MY APPROACH

My approach to reporting a gastric biopsy

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The protracted inflammation of the gastric mucosa induces profound changes in the microenvironment of the gastric cells. These changes modify the molecular signals that orchestrate morphogenesis and cell differentiation in the stem cells of the crypts. The expression of this adjustment to the new microenvironment is evidenced by the appearance of differentiated metaplastic cells (intestinal, bronchial—ciliated, pancreatic or (pseudo) pyloric, all deriving from the same embryological origin). The inability of stem cells to readapt to the new microenvironment may lead to genomic aberrations such as the retention of cellular products (glassy cells) or to neoplastic transformation. In this report, parameters such as gastric mucosal inflammation, *Helicobacter pylori*, atrophy, intestinal metaplasia and/or pseudopyloric metaplasia found in gastric biopsy specimens were individually classified according to their extension in sections as grade 1 (focal distribution in sections from individual biopsy specimens) and grade 2 (present in the entire width—distance across—in sections from individual biopsy specimen). The rationale is that a biopsy grade 2 was harvested from a larger mucosal area having that particular change. Each individual parameter gives a score, and the sum of all individual scores gives the total score. The proposed system might allow monitoring the results of treatment in follow-up biopsies. Divergent clinical results in the frequency/incidence of gastritis (including body–autoimmune gastritis), of *H pylori* strains, of various metaplasias and neoplasias, in disparate geographical regions substantiate the conviction that these parameters are much influenced by the environment. This knowledge is crucial, considering that environmental diseases are theoretically preventable.

In 1868, Kussmaul[1] introduced rigid metal endoscopes to inspect the gastric mucosa. Since then, this examination has been much improved, with flexible paraphernalia for the benefit of the observer and of the patient. Instruments were designed to obtain representative material for histological examination (for the benefit of the pathologist).

A recent search of gastric biopsies in Google (20 August 2006) yielded 1 700 000 entries. This massive number of publications mirrors the vast interest both in the microscopic changes leading to a final clinicohistological diagnosis of gastric disease, and in the biological, histochemical and immunohistochemical changes of the gastric mucosa in health and disease.

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Because of space constraints, descriptions will be limited to the most common mucosal lesions seen here and certainly at many other departments of pathology—namely, inflammation, metaplasia, atrophy, and their relationship with neoplasia.

GASTRIC MUCOSAL INFLAMMATION

Antrum-predominant gastritis

In 1862, Cruveihier[2] observed that mucosal inflammation (ie, gastritis) and gastric ulcers were invariably present in the same stomach. Since then, many studies have been carried out to disclose the pathogenesis of the mucosal inflammation and its sequelae. Before 1983, ethanol, aspirin, radiation, viruses and fungi were known to induce gastric mucosal inflammation.[3] In the absence of these agents, it was observed that the most common form of gastric mucosal inflammation occurred in the lower social classes and in people with blue eyes.[4] But in 1983, it was found that the most common aetiological agent of gastritis was the bacterium *Helicobacter pylori*.[5] Today we know that approximately 50% of the world's population is infected with this bacterium.[6] Many workers concur that the *H pylori*[7 8] is the principal agent that starts the cascade of histological events ranging from chronic gastritis to carcinoma through mucosal atrophy, intestinal metaplasia and epithelial dysplasia. *H pylori* induces mucosal inflammation in a multifocal (patchy) fashion involving first the antrum and then the oxyntic mucosa of the gastric corpus and fundus. Gastritis is histologically divided into acute, when infiltrated by neutrophils, and chronic, when infiltrated by lymphocytes, plasma cells and eosinophils. The host reacts to *H pylori* by increasing the number of T and B lymphocytes, followed by polymorphonuclear leucocytic infiltration (aiming to phagocytise the bacteria).[9] Both acute and chronic inflammation often coexist as a result of *H pylori* reinfections. In a mucosa with unrelenting chronic inflammation triggered by causes other than *H pylori*, the finding of acute inflammation at follow-up is usually due to a secondary *H pylori* infection.[10] Bacteria adhesion molecules encourage attachment to the foveolar cells, and bacteria proteases and urease damage the gastric epithelium. The next stage is the destruction of glands by CD3+ T lymphocytes.

