Accuracy of monoclonal stool antigen test for the diagnosis of H. pylori infection: a systematic review and meta-analysis

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CRD summary
This review found that the monoclonal stool antigen test (SAT) can accurately diagnose infection with Helicobacter pylori in patients with an initial infection and in those seeking confirmation of eradication following treatment, and that it is more accurate than polyclonal SAT. The review was generally well-conducted and these findings are likely to be reliable, although their generalisability remains unclear.

Authors' objectives
To determine the accuracy of the monoclonal stool antigen test (SAT) for the diagnosis of Helicobacter pylori (H. pylori) infection.

Searching
MEDLINE and EMBASE were searched from inception to November 2005, in addition to the Cochrane Library (Issue 4, 2005). The search terms, which did not include a diagnostic filter, were reported. Relevant conference abstracts, review articles and bibliographies of included studies were screened for additional studies. Unpublished studies and articles published in any language except Japanese were eligible for inclusion.

Study selection
Study designs of evaluations included in the review
Inclusion criteria were not defined in terms of the study design. Details of the designs of the included studies were not provided.

Specific interventions included in the review
Studies that evaluated the monoclonal SAT for the diagnosis of H. pylori infection were eligible for inclusion. Studies that used 'in-office' or 'rapid' stool tests were excluded.

Reference standard test against which the new test was compared
Studies had to use at least one independent diagnostic method to determine the true status of H. pylori infection to be included in the review. The specific reference standards used in the included studies were rapid urease test, histology, culture, urea breath test and serology, either alone or in combination.

Participants included in the review
Inclusion criteria were not defined in terms of the participants, although studies of patients with specific conditions such as end-stage renal disease, cirrhosis or partial gastrectomy were excluded. Studies of both adults and children were included.

Outcomes assessed in the review
Inclusion criteria were not defined in terms of the outcomes, but it appears that studies had to report sufficient data to construct a 2x2 table of test performance. The outcomes reported in the review were the sensitivity, specificity, and positive and negative likelihood ratios (LR+ and LR-, respectively).

How were decisions on the relevance of primary studies made?
The authors did not state how the papers were selected for the review, or how many reviewers performed the selection.

Assessment of study quality
Studies were assessed for methodological quality using the Quality Assessment of Diagnostic Accuracy Studies (QUADAS) criteria. Two reviewers independently performed the quality assessment; any disagreements were resolved through consensus.
Data extraction
Two reviewers independently extracted the data onto a standardised form; any disagreements were resolved through consensus. Data on accuracy were extracted as 2x2 tables of test performance for monoclonal SAT. Similar data were also extracted for polyclonal SAT when studies also evaluated this test. Where possible, data were extracted using the manufacturer’s recommended threshold to define a positive test result. Sensitivity, specificity, and LR+ and LR- were calculated, together with their 95% confidence intervals (CIs), for each study. Where cells of the 2x2 table contained 0, a value of 0.5 was added to all cells of that table to enable the calculation of LRs.

Methods of synthesis

How were the studies combined?
Sensitivity and specificity values were pooled; the methods used were not reported. Pooled LRs were estimated using the DerSimonian and Laird random-effects model. A threshold effect for the relationship between sensitivity and specificity was assessed using the Spearman test. Since no evidence of a correlation was found, a summary receiver operating characteristic curve analysis was not conducted. The accuracy of monoclonal and polyclonal tests was compared amongst studies that assessed both tests.

How were differences between studies investigated?
Heterogeneity was assessed using forest plots and the chi-squared (significance level p<0.10) and I-squared (I2) statistics. The performance of SAT was estimated separately in patients who had been tested to confirm eradication of H. pylori and in untreated patients. Subgroup analysis was conducted to investigate the effects of reference standard (one method versus at least two methods), population (adults versus children) and post-eradication setting. Meta-regression analysis was carried out to evaluate the association between each QUADAS item and the diagnostic odds ratio.

Results of the review
Twenty-six studies were included in the review.

H. pylori SAT for the diagnosis of infection before therapy (22 studies, 2,499 patients).

The mean prevalence of H. pylori infection was 62% (range: 28 to 100). The sensitivity ranged from 68 to 99%; the pooled sensitivity was 94% (95% CI: 93, 95). There was evidence of heterogeneity (p<0.001; I2=61%). Heterogeneity disappeared when one outlying study was removed (I2=13%). The specificity ranged from 76 to 100%; the pooled specificity was 97% (95% CI: 96, 98). There was evidence of heterogeneity (p<0.001; I2=58%). Heterogeneity also disappeared with the removal of a single outlying study (different study from the outlier for sensitivity) (I2=39%). None of the subgroup analyses found any significant effects. Thirteen studies evaluated both the monoclonal and polyclonal SAT. The pooled sensitivity was lower for the monoclonal SAT, whereas the pooled specificity was similar.

H. pylori SAT for the confirmation of eradication after therapy (12 studies, 957 patients).

The mean prevalence of H. pylori infection was 20% (range: 0 to 32). The sensitivity ranged from 88 to 100%; the pooled sensitivity was 93% (95% CI: 89, 96). There was no evidence of heterogeneity (I2=33%). The specificity ranged from 88 to 100%; the pooled specificity was 96% (95% CI: 94, 97). There was no evidence of heterogeneity (I2=21%). None of the subgroup analyses found any significant effects. Eight studies evaluated both the monoclonal and polyclonal SAT. The pooled sensitivity was lower for the monoclonal SAT, whereas the pooled specificity was similar.

Authors’ conclusions
This review found that the monoclonal SAT can accurately diagnose H. pylori infection, both in patients with an initial infection and in those seeking confirmation of eradication following treatment. The review also found that it is more accurate than polyclonal SAT, especially in the post-treatment setting.

CRD commentary
The review addressed a focused objective but inclusion criteria were only defined in terms of the index test and reference standard. The literature search was adequate and included some attempts to locate grey literature. A detailed
quality assessment was conducted using appropriate criteria, and the results of this were reported in full and considered in the analysis. Steps were taken to minimise bias and errors in the quality assessment and data extraction processes, but it is unclear whether such steps were also taken at the study selection stage. Some study details were tabulated but further details, especially of the index test, population and study design, would have helped to assess the generalisability of the review findings. The methods used to synthesise the studies were adequate, although the use of more statistically robust methods such as the bivariate/HSROC methods would have been preferable. Two studies were found to be responsible for much of the observed heterogeneity but possible reasons for these outlying results were not investigated. The authors' conclusions are supported by the results presented and are likely to be reliable, although their generalisability remains unclear.

Implications of the review for practice and research
The authors did not state any implications for practice or research.

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This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.