2D VS 3D SCREENING FOR BREAST CANCER (THE RADIOLOGY PERSPECTIVE)

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SCREENING

- Screening aims to identify people who are at risk of having a particular disease or medical condition **before** they show any sign of having it.
- A screening program supports people throughout the process, from inviting people to be screened to referring anyone who is found to have a particular condition for treatment and advice.

Screening (cont.)

- A screening program is established only if certain conditions are met. These include:
  - having an accurate and acceptable screening test.
  - being able to provide treatment and advice for people who are found to have a particular condition.
  - making sure the screening program does more good than harm to those who are screened.

Radiological Screening

- Screening Mammography
  - Women 40-75 at average risk
  - Younger women with higher risk

Screening Issues in Mammography

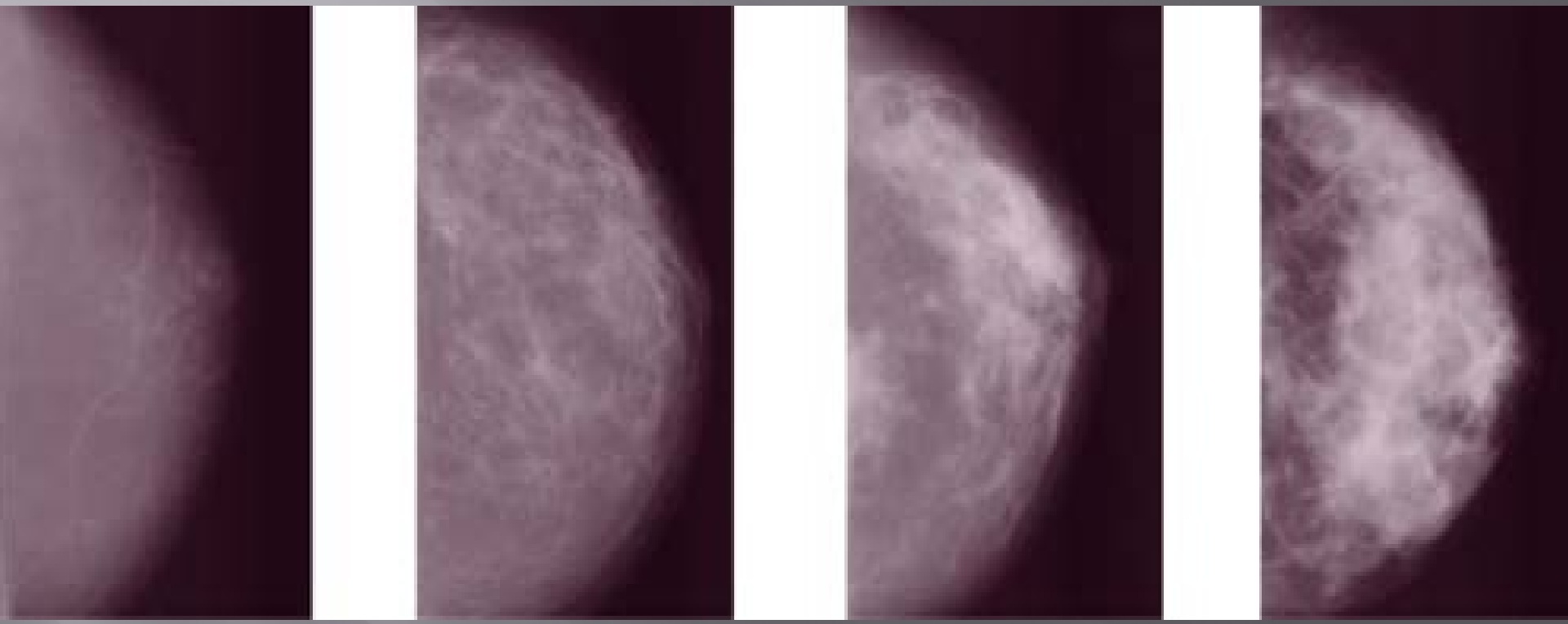
- Risk vs. Benefit (dose vs. detection)
  - 30 % decrease in breast cancer mortality since 1990 vs. ? # of cancers caused by radiation dose.
- False Positives
  - Looks positive, but isn't.
- False Negatives
  - Looks negative, but isn't.
- Breast Density
  - More dense, more false negatives. (and more cancer?)
  - Women with high breast density are 4-5 times more likely to get breast cancer than women with low breast density.

