



Tackling the challenges of genomics and studies of the immune system should help to create much-needed diagnostics and treatments.

BY CHRIS BERDIK

QUESTION

WHY IT MATTERS

WHAT WE KNOW

NEXT STEPS

1

Why do more men than women get bladder cancer?

Investigating why the risk of getting bladder tumours is at least three times greater for men than for women could reveal pathways to new treatments.

Animal studies suggest that bladder cancer is promoted by testosterone and inhibited by oestrogen, although oestrogen may speed the growth of established tumours.

Hormone-therapy drugs are already being used to treat breast and prostate cancer, and clinical trials are under way to test their effect in bladder cancer too.

2

Can we develop better non-invasive methods to check for bladder cancer?

For diagnosis of bladder cancer and post-treatment monitoring, the only reliable tool is cystoscopy, which is unpleasant and expensive — and patients can require several cystoscopies each year to check for recurrence.

Blood in the urine is the most prominent symptom of bladder cancer, although it often has other causes. Urine also carries biomarkers from the tumour. So far, tests to detect these biomarkers are not accurate enough to provide a diagnosis on their own.

Newly discovered biomarkers relating to gene mutations that are common in bladder cancer could greatly improve the accuracy of urine tests to identify the cancer.

3

Can genetic research personalize the treatment of bladder cancer?

Without knowing which therapy is best suited to a particular patient, doctors often overtreat people with combinations of therapies. This approach increases the likelihood of side effects.

The Cancer Genome Atlas and other research groups have used genomics to sort bladder-cancer tumours into molecular subtypes that can predict responses to particular forms of chemotherapy and immunotherapy.

Research is under way to see if tumours have particular genetic mutations that influence their response to chemotherapy. The work will help to match bladder cancer's genetic subtypes with the best treatments, and will form the basis for targeted therapies.

4

Will checkpoint inhibitors be a breakthrough therapy for bladder cancer?

These recently approved drugs thwart a tumour's ability to protect itself from the immune system. They are the first class of bladder-cancer therapy to be developed for decades.

Since 2016, the US Food and Drug Administration has approved five checkpoint inhibitors for metastatic bladder cancer in people who did not respond to, or are ineligible for, chemotherapy. In clinical trials, the drugs shrank tumours in 15–30% of cases.

More clinical trials are needed to see if checkpoint inhibitors can be effective as a first-line cancer therapy. Researchers will also pair them with other therapies that boost the immune system to make checkpoint inhibitors effective in more people.

Chris Berdik is a science journalist based in Boston, Massachusetts.