The staging of gastritis with the OLGA system by using intestinal metaplasia as an accurate alternative for atrophic gastritis

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Background: The OLGA (operative link on gastritis assessment) staging system is based on severity of atrophic gastritis (AG). AG remains a difficult histopathologic diagnosis with low interobserver agreement, whereas intestinal metaplasia (IM) is associated with high interobserver agreement.

Objective: The aim of this study was to evaluate whether a staging system based on IM is preferable to estimate gastric cancer risk.

Design and Setting: Prospective multicenter study.

Patients: A total of 125 patients previously diagnosed with gastric IM or dysplasia.

Interventions: Surveillance endoscopy with extensive biopsy sampling.

Main Outcome Measurements: Three pathologists graded biopsy specimens according to the Sydney classification. Interobserver agreement was analyzed by kappa statistics. In the OLGA, AG was replaced by IM, creating the OLGIM.

Results: Interobserver agreement was fair for dysplasia ($\kappa = 0.4$), substantial for AG ($\kappa = 0.6$), almost perfect for IM ($\kappa = 0.9$), and improved for all stages of OLGIM compared with OLGA. Overall, 84 (67%) and 79 (63%) patients were classified as stage I-IV according to OLGA and OLGIM, respectively. Of the dysplasia patients, 5 (71%) and 6 (86%) clustered in stage III-IV of OLGA and OLGIM, respectively.

Limitation: Prospective studies should confirm the correlation between gastric cancer risk and OLGIM stages.

Conclusion: Replacement of AG by IM in the staging of gastritis considerably increases interobserver agreement. The correlation with the severity of gastritis remains at least as strong. Therefore, the OLGIM may be preferred over the OLGA for the prediction of gastric cancer risk in patients with premalignant lesions. (Gastrointest Endosc 2010;71:1150-8.)

The presence of atrophic gastritis (AG), intestinal metaplasia (IM), and dysplasia of the gastric mucosa are important risk factors for the intestinal type of gastric cancer.[1,2] Surveillance of patients with these lesions may therefore result in early detection and improved prognosis.[3] However, an earlier study demonstrated that within a Western population, the progression rate to gastric cancer within 10 years was high for patients with dysplasia, but

Abbreviations: AG, atrophic gastritis; IM, intestinal metaplasia; OLGA, operative link on gastritis assessment; OLGIM, operative link on gastric intestinal metaplasia assessment.

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only 0.8% and 1.8% for patients with AG and IM, respectively.[3] This indicates that surveillance endoscopy is highly recommended for patients with dysplasia, but not indicated for all patients with AG and IM, and should preferably be limited to patients at high gastric cancer risk. However, up to now no guidelines are available on endoscopic surveillance of patients with premalignant gastric lesions.

Although several histologic classifications have been proposed for the classification of premalignant gastric lesions, clinical implications based on these histologic systems are lacking.[4,5] Consequently, histologic subclassification of premalignant gastric lesions is often omitted in clinical practice. Only recently, a histologic classification system was proposed to grade gastritis into stages with corresponding cancer risks in individual patients: the operative link on gastritis assessment (OLGA).[6,7] Two validation studies reported that the OLGA provides clinically relevant information and, as a consequence, identifies a subpopulation of patients that are at high risk of gastric cancer and may benefit from surveillance.[8,9]

However, one potential shortcoming of the OLGA is the fact that its main parameter is the severity and the extent of AG. Studies have shown that the interobserver agreement for AG is low, even after the updated Sydney system provided visual analog scales for its evaluation.[4,10-12]

Intestinal metaplasia is defined as replacement of gastric columnar cells by cells of intestinal morphology and is characterized by the presence of mucin-containing goblet cells, Paneth cells, and absorptive cells.[13] These cells are easily distinguished in the gastric mucosa, because they are not present in healthy gastric mucosa. Therefore, IM is associated with a high interobserver agreement.[4,14] A histologic staging system based on IM might yield additional and more accurate results for the identification of a subpopulation of patients at high gastric cancer risk. Therefore, the aim of the present study was to evaluate interobserver agreement for AG, IM, and dysplasia and to assess whether a staging system based on IM instead of AG may be preferred to estimate gastric cancer risk.

Capsule Summary

What is already known on this topic

- The histopathologic diagnosis of atrophic gastritis has low interobserver agreement, whereas that of intestinal metaplasia is associated with high interobserver agreement.

What this study adds to our knowledge

- Intestinal metaplasia staging yields more reproducible results than atrophic gastritis staging and is at least as strong in assessing the severity of gastritis and predicting cancer risk.