Fatty dense (<25%)

Scattered (25-50%)

Heterogeneously dense (51-75%)

Extremely (>75%)



N Engl J Med. 2007 Jan 18;356(3):227-36.
Mammographic density and the risk and detection of breast cancer.
Boyd NF[1], Guo H, Martin LJ, Sun L, Stone J, Fishell E, Jong RA, Hislop G, Chiarelli A, Minkin S, Yaffe MJ.

- As compared with women with density in less than 10% of the mammogram, women with density in 75% or more had an increased risk of breast cancer, whether detected by screening or less than 12 months after a negative screening examination.
- Increased risk of breast cancer, whether detected by screening or other means, persisted for at least 8 years after study entry and was greater in younger than in older women. For women younger than the median age of 56 years, 26% of all breast cancers and 50% of cancers detected less than 12 months after a negative screening test were attributable to density in 50% or more of the mammograms.

Digital Breast Tomosynthesis vs. Digital Mammography

- Digital breast tomosynthesis (DBT) has been shown to reduce recall rates and increase cancer detection in screening when compared with digital mammography.

Why do I mention this?

- All mammogram reports come with a lay letter.
- The mammo report and the lay letter state the density.
- The denser the mammogram, the lower the threshold should be for doing something else, especially in a high risk woman.
- Women may opt for 3D Mammography if they know they are in the high density population.

Digital Mammography (2D)

- Digital Mammography is the gold standard for breast cancer screening, but may yield suspicious findings that turn out not to be cancer. These false-positive findings are associated with a higher recall rate.

Digital 3D Mammography

- AKA Digital Breast Tomosynthesis
- **Breast Tomosynthesis Increases Cancer Detection, Reduces Recall Rates**
- Digital breast tomosynthesis has shown promise at reducing recall rates in all groups of patients, including **younger women** and women with dense breast tissue.

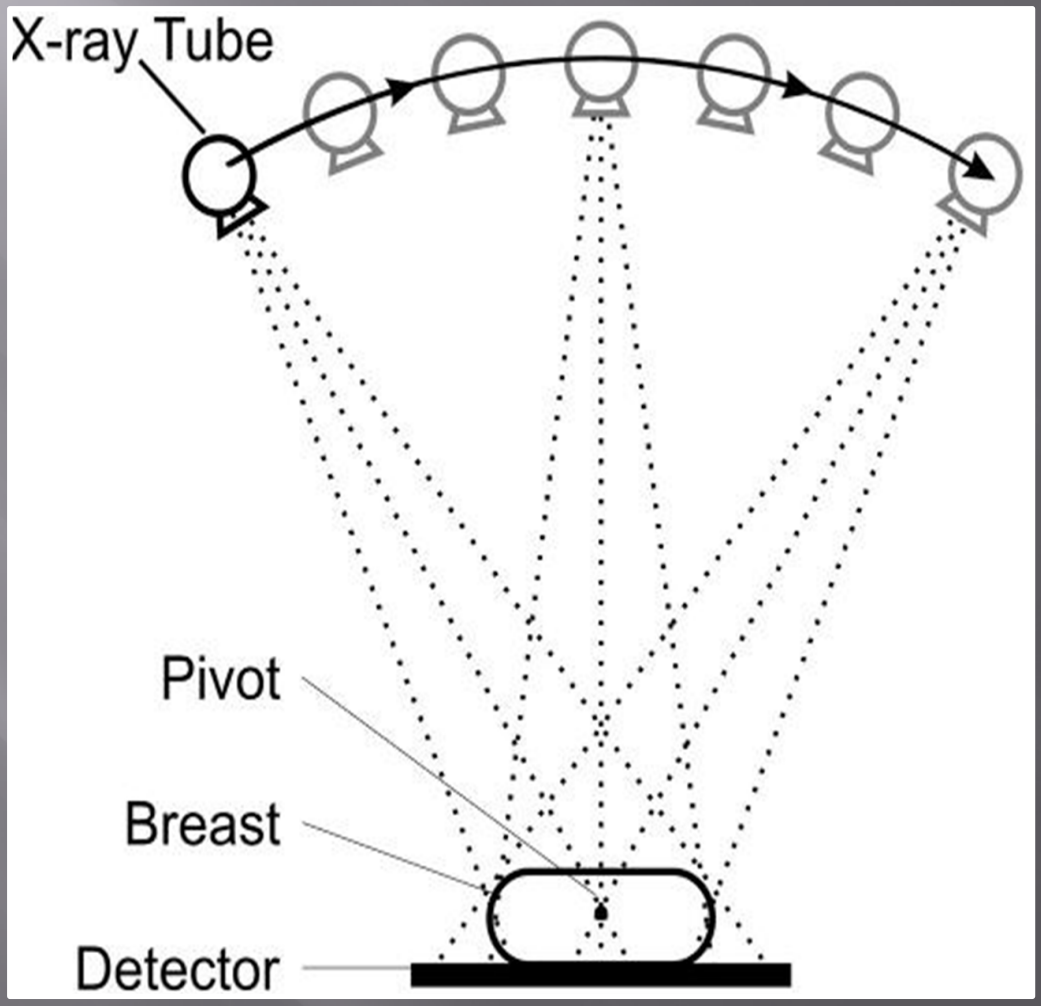
What is DBT? (part 1)

