The background is a dark purple color with various abstract geometric shapes and patterns. There are several circles, some solid and some with patterns like stripes or polka dots. There are also triangles, squares, and pentagons in various colors like pink, yellow, and blue. Some shapes have dashed outlines. A large dark blue circle is in the center, containing the main text.

What is a Bone Density Scan?

Emily Lancia
PA-S1

“Bone Density Scans”



	X-ray Absorptiometry	Single Energy Absorptiometry	Dual Energy X-Ray Absorptiometry	Quantitative Computed Tomography
Can Measure Bone Density	X	X	X	X
Measures with precision		X	X	X
Efficiently scans multiple bones or full body		X	X	X
Low Radiation	X	X	X	

precision
+ efficiency
+ safe levels of radiation

= DEXA



When to order a DEXA Scan:

Most commonly: To assess bone health for osteoporosis/fracture risk

Factors of Bone Density Loss:

- Age
 - **SOME loss of bone density is NORMAL with aging**
- Gender
 - **Screen starting at 65 for women and 70 in men**
- Family history of osteoporosis or multiple fractures
- Previous fracture injuries
- Medications
 - Prednisone, cancer drugs, immunosuppressant drugs
- Overall Health
 - Rheumatoid arthritis, lupus, diabetes, liver disease and kidney disease

Other Indications:

- To track bone health changes over time
- To monitor treatment efficacy
- To evaluate body composition, including fat and muscle mass

PRINCIPLE

When it pass through the body, the attenuation of X-rays depends on the properties of the underlying tissue (high attenuation for bone and low attenuation for fat).



WHY USE DXA SCAN?

- ✓ Non-invasive, no patient performance needed, fast exam
- ✓ High accuracy and reproducibility for all age groups
- ✓ Recommended by EFSA as a reliable measurement for body composition



TO ASSESS

- 1 Bone health through bone mineral content and density (femur and spine)
- 2 Fat mass and Fat free mass (also call lean mass) by the assessment of four regions (head, trunk, arms, and legs)

BE ABLE TO QUICKLY ACT ON:



Osteoporosis, Osteopenia and Fracture risk



Cardiovasculars risk factor (Visceral fat)



Sarcopenia risk factor (Muscle loss)

Conditions of utilization

- Specialized radiology technician required to operate
- As a radiological exam, DXA can be performed twice per year, due to the small amount of radiation exposure (radiation exposure from a whole body DXA scan is equivalent to 1-10% of a chest X-ray)
- No contraindication to the use with the exception of pregnancy

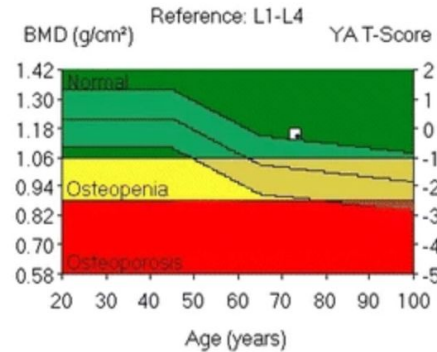
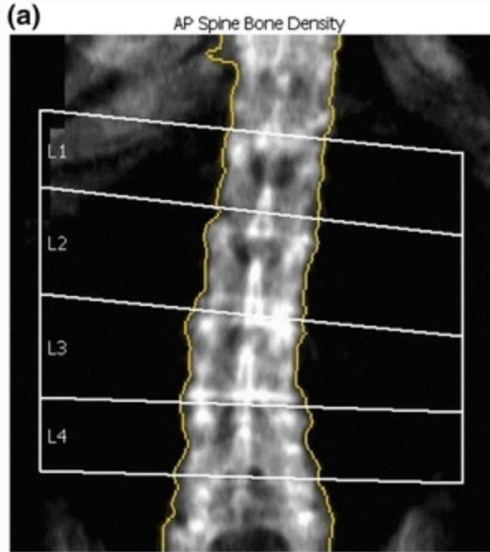


DEXA SCANNING STEPS:

1. **Pt positioned** on **DEXA table** by technologist, often with foam blocks
 - a. Hip and spine most commonly scanned
2. **DEXA arm** passes over Pt, emitting two beams of varying energies
3. **DEXA computer** calculates bone density measurement data and translates into pictures and graphs

