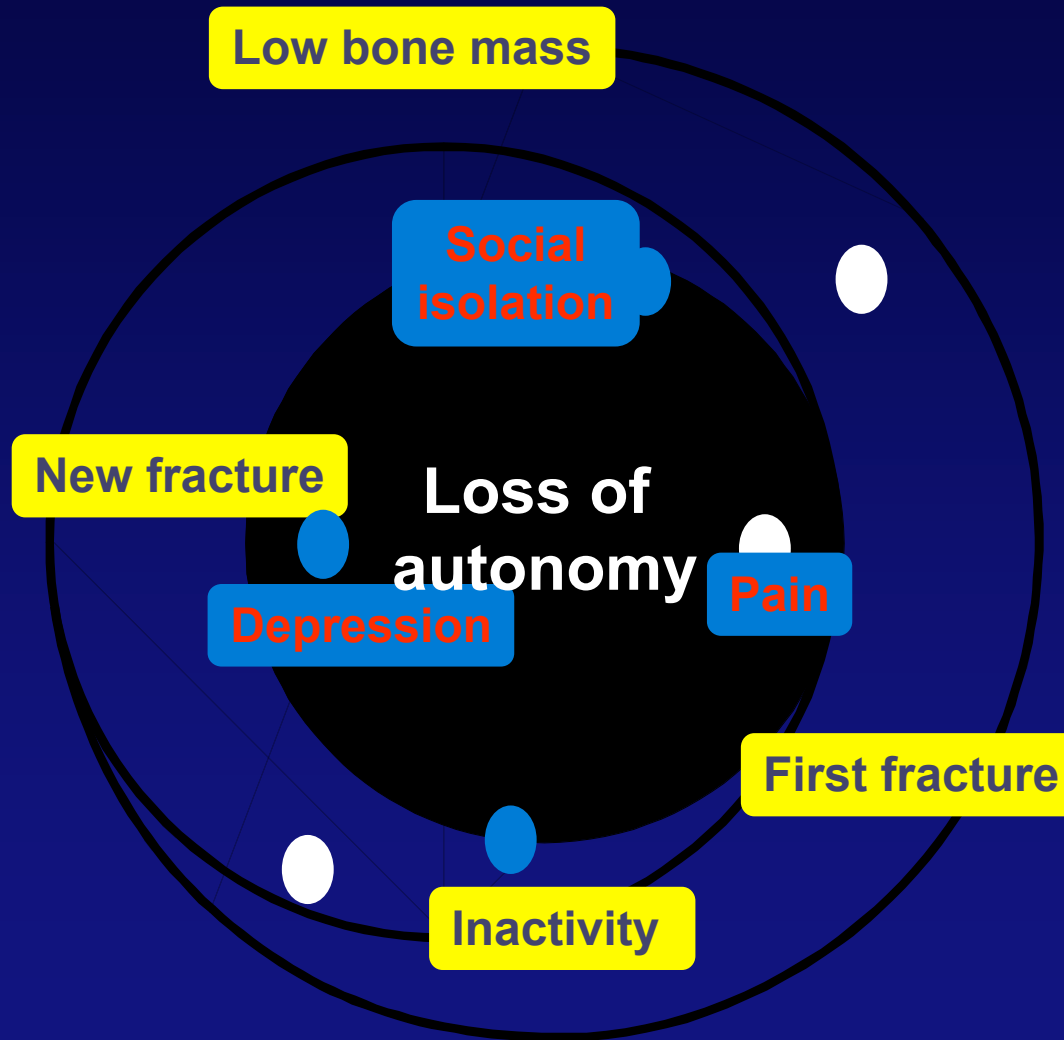




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# A dangerous vicious circle





