

ASEA Metabolomics Results

Nieman DC. Human Performance Laboratory, North Carolina Research Campus and Appalachian State University



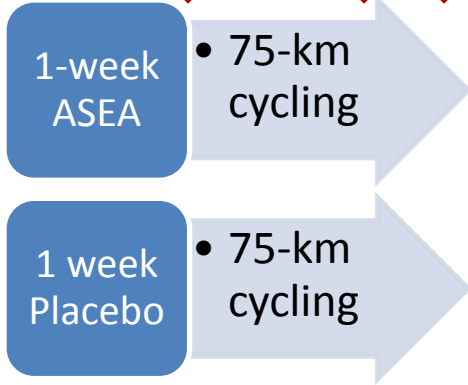
Metabolomics Laboratory, North Carolina Research Campus, David H. Murdock Research Institute



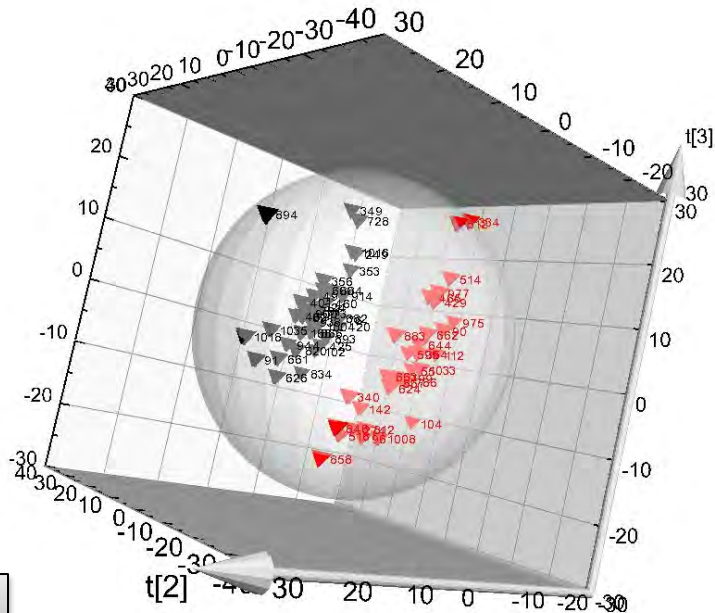
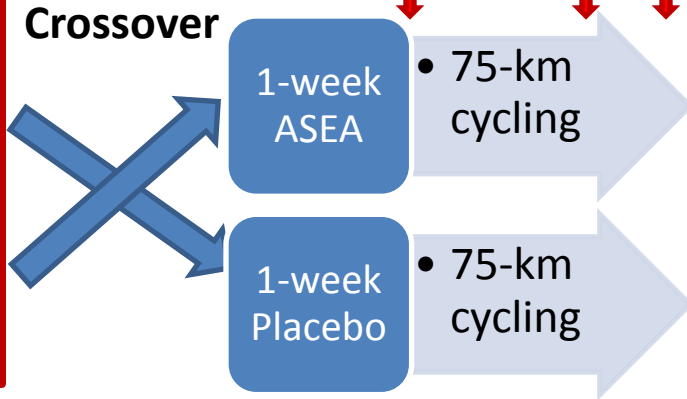
Blood/urine : Pre-Ex Post- Ex 1-h

Blood/urine : Pre-Ex Post- Ex 1-h

BASELINE TESTING for VO_{2max} , body composition (N=20 subjects)



3-week washout



Metabolomics: Goal is to measure the influence of ASEA on small molecules (metabolites) that shift in response to supplementation. The shift in metabolites, depending on the nutritional product, may represent effects on inflammation, oxidative stress, and physiologic stress.



Working Summary

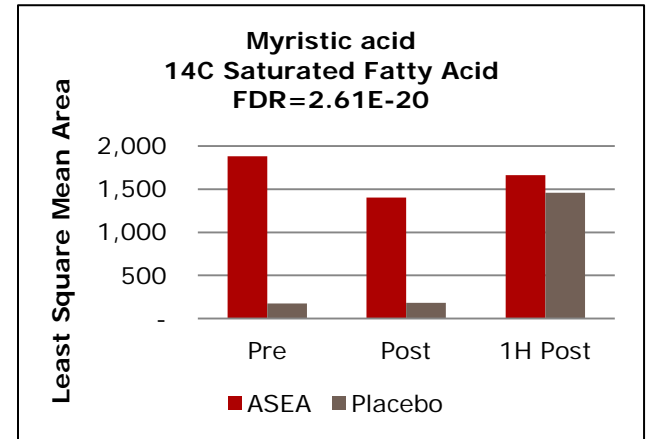
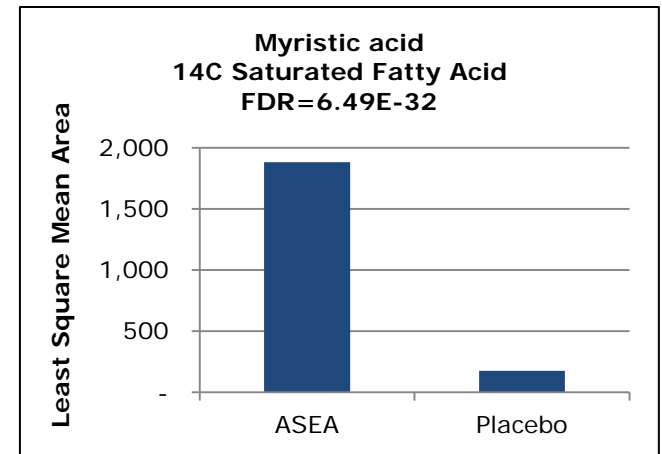
- Seven days ingestion of ASEA (relative to placebo) caused an extensive mobilization of free fatty acids from adipose tissue in male cyclists.
- Athletes on ASEA for 7-days started the 75-km cycling trial with high blood free fatty acids leading to increased fat oxidation and a sparing of amino acids (and potentially muscle glycogen).
- ASEA intake was associated with a large increase in serum ascorbic acid levels (probably from the adrenal cortex).
- Serum creatinine and urea also increased post-exercise.

Finding 1: Ingestion of ASEA beverage for one week strongly increased serum fatty acids levels (most likely from adipose tissue).

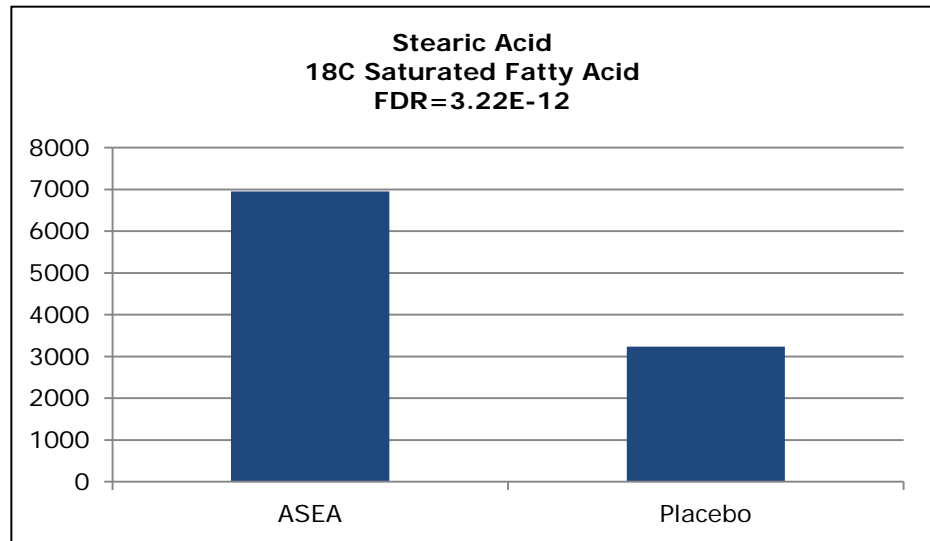
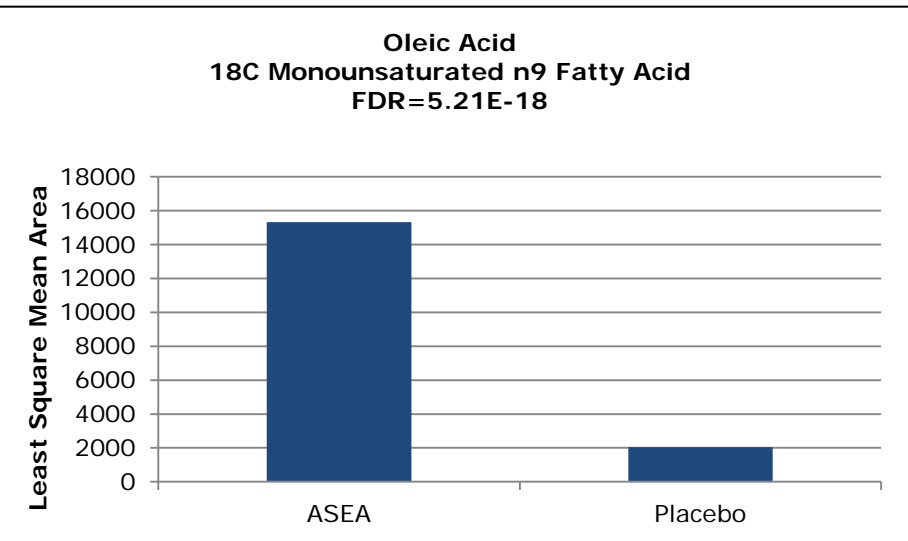
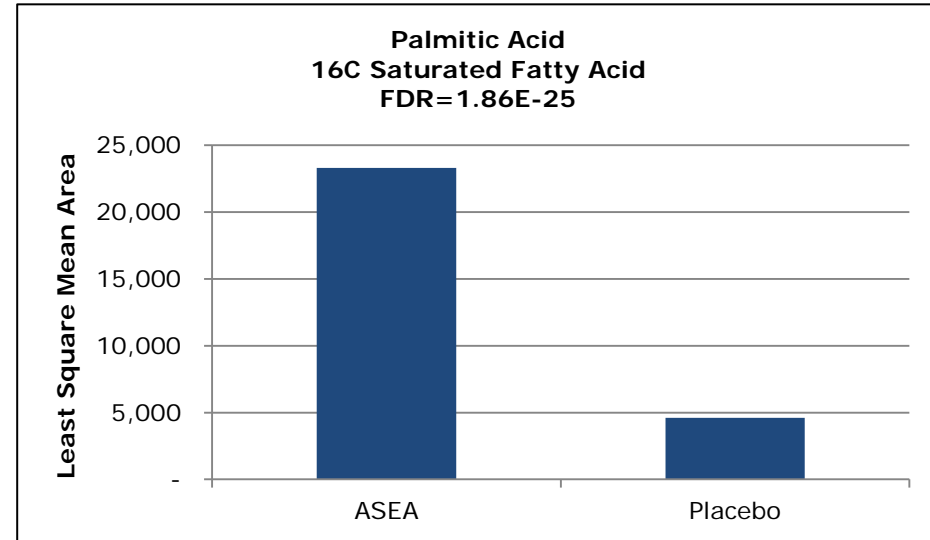
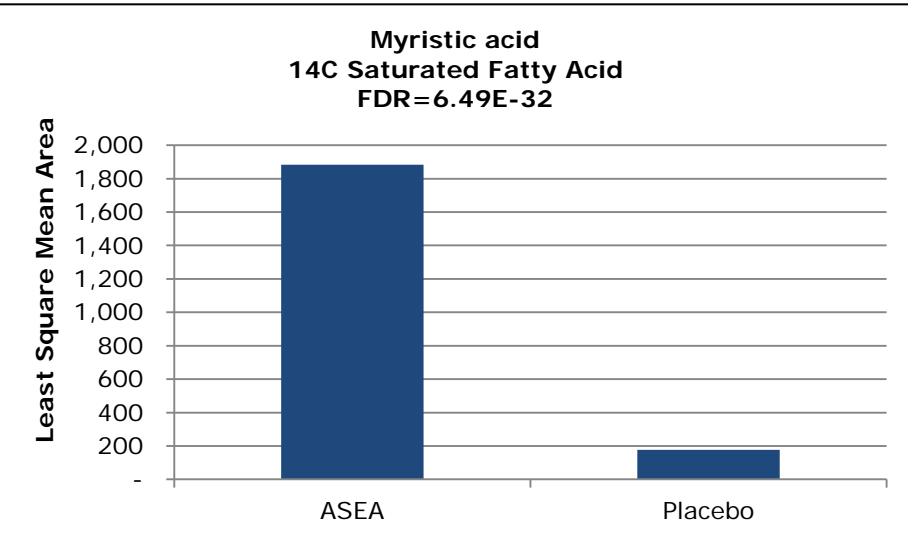
1) **Chronic Effect:** Higher fatty acid levels pre-exercise (several types of fatty acids --- see slides).

