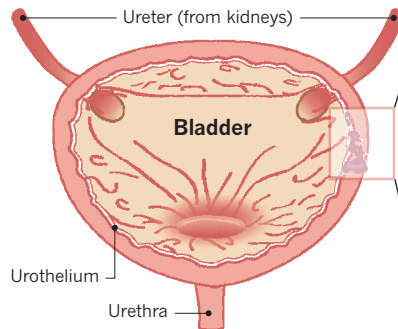


# UNLOCKING BLADDER CANCER

The diagnostics, treatment and five-year survival rates for bladder cancer are largely unchanged since the 1990s. Research into cancer genomics, risk factors and immune therapies could hold the key to progress against this malignant disease. **By Chris Berdik; infographic by Mohamed Ashour.**

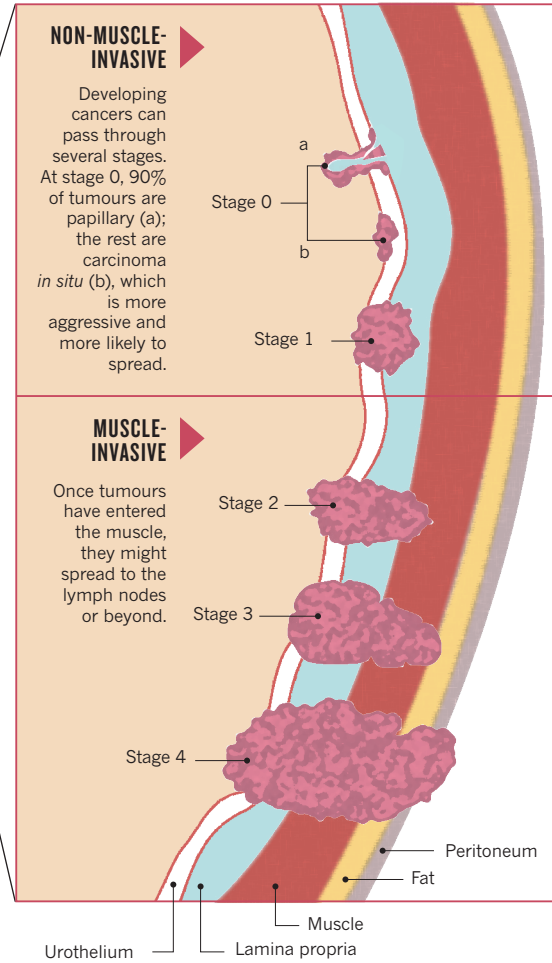
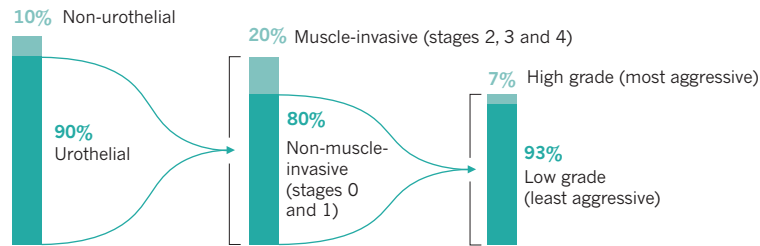
## LAYERS OF RISK

Most cases of bladder cancer occur in the cells of the bladder's innermost lining, the urothelium. In most patients, the cancer has not spread far. These 'non-muscle-invasive' tumours are easier to treat and much less lethal than tumours that have grown into the muscle wall or beyond.