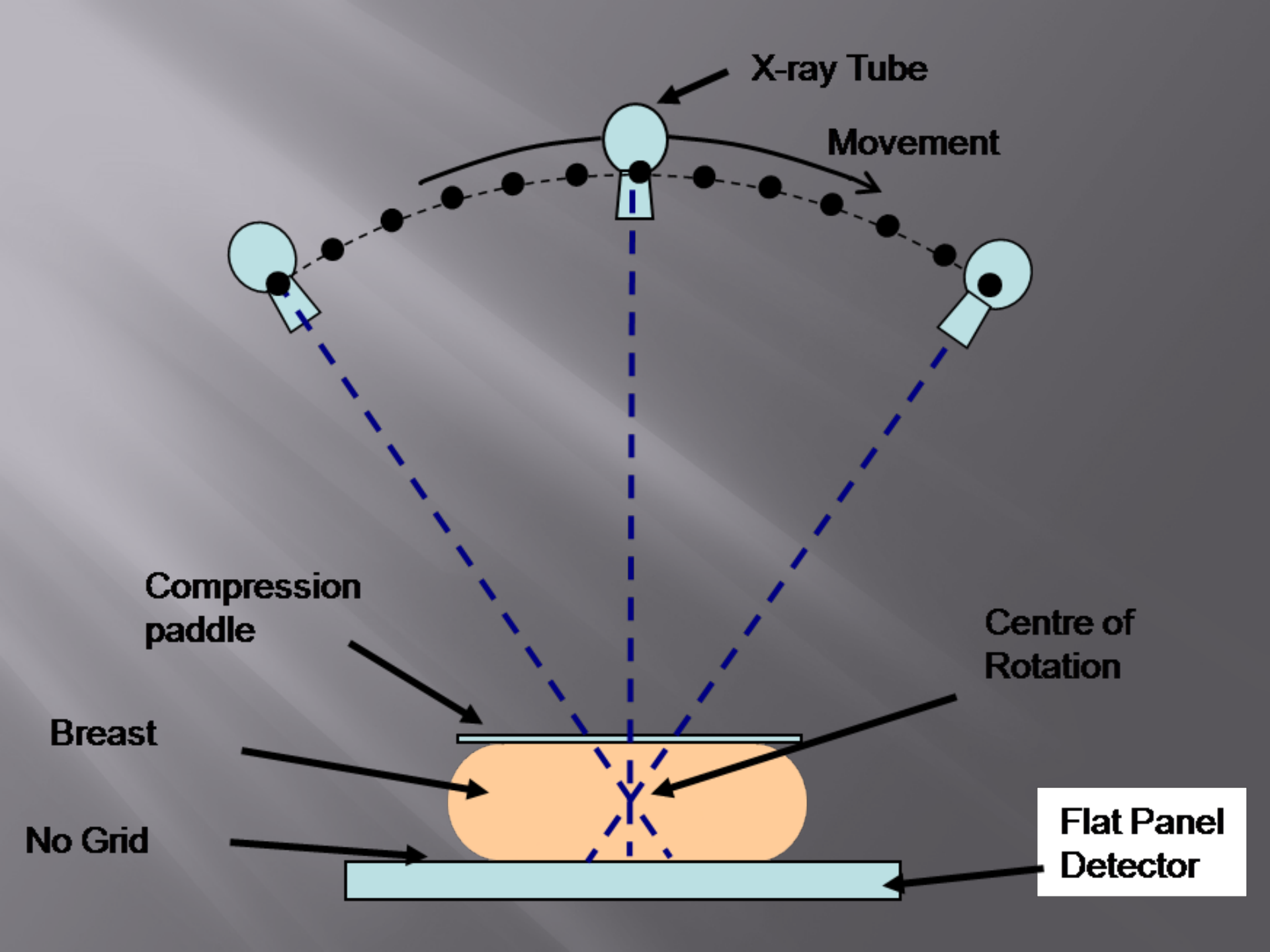
- Breast tomosynthesis converts digital images into a stack of very thin layers or "slices," building what is essentially a 3-D mammogram. This lets radiologists evaluate breast tissue one layer at a time, which allows them to detect 41 percent more invasive breast cancers and reduce false positives by up to 40 percent. This significantly reduces the number of times women are "called back" or asked to return for additional imaging.

