simply pass through it as suggested previously.[2 3] Concerning *M paratuberculosis*, however, the conflicting results were reported by Elsaghier *et al.*[4] They showed significantly increased antibody concentrations to *M paratuberculosis* specific protein in Crohn's disease patients. This difference might result from the antigens used for their experiments. Stainsby *et al* used antigens that were filtered sonicate preparations of the mycobacterial species, and as they discussed in their article, the study of humoral immunity to *M paratuberculosis* in Crohn's disease should be devoid of the cross reactive nature of mycobacterial antigens. Furthermore, Sanderson *et al* reported that *M paratuberculosis* DNA was identified in 26 of 40 (65%) Crohn's disease, in one of 23 (4·3%) ulcerative colitis, and in five of 40 (12·5%) control tissues by PCR.[5] We agree with Sanderson *et al* that this high frequency of identification of *M paratuberculosis* in Crohn's disease could not be explained by secondary invasion of a previously damaged mucosa. Therefore, some kinds of mycobacteria may be ubiquitously distributed in the human intestine, but *M paratuberculosis* might participate in the pathogenesis of Crohn's disease.

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Helicobacter pylori infection

EDITOR,—The EUROGAST Study[1] provided impressive confirmation of the geographical association between *Helicobacter pylori* infection and gastric carcinoma.[2]

The technique was serological, however, and necessarily considered geographically and ethnically disparate populations, so subgroup analysis for risk factors in *H pylori* infection may not be appropriate.[3]

It is known that serology does not always correlate well with active infection in apparently healthy subjects, and may merely provide a historical record.[4]

The 17 groups studied had between 132 and 229 subjects each, who presumably could have been from a variety of racial groups in the 13 different countries: these factors are well known to affect prevalence. The absence of a sex effect, and the increased frequency of infection at age 55–64 years compared with 25–34 years, harmonises well with the conclusions in other studies, and are easy to prove. But whether the technique is suitable to make statements about smoking and alcohol use is much more doubtful.

We used a reliable direct urease test (CLO test) for assessment of active *H pylori* infection in local British white patients to assess the effect of personal habits.[5] For the current cigarette smokers there was a clearly increased prevalence of *H pylori* infection (49·6% *v* 35·5% in non-smokers or those who had given up smoking at least a year before, $p<0·01$). This would be consistent with the known suppressive effects of smoking on immune defences; and also the association between peptic ulcer and smoking, as duodenal ulcer is uncontentiously very strongly associated with *H pylori*. Ours is the only study directly focused on this problem in a large homogeneous well defined population using an effective direct method for active *H pylori* infection.

I would like to persuade colleagues that this is indeed the correct answer and challenge doubters to produce a similarly coherent specific study devoted to this problem.

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Reply

EDITOR,—One aim of the EUROGAST study was to identify risk factors for *H pylori* seropositivity, using a common protocol to collect blood samples and questionnaire data from random samples of the general population in a wide range of different countries. Bateson criticises one conclusion from the study: that *H pylori* infection, as assessed by serology, is not associated with smoking.[1] He states that serology may be a poor indicator of current *H pylori* infection and that the use of different populations, with different prevalence rates, precludes general conclusions concerning risk factors for *H pylori* infection.

The lack of association between *H pylori* and smoking was seen in the whole EUROGAST population[1] and not in a subgroup analysis as indicated by Bateson. Furthermore, in none of the 17 individual centres was there a statistically significant association between smoking and *H pylori* seropositivity. The estimated odds ratio for smokers *v* non-smokers was 1·0 or higher in 10 study centres and was lower than 1·0 in seven centres (data available on request). This conclusion is consistent with the other large, population based studies that have investigated smoking in relation to *H pylori* infection, assessed by serology,[2] by serology and the urea breath test,[3] and by serology and histology.[4] The last two studies[3 4] used measures of current infection in addition to serology. Moreover, there is evidence suggesting that *H pylori* infection is most commonly acquired in early childhood[5 6] – that is, before most subjects take up smoking.

Those studies that have investigated the association between *H pylori* and smoking in patients undergoing endoscopy have variously reported a positive,[7–9] negative[10] or no[11 12] association.

The use of symptomatic patients may, however, lead to a spurious, non-causal relation between *H pylori* and smoking because both *H pylori* infection and smoking are independently related to gastric disease, especially peptic ulceration. The separate associations between *H pylori* and peptic ulceration and between smoking and peptic ulceration do not imply that there is an association between *H pylori* and smoking. Rather, it is plausible that smoking may increase the risk of disease in an *H pylori* infected subject.[13]

With regard to the use of serology to assess *H pylori* infection the evidence suggests that, in the absence of treatment, *H pylori* infections will persist for life.[14] The conclusion by Meyer *et al*, cited by Bateson, that spontaneous eradication of *H pylori* might commonly occur in healthy subjects,[15] was later retracted because of the low specificity of the serological test used in their study.[16] The only subjects likely to be seropositive in the absence of a current infection are those with severe gastric atrophy or intestinal metaplasia or both, as *H pylori* infection cannot persist in such conditions.[17] Such subjects would, however, be uncommon in the EUROGAST population where subjects were all aged under 65 years.

In conclusion, results from all of the population based studies weigh against the hypothesis that smokers are at an increased risk of *H pylori* infection. We would also suggest that patient groups may be an inappropriate population in which to study this relation.

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