MRI detection of residual disease following neoadjuvant chemotherapy (NAC) in the I-SPY 2 TRIAL

METHODS

**Definition of residual disease**

- **pCR**: in-breast RCB=0; yes; in-breast RCB=1: no
- **pCR**: no residual disease in breast or nodes at surger

**Statistical analysis**

- **Single predictors**: FTV3, LD3 and FTV3/LD3 at the pre-surgery
- **Multivariate analyses**: FTV3, LD3 and an optimized logistic regression model that combines FTV3, LD3 with FTV measured at all time points

**RESULTS**

**Breast pCR**

- Figure 2: AUCs of using pre-surgery FTV (FTV3) alone, LD alone (LD3), combined variable (FTV/LD3) and the combination of FTV/LD3 with FTV predictors to predict pCR

**DISCUSSION & CONCLUSIONS**

- FTV is an automated and 100% reproducible measurement that is used under FDA IDE approval to adjust randomization and measure response over treatment in I-SPY 2, while LD is measured by the radiologist and is often subjective
- Combined models perform the best in all cases and LD provides the additive value for prediction of pCR
- MRI, either single or combined measures is better for predicting significant residual disease (i.e. RCB III) than no residual disease (breast pCR)

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**LD AND FTV IN MRI**

MRI was acquired at four water points: Baseline (pre-NAC, TO), early (after 3 weeks of NAC, T1), inter-regimen (between two regimens, T2), pre-surgery (post-NAC, T3). Percent changes at T1 to T3 were also calculated (Figure 1).

- **Longest diameter of disease (LD)**
  - Measured by radiologist (diameter measurements at treatment time points were required to be along the same axis as baseline)
- **Functional tumor volume (FTV)**
  - Calculated by the sum of voxels with enhancement above predefined thresholds in the constraining volume of interest (VOI)
- **A linearized variable to combine FTV and LD (FTV/LD)**
  - $FTV/LD = \sqrt{FTV*LD}$

**RESULTS**

- Figure 3: AUCs of using pre-surgery FTV (FTV3) alone, LD alone (LD3), combined variable (FTV/LD3) and the combination of FTV/LD3 with FTV predictors to predict pCR

**SUMMARY**

- Figure 2: the combined variable FTV/LD3 achieved higher AUCs than FTV3 alone to predict breast pCR in the full cohort and in each subtype
- Figure 3: very similar to Fig 2, except for the HR+/HER2-subtype
- Figure 4: the difference between FTV3 and LD3 alone becomes smaller, except for the triple negative subtype
- FTV/LD3 plus FTV at all time points (FTV/LD3 comb) increases AUCs in predicting breast pCR or pCR. The increase was varied by subtype

**REFERENCES**