The high prevalence of *Helicobacter pylori* infection in apparently healthy humans complicates the established definite link with disease in the minority. Disputes over whether the organism is acquired in early years of life (cohort effect) or whether it increases continuously with age should not obscure the fact that recurrent infection is unlikely in adults. An attempt at eradication is, therefore, reasonable when the organism is clinically important for individual patients. The important questions are whom to treat and with what?

**Duodenal ulcer**

Duodenal ulcers can be effectively healed by proton-pump inhibitors such as omeprazole or lansoprazole given for four weeks, or histamine H2 receptor antagonists such as ranitidine or cimetidine for six to eight weeks. Most patients have a relapse of ulceration after initial healing therapy, so that preventive measures are appropriate. Almost all duodenal ulcers are associated with *H pylori* infection, and it is this combined with gastric acid which causes the ulcer to recur. The rate of relapse can be dramatically cut by clearing *H pylori* infection and this is now a prime objective in patient management. The US National Institutes of Health recommended in February 1994 that all peptic ulcer patients should be considered for anti-*H pylori* therapy.

Although clearance of *H pylori* without formal anti-acid therapy should heal duodenal ulcer permanently, the variable success rates with some of the regimes used suggests that a combined approach is correct. To guarantee almost complete healing and at least 90% long-term cure rate, a convenient regime is to use a full course of proton-pump inhibitor with two antibiotics for a week. One way of doing this is to give a one-month course of lansoprazole 30 mg daily and simultaneously in the first week amoxicillin 500 mg tid plus metronidazole 400 mg tid OR clarithromycin 250 mg bid plus tinidazole 500 mg bid. At the time of writing the cost is £36 or £56, respectively, and the side-effect rate is low, although diarrhoea may occur.

Alternatively, omeprazole can be given in a dose of 40 mg daily for a week with two antibiotics. The course could be completed with a further three weeks of omeprazole 20 mg daily, but this is both more complex and more expensive.

Another option which might be used in refractory or recurrent ulcers and continuing *H pylori* infection is quadruple therapy. This involves using omeprazole for a month and giving bismuth, tetracycline and metronidazole for the first week. This has yielded 95–98% *H pylori* eradication rates and appears to avoid the toxicity associated with the use of bismuth, tetracycline and metronidazole alone as triple therapy for two weeks as previously recommended.

To ensure that therapy has succeeded, it is necessary to check at least one month after it has all been completed. Carbon-13 or carbon-14 urea breath tests are a convenient non-invasive way of achieving this. If patients attend for review endoscopy then biopsies taken for direct urease tests are an alternative, but do need to be taken from the fundus or body as well as from the antrum of the stomach as differential clearing may occur. Serology using IgG ELISA is not very useful as it requires a sample before therapy and then 6 to 12 months later, which introduces impractical complications.

Where treatment does not produce negative *H pylori* tests further antibiotic therapy may need to be considered. It is best to use different drugs to avoid the problem of induced resistance to clarithromycin and nitroimidazoles as far as possible, but the best results have been achieved with regimes which include at least one of these agents. The notional problem of primary or secondary resistance to metronidazole or tinidazole may have been overstated for technical reasons. Optimal culture conditions for *H pylori* are not necessarily those required to demonstrate antibacterial sensitivity.

Modern regimes should consistently achieve 90% + eradication rates, and it is unsatisfactory to use treatment with lesser success. This means that dual therapy with omeprazole and amoxicillin or clarithromycin cannot really be recommended nowadays. Average success rates using one antibiotic plus a proton-pump inhibitor have been only about 60–80%, unless very large doses of omeprazole are used. Similarly, disappointingly low success rates have been achieved overall using triple therapy with bismuth, tetracycline and metronidazole. Some regimes which have been effectively used to eradicate *H pylori* include one-week treatments with omeprazole, amoxicillin and metronidazole; omeprazole, amoxicillin and clarithromycin; omeprazole, clarithromycin and metronidazole; and omeprazole, clarithromycin and tinidazole.

**Gastric ulcer**

Proton-pump inhibitor therapy for eight weeks is standard therapy, and antibiotic treatment for the first week should be added to this. A convenient regime is to use lansoprazole 30 mg for two months and amoxicillin 500 mg tid plus metronidazole 400 mg tid or clarithromycin 250 mg bid plus tinidazole 500 mg bid for the first week. It is very important to prove healing endoscopically and if this is done a month after all therapy is completed it is convenient to test *H pylori* eradication by biopsy and direct urease testing.

It is uncertain whether it is necessary to obtain proof of *H pylori* infection before therapy and analysis of any tests may be misleading for various technical and clinical reasons. In gastric ulcers more prolonged anti-acid therapy may be subsequently required and it is crucial to prove complete healing to avoid the risk of missing malignancy.

**Lymphoma**

There is no lymphoid tissue in the normal human stomach, and the local mucosa-associated lymphoid tumour (MALT-oma) is reckoned always to follow *H pylori* infection. This is a rare condition and though cure of the infection may lead to tumour regression, the large majority of patients will need surgical resection or perhaps radiotherapy to ensure cure.

**Other indications**

*H pylori* is a normal passenger in many adults. For example over 50%, of adults between the ages of 50 and 70 years are
It is even more contentious whether *H. pylori* immunisation or antibiotic treatment could be used to reduce the already falling rates of gastric carcinoma and ischaemic heart disease in Western societies. It would be very difficult to prove an effect at all, and even if there were one most of the present generation of doctors would be retired long before it could become apparent.

Since induced resistance will inevitably become a problem if anti-*H. pylori* treatment is irresponsibly widely used, it is best to restrict it to those patients with peptic ulcer disease who can be shown to improve.

The side-effects of vigorous antibiotic treatment can be severe for occasional patients and include pseudomembranous colitis. This risk is only acceptable where proven benefit can be expected.

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