

# Introduction to Genitourinary Cancers

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## Introduction

The purpose of this text is to provide nurses with the information necessary to care for patients and families who are affected by genitourinary (GU) malignancies, which comprise cancers of the bladder, kidney (renal), penis, and testicle. Prostate cancer is the most common malignancy diagnosed in males in the United States and is presented in detail in a separate text in this *Site-Specific Cancer Series*. Of the top 10 causes of *newly diagnosed* cancers in men, bladder cancer is the fourth most common, and renal cancer is the seventh most common. In women, renal cancer is the ninth most common cancer (Jemal et al., 2008). In a review of the top 10 causes of death in men, bladder cancer is eighth and renal cancer is tenth. None of these cancers are a top 10 cause of death in women. From 1990 to 2004, the death rate from both bladder cancer and renal cancer has decreased for both men and women (Jemal et al.).

The incidence of GU cancers is higher in men than in women, and in the case of bladder cancer, it is as much as three times higher (Lin et al., 2006). In addition, North American natives and African Americans have a higher incidence of renal cancer than other races. Most patients with bladder cancer are diagnosed with localized disease, but African Americans have a higher incidence of diagnosis with regional disease (Jemal et al., 2008). Clearly, GU malignancies affect a large number of patients each year, and because of the organs affected, these cancers have a significant impact on patients, as well as their spouses and other family members.

The risk factors for GU cancers have been studied extensively. This introductory section briefly reviews the most common risk factors.

## Risk Factors for Bladder Cancer

In 2008, approximately 68,810 patients in the United States were diagnosed with bladder cancer (Jemal et al., 2008).

A number of risk factors have been identified for this disease. Controllable and environmental risk factors include cigarette smoking, occupation, exposure to radiation therapy for the treatment of another malignancy, exposure to cyclophosphamide, and exposure to the infectious organism *Schistosoma haematobium*. Uncontrollable risk factors include age (Borden, Clark, & Hall, 2005), African American race (Lee, Dun, Williams, & Underwood, 2006) and family history, especially among first-degree relatives of patients with bladder cancer or other urologic cancers (Pelucchi, Bosetti, Negri, Malvezzi, & La Vecchia, 2006; Randi et al., 2007). Individuals with a family history of bladder cancer and who smoke significantly increase their risk of bladder cancer by 6.87-fold (Lin et al., 2006).

Cigarette smoking is a major cause of bladder cancer, responsible for approximately 50% of cases in men and 33% in women (Marcus et al., 2000; Zeegers, Kellen, Buntinx, & van den Brandt, 2004; Zeegers, Tan, Dornat, & van Den Brandt, 2000). Aromatic amines found in cigarette smoke are more likely to be responsible for causing bladder cancer than other chemicals found in cigarettes (Vineis & Pirastu, 1997). Another 25% of bladder cancers are attributable to occupational exposure to hazardous chemicals. Chemicals include aromatic amines used in the chemical, dye, rubber, oil, paint, leather, and printing industries (Johansson & Cohen, 1997; Kirkali et al., 2005; Yasunaga et al., 1997). The evidence related to hair dye use or employment as a hairdresser as a potential cause of bladder cancer is inconclusive; however, some individuals with genetic risk who use hair dye and hairdressers who applied hair dye prior to the 1980s may be at higher risk (Rollison, Helzlsouer, & Pinney, 2006; Bolt & Golka, 2007). Radiation therapy used in the management of prostate cancer may increase the risk of developing bladder cancer (Boorjian et al., 2007). The use of cyclophosphamide in the treatment of ovarian cancer may increase a woman's risk of developing bladder cancer months to years after ovarian cancer therapy (Kaldor et al., 1995; Volm, Pfaff, Gnann, & Kreienberg, 2001). Long-term use of phenacetin, an analgesic no longer available in the United States, may increase the

risk of bladder cancer (Fortuny et al., 2007). Uncommon in the United States but found in contaminated water in Africa and the Middle East, the parasite and eggs of *Schistosoma haematobium* are a cause of bladder cancer (Bedwani et al., 1998; Blute & Oliva, 2000).

### Risk Factors for Cancer of the Penis

Cancer of the penis is a rare malignancy. Human papilloma-virus (HPV) infection is responsible for 40%–50% of penile cancer cases (Dillner, Meijer, von Krogh, & Horenblas, 2000). Risk factors include older age, lack of circumcision as a newborn, phimosis, long foreskin, poor hygiene, penile rash, penile tear, smoking, genital warts, ultraviolet radiation exposure, and balanitis xerotica obliterans (BXO) also known as lichen sclerosus (Barnholtz-Sloan, Maldonado, Pow-sang, & Guiliano, 2007; Daling et al., 2005; Harish & Ravi, 1995; Maden et al., 1993; Misra, Chaturvedi, & Misra, 2004; Velazquez et al., 2003). BXO may be a premalignant lesion, and patients with chronic lesions require follow-up and biopsy if circumcision does not remove the problem (Pietrzak, Hadway, Corbishley, & Watkin, 2006). BXO often is associated with penile cancers, and they both may be diagnosed concurrently or sequentially (Pietrzak). BXO may be considered a premalignant lesion in patients without HPV (Velazquez & Cubilla, 2003).