Not all patients with *H pylori* infection develop gastritis. Recent studies[11–13] indicate that the pathogenicity of *H pylori* varies with different strains, and that strains that possess the cytoxin-associated gene pathogenicity island secrete a toxin that severely injures the mucosa. These considerations are in agreement with the observations that, despite adult Yemenite[14] and Mexican[15]

subjects having the same high prevalence of *H pylori* infestation (92% and 92%, respectively), gastric biopsies showed gastritis in 93% of the Yemenis,[14] but in only 66% of the Mexicans.[15] Differences in the virulence of the bacteria and/or food habits may explain this discrepancy.

Gastric mucosal inflammation may also be induced by chemical agents such as non-steroidal anti-inflammatory agents,[16] and by internal causes pertinent to the patients themselves, such as auto-antibodies or retrograde bile reflux[17] after gastric resection, with ablation of pylorus or ineffectiveness of the pylorus.

Corpus-predominant gastritis

Corpus-predominant gastritis is an inflammatory disease of the gastric mucosa usually triggered by auto-antibodies to parietal cells and intrinsic factor.[18] It may lead to pernicious anaemia. The prevalence of pernicious anaemia resulting from autoimmune gastritis has been estimated as 127 cases/100 000 inhabitants in northern Europe, including Sweden, Denmark and the United Kingdom.[18 19]

Autoimmune gastritis is characterised by the destruction of the parietal cell population by committed lymphocytes, through an autoimmune pathway. Restricted to the gastric corpus and fundus, total destruction of the oxyntic mucosa occurs only occasionally. Histological examination shows periglandular T-lymphocytic (CD3+) infiltration, glandular destruction and nodular enterochromaffin-like cell proliferation in the corpus mucosa. In some studies,[20 21] all parietal cells showed specific monoclonal antibodies, but in one of four patients the gastric mucosa was microscopically intact. Thus, specific autoantibodies participate in the early phases of parietal cell destruction. In advanced forms, the body mucosa is inflamed and shows extensive atrophy. The glandular body mucosa is usually replaced by pseudo-pyloric metaplasia. Typically, indolent enterochromaffin-like-nodular hyperplasia and multiple carcinoid tumours may develop in the corpus.[20] The antral mucosa is relatively spared.

A not uncommon phenomenon is the so-called pseudohypertrophy of the remaining parietal cells. Some workers have pointed out the relationship between autoimmune gastritis and *H pylori* infection, particularly of cytoxin-associated gene A-negative strains.

Sequelae of chronic gastritis

Atrophy

The inflammatory process in antral-predominant gastritis may lead to the destruction of gastric glands.[22 23] This destruction decreases the number and size of the gastric glands at one or more foci.

To pass a general statement of ''chronic atrophic gastritis'' based on the finding of mucosal atrophy in one or more spots in one of the biopsy specimens is misleading. The clinician may erroneously interpret the diagnosis as valid for the gastric mucosa as a whole, when in reality the phenomenon is limited to only one or a few mucosal spots, most probably of little clinical significance. And yet, treatments may be instituted on the basis of the general statement passed by the pathologist.

In advanced stages, confluent foci of mucosal atrophy lead to a reduction in mucosal thickness.

