

What is the Relationship Between a Soy-Rich Diet and the Incidence of Prostate Cancer?

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Abstract. *Introduction:* Prostate cancer (PC) is the most common non-cutaneous cancer in the United States male population, and the second most common cause of cancer mortality. It has been proposed that dietary differences in Asian and Western men may be partially responsible for the lower incidence of PC among Asian men. The assumption that the Asian diet may be prostate-healthy is based on the fact that it contains many soy products. The purpose of this study was to determine whether there is a relationship between the consumption of a soy-rich diet and PC incidence. *Methodology:* A systematic review of evidence-based literature was conducted by examining peer-reviewed articles from the following databases: MEDLINE FirstSearch, MEDLINE PubMed, and Cochrane Library. MeSH terms utilized included prostate cancer/carcinoma, soy, soy-rich diet, prostate cancer incidence, and genistein. *Results:* The findings suggest there are benefits related to the consumption of a soy-rich diet, but none were shown to be conclusively preventative. *Conclusion:* More *in vivo* research must be completed before a statistically significant relationship between the consumption of a soy-rich diet and the incidence of PC can be substantiated.

1. Introduction

Prostate cancer (PC) is the second most common cancer in the U.S. male population and the second most common cause of cancer mortality. It has been stated that the majority of men in the U.S. die with some degree of PC. With statistics such as these, it is imperative that a tested and proven cancer prevention method be determined. The etiology of PC is quite complicated due to the fact that few risk factors have been positively associated with the disease. Those risk factors which may be relevant are: age, diet, family history, geographic location, race, and testosterone deficiency [1].

Prostate cancer is typically found upon either Digital Rectal Examination (DRE) of a nodular prostate or by elevated serum Prostate Specific Antigen (PSA). PSA is a glycoprotein produced in the cytoplasm of benign and malignant prostatic cells; its level correlates to the amount of prostate tissue, benign or malignant [1]. When PSA levels are increased, it is indicative of inflammation or PC development. It is thought that there are other markers that may indicate the development of PC that have yet to be determined.

Scientists and researchers believe that diet may be the best way to prevent PC. Since it has been determined that there is a decreased incidence of PC among Asian men compared to Western men, their diet has been of utmost concern. The greatest differences between Asian and Western diets are an increased consumption of soy-rich foods, decreased consumption of red meats and dairy products, and a decreased consumption of a diet high in fat. These dietary differences have led scientists and researchers to ask the following questions: 1) Which soy components are responsible for reducing the incidence of PC and 2) what effects do these components have on PC? Phytochemicals in soy include isoflavones which are naturally occurring compounds found in plants that have strong biological activity in the body. They are relatively safe and exert multiple effects in the body including estrogen receptor activation, antiestrogenic actions, inhibition of growth factor signaling via tyrosine kinases, induction of apoptosis, induction of cell differentiation, inhibition of angiogenesis, and induction of genetic damage [2].

2. Experiment, Results, Discussion, and Significance

This research study was completed by performing a systematic review of evidence-based literature. The comprehensive literature search was carried out using the following databases: MEDLINE, FirstSearch, MEDLINE PubMed, and Cochrane Library from 1980 - 2006. MeSH terms included prostate cancer / carcinoma, soy, soy-rich diet, prostate cancer incidence, and genistein. Articles chosen for review were based on their level of evidence,

publication in peer-reviewed journals, relevance of the data, and publication in the English language. The inclusion criteria used to select articles for this review were: 1) Men between the ages of 19 – 89 years old that had not been diagnosed with any other type of cancer besides PC at the onset of the trials and 2) the evidence level of the article had to be either a Level 1 or Level 2. A total of three Level 1 articles and twenty-one Level 2 articles met the inclusion criteria. Exclusion criteria utilized were articles that were low in evidence and African American men (due to their higher rates of PC).

There were three levels of evidence used to classify each study. Level 1 evidence included double-blinded randomized control trials and large meta-analysis studies. Level 2 studies were non-blinded randomized control trials, case-control studies, cross-sectional studies, prospective studies, cohort studies, and randomized crossover intervention studies. Level 3 (background articles) included literature reviews and meta-analysis.

The results of this evidence based literature review revealed the following: nine Level 1 and 2 studies showed a decreased incidence of PC, while three studies concluded that soy demonstrated no chemo-preventative influence. The majority of studies (12) implied further research was necessary to establish a conclusive association of soy consumption and a reduced incidence of prostate cancer.

Weaknesses in the Literature:

There were differences in measuring efficacy of soy products on PC prevention / development, and a definitive unit of measurement needs to be determined for accurate assessment. Also, in each of the Level 2 studies there was some degree of confounding. Each study controlled for different variables such as age, race, and geographic location. But, there were other variables unaccounted for such as testosterone deficiency, family history, and education level. Ultimately, there needs to be a greater number of randomized control trials to determine the exact role soy and soy supplementation have on the incidence of PC.

Gaps in the Literature:

Currently, there is research under way to determine the optimal amount of soy consumption that should be recommended to provide a protective effect against developing PC.

Conclusion

There was confounding amongst the level one studies in that Adams et al indicated no association between soy and prostate health while Schroeder et al demonstrated, through the implementation of a soy supplement, an extension of the PSA doubling time to 1150 days compared to the 445 day doubling time associated with a low-soy diet [3, 4]. Such results offer promise for the treatment and prevention of PC.

In considering the twenty-one level 2 studies, seven showed a decreased incidence of PC while two did not associate soy consumption with a decrease in PC incidence. More *in vivo* research must be completed before a statistically significant relationship between the consumption of a soy rich diet and the incidence of PC can be substantiated.

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