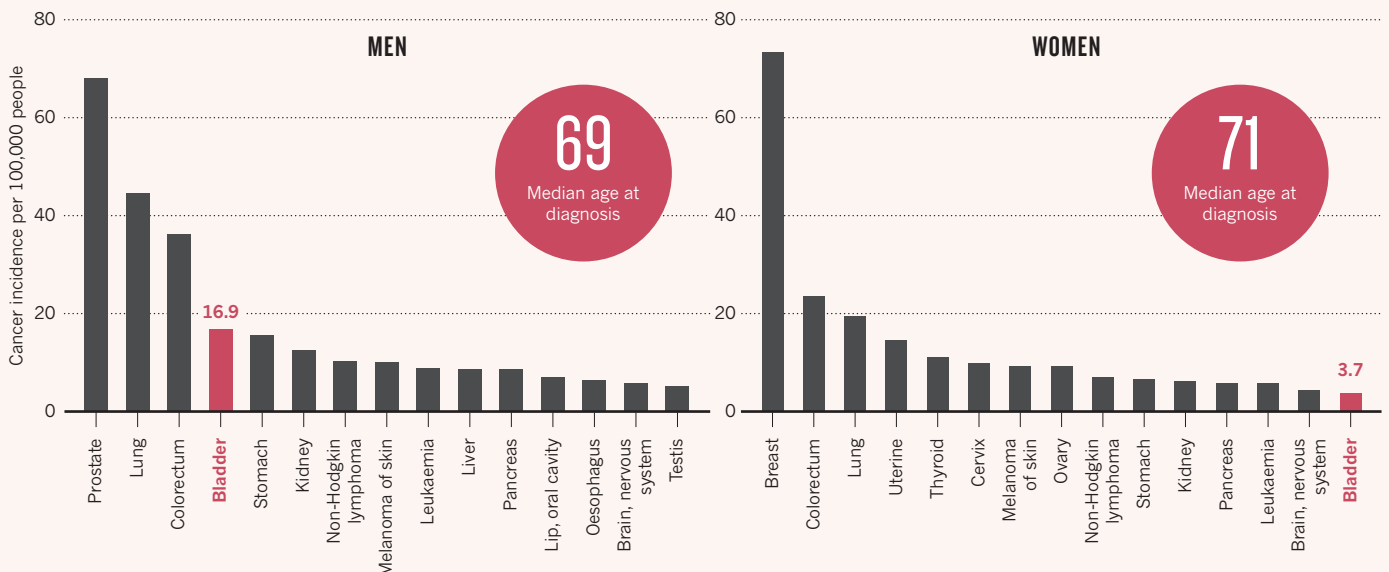
## BLADDER-CANCER DIAGNOSES

Most cases of bladder cancer are the urothelial type. The less-common types are: squamous cell carcinoma, adenocarcinoma, small-cell carcinoma, and sarcoma.



## NO COMFORT FOR OLD MEN

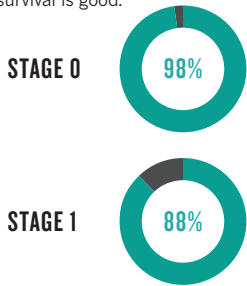
Men are about three to four times more likely than women to get bladder cancer, but women are typically diagnosed with more-advanced cancer and have a worse prognosis. Worldwide, bladder cancer is the ninth-most-common cancer and the thirteenth deadliest. But in more-developed countries (below), it poses a bigger threat than many other cancers because fewer new treatment and prevention options have been developed.



**UROTHELIAL BLADDER CANCER**

**FIVE-YEAR SURVIVAL RATES**

If caught early, long-term survival is good.



**TREATMENTS**

Doctors typically use a combination of different therapies to treat bladder cancer, depending on the size, grade and number of tumours.



**TURBT**

Transurethral resection of bladder tumour (TURBT). Non-muscle-invasive tumours are removed by a cystoscope topped with a cauterizing wire loop.



**CHEMOTHERAPY**

Can be given before or after surgery, either directly to the bladder or systemically if the cancer is invasive.



**RADIATION**

A high-energy beam is focused on the cancer from outside the body, often in combination with chemotherapy.



**IMMUNOTHERAPY**

The bacillus Calmette–Guérin (BCG) vaccine, which was originally used to prevent tuberculosis, is made with bacteria that trigger an immune response.

**STAGE 2**



**STAGE 3**



**STAGE 4**



**BLADDER REMOVAL (CYSTECTOMY)**

The bladder is replaced with either a 'neobladder' made from a piece of intestine, or diversion to an external urostomy bag.



**TRIMODALITY THERAPY (TMT)**

This combines deep TURBT with chemotherapy and radiation. Five-year survival rates are comparable to cystectomy, but up to 30% of TMT patients still need to have their bladders removed.

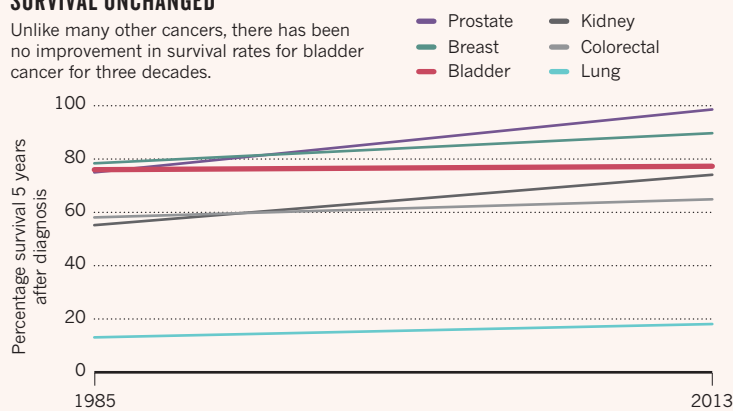
**CHECKPOINT INHIBITORS**

Five newly approved drugs called checkpoint inhibitors block the signals given by cancer cells to evade the immune response (see page S36). Currently approved only for stage 3 and stage 4 bladder cancer, they are being tested against less-advanced cancers.

**SURVIVAL AND RECURRENCE**

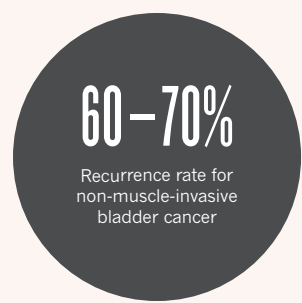
**SURVIVAL UNCHANGED**

Unlike many other cancers, there has been no improvement in survival rates for bladder cancer for three decades.



**RECURRENCE**

After surgery, people with bladder cancer should have regular cystoscopies (typically every three months for the first year or two, and then every six months) to see if the cancer returns, as well as imaging and urine tests.



**A TOXIC LEGACY**



Smoking is linked with up to 65% of bladder-cancer cases in men and about 30% in women.



Bladder infections from a parasitic water-borne flatworm called *Schistosoma* can lead to bladder cancer (see page S46).



Exposure to aromatic amines, used to process paint, rubber, dyes and petroleum products, is a risk factor.



Well water contaminated with arsenic is linked to bladder cancer.

Sources: GLOBOCAN 2012; Estimated Cancer Incidence, Mortality and Prevalence Worldwide in 2012; Ploussard, G. et al. Eur. Urol. 66, 120–137 (2014); NIH Surveillance, Epidemiology and End Results Program.