EXERCISE AND WHEY PROTEIN SUPPLEMENTATION AS ADJUNCTIVE THERAPY FOR PATIENTS WITH PROSTATE CANCER RECEIVING ANDROGEN DEPRIVATION THERAPY

**Rationale:** Testosterone is thought to be linked to the progression of prostate cancer. As a result, men with prostate cancer are often placed on a treatment called androgen deprivation therapy (ADT). This therapy diminishes the body’s ability to produce testosterone, thereby inhibiting testosterone-driven tumor progression. Muscle tissue is largely influenced by testosterone in men and total body muscle mass is significantly reduced as a consequence of ADT. Reductions in muscle mass compromise muscle strength, endurance, physical function, and quality of life in these patients. Resistance training (RT) is a commonly used method for increasing muscle mass and only a limited number of RT interventions have been completed in prostate cancer patients. These RT interventions have mainly served to prevent ADT-associated loss of muscle mass, not increase muscle mass. The most effective RT programs for increasing muscle mass should utilize high intensity protocols and the previously conducted RT interventions have used moderate training intensities. Thus, the potential for muscle growth and associated improvements in physical function and quality of life may be underestimated for prostate cancer patients receiving ADT.

**Study Goals:** We aim to implement a true high intensity RT program in combination with whey protein supplementation (WPS). RT in combination with WPS is a successful method for increasing muscle mass beyond the increases seen with RT alone in healthy older men. In addition, WPS alone may increase circulating concentrations of glutathione (GSH), a potent antioxidant and anti-carcinogen. However, the benefits of WPS alone or in combination with a RT program are uninvestigated in this population. We propose to examine the efficacy of high intensity RT with or without WPS on improving treatment-related declines in muscle mass, strength, endurance, physical function, quality of life, and GSH levels in prostate cancer patients receiving ADT.

**Clinical Application:** Exploration of the potential for increasing muscle mass during a period of very low testosterone in prostate cancer patients may provide insight toward a mechanism of testosterone-independent regulation of muscle mass. More importantly, these results may provide a method for minimizing the adverse effects of ADT on the quality of life for men with prostate cancer. Increases in muscle mass will result in increased muscular strength, endurance, and the ability to perform activities of daily living. In turn, these improvements may increase the self-esteem and confidence in physical capacity of these patients. Prolonged use of ADT is also associated with loss of bone mass and these results may provide preliminary data for exploring the long-term relationship between increases muscle mass and bone health. In addition, ADT has been associated with a deleterious effect on insulin dynamics and sugar metabolism, increasing the risk of diabetes in prostate cancer patients. RT is a successful method for improving bone mass and decreasing the risk of diabetes. Daily protein requirements are elevated in older individuals and the majority of men with prostate cancer are over 50 years of age. Hence, there may be great benefit from utilization of a protein supplement as a complementary therapy to RT, assisting these patients in meeting their nutritional requirements. However, WPS has been linked to varying levels of stomach discomfort due to digestion of the protein; discomfort levels are usually low to moderate in these cases. In addition, participation in a high intensity RT program may increase muscle fatigue and soreness in this energy-compromised population; nevertheless, we anticipate that this RT program will ameliorate many of the treatment-related side effects which contribute to the reduced energy state of this population and will, instead, decrease fatigue which may also lead to improved confidence and self-esteem.
We believe that if our findings demonstrate clinically meaningful improvements in muscle mass, strength, and physical function that it will have immediate impact on the standard of care for prostate cancer patients receiving ADT. Based on testimonials from our healthy older adults who have participated in similar programs and their reports of dramatic changes in quality of life, we believe that prostate cancer patients will experience the same improvements which will encourage expansion of treatment centers to include exercise services and enhance our knowledge of adjunctive treatment for men with prostate cancer.

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