Intestinal metaplasia

According to the definition given by the Houston International Workshop on the Histology of Gastritis,[24] intestinal metaplasia is the replacement of the foveolar and/or the glandular epithelium of the stomach by the intestinal epithelium after chronic mucosal inflammation. Metaplasia is also defined as the transformation of one mature differentiated cell type into another mature differentiated cell type.[25] Metaplasia is an adaptive response to an insult or injury. Through changes in differentiation and patterns of gene expression, the cells become more resistant to the effects of a particular insult. Intestinal metaplasia is usually reversible.[26]

Gastric intestinal metaplasia has been divided into complete and incomplete intestinal metaplasia. The incomplete type is considered to be associated with the development of a carcinoma of intestinal type. Kato *et al*[27] found that intestinal metaplasia developing in the antral mucosa was predominantly of incomplete type, whereas intestinal metaplasia developing in the fundic mucosa was predominantly of complete type. Evidence for a shift from incomplete to complete intestinal metaplasia with time was not found.[27]

Recently, Shousha *et al*[14] observed in gastric biopsy specimens that the prevalence of intestinal metaplasia in British patients was significantly higher than in Yemeni patients, despite the Yemeni patients having a significantly higher prevalence of *H pylori*. These findings suggested possible differences either in bacterial strain[11–13] or in gastric microenvironment in those disparate areas. In a previous comparative study of gastric biopsy specimens from 984 patients with chronic gastritis (without ulcers or carcinoma), we found intestinal metaplasia in 32% of the Swedish patients and in 59% of the Japanese patients.[28] In a subsequent analysis of 691 consecutive gastric biopsy specimens from Mexican patients, intestinal metaplasia was found in 13% of the patients with chronic gastritis.[15] The high frequency of intestinal metaplasia among the Japanese (a population with a high incidence of gastric carcinoma) contrasted with the moderate frequency of intestinal metaplasia among Swedes (a population with a moderate incidence of gastric cancer), and with the low frequency of intestinal metaplasia among Mexicans (a population with a low incidence of gastric carcinoma). These results, recorded in disparate geographical regions, strongly support the view that intestinal metaplasia is a lesion evoked by local environmental factors and most probably associated with gastric carcinogenesis.

Histological studies of three complete antrectomy specimens at the Department of Pathology, Karolinska Institute, Stockholm, Sweden (done because of protracted epigastrial pain) showed that the antral mucosa was reduced to the surface epithelium without glands, and that chronic inflammatory cells had replaced the entire glandular area. In these cases of massive atrophy, no single focus of intestinal metaplasia could be shown, despite investigating the entire antral mucosa in 4-cm-long blocks (unpublished). Conversely, other studies[29 30] showed that extensive areas of intestinal metaplasia occurred in the absence of any sign of current or past mucosal inflammation. Ongoing investigations at the Gastrointestinal and Liver Pathology Research Laboratory indicate that intestinal metaplasia cells may secrete lysozyme. Lysozyme is an innate non-immunological antibacterial enzyme produced normally by Paneth cells of the small intestine; it is not normally produced in the stomach. The presence of lysozyme in gastric intestinal metaplasia cells suggests a cellular adaptation aimed to protect the gastric mucosa against the various types of bacteria usually proliferating in hypo or aclorhydric stomachs (in preparation). The secretion of lysozyme by intestinal metaplasia cells is one of the explanations for the absence of bacteria in metaplastic areas. Similar defensive machinery is not provided by an atrophic, non-metaplastic gastric mucosa. These observations seem to be corroborated by the recent findings of Shen *et al*[31] showing that human defensin 5 (also an antimicrobial peptide produced by Paneth cells in the small intestine) is expressed in gastric intestinal metaplasia cells.

A more recent study on gastrectomy specimens suggested that intestinal metaplasia evolves after a mucosal insult

affecting the stem cells of the crypts of Lieberkhün.[32] We speculate that as an adaptation to the new microenvironment created by the gastric inflammation, the genes responsible for cell differentiation (homoeobox genes[33] and hedgehog transduction signals[34 35]) may encourage stem cells to differentiate towards the intestinal phenotype. Consequently, gastric intestinal metaplasia and gastric atrophy seem to be two different biological processes, atrophy being the result of the local destruction of glands by chronic inflammation, and intestinal metaplasia being the consequence of an adaptive response aimed to protect the mucosa from proliferating bacteria, and not an event that follows mucosal atrophy.

