

Bladder Cancer

Bladder cancer is any of several types of cancer arising from the epithelial lining (i.e., the urothelium) of the urinary bladder. Rarely the bladder is involved by non-epithelial cancers, such as lymphoma or sarcoma, but these are not ordinarily included in the colloquial term "bladder cancer." It is a disease in which abnormal cells multiply without control in the bladder.

The most common type of bladder cancer recapitulates the normal histology of the urothelium and is known as transitional cell carcinoma or more properly urothelial cell carcinoma. Five-year survival rates in the United States are around 77%.

Bladder cancer is the 9th leading cause of cancer with 430,000 new cases[and 165,000 deaths occurring in 2012.

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Signs and symptoms

Location of bladder cancer

Bladder cancer characteristically causes blood (redness) in the urine. This blood in the urine may be visible to the naked eye (gross/macroscopic hematuria) or detectable only by microscope (microscopic hematuria). Hematuria is the most common symptom in bladder cancer. It occurs in approximately 80-90% of the patients.

Other possible symptoms include pain during urination, frequent urination, or feeling the need to urinate without being able to do so. These signs and symptoms are not specific to bladder cancer, and are also caused by non-cancerous conditions, including prostate infections, over-active bladder and cystitis. There are many other causes of hematuria, such as bladder or ureteric stones, infection, kidney disease, kidney cancers and vascular malformations.

Patients with advanced disease refer pelvic or bony pain, lower-extremity edema, or flank pain. Rarely a palpable mass can be detected on physical examination.

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Causes

Tobacco smoking is the main known contributor to urinary bladder cancer; in most populations, smoking is associated with over half of bladder cancer cases in men and one-third of cases among women, however these proportions have reduced over recent years since there are fewer smokers in Europe and North America. There is an almost linear relationship between smoking duration (in years), pack years and bladder cancer risk. A risk plateau at smoking about 15 cigarettes a day can be observed (meaning that those who smoke 15 cigarettes a day are approximately at the same risk as those smoking 30 cigarettes a day). Quitting smoking reduces the risk, however former smokers will most likely always be at a higher risk of bladder cancer compared to never smokers. Passive smoking has not been proven to be involved.

Thirty percent of bladder tumors probably result from occupational exposure in the workplace to carcinogens such as benzidine. 2-Naphthylamine, which is found in cigarette smoke, has also been shown to increase bladder cancer risk. Occupations at risk are bus drivers, rubber workers, motor mechanics, leather (including shoe) workers, blacksmiths, machine setters, and mechanics. Hairdressers are thought to be at risk as well because of their frequent exposure to permanent hair dyes.

In addition to these major risk factors there are also numerous other modifiable factors that are less strongly (i.e. 10-20% risk increase) associated with bladder cancer, for example, obesity. Although these could be considered as minor effects, risk reduction in the general population could still be achieved by reducing the prevalence of a number of smaller risk factors together.

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Prevention

A 2008 study commissioned by the World Health Organisation concluded that "specific fruit and vegetables may act to reduce the risk of bladder cancer." Fruit and yellow-orange vegetables, particularly carrots and those containing selenium, are probably associated with a moderately reduced risk of bladder cancer. Citrus fruits and cruciferous vegetables were also identified as having a possibly protective effect. However an analysis of 47,909 men in the Health Professionals Follow-Up Study showed little correlation between cancer reduction and high consumption of fruits and vegetables overall, or yellow or green leafy vegetables specifically, compared to the statistically significant reduction among those men who consumed large amounts of cruciferous vegetables.

In a 10-year study involving almost 49,000 men, researchers found that men who drank at least 1,44 L of water (around 6 cups) per day had a significantly reduced incidence of bladder cancer when compared with men who drank less. It was also found that: "the risk of bladder cancer decreased by 7% for every 240 mL of fluid added". The authors proposed that bladder cancer might partly be caused by the bladder directly contacting carcinogens that are excreted in urine, although this has not yet been confirmed in other studies.

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Diagnosis

Bladder wall thickening due to cancer

Bladder tumor in FDG PET due to the high physiological FDG-concentration in the bladder, furosemide was supplied together with 200 MBq FDG. The uptake cranial to the lesion is a physiological uptake in the colon. Cystoscopy, a procedure in which a flexible tube bearing a camera and various instruments is introduced into the bladder through the urethra allows diagnosis and by biopsying suspicious lesions.

The gold standard for diagnosing bladder cancer is biopsy obtained during cystoscopy. Sometimes it is an incidental finding during cystoscopy. Urine cytology can be obtained in voided urine or at the time of the cystoscopy ("bladder washing"). Cytology is not very sensitive (a negative result cannot reliably exclude bladder cancer). There are newer non-invasive urine bound markers available as aids in the diagnosis of bladder cancer, including human complement factor H-related protein, high-molecular-weight carcinoembryonic antigen, and nuclear matrix protein 22 (NMP22).[17] NMP22 is also available as a prescription home test. Other non-invasive urine based tests include the CertNDx Bladder Cancer Assay, which combines FGFR3 mutation detection with protein and DNA methylation markers to detect cancers across stage and grade, UroVysion, and Cxbladder.

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The diagnosis of bladder cancer can also be done with a Hexvix/Cysview guided fluorescence cystoscopy (blue light cystoscopy, Photodynamic diagnosis), as an adjunct to conventional white-light cystoscopy. This procedure improves the detection of bladder cancer and reduces the rate of early tumor recurrence, compared with white light cystoscopy alone. Cysview cystoscopy detects more cancer and reduces recurrence. Cysview is marketed in Europe under the brand name Hexvix.

However, visual detection in any form listed above, is not sufficient for establishing pathological classification, cell type or the stage of the present tumor. A so-called cold cup biopsy during an ordinary cystoscopy (rigid or flexible) will not be sufficient for pathological staging either. Hence, a visual detection needs to be followed by transurethral surgery. The procedure is called transurethral resection of bladder tumor (TURBT). Further, bimanual examination should be carried out before and after the TURBT to assess whether there is a palpable mass or if the tumour is fixed ("tethered") to the pelvic wall. The pathological classification obtained by the TURBT-procedure, is of fundamental importance for making the appropriate choice of ensuing treatment and/or follow-up routines.

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Pathological classification[edit]

Histopathology of urothelial carcinoma of the urinary bladder. Transurethral biopsy. H&E stain. 90% of bladder cancers are transitional cell carcinoma. The other 10% are squamous cell carcinoma, adenocarcinoma, sarcoma, small cell carcinoma, and secondary deposits from cancers elsewhere in the body.

Carcinoma in situ (CIS) invariably consists of cytologically high-grade tumour cells.