2) **Acute Effect:** Increased fatty acid oxidation and mobilization during exercise (placebo condition was linked to a late mobilization).

Triglyceride Mobilization: corresponding with the increase in free fatty acids, glycerol was higher at baseline (indicative of extensive adipose triglyceride hydrolysis).



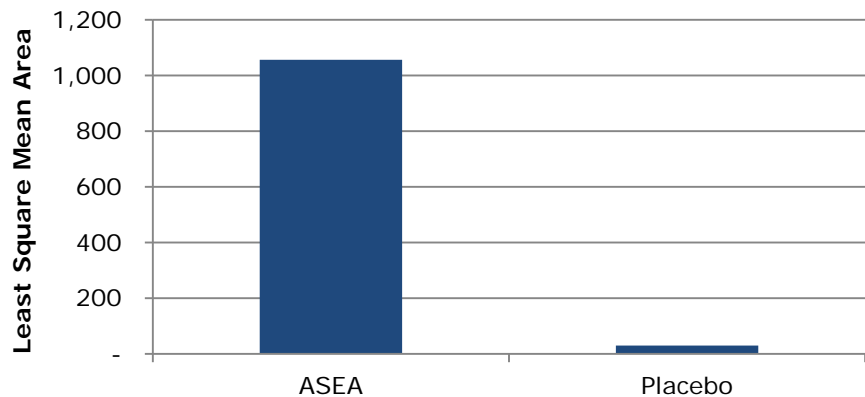
Post 7-day Ingestion: Fatty Acids Higher in ASEA vs. Placebo



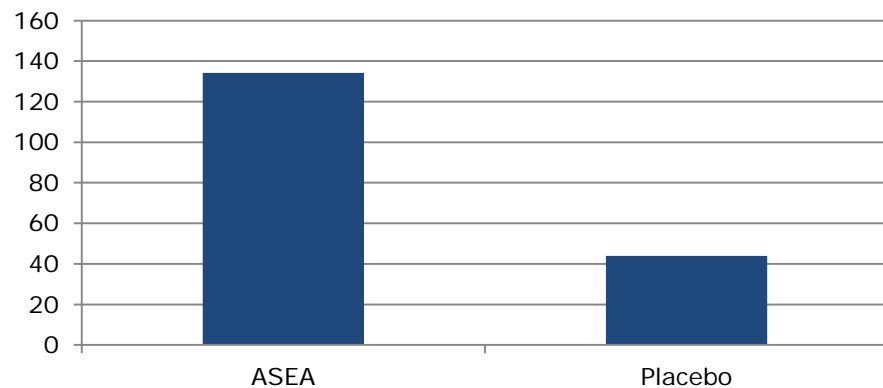
7-days Ingestion of ASEA

Fatty Acids and Glycerol Backbone: Higher in ASEA vs. Placebo

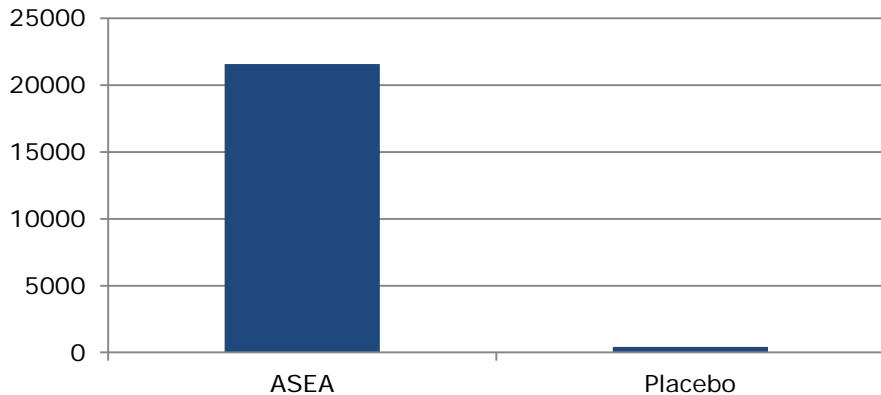
Palmitelaidic Acid
16C Trans Fatty Acid
FDR=1.13E-08