# Mortality after Major Types of Osteoporotic Fracture in Men and Women: an Observational Study

Center et al, Lancet 1999

**5 - Year Prospective Cohort Study**

**Age-Standardized Mortality Ratio**

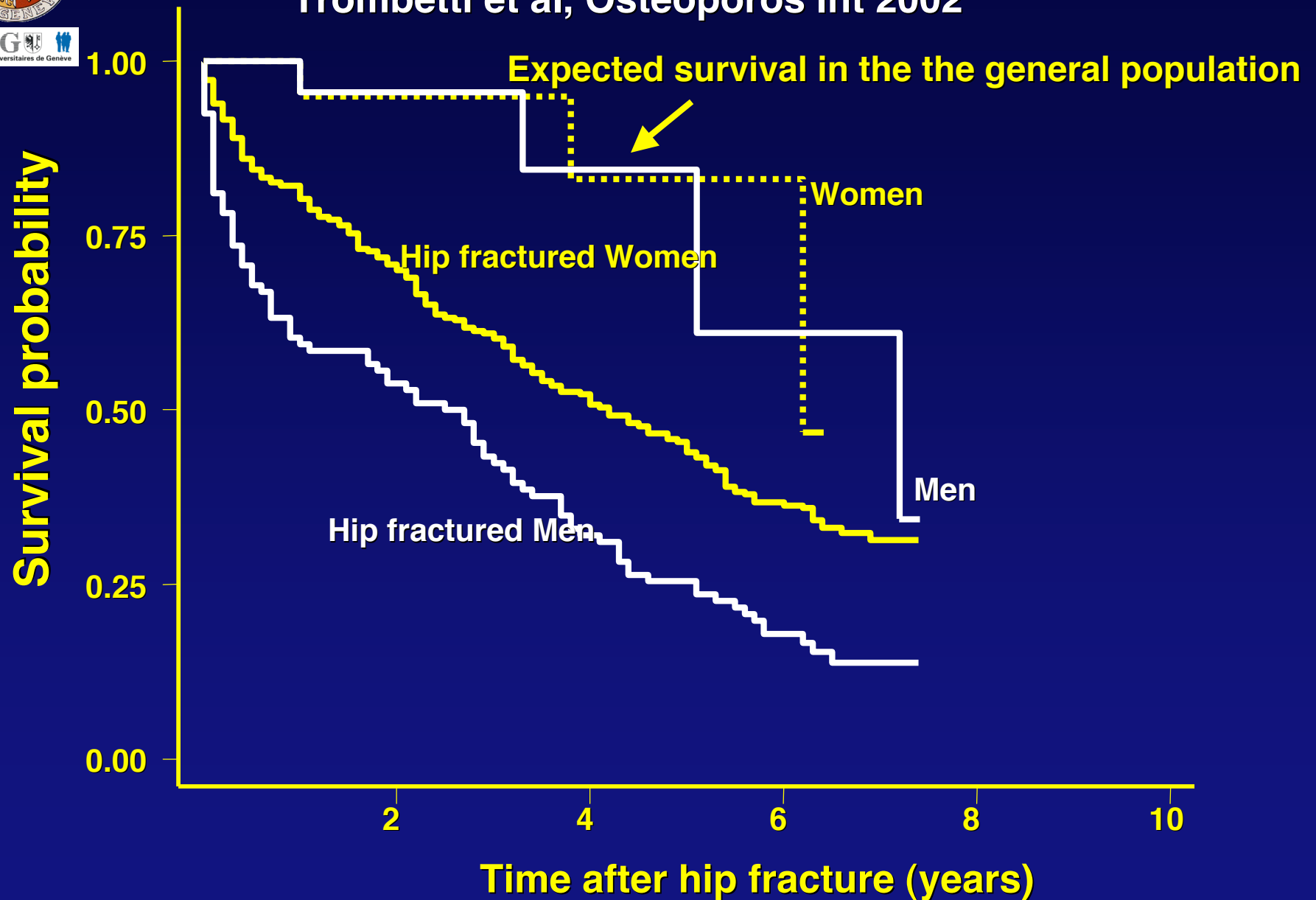
<b>Fracture</b>	<b><u>Women</u></b>	<b><u>Men</u></b>
<b>Proximal Femur</b>	<b>2.2</b>	<b>3.2</b>
<b>Vertebral</b>	<b>1.7</b>	<b>2.4</b>
<b>Other Major</b>	<b>1.9</b>	<b>2.2</b>
<b>Other Minor</b>	<b>0.8</b>	<b>1.5</b>



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# Survival after Hip Fracture

