



Original article

## Dietary patterns and health-related quality of life in bladder cancer survivors

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### Abstract

**Purpose:** A nutritious diet has been associated with better health-related quality of life (HRQOL) in a variety of cancer survivors. However, little is known about dietary habits and its association with HRQOL in bladder cancer survivors. The objective of this cross-sectional study is to describe dietary intake patterns and its relationship to HRQOL in a large cohort of bladder cancer survivors.

**Methods:** Bladder cancer survivors within our institutional database were mailed surveys to assess dietary intake patterns utilizing the Diet History Questionnaire II and assessing HRQOL utilizing the Functional Assessment of Cancer Therapy-Bladder Cancer. Diet quality was assessed via Healthy Eating Index 2010 scores based on subjects' Diet History Questionnaire II results. Univariate and multivariate analyses of HRQOL based on diet quality were used to evaluate whether diet quality was associated with HRQOL.

**Results:** Four hundred and fifty-nine patients (48%) returned questionnaires. Mean age was 74 years, 81% were male and 28% underwent radical cystectomy. Diet quality and quantity in our cohort was similar to the general older U.S. population and did not differ significantly between those managed conservatively or long-term following cystectomy. Our cohort had low intake of whole grains and fat-soluble vitamins, particularly vitamin D. Diet quality was significantly associated with HRQOL in the univariate analysis but lost statistical significance in our multivariate analysis. Elixhauser Comorbidity Index was significantly associated with HRQOL in the multivariate analysis.

**Conclusions:** This study demonstrates a similar diet quality of bladder cancer survivors to the older general U.S. population that, on average, "needs improvement." Dietary intake is particularly lacking in whole grain and vitamin D intake. Future studies are warranted to determine the impact on long-term outcome, but bladder cancer survivors should be counseled on the importance and benefits of adherence to dietary guidelines, including its potential contribution toward better HRQOL. © 2018 Elsevier Inc. All rights reserved.

**Keywords:** Bladder cancer; Urothelial carcinoma; Urinary bladder neoplasms; Cystectomy; Diet; Healthy diet; Quality of life; Health-related quality of life; Cancer survivors; Surveys and questionnaires; Vitamins; Vitamin D; Whole grains; Cross-sectional studies

### 1. Introduction

Society and medicine are placing an increasing emphasis on cancer survivorship [1]. As the population continues to

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age and cancer treatment evolves, the number of cancer survivors is expected to increase. Greater numbers will then be faced with the physical and psychosocial challenges of recovering from cancer and its treatment [2,3]. This population is already known to have elevated risks of mortality and chronic health conditions [4]. Thus, it is important to align our goals of increased overall and cancer-specific survival with concomitant efforts to improve and optimize quality of life.

Well-intentioned guidelines instruct patients to achieve and maintain a healthy lifestyle. For some cancers, a

healthy lifestyle and dietary patterns (plant based with large amounts of fruits, vegetables, and whole grains) have been associated with a reduced risk of recurrence and death [5–9]. Weight loss or gain increases mortality risk in survivors, which suggests that maintaining weight is the optimal goal [10]. Unfortunately, poor nutritional intake and dietary patterns have been reported in various cohorts of cancer survivors [11,12]. Bladder cancer survivors are a particularly important target population for health promotion efforts. Patients with invasive disease often undergo extirpative surgery using a portion of bowel as a urinary diversion. For noninvasive disease, the frequency of procedures required for surveillance and retreatment results in an extensive health care burden and cost—in fact, bladder cancer is the most expensive malignancy per patient to treat [13]. Additionally, bladder cancer survivors typically represent an older population. There is strong belief that optimizing nutrition and physical activity can make a particularly significant contribution to the quality of life of older adults [14]. Accordingly, we have previously reported a positive association between physical activity patterns and health-related quality of life (HRQOL) in bladder cancer survivors [15]. The aim of this cross-sectional study is to establish baseline dietary characteristics for bladder cancer survivors and demonstrate its relationship to HRQOL.

## 2. Materials and methods

### 2.1. Subjects

After approval by the Duke University Health System Institutional Review Board, potential subjects were identified through an institutional database and screened on pre-defined inclusion and exclusion criteria. Inclusion criteria were: (1) age  $\geq 18$  years, (2) history of care at our institution, and (3) histologically confirmed diagnosis of bladder cancer. Exclusion criteria were: (1) deceased, (2) inability to read/write English, (3) last known follow-up  $> 2$  years prior, and (4) known cognitive impairment. Eligible subjects were sent a composite of multiple questionnaires querying diet and HRQOL, which are described below. Questionnaires were returned in prestamped envelopes, and data were abstracted into an electronic database. Subjects were sent reminder postcards 4 weeks after the initial mailing. Demographics, smoking status, body mass index (BMI), comorbidities, and cancer-related details were abstracted from subjects' electronic medical records. The Elixhauser Index was used to quantify comorbidities [16].

### 2.2. Questionnaires

Diet was quantified using the paper-based Diet History Questionnaire II (DHQ2), a validated food frequency questionnaire involving 151 questions covering portion size over 134 food items and 8 supplements, taking a patient roughly an hour to complete [17,18]. It uses food frequency

methodology (usual consumption frequency and portion size over the past month) and diet history methodology (assessment of cooking methods and staple foods). It has been validated using dietary record [19], 24-hour urine [20], serum [21], and doubly labeled water [22]. It provides information on both macro- and micronutrients. The results of the DHQ2 were then used to calculate Healthy Eating Index 2010 (HEI 2010) scores, a validated and reliable single quantitative measure of diet quality. It translates the recommendations in the United States Department of Agriculture (USDA) Dietary Guidelines for Americans into standards expressed either as a percent of calories or per 1,000 calories. This uncouples diet quality from quantity and is termed a density approach. The HEI 2010 is composed of adequacy measures (total fruit, whole fruit, total vegetables, greens and beans, whole grains, dairy, total protein foods, seafood and plant proteins, and fatty acids) and moderation measures (refined grains, sodium, and empty calories) for a total of 12 components [23,24]. The components are scored for a maximum total value of 100; higher scores reflect a better quality diet. Per USDA recommendations, HEI total scores were categorized as “poor” ( $<51$ ), “needs improvement” (51–80), or “good” ( $>80$ ).

HRQOL was measured using the Functional Assessment of Cancer Therapy-Bladder (FACT-BL) cancer. The Functional Assessment of Cancer Therapy (FACT) questionnaires are an established and validated set of instruments. The FACT-BL is a modification of the general FACT measuring tool intended to capture the clinically relevant problems associated with bladder cancer and designed to be used across treatment modalities for those with muscle invasive or nonmuscle invasive disease [25–27]. This tool measures 4 primary QOL domains: physical well-being (PWB, 7 items), social well-being (7 items), emotional well-being (6 items), and functional well-being (FWB, 7 items). There is also an additional concerns scale, which evaluates urinary function (2 items), sexual function (2 items), bowel function (2 items), weight loss (2 items), body image (1 item), and concerns about ostomy appliance, if applicable (2 items). Three different composite scores can be calculated using the FACTscorer package for R: (1) FACT-BL (sum of all subscales), (2) FACT-G (sum of PWB, emotional well-being, social well-being, and FWB subscales), and (3) Trial Outcome Index (TOI; sum of the PWB, FWB, and additional concerns subscales). A higher score indicates a higher HRQOL. Because minimum clinically important differences have not been described specifically for the FACT-BL, minimum clinically important differences described in other FACT scales were used as a reference to determine clinically important differences in HRQOL in our study [28].

### 2.3. Statistical analysis

Means were used to summarize normally distributed continuous variables, whereas medians were used to

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