METHODS

Patient selection

We studied 2 groups of patients. The first group included patients with a previous diagnosis of gastric IM or dysplasia. For that purpose, we used the records between 1994 and 2009 of the histology registries of the participating hospitals (Deventer Hospital, Deventer; Rijnstate Hospital, Arnhem; Erasmus Medical Center, Rotterdam, The Netherlands) to identify patients who were eligible for inclusion. In these registries with full coverage of all histopathological specimens, all biopsy specimens receive a diagnostic code, similar to the Systematized Nomenclature of Medicine classification of the College of American Pathologists.[15] This code consists of a term indicating the anatomic location, type of sample, and a morphologic term describing the finding. The diagnostic codes that were used to identify patients with IM or dysplasia were "intestinal metaplasia" or "dysplasia." Consecutive patients with a histologically confirmed diagnosis of IM or dysplasia of the gastric mucosa (index diagnosis) were invited to undergo a surveillance endoscopy between March 2006 and June 2007. The surveillance endoscopy was performed within 6 years after the initial diagnosis of IM. The baseline endoscopy had in all cases been performed on clinical grounds, usually because of upper GI symptoms. None of the patients had been enrolled in a surveillance program after the baseline endoscopy.

The second group included patients with gastric cancer. These were also selected from the same database, using the diagnostic codes "gastric carcinoma" and "gastric adenocarcinoma." Patients with a history of esophageal or gastric surgery were excluded. For the purpose of this study, biopsy specimens from the noncancerous antrum and corpus mucosa were studied after histologic confirmation of the diagnosis of cancer.

The study was approved by the Institutional Review Boards of the Erasmus Medical Center. All patients of the first group were included after informed consents. For the second group of patients, the informed consent procedure was waived, based on the fact that the study only anonymously assessed their archived histologic specimens.

Endoscopy

All patients with a previous diagnosis of IM and dysplasia underwent a surveillance upper GI endoscopy by using a standard video endoscope (Olympus GIF-Q160; Olympus Optical Co., Tokyo, Japan). Surveillance endoscopy was performed to evaluate the severity and extent of premalignant gastric lesions. Therefore, extensive biopsy samples were obtained for histology from 12 standardized sites as described perviously[16]: 4 from the antrum, 4 from the corpus (2 from the lesser curvature, 2 from the greater curvature), 2 from the angulus, and 2 from the cardia. In

TABLE 1. The OLGA staging system[6]

		Corpus			
	Atrophy score	**Not fat: no atrophy (score 0)**	**Mild atrophy (score 1)**	**Moderate atrophy (score 2)**	**Severe atrophy (score 3)**
Antrum (including incisura angularis)	No atrophy (score 0)	Stage 0	Stage I	Stage II	Stage II
	Mild atrophy (score 1)	Stage I	Stage I	Stage II	Stage III
	Moderate atrophy (score 2)	Stage II	Stage II	Stage III	Stage IV
	Severe atrophy (score 3)	Stage III	Stage III	Stage IV	Stage IV

OLGA, Operative link on gastritis assessment.

TABLE 2. Proposal for the OLGIM staging system

		Corpus			
	IM score	**Not fat: no IM (score 0)**	**Mild IM (score 1)**	**Moderate IM (score 2)**	**Severe IM (score 3)**
Antrum (including incisura angularis)	No IM (score 0)	Stage 0	Stage I	Stage II	Stage II
	Mild IM (score 1)	Stage I	Stage I	Stage II	Stage III
	Moderate IM (score 2)	Stage II	Stage II	Stage III	Stage IV
	Severe IM (score 3)	Stage III	Stage III	Stage IV	Stage IV

IM, Intestinal metaplasia; *OLGIM*, operative link on gastric intestinal metaplasia assessment.

case of endoscopically visible lesions, additional targeted biopsy samples were obtained.

Histology

Three expert GI pathologists, who were blinded for the endoscopic findings, independently assessed all biopsy specimens of the surveillance endoscopy. The type and grade of the different stages of gastric preneoplastic changes were classified according to the updated Sydney system and scored as 0 (absent), 1 (mild), 2 (moderate), or 3 (marked) by using the Sydney system visual analog scale.[4] Dysplasia was assessed according to the revised Vienna classification.[4,5] On the basis of the standardized sites, the gastritis stage was assessed according to the OLGA (Table 1).[6] For the development of the IM staging system (operative link on gastric intestinal metaplasia assessment [OLGIM]), AG in the OLGA was replaced by IM (Table 2). AG and IM were scored in all biopsy specimens from antrum, angulus, and corpus lesser and greater curvature by using the visual analog scale of the updated Sydney classification (Fig. 1).[4] For a consensus diagnosis, the final diagnosis was based on the majority diagnosis, ie, at least 2 of 3 pathologists agreed, or a mean score in case 3 pathologists disagreed. Antrum and angulus were considered together as representative of the distal (nonoxyntic) gastric mucosa (antrum score), and corpus greater and lesser curvature were considered together as representative of the oxyntic gastric mucosa (corpus score). Combining the antrum and corpus score for AG resulted in the OLGA gastritis stage score, and a combination of the IM scores resulted in the OLGIM staging score (Table 2).

