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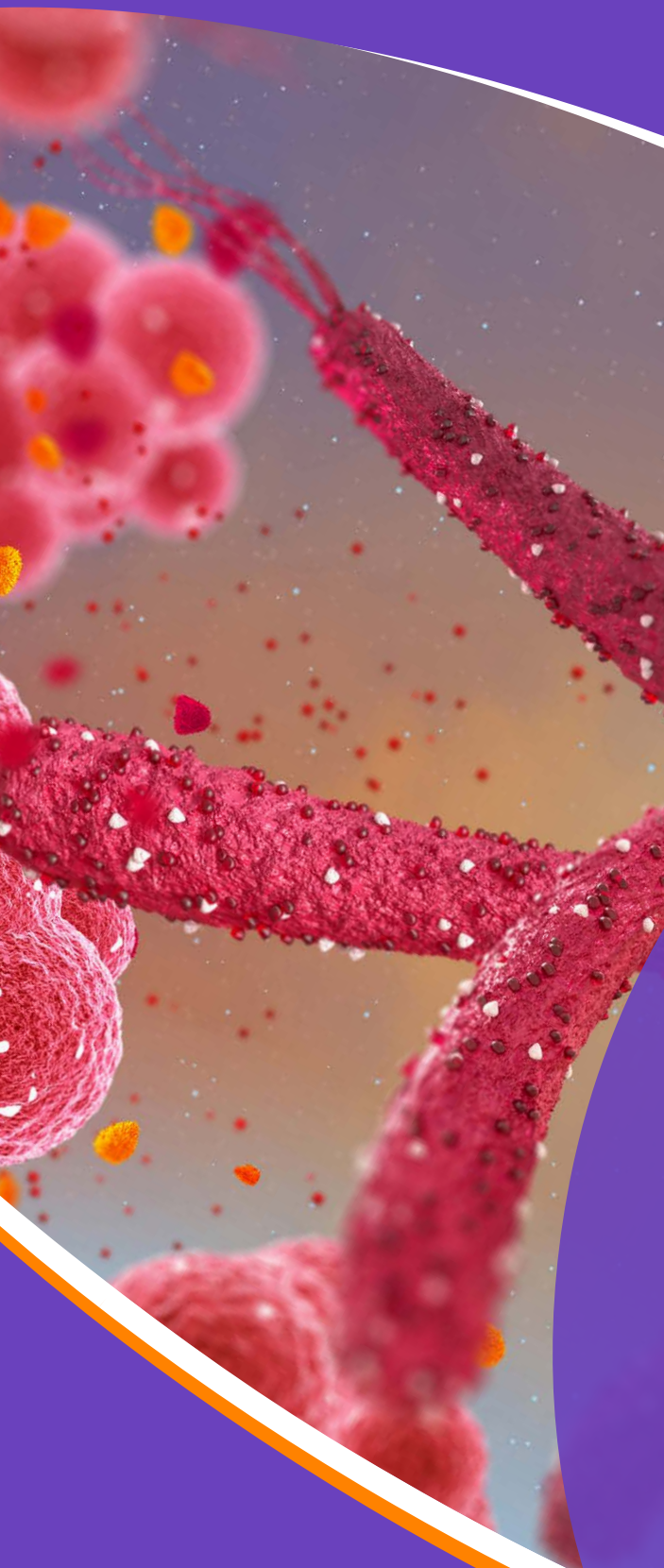

Diagnosing *Helicobacter pylori*

A clinical guide to urea breath testing and alternative methods

Helicobacter pylori (*H. pylori*)

H. pylori is a Gram-negative bacillus that is found as a natural coloniser of the human gastric mucosa in about 50% of adults worldwide. *H pylori* was first identified in Australia by Marshall and Warren in 1983, who established the association with gastric and duodenal ulcers.[1] More than 80% of duodenal ulcers and more than 60% of gastric ulcers (see Figure 1) are associated with *H. pylori*, as well as some cancers of the stomach.

> ***"More than 80% of duodenal ulcers and more than 60% of gastric ulcers are associated with H. pylori."***

Most infections are acquired during early childhood, postulated to be due to transmission from close family members by oral-oral or faecal-oral routes.[2] In Australia, 25 to 30% of the population is infected, with the prevalence increasing with age. Acute infection may be asymptomatic or associated with mild dyspeptic symptoms. Acquisition of infection in adulthood is uncommon. Once acquired, the infection usually persists, resulting in chronic gastritis with the potential to cause gastroduodenal complications, including peptic ulcer disease, gastric atrophy, and intestinal metaplasia, as well as increasing the risk of gastric cancer and gastric mucosa-associated lymphoid tissue (MALT) lymphoma.

H. pylori may also be associated with iron and/or vitamin B12 deficiency due to reduced absorption caused by gastric atrophy and hypochlorhydria induced by chronic infection.

In adults, once *H. pylori* is diagnosed, eradication treatment is recommended.

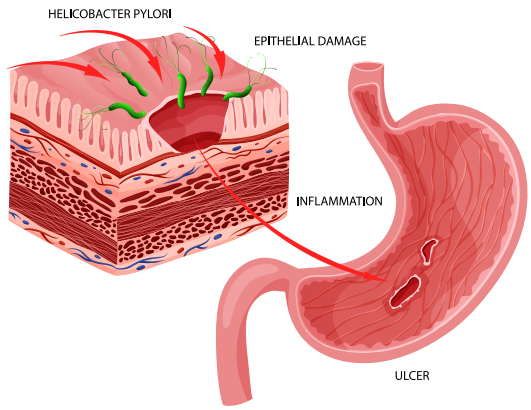

Figure 1. Gastric ulcer caused by H.pylori infection.