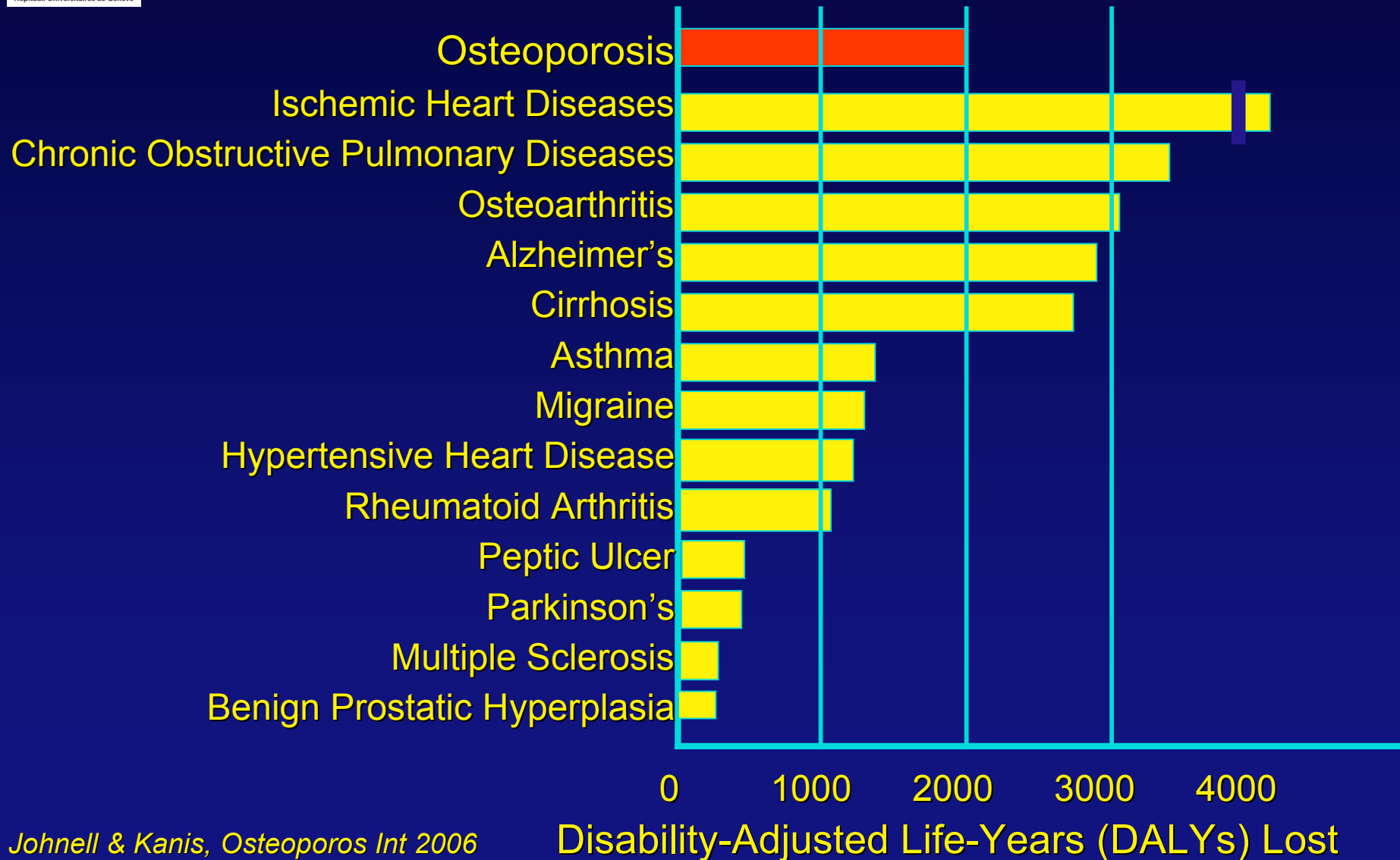
Trombetti et al, Osteoporos Int 2002





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# Disability-Adjusted Life-Years Lost because of Non-communicable Diseases in Europe



Johnell & Kanis, *Osteoporos Int* 2006



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# Osteoporosis Results in More Cost than Many Other Diseases

