



<b>Title</b>	<b>Diagnostic Tests and Algorithms Used in the Investigation of Hematuria: Systematic Reviews and Economic Evaluation</b>
<b>Agency</b>	NCCHTA, National Coordinating Centre for Health Technology Assessment Mailpoint 728, Boldrewood, University of Southampton, Southampton SO16 7PX, United Kingdom; Tel: +44 2380 595586, Fax: +44 2380 595639
<b>Reference</b>	Health Technol Assess 2006;10(18). June 2006. <a href="http://www.hta.ac.uk/execsumm/summ1018.htm">www.hta.ac.uk/execsumm/summ1018.htm</a>

## Aim

To determine most effective diagnostic strategy to investigate microscopic and macroscopic hematuria in adults.

## Conclusions and results

No studies of effectiveness of diagnostic tests or algorithms were identified.

Diagnostic accuracy studies: *Detection of hematuria*; 18 studies evaluated dipsticks. These are moderately useful in detecting, but cannot be used to rule-out, hematuria. *Hematuria as a test for the presence of a disease*; 6 studies indicated that detection of microhematuria alone is not useful either to rule-in or rule-out underlying pathology. *Further investigation to establish the underlying cause of hematuria*; 48 studies addressed localization of bleeding to a glomerular or non-glomerular source.

Our model for detecting hematuria found that immediate microscopy following a positive dipstick improved diagnostic efficiency. Modeling upper tract imaging indicated that ultrasound (U/S) detects more tumors than IVU at one-third cost and fewer false results. For any cause, CT had a mean incremental cost-effectiveness ratio of 9939 British pounds (GBP) compared to U/S. U/S followed by CT (negative results and persistent hematuria) dominates CT alone (saving of GBP 235 000 for 1000 patients). Immediate cystoscopy could be avoided in some patients undergoing lower tract investigations by using tumor markers/cytology, with cystoscopy for followup patients with persistent hematuria, saving GBP 491 000. Except for imaging strategies, the results were generally robust to sensitivity analyses. Delayed detection was not evaluated.

## Recommendations

The data are insufficient to derive an evidence-based algorithm of the diagnostic pathway for hematuria. An algorithm based on opinion and practice of clinical experts in review teams, other published algorithms, and results of economic modeling, is presented. The ideas

contained in this algorithm and specific questions outlined should form the basis of future research.

## Methods

This systematic review followed published guidelines. Decision analytic modeling was undertaken. Studies were identified through searches of electronic databases and handsearching. Two reviewers independently screened titles/abstracts for relevance. Relevant papers were assessed by one reviewer and checked by a second. Published and unpublished studies in any language were eligible. Separate inclusion criteria were derived for each objective, and data were extracted using standardized forms. A second reviewer checked diagnostic accuracy studies. Quality was evaluated using published checklists and criteria. Results were analyzed according to test grouping and clinical aim of studies. (See full report for detailed description of the analysis.)

## Further research/reviews required

Future studies should follow the STARD guidelines for reporting of diagnostic accuracy studies. Questions for future research include: Is screening for hematuria effective? Is investigation of the cause of hematuria effective? Which patients with asymptomatic macrohematuria need full investigation? Is there a subset of patients who require fewer or no further investigations? (See full report for other questions.) Areas where further research may be useful are: accuracy of dipstick tests in detecting hematuria; factors that affect the performance of urine cytology; diagnostic accuracy of tumor markers; and the cumulative diagnostic effect of imaging studies.