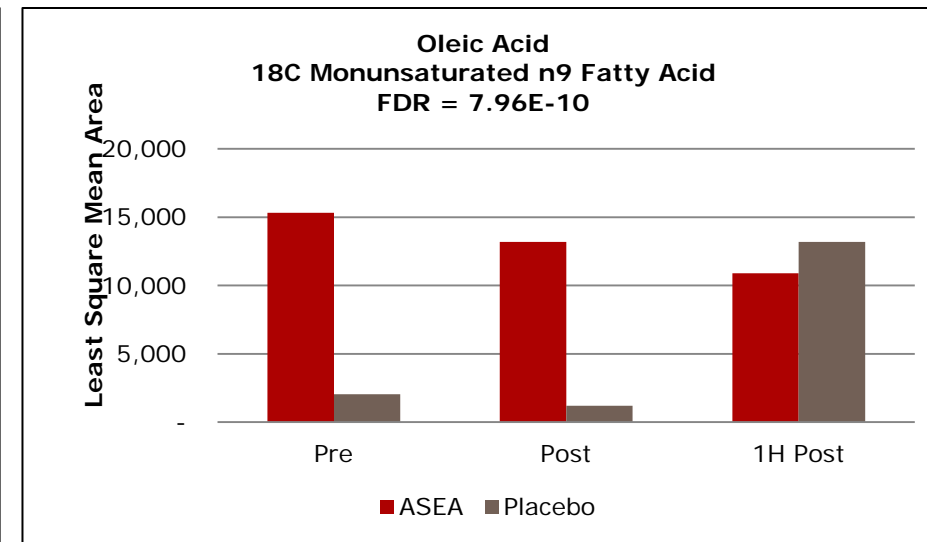
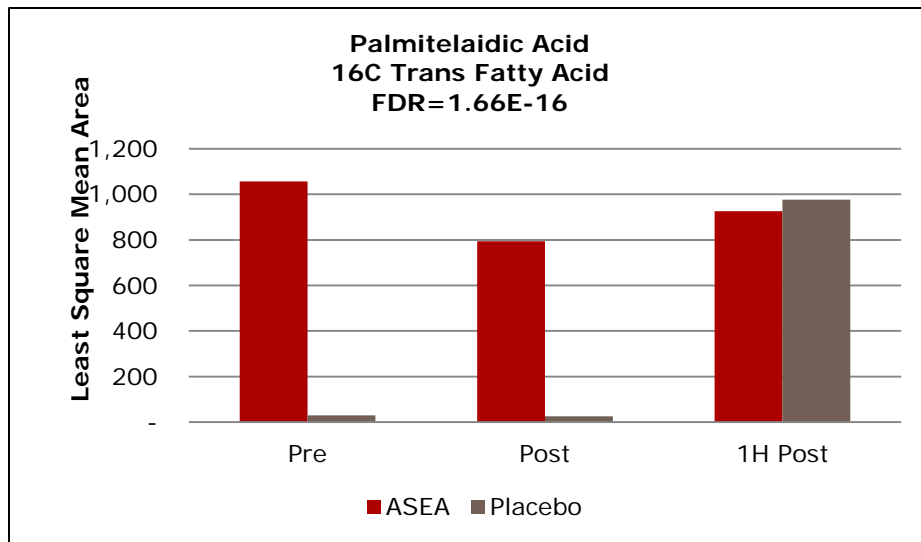
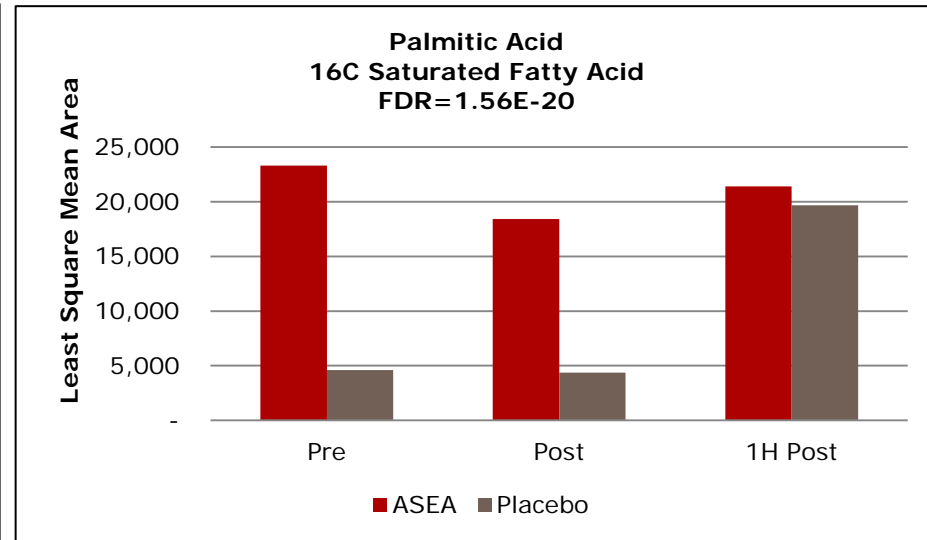
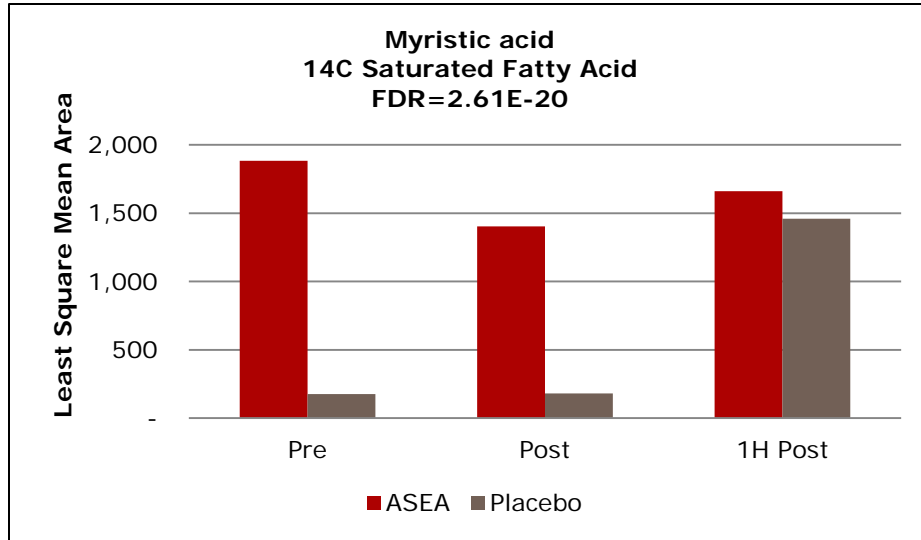
Capric Acid
10C Saturated Fatty Acid
FDR=5.39E-07



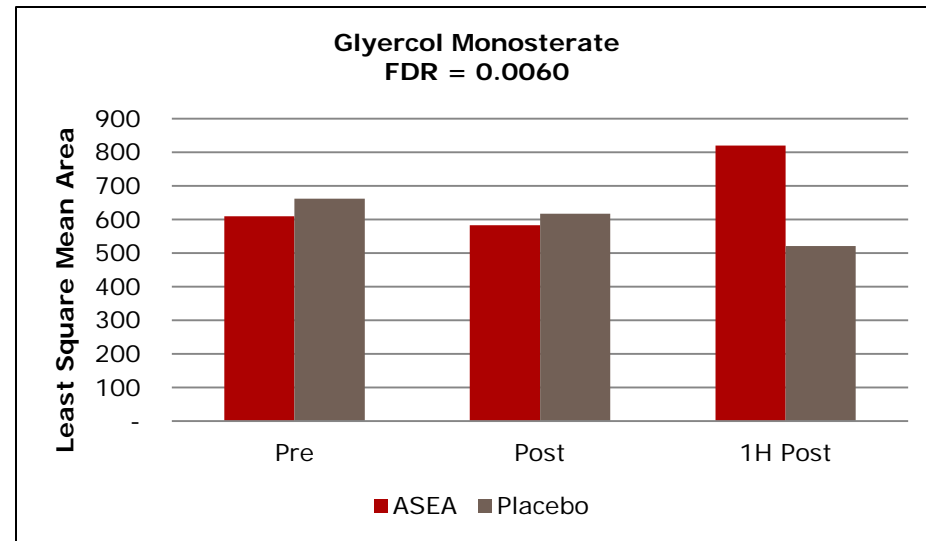
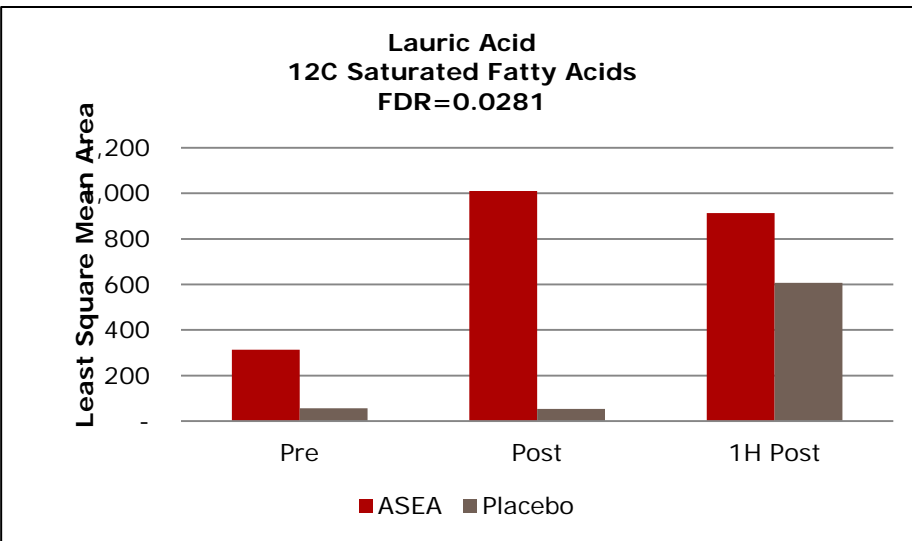
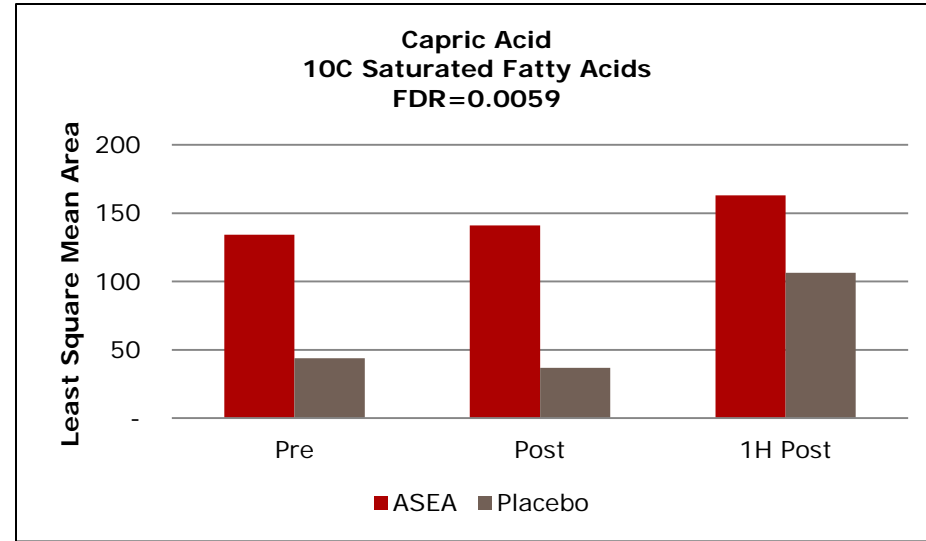
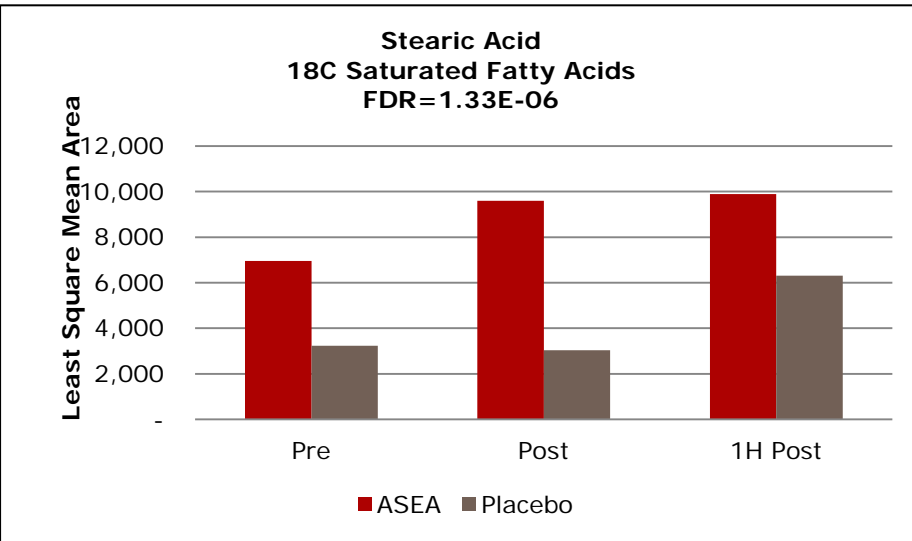
Glycerol
Backbone of Triglycerides
FDR=9.49E-07