## Number of bed days (men and women)

- 701,000 for osteoporosis
- 891,000 for COPD
- 533,000 for stroke
- 328,000 for myocardial infarct
- 201,000 for breast cancer

Osteoporosis  
# 1 when  
looking at  
women only



# Diagnosis

# X-ray techniques

pDXA



XR-36



DXA

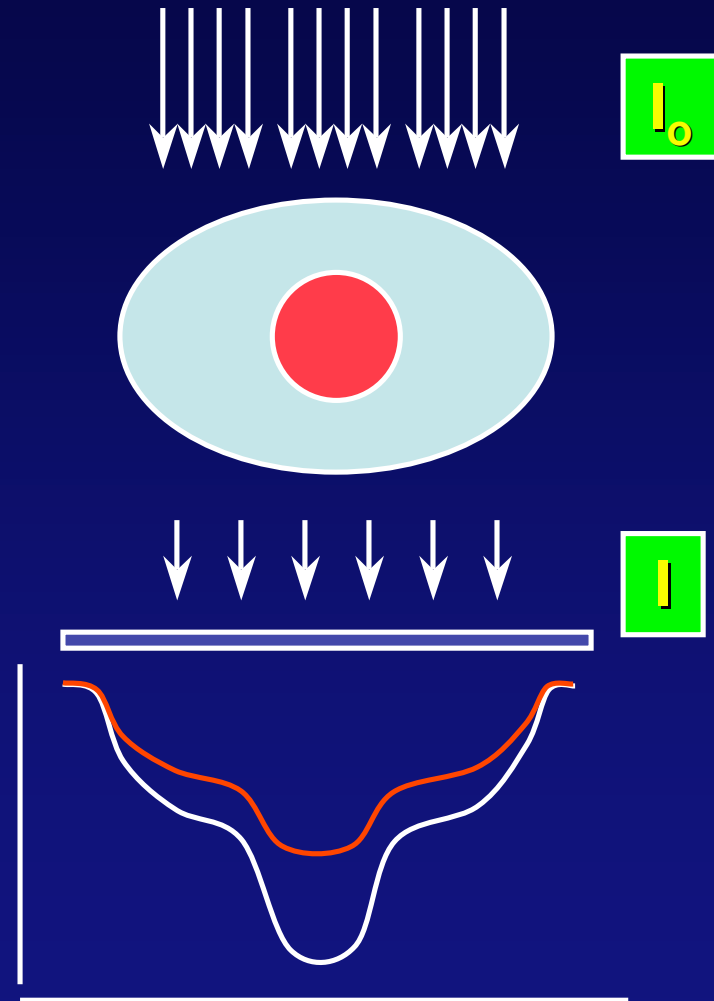
pQCT



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# DXA: Principle

- **Two attenuation profiles:**  
Low energy X-ray attenuation  
High energy X-ray attenuation
- **Multiply high energy profile by 'k' factor (ratio of soft tissue attenuation at low- & high-energy)**
- **BMD along scan = Low-energy profile - k-corrected high energy profile**