Some authors postulated that the precancerous potential of intestinal metaplasia is directly related to the histochemical constituents of the mucin contained in columnar and goblet cells at a particular spot.[36 37] This histochemical pathway of cancer development, detected in gastric biopsy specimens, was not confirmed in subsequent studies.[19 38–40] On the other hand, the extension of intestinal metaplasia in gastrectomy specimens has been found to correlate with the presence of a gastric carcinoma.[41 42] The extensive intestinal metaplasia (EIM)[43] was considered when it encompassed one or more entire low power fields (≥5 mm in length/section) in one or more sections. The EIM was more often associated with intestinal carcinoma than with diffuse carcinoma or with miscellaneous gastric diseases, more notably in patients dwelling in the Pacific basin (where the incidence of gastric carcinoma is highest) than in those from the Atlantic basin.[43]

Ciliated metaplasia

Years ago, we detected ciliated cells in the gastric mucosa of a large number of Japanese patients living either in Japan[44] or in Hawaii.[45] Ciliated cells are found in the basal segments of antral glands (usually cystically dilated) whose superficial segments had undergone intestinal metaplasia. To detect glands with ciliated metaplasia, the basal aspect of gastric pyloric glands should be particularly scrutinised using ×40 objective magnifications. Ciliated metaplasia may be readily shown in haematoxylin and eosin-stained sections and in sections immunostained with tubulin B, which specifically stains the microtubuli of the ciliae.[46] Ciliated metaplasia may be an aborted form of bronchial metaplasia in the gastric mucosa. It should be kept in mind that both gastric and bronchial mucosas have a common embryological lineage, from the primitive gut tube and its endodermal lining.[47] Ciliated metaplasia is usually present in gastrectomy specimens harbouring a gastric carcinoma, particularly of intestinal type and notably in dwellers of the Pacific basin.[48]

Glassy gastric cells

Fifteen years ago, we detected pyloric gastric cells with glassy cytoplasm in the antrum of conventionally stained haematoxylin and eosin sections.[49]

Although the significance and nature of the retained cellular secretion in these cells remain elusive, Kopito and Sitia[50] claim that all cells are equipped with a proteolytic apparatus that excludes misfolded and damaged proteins. The 26S proteasome, the principal engine of cytoplasmic proteolysis, requires unfolded substrates but is ineffective at degrading aggregated proteins. When the production of aggregated proteins exceeds the cell's capacity to exclude them, a phenomenon of cellular indigestion of the endoplasmic reticulum occurs. The condensation of proteinaceous material in glassy cells suggests that the mechanism of protein transport in the endoplasmic reticulum is incompetent, and that those proteins are neither degraded nor secreted and remain stored in dilated cisternae.[50] Glassy gastric cells (GGCs) may be misinterpreted as tumour cells from a signet ring carcinoma.[51]

GGCs have been found more frequently in patients from the Pacific basin, having a gastric carcinoma, a peptic ulcer or miscellaneous gastric diseases.[52]

As a corollary, the finding that EIM, ciliated metaplasia and GGCs are more frequent in the Pacific than in the Atlantic basin strongly suggests that environmental exposures including different food habits—and not racial factors—may influence the histological make-up of the gastric mucosa. These considerations may help to understand the variations in frequency of diseases reported in gastric biopsy specimens from pathology departments located in disparate geographical regions.

Pseudopyloric metaplasia

A sequela of auto-immune gastritis pseudopyloric metaplasia is characterised by the mucous-cell metaplastic transformation of the oxyntic mucosa. This focal mucous neck cell hyperplasia stains positive for a marker for corpus epithelium, pepsinogen I and, in contrast with the true pyloric glands present in the antrum–pyloric region, has no or very few[53] gastrin-producing cells. Pseudopyloric metaplasia has received several names such as fundic antralisation or pyloric metaplasia. The reader will understand that these are misnomers.