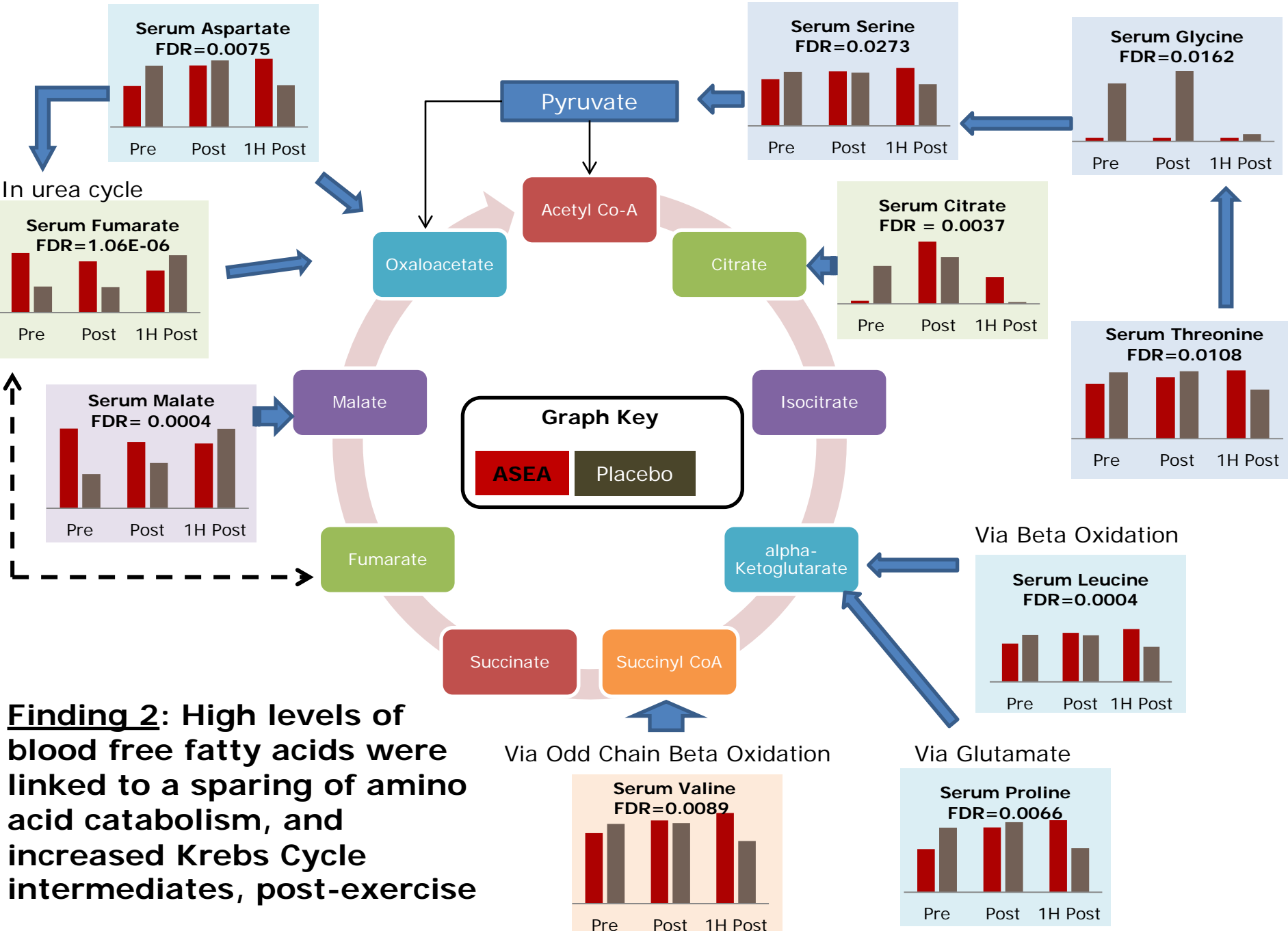


Serum Fatty Acids During Exercise



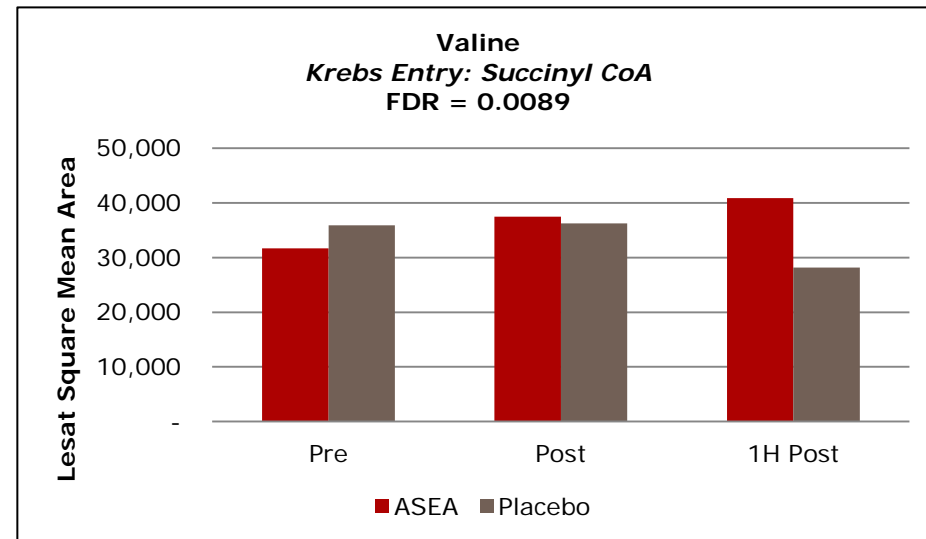
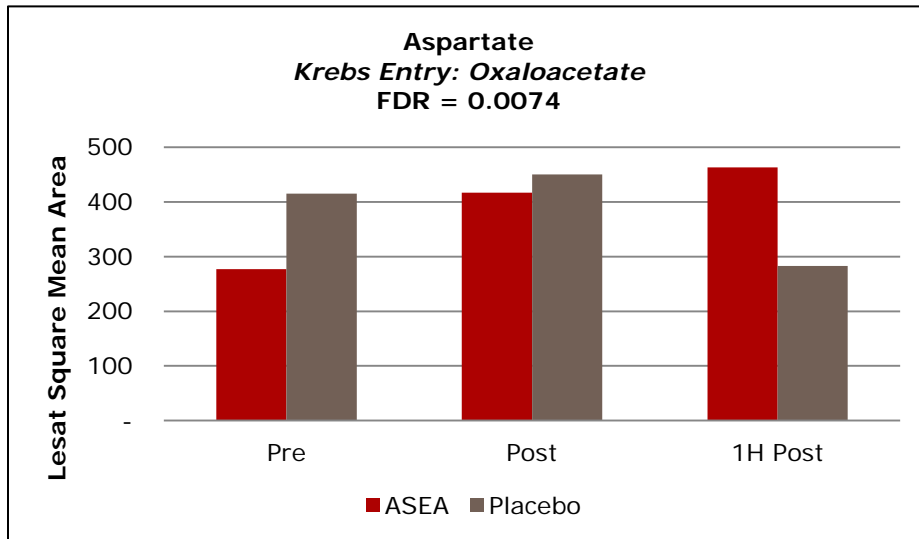
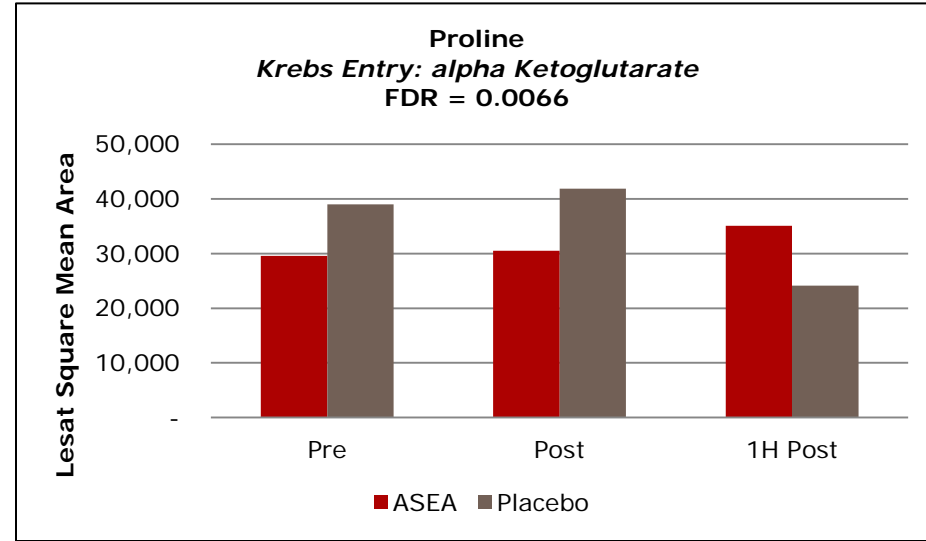
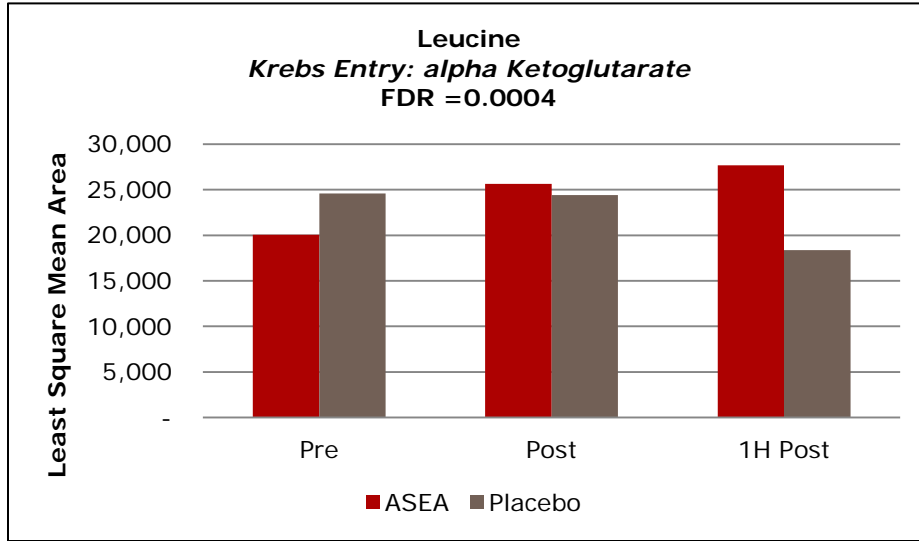
Serum Fatty Acids During Exercise