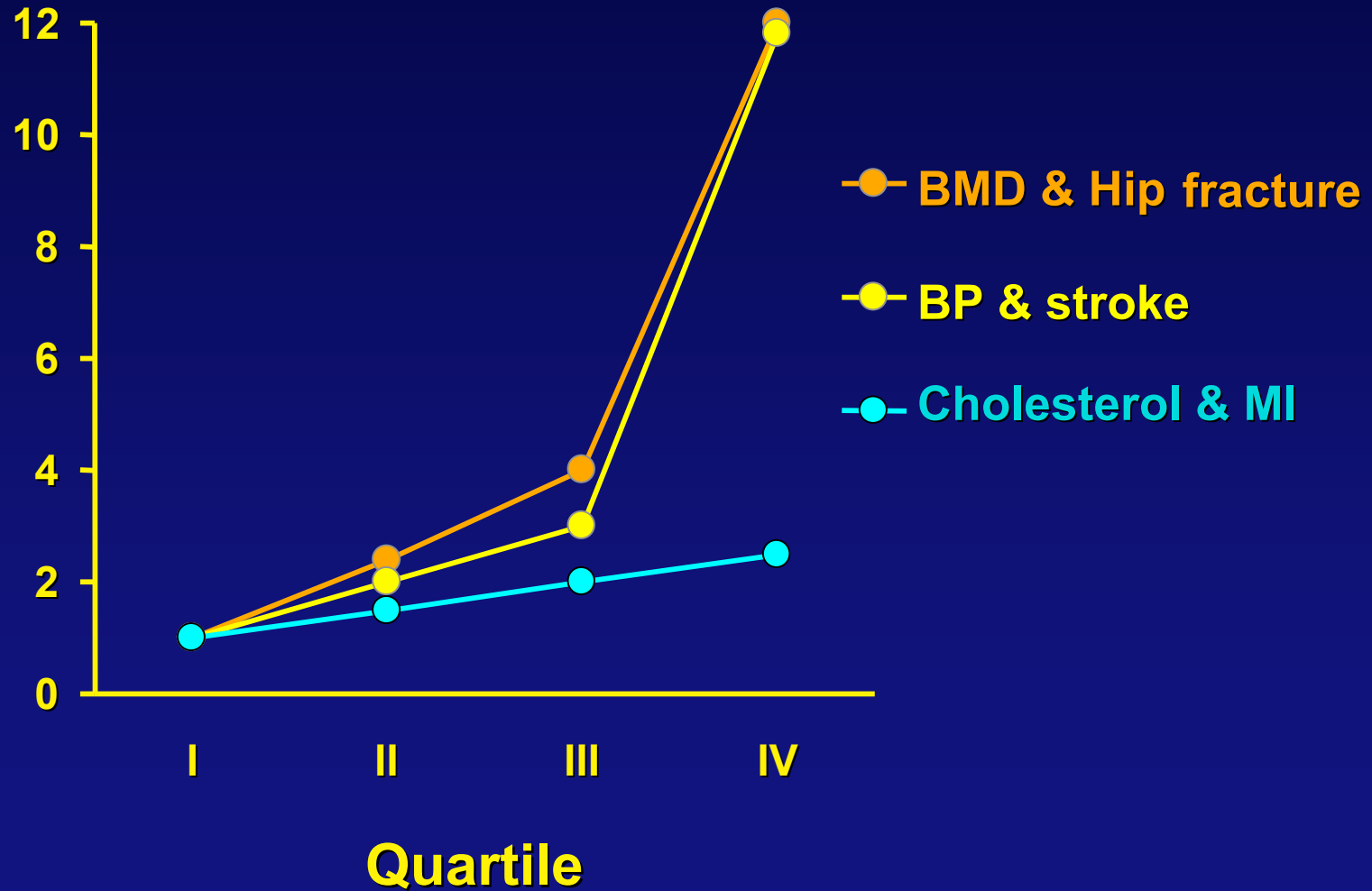




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# Gradients of risk

## Relative risk





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# Noninvasive Measurement of Bone Mineral Mass

<u>Technique</u>	<u>Site</u>	<u>Precision</u>	<u>Cost</u>	<u>Response to Therapy</u>
<b>SXA</b>	Forearm	++	±	±
	Heel			
<b>DXA</b>	Spine	++	+	++
	Hip	+	+	+
	Tot. Body	++	+	±
<b>QCT</b>	Spine	±	++	+
	Forearm	++	+(+)	±
<b>US</b>	Heel	±	-	-
	+ Fingers			