For the gastric cancer cases, 1 expert GI pathologist assessed all biopsy specimens of patients with gastric cancer. The type and grade of atrophic gastritis and

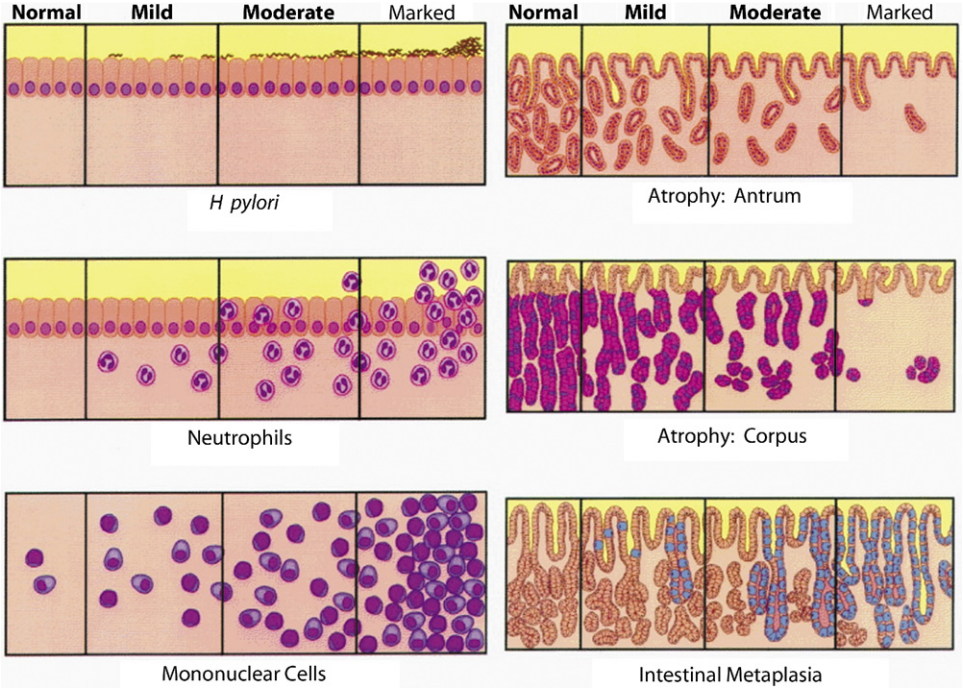

Figure 1. Visual analog scale. Atrophic gastritis and intestinal metaplasia were scored according to the visual analog scale of the updated Sydney classification as previously published by Dixon et al.[4]

intestinal metaplasia were assessed according to the updated Sydney classification in biopsies from the non cancerous mucosa of the antrum and corpus mucosa. These scores were combined to evaluate OLGA and OLGIM staging in gastric cancer patients.

Statistical analysis

Interobserver agreement was determined by using kappa statistics for multiple raters.[17] Kappa statistics are widely used mathematical coefficients adjusting for agreement by chance alone. Kappa values between 0 and 1 were categorized after Landis: 0 is no agreement, 0.01 to ≤0.20 is slight agreement, 0.21 to ≤0.40 is fair agreement, 0.41 to ≤0.60 is moderate agreement, 0.61 to ≤0.80 is substantial agreement, and 0.81 to ≤1.0 is almost perfect agreement.[18] Kappa statistics were evaluated for AG, IM, and dysplasia in the random and targeted biopsies to assess the overall agreement. For the agreement per intragastric location, kappas were calculated for the presence of AG, IM, and dysplasia in the random biopsies. The stages 0-IV of the OLGA and the stages 0-IV of the OLGIM were evaluated for agreement, patient characteristics, patient distribution, and gastric cancer risk. Categoric variables were compared by using chi-square tests and the McNemar test. A 2-sided P value of $<.05$ was considered to be statistically significant.

