Exercise’s Effects on Factors Associated with Prostate Cancer

by Anwar Jackson

Photo on the left is courtesy of Santa Cruz Biotechnology Inc.

Photo on the right is courtesy of the University of Zurich’s Institute of Anatomy
Prostate cancer is the second-leading cause of death among American men.
Age, race, and diet are speculated to be prostate cancer risk factors.
Other risk factors exist at the molecular level, such as androgen and insulin-like growth factor-1 (IGF-1) levels.
Insulin-like growth factor binding protein-3 (IGFBP-3) is also believed to have a relation with prostate cancer.
Outside studies have shown that exercise may reduce the risk of prostate cancer.
Goal of the Study

- We hypothesized that exercise can reduce a person’s risk for prostate cancer.
- We also hypothesized that exercise can increase a person’s IGFBP-3 serum levels.
- We also hypothesized that exercise can reduce cancerous growth in vitro.
Methods

Nineteen African-American men between the ages of 20 and 25 volunteered for the study. The men were randomly put into three exercise groups in which they would follow that group’s exercise regimen for seven consecutive days.

- Aerobic Exercise (n=7)
- Resistance Training (n=7)
- Control Group (n=5)

Serum was extracted from each subject before and after the exercise regimen.
Methods (continued)

- LNCaP cells were washed with DPBS.
- LNCaP cells were then trypsinized and incubated in order to detach them from their flask.
- RPMI 1640 medium was used to deactivate trypsin, and the LNCaP cells were dislodged into a single-cell suspension.
- The LNCaP cells were then counted with a hemocytometer, and the number of cells was used to determine the volumes of medium and cells that were to be used.
Methods (continued)

- 200 microliters of the mixture were placed in each well of an MTT assay.
- After 24 hr incubation period, the medium was removed from all wells.
  - The LNCaP cells stick to the wells’ surfaces.
- Serum-free medium was added to all wells.
- 20 microliters each of serum and control were added to the wells, and the assays are incubated for 48 hr.
- 38.3 mL of RPMI medium and 1.7 mL of LNCaP cells were placed in two T-25 flasks (40 mL in each flask).
The MTT assay was used to test LNCaP cell growth in each pre and post-exercise serum sample.

- Samples were tested in triplicate
- Fetal Bovine Serum (FBS) was used as the control

An IGFBP-3 assay was used to test the binding protein’s expression in each pre and post-exercise serum sample.

- Samples were tested in duplicate

Plate readers measured cell growth and gene expression by measuring the absorption levels of each plate well.
Methods (continued)

- The absorptions were matched with their corresponding patients and groups.
- The mean and standard deviation was calculated for each exercise group (in both IGFBP-3 and LNCaP growth analysis).
- A one-tailed paired t-test was used to calculate the statistical significance in LNCaP cell growth and IGFBP-3 expression between pre and post-exercise serum.
Results

The difference in LNCaP cell growth between pre and post-exercise serum was insignificant for the aerobic, resistance, and control groups.

- Aerobic: p = 0.486
- Resistance: p = 0.147
- Control: p = 0.196

The difference in IGFBP-3 levels between pre and post-exercise serum was insignificant for aerobic and control groups.

- Aerobic: p = 0.135
- Control: p = 0.156
Results (continued)

IGFBP-3 levels for the resistance group was significantly higher (p = 0.014) in the post-exercise serum than in the pre-exercise serum.
Figure 1: Aerobic Exercise and IGFBP-3 levels

Figure 1. Mean ± SD values for IGFBP-3 in the aerobic exercise group during pre and post exercise conditions.
Figure 2. Mean ± SD values for relative LNCaP cell growth in the aerobic exercise group during pre and post exercise conditions.
Figure 3. Mean ± SD values for IGFBP-3 in the resistance exercise group during pre and post exercise conditions.

*Figure 3 has significant difference
Figure 4. Mean ± SD values for relative LNCaP cell growth in the resistance exercise group during pre and post exercise conditions.
Figure 5: Control Group and IGFBP-3 levels

Figure 5. Mean ± SD values for IGFBP-3 in the control group during pre and post control conditions.
Figure 6: Control Group and LNCaP cell growth

Figure 6. Mean ± SD values for relative LNCaP cell growth in the control group during pre and post control conditions.
Conclusion

Our hypothesis concerning the change in IGFBP-3 serum levels for the resistance training group was supported by the increase in said levels from pre-exercise to post-exercise.

Our hypotheses concerning LNCaP cell growth in vitro and the change in IGFBP-3 serum levels in the aerobic exercise group were not supported.
References


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