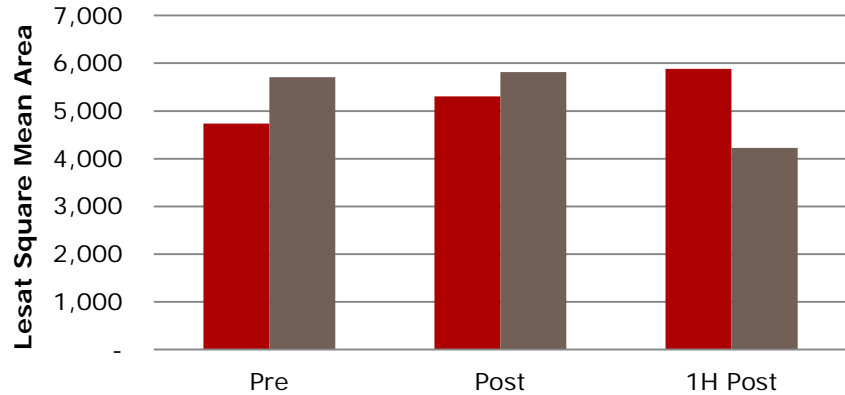
Finding 2: High levels of blood free fatty acids were linked to a sparing of amino acid catabolism, and increased Krebs Cycle intermediates, post-exercise

Serum Amino Acids at Pre, Post, and 1H Post-Exercise "Sparing" of Amino Acids with ASEA

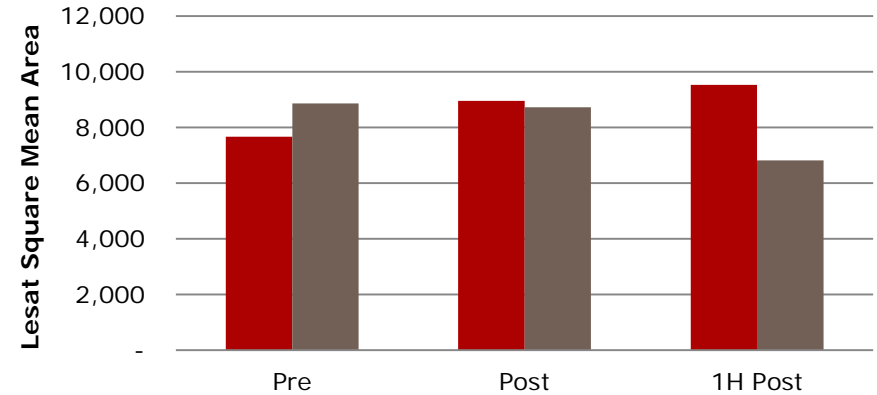


Serum Amino Acids at Pre, Post, and 1H Post-Exercise "Sparing" of Amino Acids with ASEA

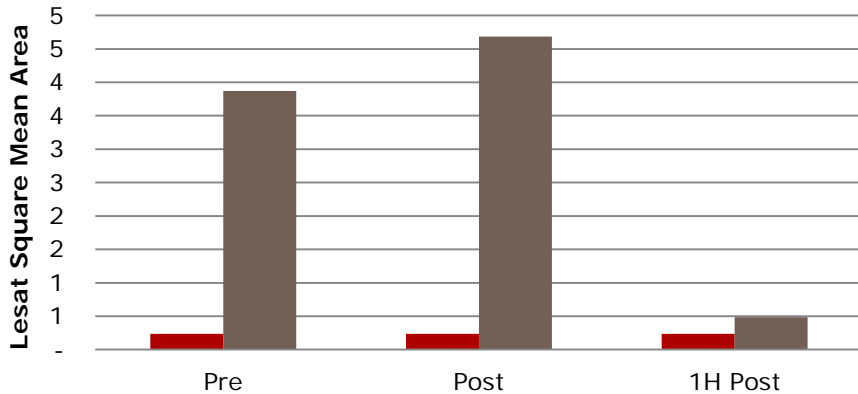
Threonine
Krebs Entry: Pyruvate
FDR= 0.0108



Serine
Krebs Entry: Pyruvate
FDR= 0.0273



Glycine
Krebs Entry: Pyruvate
FDR= 0.0162

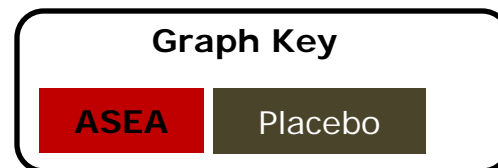
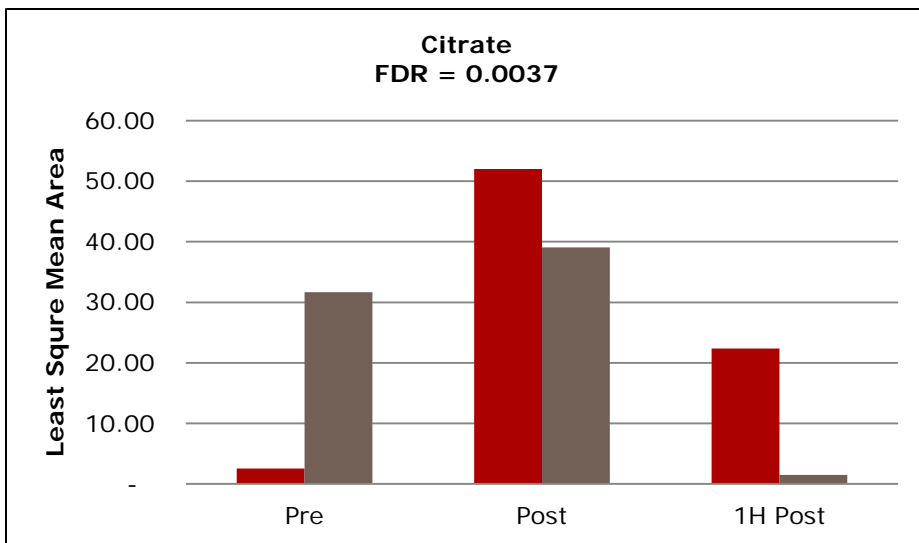
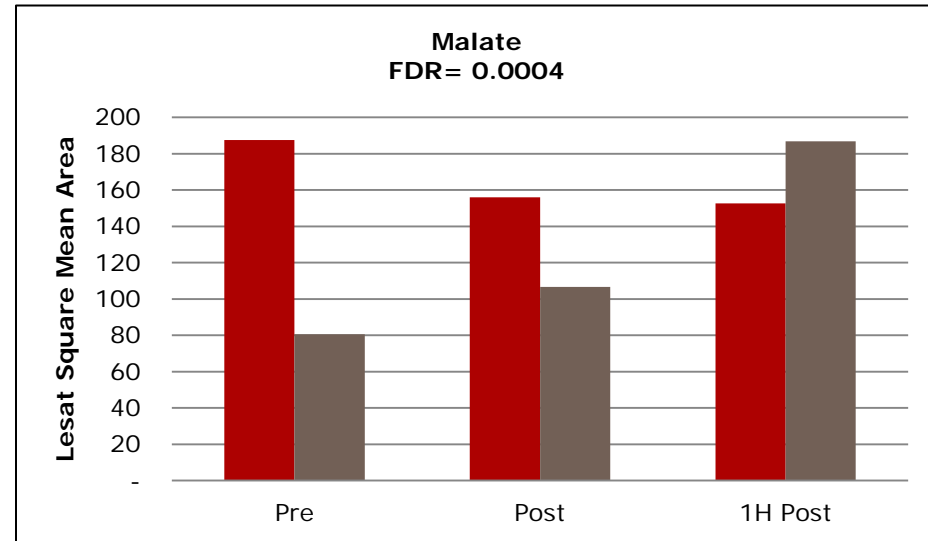
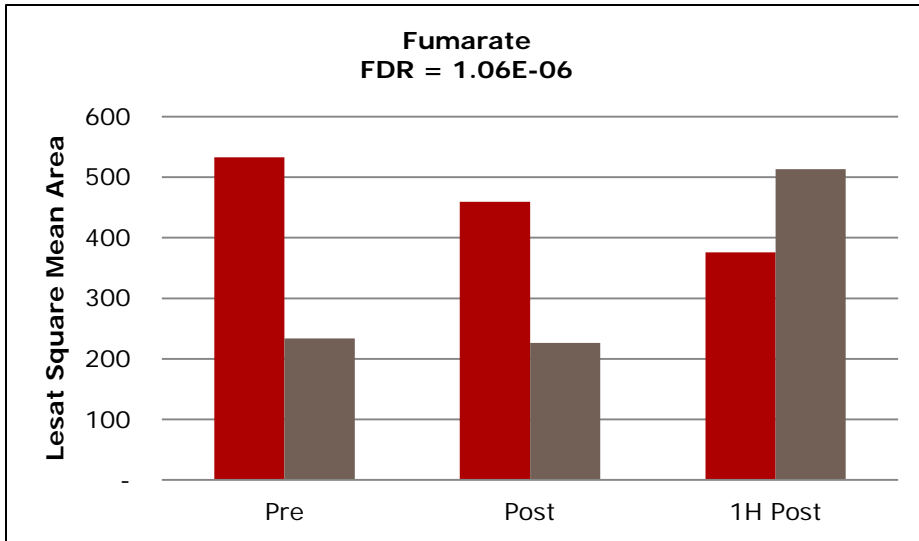


