Ultrasensitive Quantification of Inflammatory Biomarkers in Breast Cancer Survivors
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Background:
- Breast cancer (BC) is the most common cancer in women (CDC, 2017)
- 87% of BC patients have sleep and fatigue symptoms (Palesh et al., 2012)
- BC pathology and chemotherapy can alter interleukin-6 (IL-6) levels
- IL-6 levels are related to sleep and fatigue in BC patients and survivors
- Limitations in detection may obscure scientific understanding
- ELISA often cannot detect beyond the picomolar level

Objective:
- This study aims to describe new methodologies for evaluating changes by comparing IL-6 levels in the serum of breast cancer survivors previously obtained in the parent study using the BioPlex200 System (Luminex®) to those obtained in a daughter study using the SMCxPRO (MilliporeSigma).

Study Description:
- IRB and IBC approval was obtained from the University of Texas at Austin
- Participants completed Stage I-III breast cancer treatment (6-10yr prior)
- Blood and self-reported data were collected at a single time point
- Measures of sleep and fatigue included: Pittsburgh Sleep Quality Index (PSQI), Epworth Sleepiness Scale (ESS), Patient-Reported Outcomes Measurement Information System Fatigue scale (PROMIS-Fatigue).

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Laboratory Methods:
- A bead-based assay system was used to perform single molecule counting (SMCxPRO, MilliporeSigma)
- Data were compared to past results obtained using conventional methods (BioPlex200, Luminex)

Sample Characteristics:
- Sample: all female, 93.9% Caucasian, average age= 48.44 (SD = 8.73)
- The mean hours from waking until blood draw was 3.03 hours (SD= 0.90)
- PSQI scores ranged from 0-17 (mean= 7.60; SD=4.35)
- 62.1% of the sample met the clinical criteria for poor sleep (PSQI score ≥6)
- ESS scores ranged from 0-18 (mean= 6.98; SD= 4.59)
- PROMIS-Fatigue scores ranged from 8-39 (mean= 21.21; SD= 8.05)

Results & Discussion:
- Inflammatory changes are detectable using both systems
- The SMCxPRO has a lower limit of quantification (0.019 vs. 0.3 pg/mL)
- IL-6 measures were not associated with sleep outcomes on either platform
- Femtomolar-level sensitivity may result in identification of meaningful associations that could not be determined using traditional methods
- Future research efforts to replicate and expand upon this data are needed.
- The small sample in this study has limited generalizability
- Ultimately this work could inform prospective and interventional research.