AbstractID: 2566 Title: Measuring the Clinical Impact of CAD on Screening Mammography

I have developed a simple model to study the effects of computer-aided detection (CADe) on screening mammography. The model incorporates tumor growth rate, the sensitivity of radiologists and the CADe scheme, how effectively the radiologist uses the CADe output, and the interval cancer rate. The model shows that the additional cancers detected when the radiologists uses CADe depends on how many cancers the radiologist misses without the computer aid, how many of the missed cancers the computer can detect, and what fraction of the computer detected missed cancers the radiologist will correctly recognize as a missed cancer. I also modeled the effect of CADe on radiologist false-detection rate. Unless the computer can preferentially detect cancers over benign lesions, the increase in the number of cancers detected when using CADe will be the same as the increase in the number of women recalled (the vast majority of which will be false positives). This does not imply that CADe has no net affect. On the contrary, an equal increase in the cancer detection rate and the recall rate is consistent with radiologists operating on a higher ROC curve implying that CADe is improving the radiologists' performance. However, even if CADe was able to help radiologists reduce their miss rate by 50%, there will be only a 10% increase in the cancer detection rate before and after implementation of CADe. This increased is difficult to detect in practice because of the variable growth rate of tumors. The number of cancers present in a screened population will change year by year so that this variation can mask the actual increase in the cancer rate when CADe is implemented. However, the size of the cancers detected when using CADe is smaller than those detected by the radiologist when not using CADe.

Learning Objectives
- Understand the factors affecting the clinical effectiveness of computer-aided detection
- Understand some of the difficulties of measuring the clinical effectiveness of computer-aided detection

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