Graph Key

ASEA

Placebo

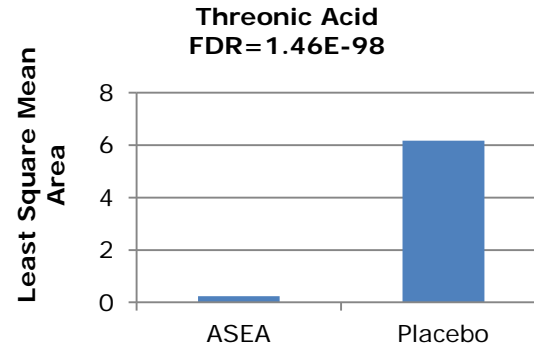
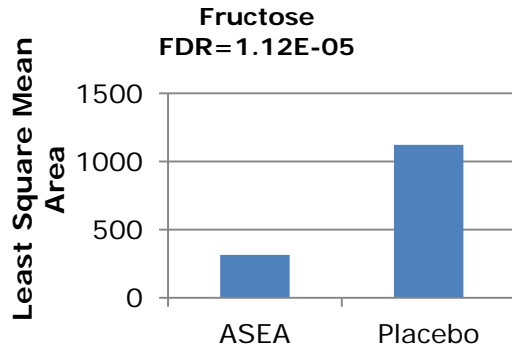
Serum Krebs Intermediate at Pre, Post, and 1H Post-Exercise Higher Levels with ASEA



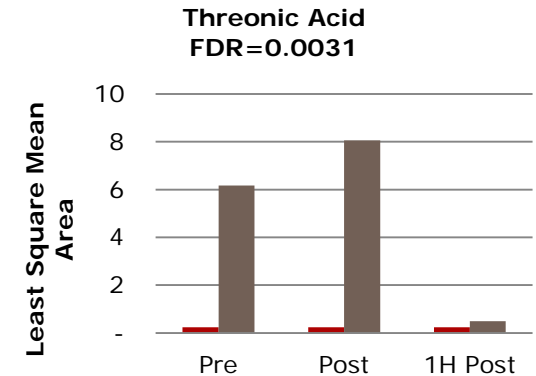
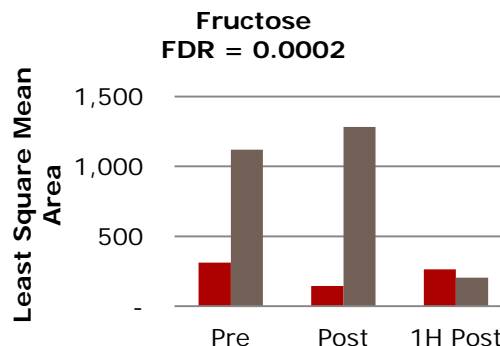
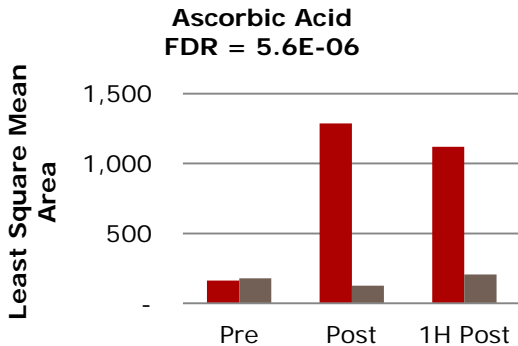
3) Ascorbic Acid Metabolism:

ASEA supplementation appears to be affecting ascorbic acid both acutely and chronically.

Chronic Differences: ASEA group has lower baseline levels of fructose and lower levels of threonic acid. Fructose is broken down into ascorbic acid which is further metabolized into threonic acid. This could be suggestive of higher ascorbic acid production but no differences in groups were detected at baseline.

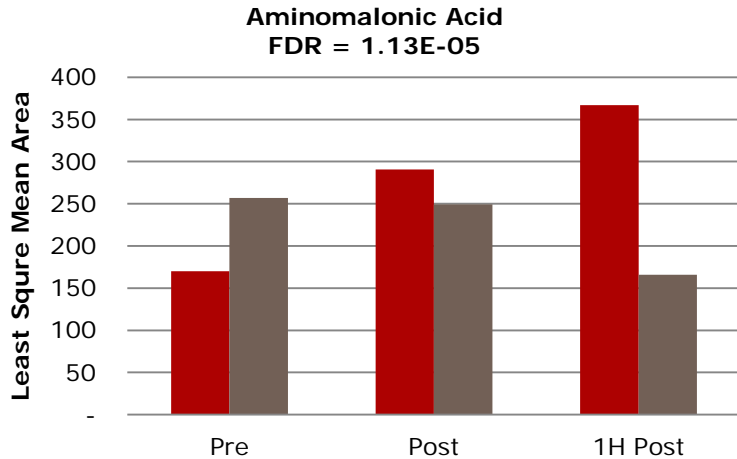


Acute Differences: ASEA group has higher levels of ascorbic acid, an antioxidant, and lower levels of both fructose and threonic acid.

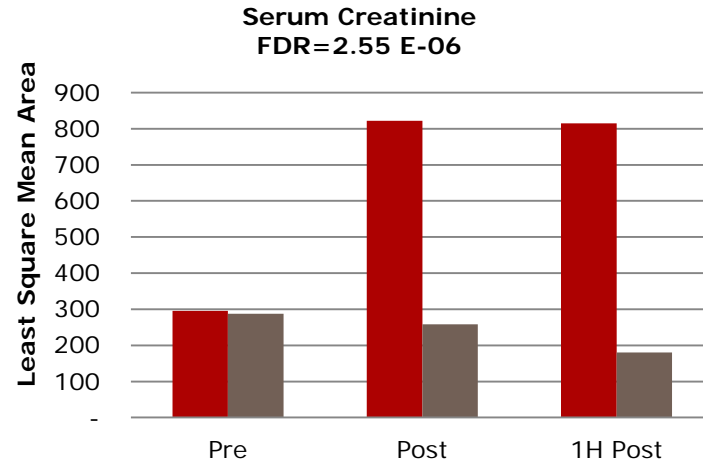


4) Other Changes.

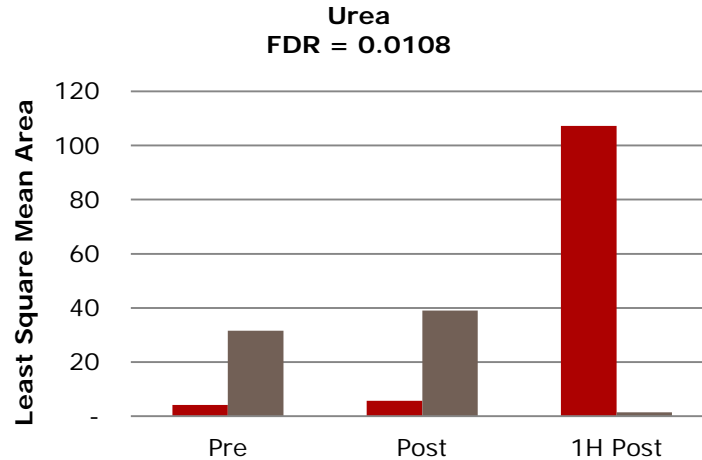
Some other changes were found both acutely and chronically that require further investigation into implications.



