## Original Article

# Environmental and Psycho-social Factors Related to Prostate Cancer Risk in the Chinese Population: a Case-control Study*

LI Mei Ling[1], LIN Ji[1], HOU Jian Guo[2], XU Lei[3], CUI Xin Gang[4], XU Xing Xing[1,5], YU Yong Wei[6], HAN Xue[7], WANG Guo Min[3], GUO Jian Ming[3], XU Dan Feng[4], THOMPSON Timothy C[8], CAO Guang Wen[1], and ZHANG Hong Wei[1,#]

*1. Department of Epidemiology, Secondary Military Medical University, Shanghai 200433, China; 2. Department of Urology, Changhai Hospital, Second Military Medical University, Shanghai 200433, China; 3. Department of Urology, Zhongshan Hospital, Fudan University, Shanghai 200032, China; 4. Department of Urology, Changzheng Hospital, Second Military Medical University, Shanghai 200003, China; 5. Center for Disease Control and Prevention of Zhabei District, Shanghai 200072, China; 6. Department of pathology, Changhai Hospital, Second Military Medical University, Shanghai 200032, China; 7. Center for Disease Control and Prevention of Yangpu District, Shanghai 200090, China; 8. Department of Genitourinary Medical Oncology-Research, University of Texas MD Anderson Cancer Center Houston, 77030, USA*

**Abstract**

**Objective** To study the risk environmental and psycho-social factors associated to prostate cancer (PCa) in Chinese population.

**Methods** 250 PCa patients and 500 controls were enrolled in this case-control study. Information was collected and logistic regression analysis was used to estimate the odds ratios (OR) and 95% confidence intervals (95% CI) for relationship between lifestyle, eating habits and psycho-social factors with PCa risk.

**Results** Green vegetables and green tea were associated with a decreased risk of PCa (OR=0.39, 95% CI: 0.28-0.53; OR=0.59, 95% CI: 0.40-0.87, respectively). Family history of PCa (OR=7.16, 95% CI: 2.01-25.49), history of prostate diseases (OR=2.28, 95% CI: 1.53-3.41), alcohol consumption (OR=1.97, 95% CI: 1.33-2.90), red meat consumption (OR=1.74, 95% CI: 1.20-2.52), barbecued (OR=2.29, 95% CI: 1.11-4.73) or fried (OR=2.35, 95% CI: 1.24-4.43) foods were related with increased PCa risk. Negative psycho-social factors including occupational setbacks (OR=1.61, 95% CI: 1.00-2.59), marital separation (OR=1.94, 95% CI: 1.29-2.91), self-contained suffering (OR=2.37, 95% CI: 1.58-3.55), and high sensitivity to the personal comments (OR=1.73, 95% CI: 1.18-2.54) were related to PCa.

**Conclusion** Regular consumption of green vegetables and green tea may suggest protective effects on PCa. Alcohol consumption, red meat consumption and barbecued or fried foods were associated with PCa. Negative psycho-social factors may also play a role in the incidence of PCa in Chinese population.

**Key words:** Case-control study; Lifestyle; Dietary factors; Psycho-social factors; Prostate cancer

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#Correspondence should be addressed to ZHANG Hong Wei, Tel: 86-21-81871061, E-mail: hwzhang@smmu.edu.cn

Biographical note of the first author: LI Mei Ling, female, born in 1988, Master Degree, occupying in molecular epidemiology of cancer.

## INTRODUCTION

Prostate cancer (PCa) is the second common male malignant tumor and the sixth leading cause of cancer deaths worldwide, and it has remarkable geographical and ethnic difference in incidence and mortality[1]. The age-standardized incidence rate of PCa (per 100,000 persons) was 104.2 in Australia/New Zealand, 94.1 in Western Europe, 85.6 in Northern America, but only 8.2 in Eastern Asia. As for age-standardized mortality rates of these countries, the highest mortality rate occurs in Australia/New Zealand (15.4/100,000) compared with that in Western Europe (12.4), Northern America (9.9) and Eastern Asia (2.5)[1]. In 2008, the age-standardized incidence of PCa by world population was 6.73/100,000, which was accounted for 3.33% of men's malignant tumors incidence in China, and the average annual growth rate was 12.07% during 1998-2008[2]. Although the incidence rate of PCa in China has remained relatively low, it has rapidly increased in recent years. Apart from aging population that contributes to an increased incidence of PCa, environmental factors can also play a role in increasing PCa risk[3]. Currently, the well-established risk factors for PCa are ethnicity, age and family history of PCa[4]. In addition, some modifiable lifestyle factors such as smoking and obesity have been found to be associated with the incidence of PCa[5]. A recent study also found that heavy smoking was related to increased risk of PCa and higher Gleason grade in African American men, but not in European American men[6]. Several studies indicated that consumption of vegetables, green tea and physical activity may be protective factors for PCa[7-9]. Although some studies have shown associations between PCa and environmental factors that are specific to different ethnic backgrounds, overall the results of these studies are inconclusive. Psycho-social factors have also been recognized as important factors in the development of cancer and in cancer treatment[10-11], but few of these studies were focused on PCa. To address this issue, we conducted a case-control study to investigate the associations between PCa and lifestyle, eating habits, and psycho-social factors in the Chinese population.

## MATERIALS AND METHODS

### *Study Design*

One 1:2 case-control study was conducted based on hospital and community populations. 250 cases and one group of 250 controls were from Changhai and Changzheng Hospitals of the Second Military Medical University, and Zhongshan Hospital of the Fudan University, between 1 January 2007 and 1 July 2013. These three hospitals were separately located in Yangpu, Huangpu, and Xuhui District in Shanghai city. Another group of 250 controls were from communities. A questionnaire was designed to collect the basic demographic and environmental information (including lifestyle, history of diseases, and eating habits) for both of cases and controls. We also explored psycho-social factors including negative life events and personality which might be related to the incidence of PCa. The investigators had been trained to interview the subjects by face-to-face method with the designed questionnaires.

### *Cases and Controls Selection*

250 cases were newly diagnosed patients with PCa by histopathological verification after radical prostatectomy. 250 controls were non-tumor patients from pneumology or Cardiology departments from the same hospitals as cases, and the other 250 controls were non-tumor community people with normal value of PSA (<4.0 ng/mL) from different District in Shanghai. All controls were matched by race and age (within 5 years old), location and free of PCa. All of the controls provided blood samples for the examination of PSA. Those with PSA value >4.0 ng/mL were excluded from the study.

### *Data Collection*

All participants signed informed consents and provided data with regard to basic demographic information, lifestyle and habits, history of diseases, family history of tumor, and eating habits applicable to the most recent one-year period. The demographic information included primarily nationality, age, educational level, occupation, weight, and height. Information collected with regard to eating habits included the intake frequency and quantity of meat (red meat: pork, mutton, and beef) consumption, vegetable consumption, and fruit consumption per week; and the cooking methods. For the lifestyle and behaviors, the frequencies of alcohol consumption, smoking and tea consumption were investigated. We also collected information about urinary system diseases, hypertension, and diabetes mellitus. To explore the