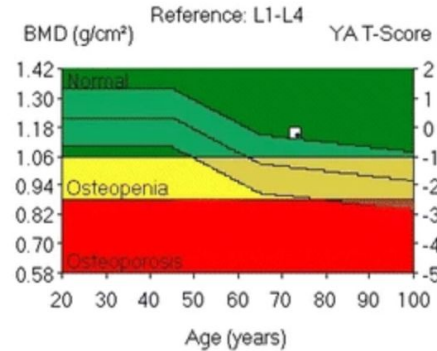
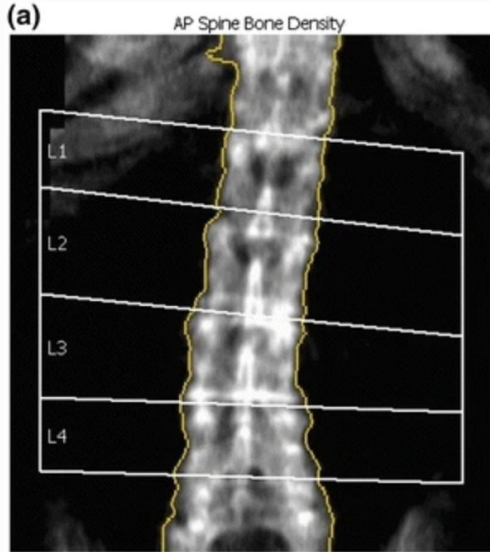
DEXA scans measure bone density (thickness and strength of bones) by passing *both a high and low energy x-ray beam* through the body. The *difference in absorptiometry between beams* is used for calculations.

4. Results are reviewed and interpreted by a radiologist or other provider trained in DEXA interpretation



Region	¹ BMD (g/cm ²)	Young-Adult (%)	² T-Score	Age-Matched (%)	³ Z-Score
L1	0.999	88	-1.1	104	0.3
L2	1.149	96	-0.4	111	1.0
L3	1.312	109	0.9	127	2.3
L4	1.131	94	-0.6	109	0.8
L1-L2	1.085	94	-0.5	110	0.9
L1-L3	1.165	100	0.0	116	1.3
L1-L4	1.156	98	-0.2	114	1.2
L2-L3	1.227	102	0.2	119	1.6
L2-L4	1.198	100	0.0	116	1.4
L3-L4	1.225	102	0.2	119	1.6

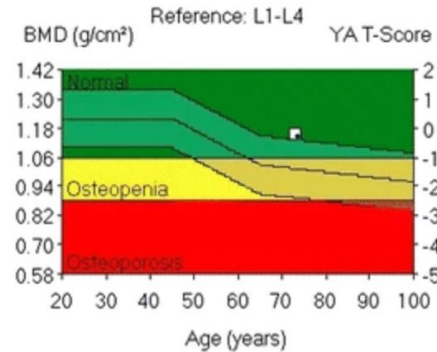
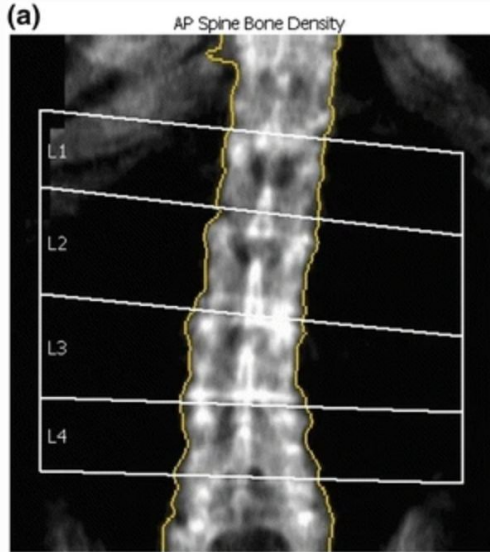
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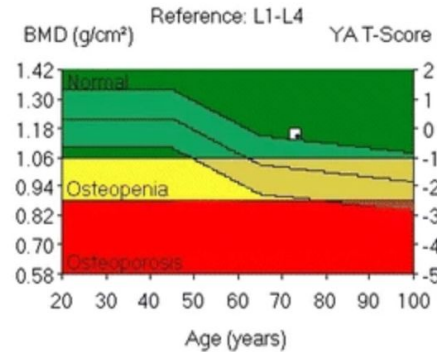
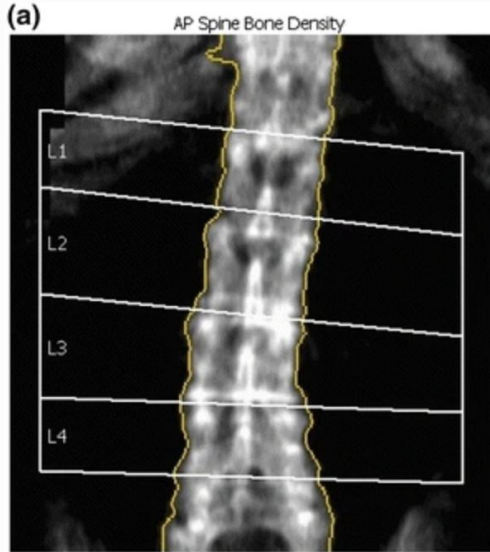