RESULTS

Overall, 204 patients were eligible for inclusion. Contact information was missing or wrong in 28 patients, and 51 patients refused to participate in this study. In total, 125 patients with a previous diagnosis of IM or dysplasia (69 male, 56 female) with a mean (±SD) age of 61 ± 11.7 years underwent surveillance endoscopy (Table 3). Ninety-eight patients (78%) were of Dutch origin, 53 patients (42%) had a previous history of *Helicobacter pylori* eradication, and 41 patients (33%) had a history of peptic ulcer disease. According to the index histologic findings, 63 patients (50%) had been diagnosed with IM and 62 (50%) with dysplasia (Table 3). At surveillance endoscopy, 9 patients (7%) were diagnosed with AG and 76 (61%) with IM as the most advanced lesion. Low-grade and high-grade dysplasia were diagnosed in 5 (4%) and 2 (2%) patients, respectively. In the remaining 33 patients (26%), no premalignant lesion was diagnosed, and 29 (89%) were diagnosed with chronic active gastritis.

The biopsy specimens of 30 patients with a diagnosis of gastric cancer were collected. After histologic revision, the biopsy specimens of 10 (33%) of these patients were excluded because either the antrum or the corpus specimens did not contain noncancerous tissue required for OLGA and OLGIM classification. The biopsy specimens of the 20 remaining gastric cancer patients (67%) were included for gastric cancer risk assessment.

Interobserver agreement

Overall, agreement between 3 GI pathologists was moderate to substantial for AG (κ = 0.6) and almost perfect for IM (κ = 0.9) (Table 4). There was slight agreement for low-grade dysplasia and moderate agreement for high-grade dysplasia (κ = 0.2 and κ = 0.5, respectively).

TABLE 3. Baseline characteristics and OLGA and OLGIM staging of our study population (n = 125)

	Total (%)	OLGA staging					OLGIM staging				
		0	1	2	3	4	0	1	2	3	4
n	125	41	24	30	22	8	46	22	28	20	9
Gender											
Male	69 (55)	26	11	15	14	3	27	11	14	14	3
Female	56 (45)	15	13	15	8	5	19	11	14	6	6
Mean age (SD)	61 (11.7)	56.9	64.4	63.7	60.6	66.4	58.0	63.2	63.0	61.8	66.0
Ethnicity											
White	98 (78)	26	20	27	17	8	32	17	24	16	9
Non-white	27 (22)	15	4	3	5	0	14	5	4	4	0
Medication use											
PPI	74 (59)	25	15	14	13	7	28	13	12	13	8
NSAIDs	22 (18)	33	3	7	3	1	7	5	6	2	2
H. pylori eradication	53 (42)	18	11	9	11	4	19	9	8	13	4
Index endoscopy											
IM	63 (50)	21	9	18	11	4	24	9	16	10	4
DYS	62 (50)	20	15	12	11	4	22	13	12	10	5
Surveillance endoscopy											
None	33 (26)	33	0	0	0	0	33	0	0	0	0
AG	9 (7)	2	6	0	1	0	9	0	0	0	0
IM	76 (61)	6	17	29	19	5	4	22	27	18	5
LGD	5 (4)	0	1	1	1	2	0	0	1	1	3
HGD	2 (2)	0	0	0	1	1	0	0	0	1	1

AG, Atrophic gastritis; *DYS*, dysplasia; *HGD*, high-grade dysplasia; *IM*, intestinal metaplasia; *LGD*, low-grade dysplasia; *NSAID*, nonsteroidal antiinflammatory drug; *OLGA*, operative link on gastritis assessment; *OLGIM*, operative link on gastric intestinal metaplasia assessment; *PPI*, proton-pump inhibitor.

TABLE 4. Interobserver agreement (kappa values) for the overall agreement and agreement per intragastric localization

	Overall*	Antrum†	Angulus†	Corpus greater curvature†	Corpus lesser curvature†	Cardia†
AG	0.64	0.47	0.59	0.77	0.85	0.57
IM	0.87	0.81	0.88	0.90	0.95	0.86
DYS	0.41	0.18	0	0	0.49	0
LGD	0.18	0.20	0	0	0.27	0
HGD	0.55	0	‡	‡	0	‡

AG, Atrophic gastritis; *DYS*, dysplasia; *HGD*, high-grade dysplasia; *IM*, intestinal metaplasia; *LGD*, low-grade dysplasia; *OLGA*, operative link on gastritis assessment; *OLGIM*, operative link on gastric intestinal metaplasia assessment.
*Targeted and random biopsies.
†Random biopsies.
‡No patients were diagnosed with HGD in antrum, angulus, or cardia.