Pancreatic acinar cell metaplasia

Pancreatic acinar cell metaplasia is the collection of pancreatic acinar cells, usually in the gastro-oesophageal junction mucosa. Pancreatic acinar cell metaplasia occurs, predominantly, in specimens from patients with autoimmune gastritis.[54]

Lymphocytic gastritis

In 1985, a novel phenotype of gastritis was referred to as the ''lympho-epithelial phenomenon''.[55] One year later, it was called ''lymphocytic gastritis''.[56] The malady is characterised by lymphocytic infiltration (>25 lymphocytes/100 epithelial cells) of the superficial and foveolar epithelium. It may concur with coeliac disease or lymphocytic colitis. In a study of entire gastrectomy specimens,[57] we found that 2 of the 48 specimens investigated had a large number of lymphocytes in the surface and the foveolar epithelium of the mucosa. Focal or more extended areas of chronic gastritis (ie, superficial or atrophic with or without intestinal metaplasia) were present in all 48 specimens. Lymphocytic gastritis was found in all 156 blocks obtained from the two specimens, even in areas lacking chronic mucosal inflammation in the lamina propria mucosa. Lymphocytic gastritis shows an extensive continuous distribution, whereas chronic gastritis usually has a focal or a regional distribution.

Lymphocytic gastritis may concur with foveolar hyperplasia. Two subtypes of lymphocytic gastritis with gastric foveolar hyperplasia are recognised: Menetrier's-like lymphocytic gastritis and varioliform-like lymphocytic gastritis.

Menetrier's-like lymphocytic gastritis

Menetrier's-like lymphocytic gastritis should be differentiated from Menetrier's gastropathy (vide infra). Menetrier's-like lymphocytic gastritis shows diffuse foveolar hyperplasia with serrated, foveolar infoldings with marked intraepithelial (foveolar) lymphocytosis.[58]

Varioliform-like lymphocytic gastritis

At gross examination, one or multiple nodules are found. At histological examination, there is focal foveolar hyperplasia infiltrated by a high number of intraepithelial (foveolar) lymphocytes.[58]

Table 1 Histological score in initial gastric biopsy specimens in patient ''A''

Histological changes	Biopsy number 1	2	3	4	5	Score
Acute inflammation	1	2	1	2	1	7
Helicobacter pylori	2	1	2	0	1	6
Chronic inflammation	2	0	2	2	2	8
Atrophy	1	0	0	0	1	2
Intestinal metaplasia	0	1	1	0	0	2
Pseudopyloric metaplasia	NA	NA	0	0	0	0
All changes	6	4	6	4	5	25

NA, not applicable.
Biopsy number 1–2: greater–lesser curvature of the distal antrum; 3: lesser curvature at the incisura angularis; 4–5: greater–lesser curvature of the corpus.

Hyperplastic gastropathies (without intraepithelial lymphocytosis)

Hyperplastic polyps

Hyperplastic polyps may evolve in patients with chronic gastritis. They are the expression of a foveolar proliferation, with elongated, distorted pits and cystically dilated glands. Foveolar and glandular structures may develop a serrated pattern. Although the foveolar hyperplasia is considered a benign reactive proliferation, dysplasia and carcinoma[59] have been reported, including six cases of serrated adenomas, five of them showing an invasive growth.[60]

Menetrier's gastropathy

At gross examination, a diffuse hypertrophy of the fundic mucosal folds is found. Menetrier's gastropathy is characterised histologically by tortuous foveolar hyperplasia without intraepithelial lymphocytosis, glandular atrophy and prominent glandular cysts.[58]

Varioliform gastropathy

Multiple mucosal nodules with crest depression are found at gross examination. Histological examination shows focal foveolar hyperplasia with crest depression, but without intraepithelial lymphocytosis.