Plays role in binding calcium to protein



Breakdown product of creatine



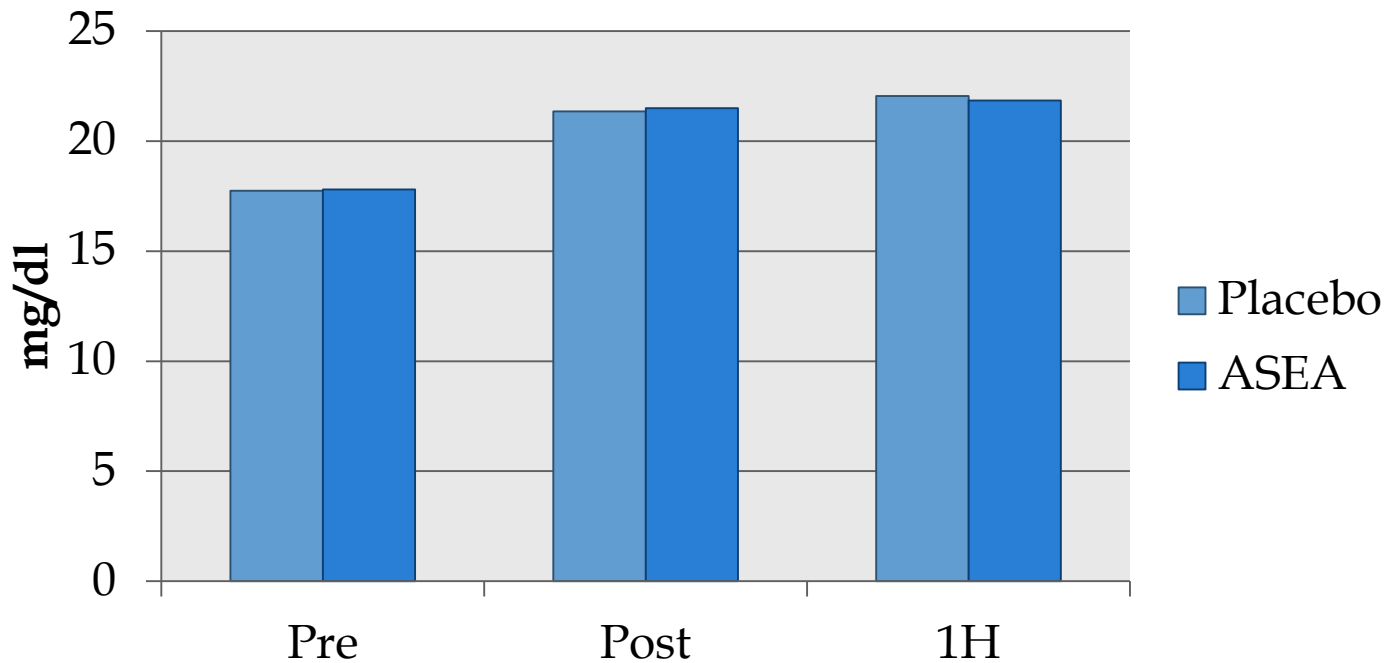
Formed in liver; Removal of nitrogen and ammonia

Graph Key

ASEA

Placebo

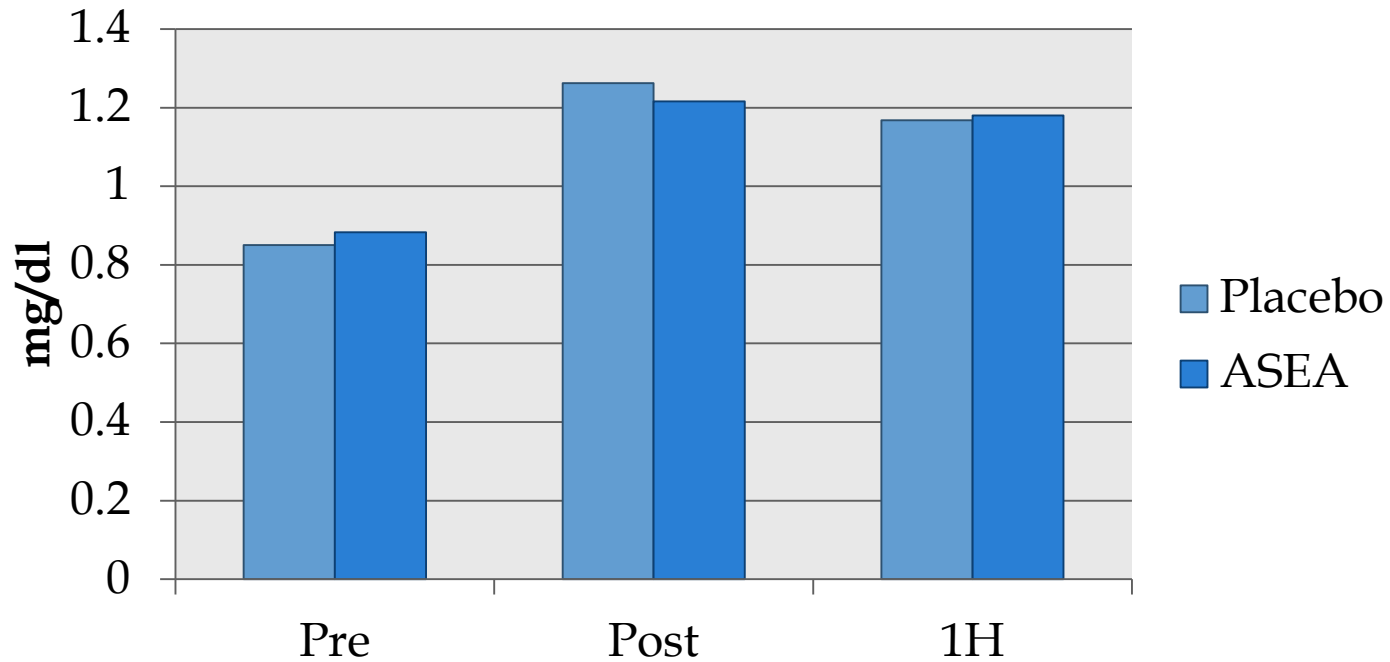
Blood Urinary Nitrogen (BUN) Normal Range: 8-20 mg/dl



**BUN levels did not differ between treatment
(treatment x time p-value=0.9743)**

Creatinine

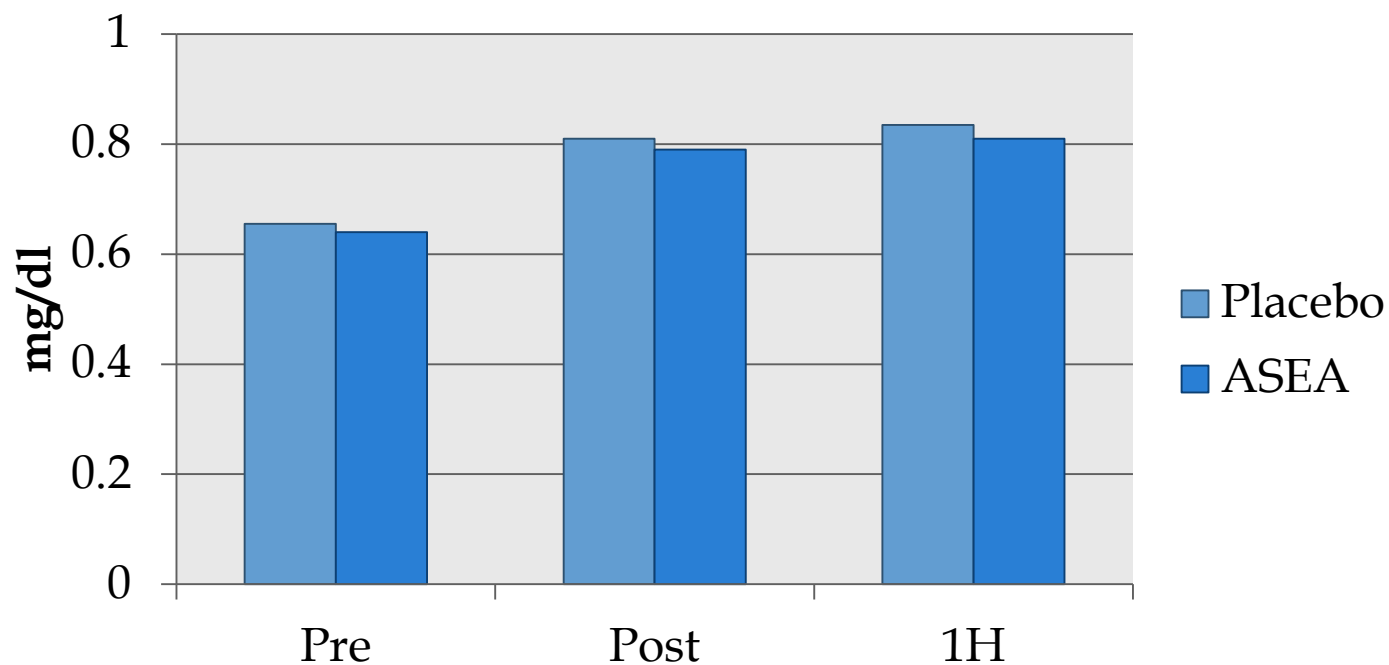
Normal Range: 0.7-1.2 mg/dl



Creatinine levels did not differ between treatment (treatment x time p-value=0.7717)

