# CALIFORNIA STATE SCIENCE FAIR
# 2008 PROJECT SUMMARY

**Name(s)**

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**Project Number**

**S1519**

**Project Title**

## The Role of Nitrosative Stress in Testosterone Depletion and Overload in Skeletal Muscle

**Abstract**

**Objectives/Goals**

The objective is to test the hypothesis that testosterone depletion will cause nitrosative stress as seen through increased nitrotyrosine levels. This will result in the nitration of tyrosine residues in proteins, which will lead to protein dysfunction. The nitration of the tyrosine residues will occur because inducible nitric oxide synthase (iNOS) will be producing nitric oxide (NO) in greater amounts in castrated samples and in those supplemented with supraphysiological levels of testosterone. Thus, iNOS levels should be greater in these samples. Additionally, supplementation with physiological levels of testosterone will reverse these effects.

**Methods/Materials**

Western blots were conducted to determine the relative abundances of inducible nitric oxide synthase (iNOS) and nitrotyrosine. Testosterone levels were altered. Four groups of samples came from a total of 16 mice: those that had been castrated, those supplemented with physiological testosterone levels, those supplemented with supraphysiological testosterone levels, and the controls. Each experiment was repeated three times.

**Results**

The expressions of both iNOS and nitrotyrosine were significantly upregulated in the castrated samples and the samples supplemented with supraphysiological doses of testosterone. Supplementation with physiological doses of testosterone ameliorated this upregulation.

**Conclusions/Discussion**

Testosterone depletion caused nitrosative stress, as did testosterone overload. The upregulation of iNOS led to the increased production of nitric oxide (NO), which then reacted with increased superoxide radical levels. This produced the peroxynitrite radical (ONOO-), which then nitrated tyrosine residues of proteins, causing protein dysfunction. This suggests that testosterone overload and depletion cause nitrosative stress, thereby resulting in protein modification. Supplementation with physiological testosterone levels prevented such protein modification.

**Summary Statement**

Testosterone depletion and overload cause protein modification.

**Help Received**

Used lab equipment at Charles Drew University under the supervision of Dr. Ram Sindhu