# Medicare Coverage for BMD Tests

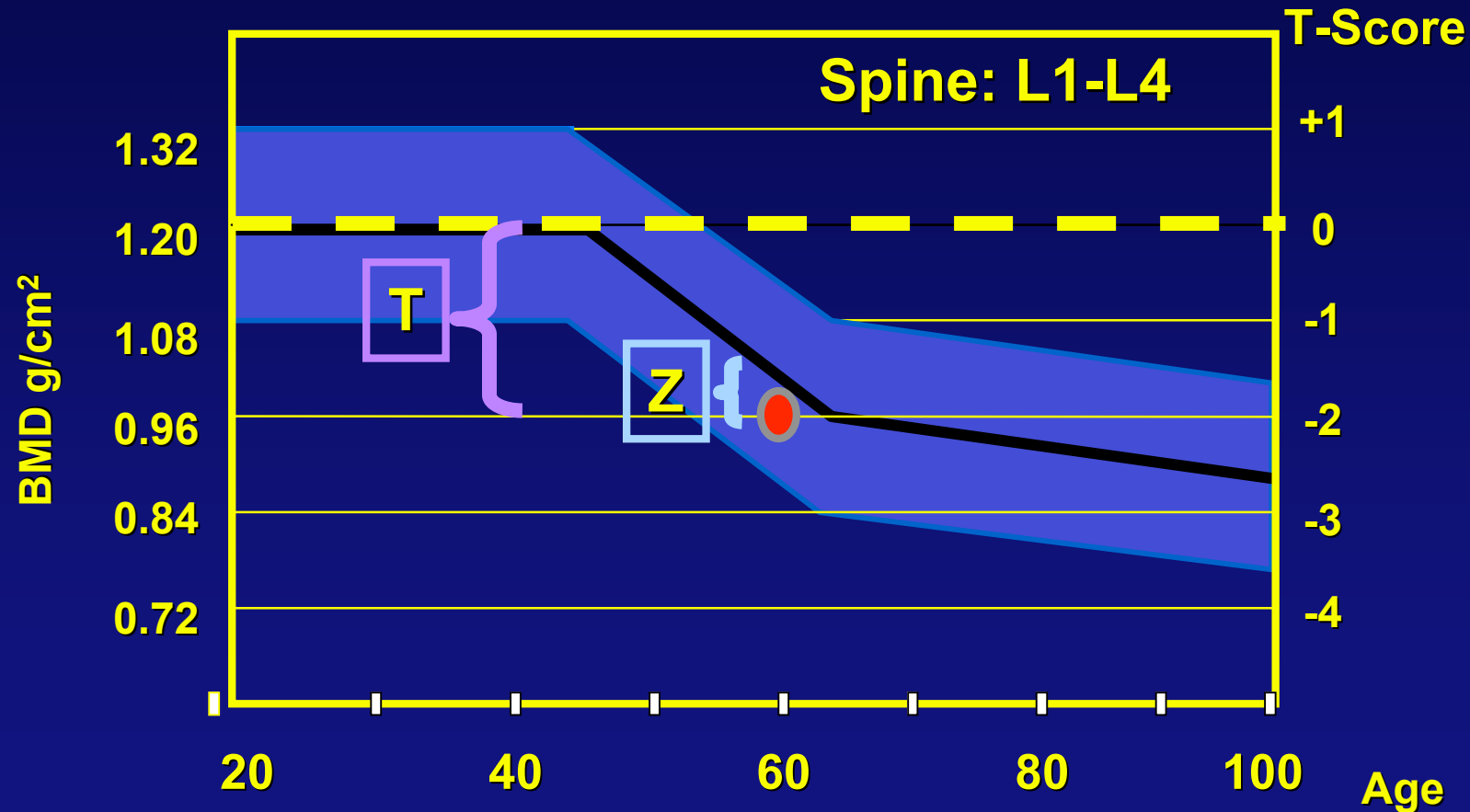
<u>Procedure</u>	<u>Site</u>	<u>Fee Schedule Medicare *</u>
DXA	Axial	\$ 128
pDXA	Appendicular	\$ 40
RX Absorptiometry	Appendicular	\$ 38
QUS	Appendicular	\$ 53
SXA	Appendicular	\$ 40
QCT	Axial	\$ 185
pQCT	Appendicular	\$ 40

\* Medicare Allowable Charge = 80% of the Costs



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# Example for T-score = - 2.0, 60 year old and Z-Score = - 0.5





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## Diagnosis of Osteoporosis Using Central DXA *WHO-Definition*

	T-score
Normal	$\geq -1$
Osteopenia	$< -1$ and $> -2.5$
<b>Osteoporosis</b>	$\leq -2.5$
Severe Osteoporosis	$\leq -2.5$ with Fracture

**Mainly for Spine and Hip in Women**



# Pathophysiology



# Osteoporosis Pathogenesis and Management

**Fracture**



*Fracture Treatment*



**Rehabilitation**

-> To Restore Independence

-> To Reduce Disabilities

**Prevention Subsequent Fracture**