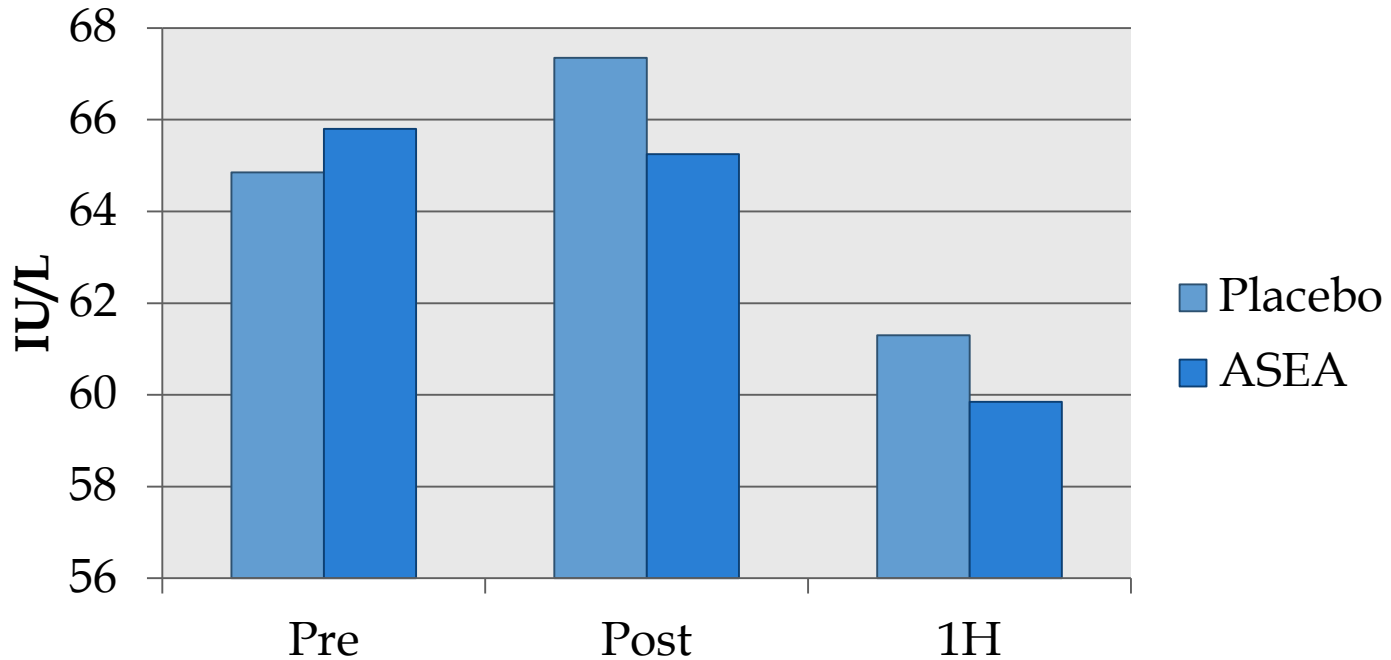
Bilirubin

Normal Range: 0.3-1.2 mg/dl



Bilirubin levels did not differ between treatment (treatment x time p-value=0.9971)

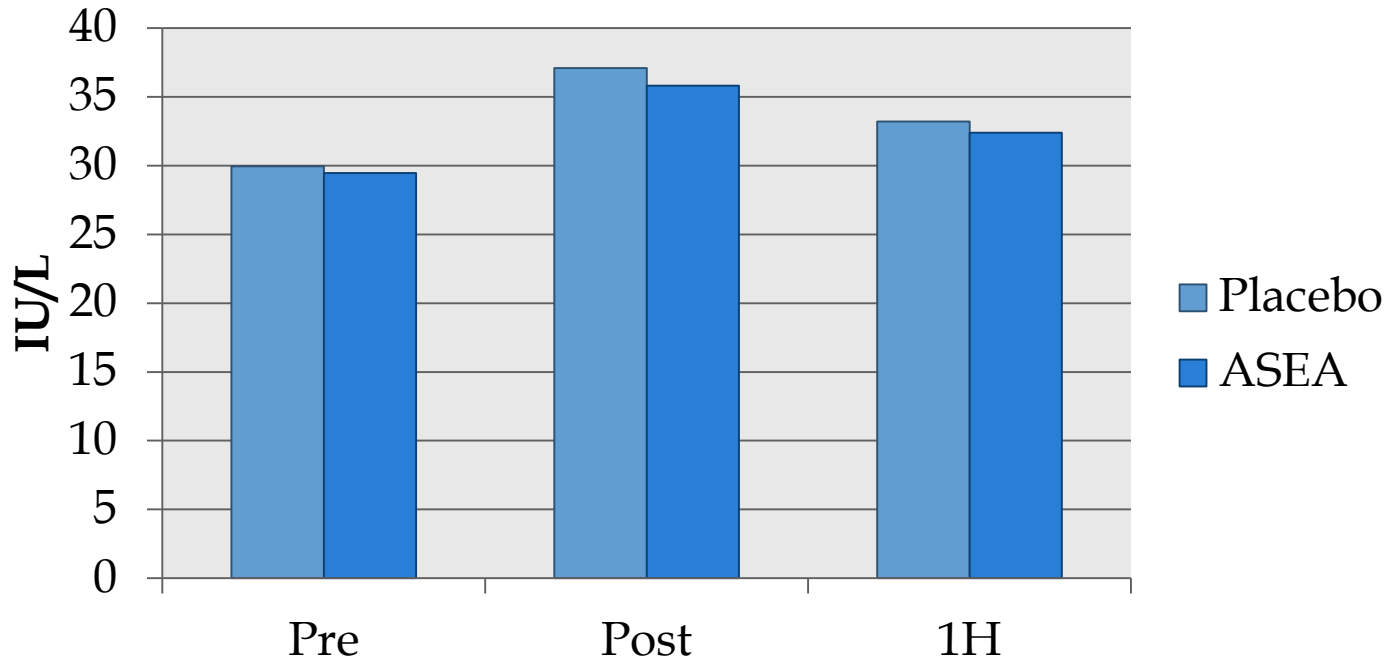
Alkaline Phosphatase Normal Range: 39-117 IU/L



Alkaline Phosphatase levels did not differ between treatment (treatment x time p-value=0.8819)

AST

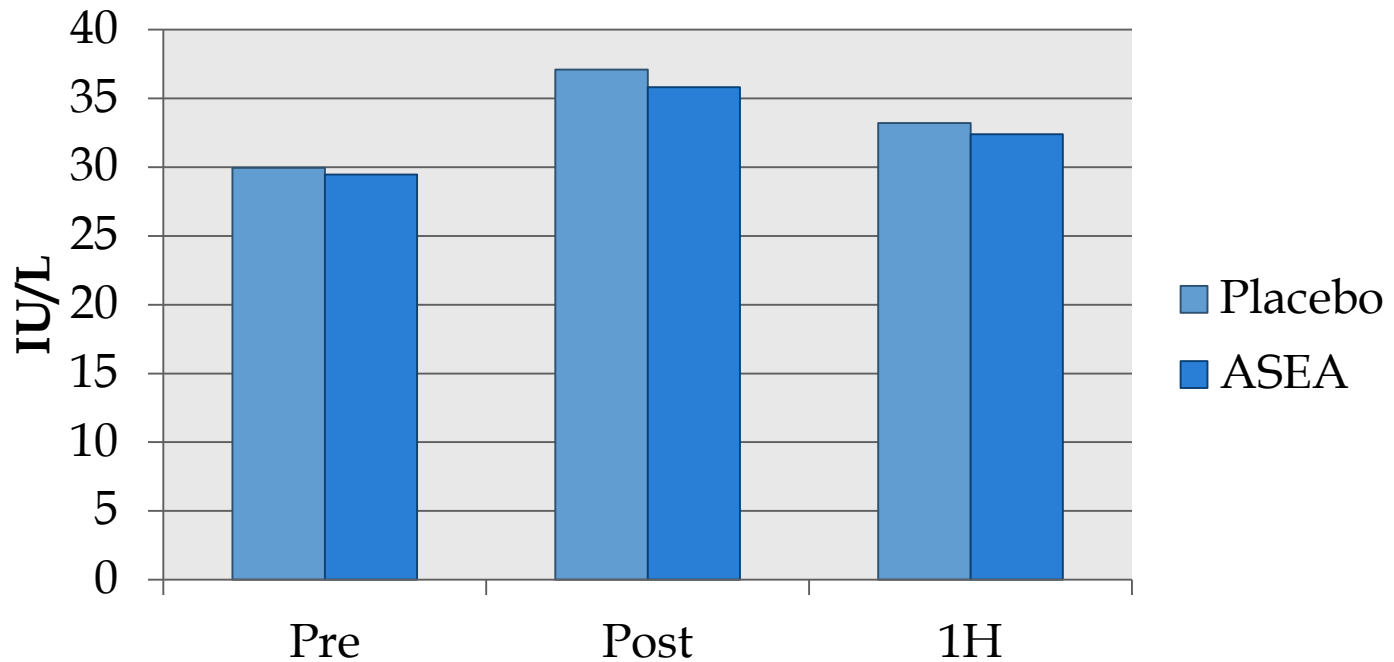
Normal Range: 15-41 IU/L



**AST levels did not differ between treatment
(treatment x time p-value=0.9546)**

ALT

Normal Range: 17-63 IU/L



**ALT levels did not differ between treatment
(treatment x time p-value=0.9739)**