YOGA VS. PLACEBO ON INFLAMMATION AMONG CANCER SURVIVORS: A NATIONWIDE MULTICENTER PHASE III RANDOMIZED CONTROLLED TRIAL (RCT)

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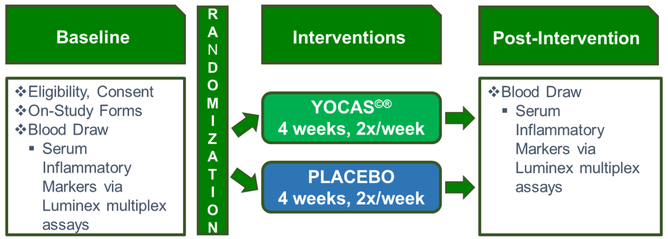
INTRODUCTION

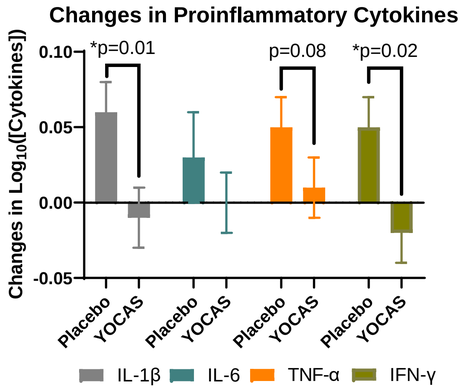
Inflammation, both acute and chronic, is universally associated with primary and secondary cancer development and progression and a myriad of toxicities that negatively affect cancer treatment adherence and survival. The effectiveness of targeting inflammation with non-pharmaceutical therapies such as yoga is not understood. As part of a nationwide, multicenter, phase III RCT with cancer survivors, we compared the effects of yoga (Yoga for Cancer Survivors; YOCAS©®) to a behavioral placebo (ASCO survivorship recommendation-based health education) on inflammation (i.e. pro-inflammatory, anti-inflammatory, and overall inflammatory status).

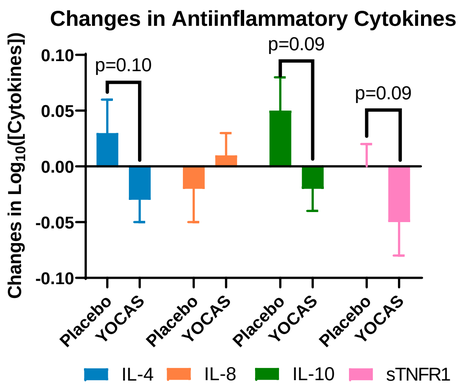
METHODS



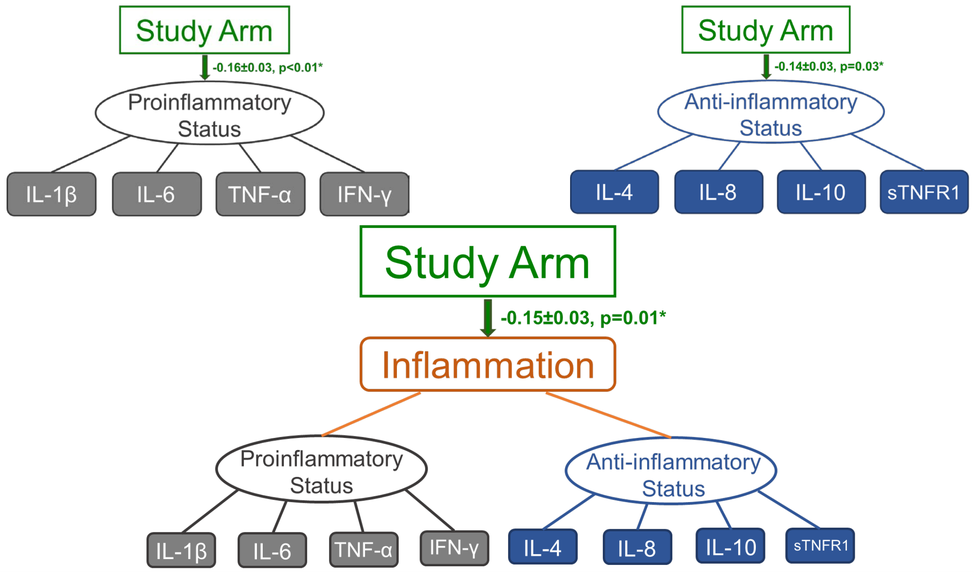
- 502 cancer survivors with insomnia 2-60 months post-treatment were enrolled and randomized to Yoga for Cancer Survivors (YOCAS©®) or Placebo.
  - YOCAS©®: Gentle Hatha and Restorative Yoga; 75-min./session, 2x/week for 4 weeks
  - Placebo: ASCO Survivorship Recommendation-based Health Education; 75-min./session, 2x/week for 4 weeks
- Both intervention sessions were led by certified health professionals in a small group setting.
- Serum samples were collected at baseline and post-intervention to assess inflammatory markers via Luminex multiplex assays.
  - Pro-inflammatory markers: IL-1β, IL-6, TNF-α, IFN-γ
  - Anti-inflammatory markers: IL-4, IL-8, IL-10, sTNFR1
- Analysis of covariance (ANCOVA) and structural equation modeling (SEM) were used to assess intervention effects on inflammation.

CHANGES IN INFLAMMATORY MARKERS





STRUCTURAL EQUATION MODELING (SEM)



DEMOGRAPHICS & CHARACTERISTICS

	YOCAS (n=251)	SHE (n=251)
Age (Mean ± SD, years)	55 ± 10.8	57 ± 10.5
Gender (% female)	93%	94%
Race/Ethnicity (% white)	85%	85%
Cancer Type (% breast)	74%	74%
Time Since First Treatment (Mean ± SD, months)	23 ± 15.3	24 ± 23.2
Previous Surgery	91%	94%
Previous Chemotherapy	58%	57%
Previous Radiation	64%	61%
Current Hormonal Therapy	57%	58%

SUMMARY OF RESULTS

- ANCOVAs revealed significantly lower levels of pro-inflammatory markers in YOCAS participants compared to placebo participants (IL-1β: -0.07±0.03, p=0.01; TNF-α: -0.04±0.02, p=0.08; IFN-γ: -0.07±0.03, p=0.02) where YOCAS participants exhibited stable pro-inflammatory responses (all p>0.05) while placebo participants exhibited significant increases in pro-inflammatory responses (all p≤0.05) from baseline to post-intervention.
- ANCOVAs also revealed a statistical trend toward lower levels of anti-inflammatory markers in YOCAS participants compared to placebo participants (IL-4: -0.06±0.04, p=0.10; IL-10: -0.06±0.04, p=0.09; sTNFR1: -0.06±0.04, p=0.09).
- SEM demonstrated significantly lower pro-inflammatory status (-0.16±0.03, p<0.01), significantly lower anti-inflammatory status (-0.14±0.03, p=0.03), and significantly lower overall inflammatory status (-0.15±0.03, p=0.01) in YOCAS participants compared to placebo participants.

CONCLUSIONS

- Our data suggested that YOCAS©® yoga significantly reduces inflammation among cancer survivors.
- Clinicians should consider prescribing YOCAS©® yoga for survivors experiencing inflammation, which may lead to a high chronic toxicity burden and increased risk of progression, recurrence, and second cancers.

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