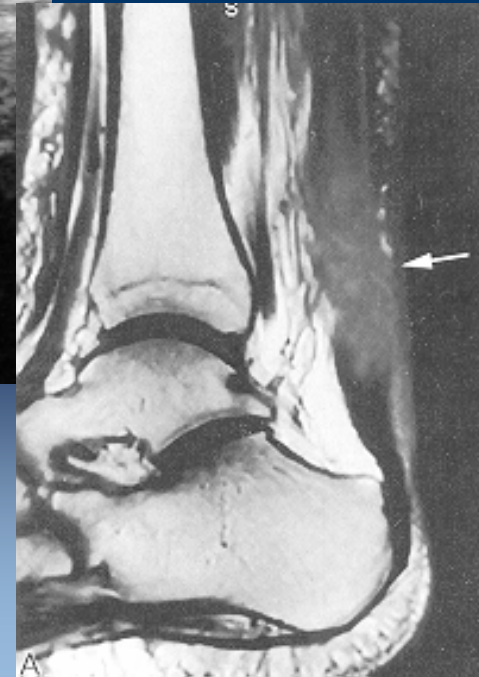
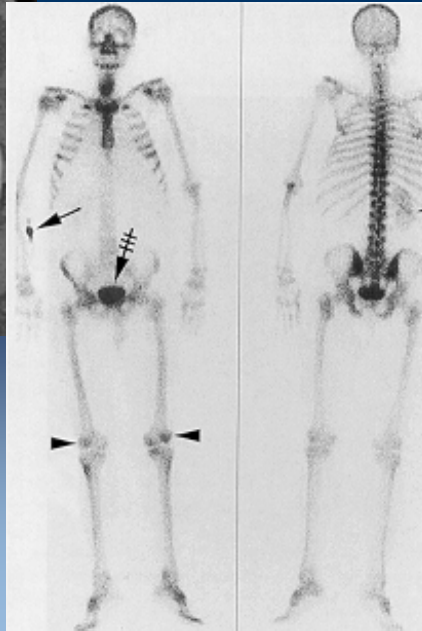
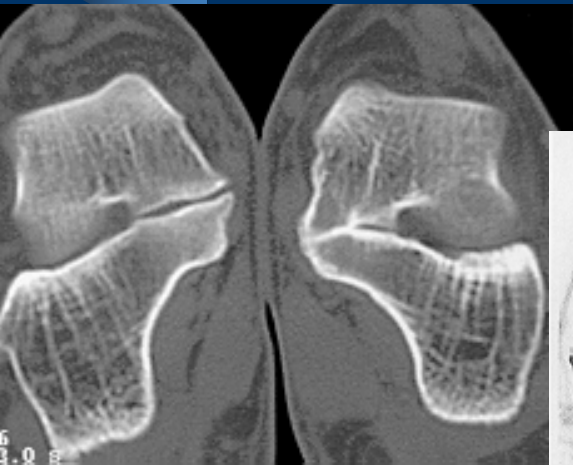


Week 6, Lecture 1

Introduction to other imaging modalities



Lecture Outline

1. Logical approach to imaging
2. Validity of diagnostic imaging
 - Validity and Reliability
 - Sensitivity and Specificity
3. Summary

1. Logical approach to imaging

- ∞ Reduce unnecessary examination, radiation exposure and cost
- ∞ Expedite diagnosis and treatment
- ∞ Need to order appropriate examination at the appropriate time

Plain radiography

- ∩ Starting point
- ∩ Relatively cheap
- ∩ Easily accessible
- ∩ Currently podiatrists have direct referral
 - Covered by Medicare

Other imaging modalities

- ∩ Bone scanning
- ∩ Ultrasonography (diagnostic)
- ∩ CT scan
- ∩ MRI scan
- ∩ Other

2. Validity of diagnostic imaging

- ⌚ Prior to accepting a new diagnostic test proper validity and reliability testing should be conducted
- ⌚ A test should be valid and reliable
- ⌚ It should be sensitive to detect a condition and specific for that condition

Validity of diagnostic imaging

∞ Validity

- The degree to which an instrument measures what it is intended to measure
- *Sensitivity* and *Specificity*

∞ Reliability

- The degree of consistency with which an instrument or rater measures a variable


Sensitivity and Specificity

⌚ Sensitivity

- A measure of validity of a screening procedure, based on the probability that someone with a disease will test positive

⌚ Specificity

- A measure of validity of a screening procedure, based on the probability that someone who does not have a disease will test negative

- 
- ⌚ If an instrument is sensitive, then it will infrequently underdiagnose a disease
 - ⌚ If an instrument is specific, then it will infrequently overdiagnose a disease
 - ⌚ Sensitivity and specificity represented as a percentage (e.g. 90% sensitive and 60% specific)

Calculation of diagnostic statistics

	Disease present	Disease absent	Total
Test positive	a	b	a+b
Test negative	c	d	c+d
Total	a+c	b+d	

$$\text{Sensitivity} = a/(a+c)$$

$$\text{Specificity} = d/(b+d)$$

Example

	Disease present	Disease absent	Total
Test positive	80	20	100
Test negative	10	90	100
Total	90	110	200

$$\text{Sensitivity} = 80 / (80 + 10) = 89\%$$

$$\text{Specificity} = 90 / (20 + 90) = 82\%$$

3. Summary

- ⌚ Many different imaging modalities now available
- ⌚ Need to order rationally
- ⌚ Keep in mind radiation (if relevant) cost, availability, plus sensitivity and specificity