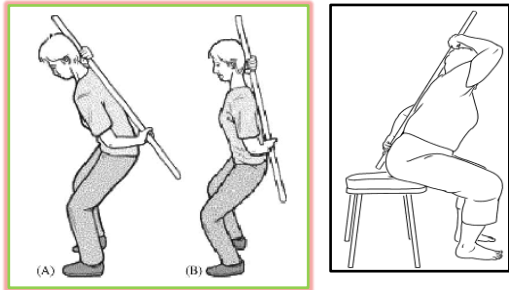
ALIGNMENT

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HIP HINGE/ALIGNMENT



Incorrect Correct

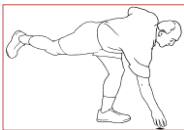
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BODY MECHANICS



S.A.F.E. FUNCTIONAL Patterns of MOVEMENT

during
ADL'S / Activities



- ♥ Hip Hinge
- ♥ Golfer's Reach
- ♥ Wide Squat
- ♥ Reverse Lunge

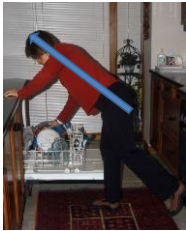
♥ Waiters Bow
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VCF'S OCCUR PRIMARILY DURING DAILY ACTIVITIES

- 50% - occur "spontaneously"
- 64% - when getting out of bed
- 37% - trivial housework
- In men, 73% - no known trauma or by low energy trauma including falls in 57%
- 25-30 % of hip fx's - previous VCF's
- Most occur at T 7-8 and T11-L1

Christiansen, Bouxsein, 2010. Briggs et al 2007

Applying Body Mechanics to ADL's



S.A.F.E.
Golfers Reach



S.A.F.E.
Lunge



UN-S.A.F.E.

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MelioGuide

Getting In and Out of Bed



SAFE



- ❖ **Sideways method:** Sitting on the edge of your bed lower yourself onto your side as you raise your legs onto the bed, then Log Roll.
- ❖ **Hand and knees method to get in:** From your hands and knees lower yourself to your forearms then your hips. Roll to your side or back from here.
- ❖ **Cueing for Spinal Alignment, Core Muscle Activation , LOG ROLL**



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Adaptive Equipment

- Long Handled Equipment
- Stocking Aide
- Reacher
- Elastic shoe laces
- Step stool
- Toilet Hygiene Self care

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Strengthen Support Muscles

"Fountain of Youth" Muscles

- Diaphragm & Intercostals
- Heart
- Back Extensors
- Abdominals
- Pelvic Floor
- Gluteus Maximus
- Gluteus Medius

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CONSIDERATION

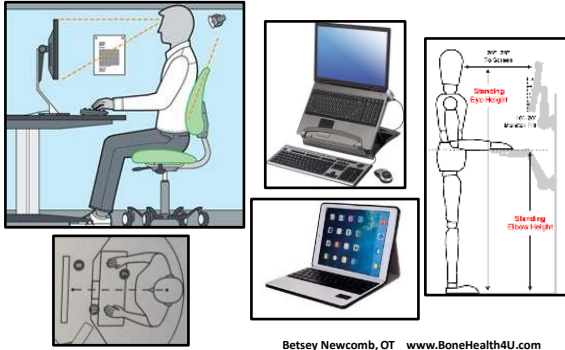
Lower Abdominals

Erector Spinae (ALL)

Anatomy of the Human Body
Henry Gray, F.R.S.
27th Edition
Lea & Febiger; Philadelphia, PA

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Work Station



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Work Station



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What do you do all day?
Puzzles, Cook, Needlework, Read, Crafts, Gardening , Crossword puzzles, TV, Video Games, ... ??

Ergonomics



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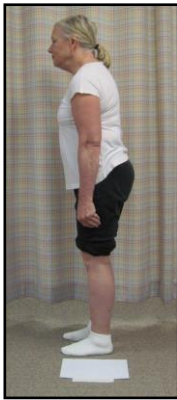


BEFORE



AFTER 7 Weeks

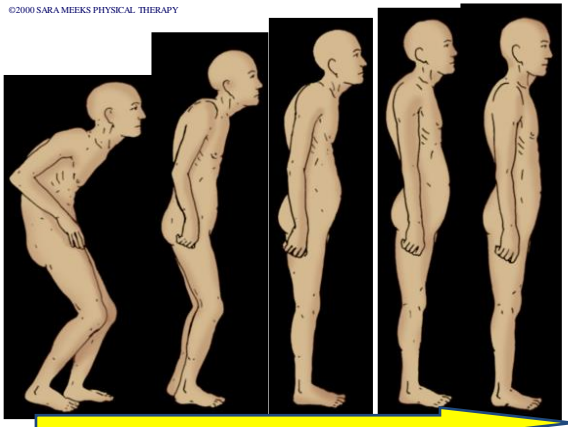
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1 Hour later

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©2000 SARA MEEKS PHYSICAL THERAPY



Case Study

- 84 Y.O.
- 5 Vertebroplasties
- VCF cascade above and below
- Cardiac complications
- Breathing 2-4 liters O2
- Digestion/Bowel
- What would YOU do?



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Progress

Best Posture
No Brace



Day 1 - Spinomed IV
Brace



5 1/2 weeks Later
No Brace



THINK

BONE

WHEN YOUR PATIENT
FIRST COMES THROUGH
THE DOOR

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Shouldn't *all* patients at risk be handled in a manner that would avoid potential compression fractures?



QUESTIONS...???



THANK YOU!

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A cartoon skeleton on the left side of the blue box, with its right arm raised. On the right side, there is a small, square portrait of a woman with blonde hair, wearing a red top.

***What did you learn that you will
apply in your clinics?***



Can you think of any of your patients that may have Osteoporosis?

Write down three things that you will do differently when you see a new patient.
