



C¹⁴ Urea breath testing for *Helicobacter pylori* in general practice

What is a C¹⁴ Urea breath test and how does it work?

Helicobacter pylori (the major cause of gastric and duodenal ulcers) is a fastidious bacterium which is known to be a potent producer of the enzyme urease. Urease splits urea to hydrogen and ammonia which raises the pH of the environment surrounding the organism and allows it to survive in the acidic environment of the stomach. The C¹⁴ Urea breath test works on the principle that a capsule containing radioactive C¹⁴ labelled urea, when ingested by a fasting patient, will be broken down by the organism (if present). The C¹⁴ Urea is broken down by the bacteria to HC¹⁴O₃ which is later transported to and excreted by the lungs as C¹⁴O₂. This can be readily measured in the laboratory.

What Medications can interfere with the test?

Other organisms may produce the urease enzyme and can give a false positive reading. Usually these other organisms do not survive in the acidic environment of the stomach. Urease producing bacteria do however live in the mouth and so it is important that during the test the capsule be swallowed and not chewed. Prior use of a range of medications (see Table 1) can interfere with the test, either by partially suppressing *H.pylori* growth (rendering the test falsely negative) or by reducing gastric acidity (proton pump inhibitors) which can enhance the growth of other organisms that produce urease (resulting in false positive tests). It is therefore important that patients carefully follow the medication restrictions, outlined in Table 1, before undergoing the test.

What does a positive C¹⁴ Urea breath test tell you about your patient's symptoms?

It is important to remember that a positive C¹⁴ Urea breath test simply tells you that the patient is actively infected with *H.pylori*. Clinical interpretation is still very important as not all patients that are actively infected with *H.pylori* will have symptoms that can be attributed to the infection. Gastro-oesophageal reflux is a common example of this, and is usually unrelated to *H.pylori* infection.

How does C¹⁴ Urea breath test differ from *H.pylori* serology?

The major difference between *H.pylori* serology and a C¹⁴ breath test is that a true positive C¹⁴ Urea breath test tells you that the patient is actively infected with *H.pylori*. *H.pylori* serology cannot reliably distinguish between past or present infection and will also not reliably tell you whether or not you have achieved eradication of the organism. This is because even after successful treatment, serology may remain positive for 6 months or longer. A C¹⁴ Urea breath test may demonstrate eradication just 4-6 weeks post treatment.

Performing C¹⁴ Urea Breath test



Fig. 1 (left) Patient swallowing capsule



Fig. 2 (below) Patient blowing into foil balloon

Are there safety concerns about C¹⁴ Urea breath testing?

An issue that is frequently raised is the dose of radiation from C¹⁴ Urea breath testing. Placed in perspective, the dose of radiation received during the test is equivalent to only three microsieverts (this is one tenth the dose of a plain Chest X-ray and equivalent to half the normal daily background exposure to radiation for everyday living).



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Table 1.

Type	Name			Exclusion period		
Antacids	ALU-TAB	Gastrogel	Mylanta Original	Fasting period and during test		
	Algicon	Gaviscon	Rennie			
	Amphojel	Gelusil	Rennie Digestif			
	Andrews Tums Antacid	Medeform 2	Salvital			
	Antassa	Meracote	Sigma Liquid antacid			
	De Witts Antacid Powder	Mucaine 2 in 1	Simenco			
	Dexsal Antacid Liquid	Mucaine Suspension	Titralac			
	Dexsal Granules	Mylanta Double Strength	Titralac SIL			
	Eno	Mylanta Heartburn Relief				
	Antibiotics**	Multiactives	Clamoxyl		Tetracycline	For 30 days prior to test
Flagyl		Clavulin	Achromycin			
Flagisyn		Moxacin	Helidac			
Helidac		Ampicillin	Doxycycline			
Losec HP7		Alphacin	Doryx			
Amoxycillins		Austrapen	Doxsig			
Alphamox		Ampicin	Doxy			
Amoxil		Erythromycin	Doxylin			
Amoxoheal		EES	Doxyheal			
Augmentin		E-mycin	Vibramycin			
Bgramin		Eryc	Minocycline			
Cilamox		Erythrocin	Akamin			
Bismuth		De-nol	Helidac		For 30 days prior to test	
Cytoprotectives		Carafate	Sucralfate	SCF Ulcyte	For 30 days prior to test	
H2 Antagonists	Amfamox (famotidine)	Pepcid (famotidine)	SBPA Ranitidine	Fasting period and during test		
	Ausran	Pepcidine (famotidine)	Sigmatidine			
	Cimehexal (cimetidine)	Rani 2	Sigmatidine			
	Cimetidine	Ranihexal	Tagamet			
	Cimetax	Ranitidine	Tazac (nizatidine)			
	DBL Ranitidine	Ranoxyl	WL-cimetidine			
	Magicul (cimetidine)	SBPA Cimetidine	Zantac (ranitidine)			
			Zantac Relief			
Proton Pump Inhibitors	Acimax	Maxor	Rabeprazole	For 7 days prior to test		
	Esomeprazole	Nexium	Somac			
	Lansoprazole	Omeprazole	Somac Injection			
	Losec Tablets	Pantoprazole	Zoton			
	Losec Intravenous	Pariet				

