

# Green Tea Supplementation Lowers IGF-I in Men at Risk for Prostate Cancer

Christopher S. Errante, BS; Charles Roberts, PhD; Melanie Gillingham, PhD; Jackilen Shannon, PhD

Sub-Analysis funded by Dr. Shannon's CROET research team and in part by CSE

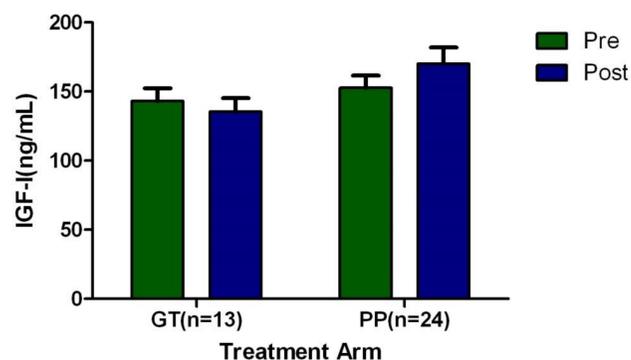
Graduate Program in Human Nutrition  
Oregon Health & Science University

## INTRODUCTION:

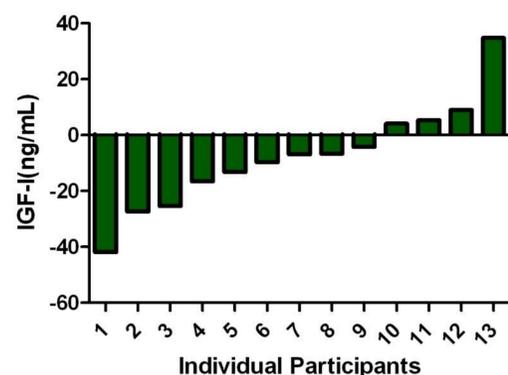
In 2011, there were over 240,000 new cases of prostate cancer (CaP) in the United States. Men currently have a 1 in 6 chance of developing CaP in their lifetime.<sup>1</sup> Increased circulating concentrations of insulin-like growth factor I (IGF-I) in humans is consistently reported to be associated with an increased risk of CaP.<sup>2</sup> Dietary factors that can alter the concentrations of IGF-1, such as the green tea polyphenol(GT) antioxidants, may be one potential mechanism to reduce CaP risk.<sup>3</sup>

