Personalised urinary diagnostics

Well-defined clinical cohorts are needed to determine the role of urine markers in BCa.

Urine markers in the primary detection of bladder cancer

We discern four clinical entities as there are:

- Population-based screening for BC using urine markers. Personalised urinary diagnostics are needed to further determine the role of urine markers in BCa.
- Patient selection seems the most likely explanation for the discrepancies between the studies on urine markers. Considering the large number of follow-up visits, this selection criterion.
- Moreover, considering the high specificity of sensitivity, particularly for the low-grade lesions.
- Positive (percentage in whom the test is positive and the disease is absent) and/or specificity were more expensive and labor-intensive.
- Personalised urinary diagnostics
- Microsatellite analysis (MA) and FISH have a higher sensitivity and specificity but require more extensive studies for validation and are more expensive and labor-intensive.
- Recently, the first results of a multi-center, randomized prospective study became available. This study is the first to investigate the possibility of lowering the UCS frequency in a randomized fashion for low and intermediate risk NMIBC.
- The sensitivity of urine tests is defined as the percentage of patients with a positive UCS for whom the test is positive (tested positive / patients with disease at UCS), i.e. the true positives. Sensitivity is defined as the percentage of patients with a negative UCS in which the test is also negative (tested negative / no evidence of disease at UCS), i.e. the true negatives.
- Positive (percentage in whom the test is positive and the disease is present) and negative (percentage in whom the test is negative and the disease is absent) predictive values are less useful for comparison of two populations with different BC incidences because they vary by their definition.
- Conversely, sensitivity and specificity stay constant between populations with different numbers of tumour and non-tumour cases and therefore, they are more commonly used in studies.
- The first steps towards personalized urinary diagnostics is to assess the value of urine diagnostics in well-defined clinical situations.
- In conclusion, we recommend that cystoscopy (UCS), the gold standard, and urine cytology as an adjunct. In general, these tests have a higher specificity but a lower sensitivity than cytology.
- Considering the large number of follow-up visits, this selection criterion.

Urine markers in the surveillance of MIBC and NMIBC

Cytology and cytoscopy are the cornerstones of bladder cancer detection and follow-up.

For recurrent BC compared to studies which do not use this selection criterion.

If we consider the follow-up of NMI-BC, we can discern patients with low grade (G2-3) lesions from the patients with high grade (G3/G5) disease. High grade tumours should be detected early in follow-up and the percentage of tumours missed should be as low as possible. Therefore, the best surveillance strategy for these patients will continue to include both frequent UCS and cytology as an adjunct to detect “invisible” disease as discussed above.

Again specificity is more important than sensitivity in this subset of patients because the urine marker is used in parallel to UCS. On the other hand, for patients with low intermediate risk for progression, it may be acceptable to postpone the diagnosis of recurrent grade low tumours. The first target for a urine marker in this group is the reduction of the number of UCS needed for follow-up by lowering the frequency of UCS with a urine test. Using such an approach, sensitivity and specificity of a urine marker are both important because a low sensitivity will eventually miss too many tumours and a low specificity may lead to unnecessary invasive procedures to rule out upper urinary tract cancer.

The sensitivity of cytology is too low for this purpose.

However, what is the best alternative is difficult to answer as the available urine markers have their advantages and disadvantages. For example, some markers have been investigated in many patients and/or give instant test results (BTA stat, uCyt+, ImmunoCyt and FISH (UroVysion)) have been approved by the FDA. In general, these tests have a higher sensitivity but a lower specificity than cytology.

For the urorological practice, in terms of cost-reduction and convenience of our patients, particularly markers to detect recurrent disease would be useful. However, urine cytology is hampered by operator dependency and a low sensitivity, particularly for the low-grade lesions. Therefore, many urine-based tests for BC have been developed.

Among others, Blaatak, NMP22, uCyt+, ImmunoCyt and FISH (UroVysion) have been approved by the FDA. In general, these tests have a higher specificity but a lower sensitivity than cytology.

Examples of white and fluorescent blue light cystoscopy

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