Diagnosis of *H. pylori*

The choice of test used to diagnose *H. pylori* is dependent on whether the patient requires an endoscopy to evaluate their symptoms. If an endoscopy is not required on the basis of clinical presentation, non-invasive tests for *H. pylori* are recommended.

Non-invasive tests are also useful where there is a potential false negative test during endoscopy (due to use of certain medications or active peptic ulcer bleeding) and for follow-up to confirm successful eradication after treatment.

Indications for testing (adults)[3,4]

- Established peptic ulcer disease
- Non-ulcer dyspepsia
- Monitoring the success of eradication of *H. pylori* after treatment
- Prior to chronic treatment with nonsteroidal anti-inflammatory drugs (NSAIDs) or low-dose aspirin
- Unexplained iron deficiency anaemia (after investigation for other causes)

In children, testing is generally only recommended where there is established peptic ulcer disease or during endoscopy if treatment is intended. Such patients should be under specialist care.

Urea breath testing for *H. pylori*

The urea breath test is an accurate, non-invasive way to diagnose active *H. pylori* infection.

The test relies on the fact that *H. pylori* produces bacterial urease, which hydrolyses urea to produce CO_2 and ammonia. This helps to neutralise gastric acid and allows *H. pylori* to survive in the gastric environment.

In the ^{14}C Urea Breath Test, a capsule containing ^{14}C-labelled urea is given by mouth, and 10 minutes later, exhaled breath is collected into a balloon. If *H. pylori* is present, $^{14}CO_2$ will be produced, and this can be detected in the breath sample. If *H. pylori* is not present, the labelled urea will not be broken down, and the breath will not contain $^{14}CO_2$.

Is the test safe?

^{14}C is a naturally occurring radioactive form of carbon, present in very small amounts in all living things, with the more common form being ^{12}C. The dose of radiation in the ^{14}C Urea Breath Test is approximately equivalent to one day of background radiation exposure, far less than a standard X-ray.[5]

However, as studies have not been performed to determine safety in pregnancy, breastfeeding, and for children under 12 years, testing is not routinely performed in these groups. A stool antigen test is available as an alternative when testing for *H. pylori* is indicated.

Patient preparation

The patient will need to fast for a minimum of 6 hours before the test. The following medications should be discontinued before the test to prevent false negative results.

Medication	Exclusion period
Antibiotics and bismuth containing products	4 weeks
Sucralfate	2 weeks
Proton Pump Inhibitors	7 days
Antacids and H2 Antagonists	No exclusion period, other than during fasting and during the test

Testing to confirm eradication following treatment should be performed at least 4 weeks following completion of treatment.

Alternative tests

Invasive tests

Invasive tests require upper endoscopy to obtain gastric tissue biopsies, which can be used for bacterial culture, susceptibility testing, and histopathology. The main limitation of these methods is their invasiveness and the ability to analyse only a small part of the gastric mucosa.[6] These tests are of value in the management of recurrent infection and in patients who are failing therapy, where specialist consultation is required.

Non-invasive tests

In addition to the urea breath test, non-invasive tests include serology and stool antigen tests. These tests provide high reliability in the detection of *H. pylori* due to their high sensitivity and specificity (Table 1). However, all of these methods have limitations, and the selection of test will depend on the clinical circumstances. Only the urea breath test and stool antigen test identify active infection.

The Stool Antigen Test (SAT) is based on the direct identification of *H. pylori* in stool samples. SAT is recommended for both the primary diagnosis of *H. pylori* infection and for the monitoring of therapy effectiveness. The test is non-invasive, quick, and easy to use, with a sensitivity of 95% and specificity of 97%. It is suitable for the diagnosis of *H. pylori* in children.

Serology: Antibodies to *H. pylori* appear in the blood 3 to 4 weeks after infection and may be present for life. Serologic tests are widely available to diagnose *H. pylori*. They are non-invasive, rapid, and can be used in screening populations. However, there are a number of limitations. Serology may be positive due to the presence of an active infection at the time of the test, a previous infection, or non-specific cross-reactive antibodies. The results must therefore be interpreted within the context of the clinical illness. Antibodies do not decline following treatment, so the test is of no value in monitoring therapy.

Table 1: Accuracy of *H. pylori* diagnostic methods[6]

Specimen type	Sensitivity (%)	Specificity (%)
Non-invasive tests		
Urea Breath Test	96-100	93-100
Stool Antigen Test	95	97
Serology	76-84	79-80
Invasive (requires Endoscopy)		
Rapid Urease Test	85-95	95-100
Histology	91-93	100
Culture	76-90	100

Requesting the ^{14}C Urea Breath Test with Clinical Labs

How to order: Request 'Urea Breath Test' on a Clinical Labs General Pathology Request Form.

Follow-up testing: Testing to confirm eradication following treatment should be performed at least 4 weeks following completion of treatment.

Cost: The Urea Breath Test is bulk-billed subject to Medicare criteria, which includes both confirmation of *H. pylori* colonisation and monitoring of successful eradication.

Alternative non-invasive tests (for pregnancy, breastfeeding and children):

- The Stool Antigen Test (SAT) – Specify 'Stool Antigen Test (SAT)' on the request form.
- Serology – Specify 'Serology for H. pylori' on the request form.

References

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