### Risk Factors for Renal Cell Cancer

In 2008, approximately 54,390 people in the United States were diagnosed with renal cell cancer (RCC) (Jemal et al., 2008). Risk factors are divided into controllable (environmental) or uncontrollable. Environmental risk factors include cigarette smoking, obesity, diet, and hypertension. Uncontrollable risk factors include family history and the need for dialysis because of renal disease. Some variables that are a mixture of controllable and uncontrollable risk factors include the presence of underlying medical conditions such as diabetes.

Cigarette smoking is responsible for up to 27% of RCC cases in men and 11% of cases in women (Benichou, Chow, McLaughlin, Mandel, & Fraumeni, 1998; Yuan, Castela, Gago-Dominguez, Yu, & Ross, 1998). As expected, the greater the number of cigarettes smoked per day, the greater a person's risk of developing RCC (Hunt, van der Hel, McMillan, Boffetta, & Brennan, 2005). In addition to active smoking, passive smoking (also known as secondhand smoke) also increases the risk of RCC (Hu, Ugnat, & Canadian Cancer Registries Epidemiology Research Group, 2005).

Obesity with an increasing body mass index of more than 25 kg/m<sup>2</sup> and excess calorie consumption increases the risk of RCC for both men and women and accounts for as much as 27% of cases in men and 29% of cases in women (Bergstrom et al., 2001; Pan, DesMeules, Morrison, Wen, & Canadian

Cancer Registries Epidemiology Research Group, 2006). The mechanisms by which obesity and excess calories promote RCC are unclear but most likely include a complex interaction between a variety of growth factors, insulin resistance, altered hormone levels, and other factors (Calle & Kaaks, 2004).

Hypertension may cause 21% of RCC cases (Benichou et al., 1998). Although the disease process or the drugs used to treat it may be responsible for the increased risk, current studies concluded that the hypertension itself is the most likely etiology perhaps by causing injury to the renal tubule (Lipworth, Tarone, & McLaughlin, 2006; McLaughlin & Lipworth, 2000; Zucchetto et al., 2007). Hypertension also is a risk factor for RCC for a variety of ethnic groups including African Americans and Latinos (Setiawan, Stram, Nomura, Kolonel, & Henderson, 2007).

A family history of having a first-degree relative with RCC increases a person's relative risk of developing RCC (Randi et al., 2007; Zbar et al., 2007). Genetic predispositions for RCC are found in people with tuberous sclerosis complex, von Hippel-Lindau syndrome, hereditary papillary renal carcinoma, hereditary leiomyomatosis and RCC, Birt-Hogg-Dubé syndrome, or hyperparathyroidism-jaw tumor syndrome (Pavlovich & Schmidt, 2004; Rakowski et al., 2006; Sudarshan & Linehan, 2006). These syndromes are responsible for 1%–4% of all RCCs (Pavlovich & Schmidt). A number of the genes responsible for these autosomal dominant familial or genetically associated RCC have been identified (Pavlovich & Schmidt). A significant number of RCC cases are diagnosed in people with the highest genetic risk (Hung et al., 2007).

Patients, especially younger patients, who receive long-term renal dialysis for end-stage renal disease (ESRD) are at risk for RCC, possibly related to virus exposure (Maison-neuve et al., 1999) or from renal cystic disease (Stewart et al., 2003). Approximately 1.3%–1.68% of patients on dialysis develop renal cell cancer. RCC occurs in patients on either peritoneal dialysis or hemodialysis (Kojima et al., 2006; Savaj et al., 2003). In patients who have received a renal transplant for ESRD, cancer may develop in the native kidney or in the transplanted kidney, but the incidence is much higher in the native kidney (Ianhez et al., 2007).

### Risk Factors for Testicular Cancer

Testicular cancer (TC) is a rare GU malignancy with an increasing incidence (McGlynn et al., 2003). Cryptorchidism, also known as undescended testicle, is a risk factor, and corrective surgery prior to the onset of puberty reduces the risk of malignancy (Pettersson, Richiardi, Nordenskjold, Kaijser, & Akre, 2007). Should orchiopexy not be performed prior to puberty, the cancer risk is six times higher than when an orchiopexy is performed prior to puberty (Walsh, Dall'Era, Croughan, Carroll, & Turek, 2007). Having a brother with TC increases a man's risk of disease development by nine-fold, and it increases

by four-fold when a father has a history of TC (Hemminki & Li, 2004). The presence of the TC precursor, carcinoma in situ, which develops in utero, is an important risk factor (Giwerzman, Muller, & Skakkebaek, 1991). Therefore, its identification in at-risk patients is important in risk reduction. Risk factors for CIS may include low parity of the mother, low gestational age, epilepsy, and retained placenta (Aschim, Haugen, Tretli, Daltveit, & Grotmol, 2006); however, more research is needed on these potential risk factors and other risk factors potentially found in the mother, the hormonal milieu, or the fetal development (Bridges & Hussain, 2007; Garner, Turner, Ghadirian, & Krewski, 2005). Race may be a risk factor, as Caucasians have a higher incidence than African Americans. However, the incidence of TC is increasing in African American and Hispanic men (Shah, Devesa, Zhu, & McGlynn, 2007). Age is a risk factor, as most patients present with disease when aged 25–35 (Liu, Wen, Mao, Mery, & Rouleau, 1999).

## Summary

Cigarette smoking is a major risk factor for GU malignancies, particularly playing a role in renal cell and bladder cancer. Reducing the smoking incidence would significantly affect the frequency of these two diseases. Additional cancer reductions would occur with reduced exposure to environmental toxins and pollutants in the work setting.

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