1. T-score: compares to the optimal peak bone density for gender

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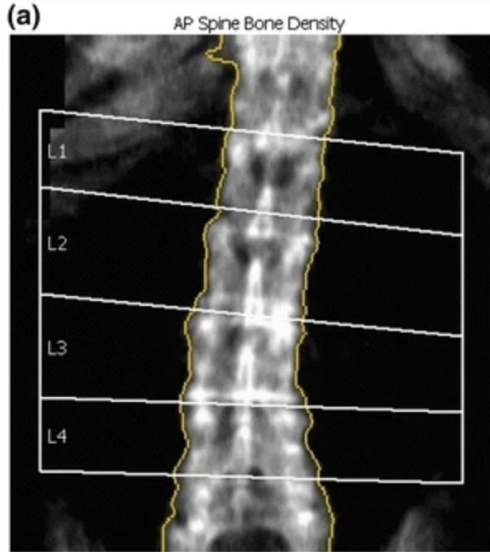
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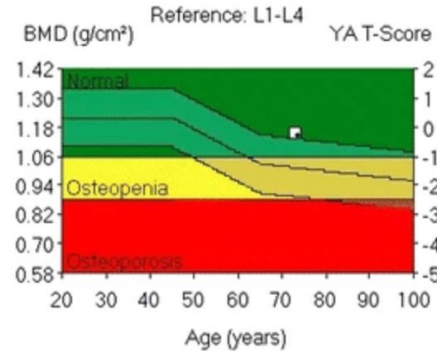
Reference Population Curves

2. Z-score: compares bone density to optimal of others who are the same age, gender, and ethnicity

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3. 3D Renderings and breakdowns to locate areas of particular clinical interest



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Reference Population Curves

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STATS ARE HARD!

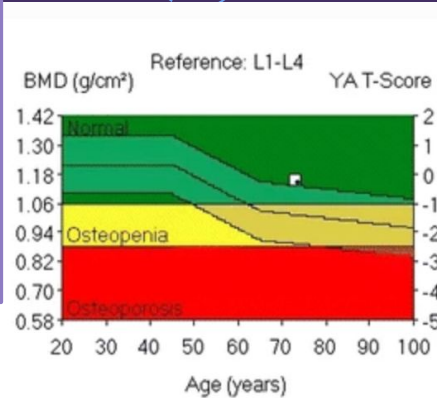
Reductive Breakdown...

T-Score: for men >50yo and menopausal women

- >-1 = normal
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- <-2.5 = osteoporosis

Z-Score: for children, premenopausal women, and males younger than age 50

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T-score: IGNORES age and race

- Is bone lost since optimal age “normal?”
- “Longitudinal”
- Diagnostic

Z-score: FACTORS age and race

- Is bone mass compared to age group normal?
- “Cross-sectional”
- Non-diagnostic clinical tool

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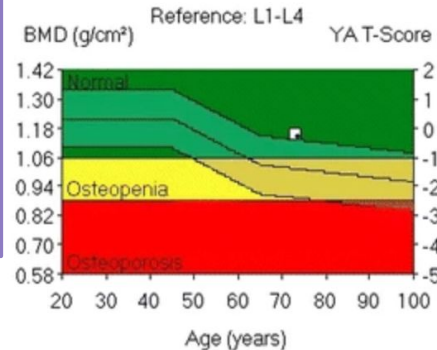
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5. Results sent to prescribing provider for diagnosis and treatment...

References

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