## FIRST ANALYSIS:

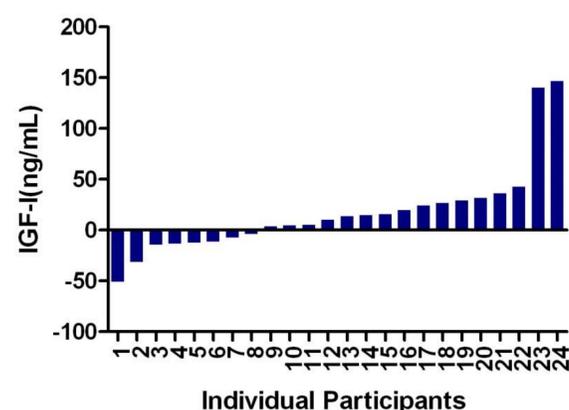
### Pre-Post Changes in IGF-I



### Absolute Change in IGF-I for GT (n=13)

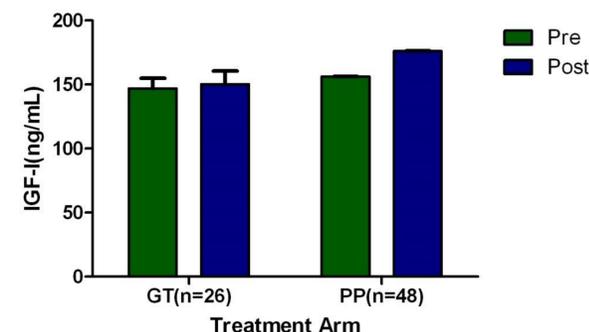


### Absolute Change in IGF-I for PP (n=24)

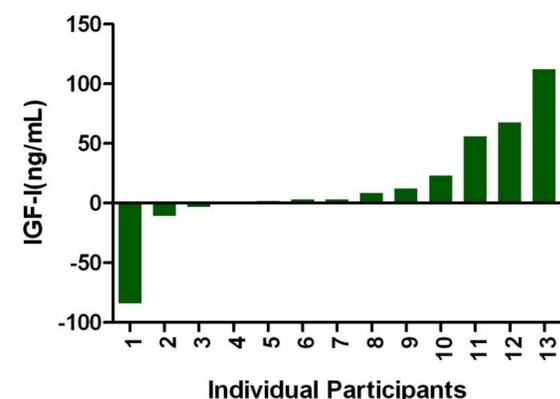


## SECOND ANALYSIS: COMBINED TREATMENT ARMS

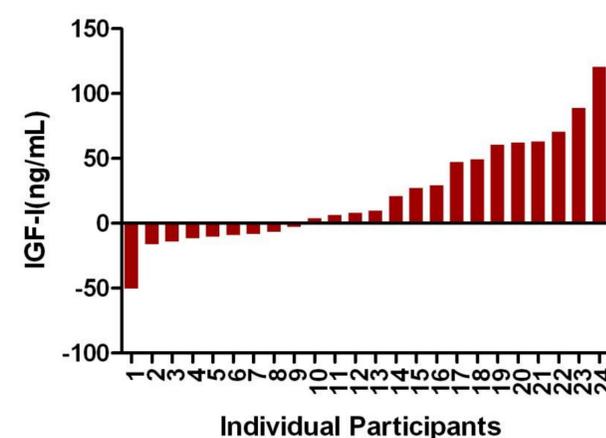
### Pre-Post Changes in IGF-I



### Absolute Change in IGF-I for GTFO (n=13)



### Absolute Change in IGF-I for FO (n=24)



## REFERENCES

- Siegel R, Naishadham D, Jemal A. Cancer Statistics 2012. *Cancer J Clin* 2012;62:10-29.
- Chan JM, Stampfer MJ, Giovannucci E, Ma J, Pollak M. Insulin-like growth factor I (IGF-I), IGF-binding protein-3 and prostate cancer risk: epidemiological studies. *Growth Hormone and IGF Research* 2000;Supplement A:S32-3.
- Nguyen MM, Ahmann FR, Nagle RB et al. Randomized, double-blind, placebo-controlled trial of polyphenol E in prostate cancer patients before prostatectomy: evaluation of potential chemopreventive activities. *Cancer Prev Res* 2012;5:290-298
- Childs S, Hennessy AA, Sreenan JM, Wathes DC, Cheng Z, Stanton C, Diskin MG, Kenny DA. Effect of level of dietary n-3 polyunsaturated fatty acid supplementation on systemic and tissue fatty acid concentrations and on selected reproductive variables in cattle. *Theriogenology* 2008;70:595-611.
- Hutchinson IA, Hennessy AA, Water SM, Dewhurst RJ, Evans ACO, Lonergan P, Butler ST. Effect of supplementation with different fat sources on the mechanisms involved in reproductive performance in lactating dairy cattle. *Theriogenology* 2012;78:12-27.
- Damsgaard, CT, Molgaard C, Mathiassen J, Gyldenløve SN, Lauritzen L. The effects of n-3 long-chain polyunsaturated fatty acids on bone formation and growth factors in adolescent boys. *Pediatric Research* 2012;71(6):713-719.

## Baseline Characteristics for All Participants

	Mean	SEM	Min	Max
Age (yrs)	62.7	0.73	50	78
BMI	28.47	0.50	21.6	43.7
IGF-I (ng/mL)	152.52	4.79	82.7	279.6
PSA (ng/mL)	6.2	0.43	0.13	19.4

## SUMMARY AND CONCLUSIONS:

This is the first study demonstrating that GT supplementation significantly lowers IGF-I in men at risk for CaP.

This is also the first trial in humans that has demonstrated a significant lowering effect of GT versus placebo on IGF-I. To date, only one other trial has compared the effect of GT versus placebo on IGF-I, but that study did not demonstrate a significant effect.<sup>3</sup>

Our most significant results were found in the absence of fish oil supplementation (GT vs PP). To see if GT and GTFO groups could be considered equivalent for the combined analysis we compared post-treatment values (p=0.14) and absolute pre-post changes (p=0.14). In both cases, they were not significantly different. The same tests were performed to compare the FO and PP groups. Neither post-treatment IGF-I (p=0.46) nor absolute pre-post changes (p=0.74) were different.

A small number of published reports suggest that FO may raise IGF-I.<sup>4-6</sup> We may speculate that, in the combined analysis, FO may have worked against the capacity of GT to lower IGF-I. This may explain why the GTFO group had a significantly lower proportion of decreases in IGF-I compared to the GT group (p=0.047; Fischer's exact test).

Reduced levels of IGF-I are associated with decreased risk of CaP. This study shows that GT may reduce IGF-I in men at risk for CaP, which may, in turn, reduce their risk of subsequently developing CaP.



## SPECIFIC AIM:

Determine if green tea (GT) supplementation lowers circulating IGF-I in men at risk for prostate cancer.

•Hypothesis: We hypothesize GT supplementation will lower IGF-I in men at risk for prostate cancer (CaP) versus placebo(PP).

## METHODS:

We conducted a sub-analysis of plasma (n=71) and serum (n=3) samples from a recent randomized, double-blind, placebo-controlled trial examining GT and fish oil (FO) supplementation in men at risk for CaP. Men received either GT and FO placebo; FO and GT placebo; GT and FO(GTFO); or double placebo (PP). Average supplementation was 15 weeks.

IGF-I was measured before and after treatment using commercially available radioimmunoassay(RIA) kits.

Two separate analyses were conducted:

The first analysis incorporated 2 treatment arms:

GT(n=13) versus PP(n=24)

The second analysis combined treatment arms:

GT+GTFO(n=26) versus PP+FO(n=48)

Pre-post differences were analyzed in STATA for all four treatment arms. T-tests were run comparing absolute changes in IGF-I between GT and PP groups. For the second analysis, GT+GTFO was compared to PP +FO. FO was considered to be an additional placebo.

## RESULTS:

1. First analysis (n=37):

GT supplementation significantly lowered IGF-I compared to PP (p=0.01). Two-sided significance was also obtained when comparing absolute change between the two groups (p=0.02).

### Mean Difference in Absolute Change Between Groups

-24.91 ± 6.43 ng/mL (mean ± SEM)  
95% CI: (-46.3, -3.52)

2. Second analysis (n=74):

After combining treatment arms, and considering the FO to be an additional placebo, the effect of GT on IGF-I levels was still significant compared to placebo (p=0.0495, one-sided)

### Mean Difference in Absolute Change Between Groups

-16.34 ± 9.78 ng/mL (mean ± SEM)  
95% CI : (-35.8, 3.15)

Precision of IGF-I RIA Assays: Unknowns Determined in Two Separate Sessions

Assay	Unknowns	Mean % Difference b/t Duplicates	Intra-Assay CV
Session One	150	8.6%	6.05%
Session Two	204	7.8%	5.45%