



# HELICOBACTER PYLORI: UPDATE

MARCH 2007

# insight

■ The role of *Helicobacter Pylori* (HP) in gastric ulcers has been well established by Nobel Prize winners Professor Barry Marshall and Dr Robin Warren.

■ The Medical Benefits Schedule changed in November 2006 to rebate diagnostic breath testing for HP.

■ The PyTest® has several advantages over other tests for HP and is now available through Melbourne Pathology.

Australian researchers Professor Barry Marshall and Dr Robin Warren were awarded the Nobel Prize in medicine in 2005 for their groundbreaking achievement in 1981 of identifying the bacteria *Helicobacter Pylori* as the causative organism for 70 to 90 per cent of gastric and duodenal ulcers.

*Helicobacter Pylori* (HP) is also found in 80 per cent of patients with gastric cancer and mucosal-associated lymphoid tumours, and has been classified as a carcinogen for these cancers. Ongoing research continues as to its relationship with cancer and whether eradication therapy in the asymptomatic patient may prevent gastric cancer.

HP is a gram-negative bacteria that has evolved to inhabit the hostile environment of the human stomach. A spiral/helical shape and specialised motility allow the organism to swim in a corkscrew-like fashion through the viscous gastric mucous down to the gastric mucosa. It resists the effect of gastric acidity by breaking down the endogenous urea via the activity of the enzyme urease, creating a protective cloud of alkaline ammonia.

## Epidemiology of *Helicobacter Pylori*

Up to 40 per cent of Australians are colonised by HP. In some ethnic groups, over 50 per cent may be colonised (eg some South East Asian groups).

HP is most commonly spread by direct faecal oral transmission, often within family groups. Toddlers often acquire HP from their mother due to shared eating habits. Acquisition later in life is often through hygiene factors. For example, HP is often found under the fingernails and in the mouth, particularly in

conditions of overcrowding, hygiene and questionable water supply. The bacteria may be spread to food via flies and cockroach excreta, although spread by flies is less likely. Interestingly there is a high prevalence of HP in sheep's milk and this may have been where homo-sapiens first acquired the infection. Surprisingly it does not survive in yoghurt.

## Disease associations

HP can adhere to the gastric epithelium via specific adhesion molecules, then bacterial enzymes and cytotoxins can cause structural damage and induce an inflammatory response.

Aspirin and other NSAID side effects are more likely in the presence of HP infection. All patients with dyspepsia should be considered as possibly having the infection through its causal association with gastritis. There is an association with morning sickness in pregnancy and this is important to consider prenatally.

First-line triple therapies include metronidazole, clarithromycin and a proton pump inhibitor. Other therapies exist for the 25 per cent of patients where first-line therapy fails to clear the infection (90 per cent of patients with failed therapy have resistance to metronidazole and clarithromycin). Recent work in microbiology at Melbourne Pathology showed amoxicillin and tetracyclines remain useful agents. The role of re-infection is still being determined.

Monitoring of patients to ensure bacterial eradication, is associated with symptomatic improvement in chronic inflammation.

## PyTest®

### THE UREA BREATH TEST FOR HELICOBACTER PYLORI

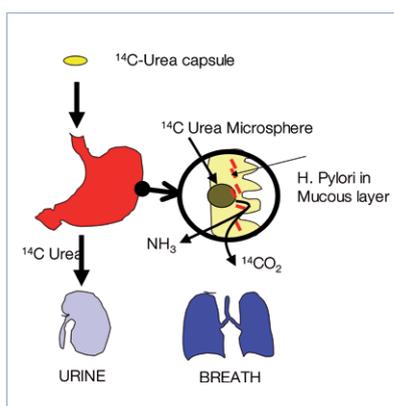
The urea breath test was pioneered by Professor Barry Marshall in 1988. He has since fine-tuned the test and PyTest® is now the only breath test accredited in Australia (TGA), USA (FDA) and Canada (Health Canada).

#### Features of the PyTest®

- Requires only a six-hour fast
- No baseline breath sample required
- Least invasive test for HP
- Collection procedure takes less than 20 minutes
- Some medications must be avoided prior to test (see table)
- It is acceptable for patients to take medication for other conditions and to have breakfast as the test can be performed in the afternoon after the fasting period.
- Medicare-rebatable for both diagnostic testing and eradication purposes (one month after treatment is completed) from 1 November 2006.

#### The PyTest® procedure

The PyTest® has a specially designed gelatine capsule containing maize starch microspheres impregnated by <sup>14</sup>C urea. The radioactivity involved is tiny; we are all exposed to twice that amount of radiation through our normal environment each day.



The capsule is swallowed with 20mL of water. Three minutes is allowed then 20mL more water is swallowed to ensure the capsule is not lodged in the oesophagus. After seven minutes, the breath sample is taken into a balloon.

The microspheres are released within two minutes of entering the stomach and can easily penetrate the mucosal layer, allowing the test to operate reliably within 10 minutes. Tablets used in other tests take too long to dissolve and urea solutions don't penetrate the mucosal layer. Because urease is denatured at pH<5, it is only found in the lower levels of the mucous layer. Urea is then broken down to ammonia and bicarbonate. The bicarbonate freely diffuses into the

body and is converted by the respiratory system to carbon dioxide (CO<sub>2</sub>).

#### Medications to avoid during the PyTest®.

PERIOD	CATEGORY	MEDICATION
6 hours	Antacids	Mylanta, Gaviscon
	H <sub>2</sub> Antagonists	Tagamet, Zantac
7 days	Proton Pump Inhibitors	Zoton, Losec, Somac, Nexium
14 days	Cytoprotectives	Sucralfate
30 days	Antibiotics	Flagyl, Amoxil, Klacid, Rulide, Tetracyclines.

#### Serological tests

IgG and IgA serology is not useful for monitoring eradication or acute infection. IgG tends to persist for many years after infection and cannot be used as a measure of active disease. Serology may not detect all strains of HP due to varying immune responses.

#### Other tests

Faecal HP antigen testing offers some advantage in patients unable to withhold medications, or in young children living in a household where someone has HP infection. Samples need to be fresh as levels can be low.

Gastroscopy and biopsy can show inflammation and the bacteria using special stains. Two antral biopsies are generally recommended and the test has a 95 per cent sensitivity and specificity.

The 'rapid urease test' involves inoculation of gastroscopy samples into a medium where pH indicators change colour due to released ammonia. The test can give a result within 20 minutes.

In patients for whom repeated therapy has failed, highly sensitive culture on mucosal biopsy can be used. The culture takes seven days.



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Dr Zhong is a Chemical Pathologist at Melbourne Pathology and also works at Austin Health. She graduated from the Guangzhou Medical College in China then moved to Melbourne to study a Master of Human Nutrition at Deakin University. She completed a PhD in Epidemiology and Preventive Medicine at Monash University in 2001.

#### For further information, please contact one of our Specialist Pathologists:

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