** NB: All antibiotics except Vancomycin and Sulfa drugs (Bactrim etc) be withheld for 4 weeks for maximal accuracy





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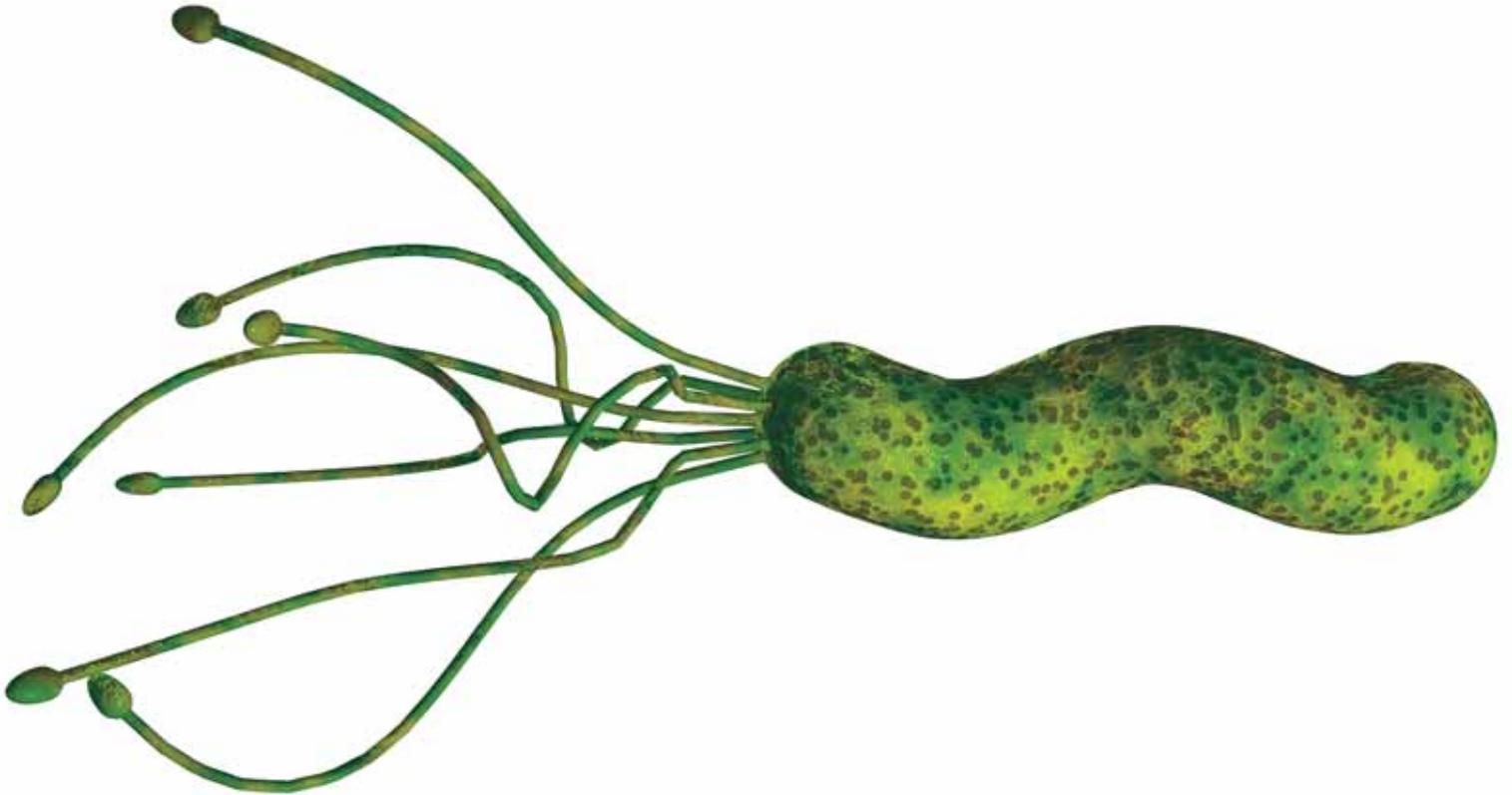


Fig. 1 *Helicobacter pylori* (*H.pylori* image courtesy of www.hpylori.com.au)

What are the indications for the C¹⁴ Urea breath test?

Medicare Australia has recently changed the rules for the C¹⁴ Urea breath testing rebate. Testing is now at the discretion of the ordering doctor and all requested tests will attract the Medicare rebate.

There is currently no consensus on the role of C¹⁴ Urea breath testing in general practice in Australia. It is however, generally accepted that it is a valid test for determining if a patient is actively infected with *H.pylori* both pre and post therapy. Some would also argue that it may prevent patients with positive *H.pylori* serology (but no active infection) being unnecessarily treated with broad spectrum antibiotics. It should always be remembered however, that the clinical interpretation of symptoms and signs is paramount in arriving at the correct diagnosis of your patient, and that a positive C¹⁴ Urea breath test only tells you that the patient is actively infected with *H.pylori*. If there is doubt about the cause of your patient's symptoms, or if symptoms persistent following successful eradication of the organism then referral to a gastroenterologist for further investigation is strongly recommended. This is particularly important in patients over 40 years of age. The C¹⁴ Urea breath test is generally accepted as the non-invasive test of choice for determining whether or not eradication of *H.pylori* has been achieved.

Where can C¹⁴ Urea breath testing be performed?

All Clinipath pathology collections centres are able to perform this test. A booking is not essential but patients can contact their nearest collection centre for further information. It is important that your patients are given the appropriate information prior to testing. This includes the medication restrictions outlined previously and the requirement to fast (no food or water) for a minimum of six hours prior to testing.

Where can I receive advice about interpretation of the C¹⁴ Urea breath test?

Clinipath Pathology microbiologists will be happy to help with interpretation of your patient's test results. In addition, you may wish to discuss clinical interpretation with the gastroenterologist that you regularly refer to, particularly in the setting of atypical clinical presentations that may require expert advice on the differential diagnosis of the clinical symptoms that your patient is experiencing.

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