What is DBT? (part 2)

- During the tomosynthesis part of the exam, the X-ray arm sweeps in a slight arc over the breast, taking multiple breast images in just seconds. A computer then produces a 3-D image of breast tissue in one millimeter layers. Radiologists can now see breast tissue in a more detailed way. Instead of viewing your breast tissue in a flat image, the tissue can be examined one millimeter at a time and fine details are more clearly visible.

What is Tomosynthesis?




X-ray Tube
Movement
Compression paddle
Centre of Rotation
Breast
No Grid
Flat Panel Detector

Univ of Pennsylvania Study

- In a U of P research study comparing DBT to DM researchers found that, compared to digital mammography, the average recall rate using DBT decreased from 10.4 percent to 8.78 percent, and the cancer detection rate increased from 3.51 to 5.24 (per 1,000 patients). The overall positive predictive value — the proportion of positive screening mammograms from which cancer was diagnosed — increased from 4.1 percent to 6 percent with DBT.

Special Circumstances

- BRCA mutations
- Relatives with pre-menopausal breast cancer
- >20% Lifetime Risk
- When to stop
  - When life expectancy is <5 to 7 years on the basis of age or comorbid conditions.
  - When abnormal results of screening would not be acted on because of age or comorbid conditions.

Adjuncts to Mammography

- Breast Ultrasound and Breast MRI
  - No radiation exposure
  - Not as useful for an entire population
- Special Populations
  - History of mantle radiation for Lymphoma
  - BRCA and dense breast tissue
  - High risk histology and dense breast tissue

Special Topics

- Insurance Coverage? Yes, most.
- Has 3D Mammo altered screening guidelines?
  No, not yet
- Is adoption of 3D mammo universal? No, not yet, as there is an added cost to the technology and it is not needed for all populations .
- How do I reconcile the rate of FP's and callbacks with 2D vs. 3D? Tough Question. Every mammogram is a unique experience and is addressed individually.

QUESTIONS?

- Thank you for your attendance, attention, and interest.