

Bladder cancer

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Supplementary Information

Supplementary Table 1 | Emerging advanced cystoscopy technologies

Technology	Characteristics	Evidence
Narrow band imaging (NBI)	Filters white light into blue light and green light which differentially penetrate the mucosa	In a randomised study comparing between NBI-assisted and WLI-assisted transurethral resection of bladder tumour (TURBT), 12-month recurrence were similar between the two groups (27.1% in the WLI group versus 25.4% in the NBI group) ¹ . In patients with low-risk non-muscle-invasive bladder cancer (NMIBC), the NBI group was found to have lower recurrence rates than the WLI group at 3 months (0% versus 15.1%, $p=0.006$) and 12 months (5.6% versus 27.3%, $p=0.002$) ¹ .
Photodynamic diagnosis (PDD)	Intravesical instillation of 5-aminolaevulinic acid (ALA) or hexaminolevulinate acid (HLA), followed by visualization using blue-violet light. The intravesical instillation of ALA or HLA leads to accumulation of protoporphyrin IX in bladder cancer cells, which emits fluorescence upon blue-violet illumination (380-440nm)	In a meta-analysis of 14 randomised trials ² , the use of PDD was associated with a reduced risk of bladder cancer recurrence at 3 months (RR 0.59, 95% CI 0.40-0.88), 3-12 months (RR 0.70, 95% CI 0.56-0.88) and 12 months (RR 0.81, 95% CI 0.70-0.93). In a network meta-analysis of 22 studies ³ , PDD-assisted TURBT and NBI-assisted TURBT were found to be better strategies over WLI-assisted TURBT in preventing 12-month recurrence rate.
Image 1S	Software platform that can produce images with different contrast specifications and enhance the differentiation between normal and abnormal tissues	In a randomised study comparing between Image 1S-assisted TURBT and WLI-assisted TURBT, 18-month recurrence were similar between the two groups (31.0% in the WLI group versus 25.4% in the Image 1S group) ⁴ . However, in patients with primary, low- / intermediate-risk NMIBC, the Image 1S group had a lower 18-month recurrence rate than the WLI group (22.3% vs 31.9%, $p=0.035$) ⁴ .

References

1. Naito, S. *et al.* The Clinical Research Office of the Endourological Society (CROES) Multicentre Randomised Trial of Narrow Band Imaging-Assisted Transurethral Resection of Bladder Tumour (TURBT) Versus Conventional White Light Imaging-Assisted TURBT in Primary Non-Muscle-invasive Bladder Cancer Patients: Trial Protocol and 1-year Results. *Eur. Urol.* **70**, 506–515 (2016).
2. Chou, R. *et al.* Comparative Effectiveness of Fluorescent Versus White Light Cystoscopy for Initial Diagnosis or Surveillance of Bladder Cancer on Clinical Outcomes: Systematic Review and Meta-Analysis. *J. Urol.* **197**, 548–558 (2017).
3. Sari Motlagh, R. *et al.* Impact of enhanced optical techniques at time of transurethral resection of bladder tumour, with or without single immediate intravesical chemotherapy, on recurrence rate of non-muscle-invasive bladder cancer: a systematic review and network meta-analysis of randomized trials. *BJU Int.* **128**, 280–289 (2021).
4. Lam, K. N. *et al.* Phage-delivered CRISPR-Cas9 for strain-specific depletion and genomic deletions in the gut microbiome. *Cell Rep.* **37**, 109930 (2021).