In short, the architecture of the foveolar epithelium and the presence or absence of intraepithelial lymphocytosis are valuable criteria in the differential diagnosis between the various types of foveolar hyperplasias of the gastric mucosa.[58]

Similar inflammatory and/or metaplastic changes in animals

The acute–chronic gastritis–intestinal metaplasia–dysplasia–carcinoma sequence has been documented only in *H pylori*-infected Mongolian gerbils treated with the carcinogen N-methyl-N-nitrosourea.[61–63] *H pylori* infection in itself does not induce gastric tumours.[64 65]

Intestinal metaplasia can also be evoked in animals by irradiation[66] or by genetic manipulation.[67 68] These alternative pathways substantiate the notion that intestinal metaplasia may be conveyed by a reprogrammed differentiation of the stem cells of the gastric crypts, in the absence of *H pylori* infection.

Ciliated metaplasia and glassy cells evolve in the gastric mucosa of genetically manipulated mice[68] and in the inflamed gastric mucosa of baboons.[69] These serendipitous findings may facilitate the study of the histogenesis of these elusive cells in animals.

Lymphocytic gastritis occurs spontaneously in the gastric mucosa of pigs,[70] but in none of 10 other animal species investigated. Although the aetiology of lymphocytic gastritis remains unknown (though it may regress after treatment for *H pylori*[71]), its apparent endemic nature in pigs opens an alternative window to scrutinise the possible cause(s) and mechanism(s) leading to this disease.

Varioliform-like lymphocytic gastritis and Menetrier's disease have also been found in baboons.[72] As the causes of these diseases in humans remain unknown, their spontaneous occurrence in baboons may assist in studying the possible aetiological factors in the laboratory.

In humans, environmental agents (eg, *H pylori*) may severely alter the microenvironment of the gastric cells, leading to mucosal inflammation. As these areas are difficult to recognise by the endoscopist,[73] the pathologist has to decide whether there is mucosal inflammation in the biopsied material, and, if so, whether it is acute, chronic, metaplastic, focal or extensive. Owing to the new microenvironment created by the protracted inflammation, the stem cells of the crypts of Lieberkühn adjust to the molecular signals that orchestrate morphogenesis and cell differentiation. The expression of this adjustment is manifested in the appearance of differentiated metaplastic cells (intestinal, bronchial (ciliated), pancreatic or pseudo-pyloric,

Table 2 Histological score in gastric biopsy specimens recorded 12 months later in the same patient as in table 1

Histological changes	Biopsy number 1	2	3	4	5	Score
Acute inflammation	0	1	0	0	0	1
Helicobacter pylori	0	1	0	0	0	1
Chronic inflammation	2	2	2	2	2	10
Atrophy	2	2	1	0	1	6
Intestinal metaplasia	1	2	2	1	2	8
Pseudopyloric metaplasia	NA	NA	0	1	1	2
All changes	5	8	5	4	6	28

NA, not applicalble.
Biopsy number 1–2: greater–lesser curvature of the distal antrum; 3: lesser curvature at the incisura angularis; 4–5: greater–lesser curvature of the corpus.

all derived from the same embryological origin as the gastric mucosa[47]). The discoveries that in the absence of *H pylori*, intestinal metaplasia is also evoked by irradiation,[66] by genetic activation of dioxin receptors[74] or by intestine-specific transcription factor in Foxa 3/Cdx2 transgenic mice,[75 76] that ciliated metaplasia can be induced in transgenic mice lacking the catalytic subunit of gastric H/K ATPase,[68] and that pancreatic metaplasia can be elicited by a steroid alkaloid that blocks sonic hedgehog signals[77] or by a pancreatic morphogenic (parafox) factor PDX1,[78] reinforce the view that owing to changes in the microenvironment, the genome of stem cells of the crypts can be manipulated to redifferentiate into dissimilar metaplastic pathways. The inability of stem cells to readapt to the new microenvironment may lead to genomic aberrations such as retention of cellular products (as in glassy cells) or to neoplastic transformation.

Classification of gastric biopsy specimens with mucosal inflammation

In the Sydney classification[79] and in the Houston modification[24] of the Sydney classification, inflammation, *H pylori* infection, atrophy and intestinal metaplasia were graded into slight, moderate and severe. But, according to Zaitoun and Record,[80] despite the Sydney system classifying atrophy into a four-grade scale—no atrophy, and mild, moderate, or severe atrophy, agreement among histopathologists regarding its recognition and grading remains poor.

Modern classifications in histopathology recommend only two grades (low grade and high grade).[81] I have adopted that concept.

Scoring

A total of five endoscopical biopsy specimens are usually harvested at endoscopy: two from the antrum, one from the incisura angularis and the remaining two from the corpus (tables 1 and 2). Each biopsy specimen is placed in separate phials containing buffered formalin (4%). This fixative preserves the cytoskeleton of the mucosa, thus permitting challenge of new sections with immunostains and obtainment of material for DNA analysis.[82]

The parameters acute inflammation, chronic inflammation, *H pylori*, mucosal atrophy, intestinal metaplasia and pseudopyloric metaplasia are individually classified according to their presence into grade 1 (corresponding to one or more foci with a particular parameter in sections from individual biopsy specimens) and grade 2 (when a particular parameter is present in the entire width—distance across—of sections from individual biopsy specimens). The likelihood that a grade 2 biopsy specimen has been sampled from a larger mucosal area having that particular change is higher than that for a grade 1 biopsy specimen. When one or more histological parameters are classified as grade 2 in the complete set of biopsy specimens —taken during the same endoscopic session—the probability that the changes are widespread in gastric mucosa is even higher.

The proposed classification was tested recently in a consecutive set of 100 gastric biopsy specimens. We found this scoring system to be less time-consuming than the mental process involved in trying to summarise all the parameters present in the five biopsy specimens in a final single diagnostic statement. After briefing gastroenterologists, endoscopists and pathologists at a conference, I have started to prospectively score gastric biopsy specimens according to that protocol. At this stage, a copy of the results in the protocol is added to a conventional diagnostic statement. In that statement, the presence of other metaplastic sequelae of mucosal inflammation is included. It should be mentioned that in 4 of 400 biopsy specimens, the gastric mucosa was tangentially cut; the surface and the lateral sides of the biopsied mucosa were not present in the sections. In three of these four biopsy specimens, the problem was solved in recuts after reorienting the blocks.

A setting of gastric biopsy specimens showing normal histology receives a score 0. In the example presented in table 1, in an initial set of gastric biopsy specimens from patient ''A'', the total inflammation–Helicobacter–atrophy–metaplasia score was 25.

Twelve months later, another set of biopsy specimens taken from the same patient (table 2) showed that the total inflammation–Helicobacter–atrophy–metaplasia score had increased to 28.

However, the horizontal score between the first and the second group of biopsy specimens varied substantially: compared with the first set of biopsy specimens, the scores for acute inflammation and for *H pylori* infection in the second examination had plummeted, whereas scores pertinent to chronic inflammation, atrophy, intestinal metaplasia and pseudo-pyloric metaplasia had increased.

The proposed scoring system would allow pathologists to monitor, in the same patient, the evolution of initial gastric biopsy specimens in follow-up endoscopical biopsies. Gastroenterologists receive a score of the extension of each parameter in individual biopsy specimens and a total score of all biopsy specimens obtained during one endoscopical session. They would be able to monitor the results of treatment by comparing individual–horizontal scores in follow-up biopsies as well as to compare scores in different patients for research purposes.

Take-home messages

- Gastric mucosal inflammation, *Helicobacter pylori* infection, atrophy and metaplasia(s) were classified according to their presence in individual biopsy specimens into grade 1 (focal) and grade 2 (occupying the entire width—distance across—of individual sections). The likelihood that grade 2 biopsy specimens have been sampled from a larger mucosal area having that particular change is higher than that for a grade 1 biopsy specimen. When one or more histological parameters are classified as grade 2 in the complete set of biopsy specimens, the probability that the changes are widespread in the gastric mucosa increases.
- The proposed system will permit gastroenterologists to monitor the results of treatment by comparing individual scores in follow-up biopsies, as well as to compare scores in different patients for research purposes.

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