TABLE 5. Interobserver agreement (kappa values) for different stages of the OLGA and OLGIM staging systems

Stage(s)	OLGA	OLGIM
0-IV	0.38	0.58
0	0.56	0.88
I	0.19	0.48
II	0.29	0.31
III	0.36	0.48
IV	0.48	0.59
III-IV	0.48	0.61

OLGA, operative link on gastritis assessment; *OLGIM*, operative link on gastric intestinal metaplasia assessment.

Table 4 demonstrates the agreement for the overall diagnosis, based on random and targeted biopsies together, as well as the agreement per intragastric localization based on random biopsies only. The agreement for antral and angular random biopsies for AG was moderate (κ = 0.5 and κ = 0.6, respectively), whereas agreement for IM for both intragastric localizations was almost perfect (κ = 0.8 and κ = 0.9, respectively). For corpus biopsies, overall agreement for AG was substantial to almost perfect for corpus greater curvature and corpus lesser curvature and was almost perfect for both localizations for IM (Table 4). Agreement for dysplasia varied from no or slight agreement for the antrum, angulus, cardia, and greater curvature biopsies of the corpus to fair agreement for the corpus lesser curvature. Table 5 demonstrates the agreement for the stages of OLGA and OLGIM. The overall agreement was fair for the OLGA and moderate for the OLGIM. Both the individual stages III and IV as well as their combination had an improved interobserver agreement in the OLGIM compared with the OLGA (Table 5).

OLGA versus OLGIM

Eighty-four patients (67%) were classified as stage I-IV according to the OLGA (stage I, n = 24; stage II, n = 30; stage III, n = 22; stage IV, n = 8) and 79 patients (63%) were classified as stage I-IV according to the OLGIM (stage I, n = 22; stage II, n = 28; stage III, n = 20; stage IV, n = 9) (P = .23). The baseline characteristics were not significantly different between the stages 0-IV of the OLGA and the stages 0-IV of the OLGIM (Table 3). In total, 30 patients (24%) clustered in stage III-IV in the OLGA and 29 patients (23%) clustered in stage III-IV in the OLGIM.

Table 6 demonstrates the differences between patient distribution in the stages 0-IV according to the OLGA and patient distribution in the stages 0-IV according to the OLGIM. Overall, in 104 patients (83%) the gastric cancer risk was classified equally in the OLGIM and the OLGA. The gastric cancer risk of 13 patients (10%) was downgraded with the OLGIM compared with the OLGA, whereas 8 patients (6%) were classified as having a higher risk (Table 6). Among the 13 patients that were downgraded according to the OLGIM, the most severe grade of IM was mild in 3 patients (23%), moderate in 1 patient (8%), and marked in 1 patient (8%). The remaining 8 patients (62%) demonstrated no IM, but marked AG in 1 patient (8%), moderate AG in 1 patient (8%), and mild AG in 6 patients (46%). Within the group of 8 patients who were classified as having a higher gastric cancer risk according to the OLGIM, the most severe grade of IM was mild in 3 patients (37.5%) and moderate in 2 patients (25%). In addition, 3 patients (37.5%) had a most-severe diagnosis of marked IM, of which 2 also had a diagnosis of low-grade dysplasia.

Of the dysplasia patients, 5 patients (4%) had a diagnosis of low-grade dysplasia and 2 patients (2%) had a diagnosis of high-grade dysplasia. The prevalence of dysplasia in stage III-IV was 17% (5/30) and 21% (6/29) for the OLGA and the OLGIM, respectively (Table 3). Both patients with high-grade dysplasia clustered in stage III-IV of the OLGA as well as the OLGIM. Out of the low-grade dysplasia patients, one patient was reclassified in stage III according to the OLGIM instead of stage I according to the OLGA, and 1 patient was reclassified in stage IV according to the OLGIM instead of stage III in the OLGA. A significant association was demonstrated between the severity of gastritis staging based on dysplasia and the stages I-IV in the OLGA as well as between the severity of gastritis based on dysplasia grading and the stages I-IV in the OLGIM (P = .02 and P = .001, respectively). In addition, considering together stages 0-II versus stages III-IV also resulted in a significant association between stages III-IV and dysplasia for the OLGA as well as the OLGIM ($P < .01$ and $P < .001$, respectively).

In the analysis of patients with gastric cancer, 10 patients (50%) were diagnosed with intestinal-type gastric cancer and 10 patients (50%) with diffuse-type gastric cancer. Of the 10 intestinal-type gastric cancer patients, 5 (50%) were classified in stage III-IV of both the OLGA and OLGIM, and 5 (50%) were classified in stage 0-II of both OLGA and OLGIM. Out of the 10 diffuse type gastric cancer patients, 1 (10%) was classified in stage III-IV of both OLGA and OLGIM, whereas 9 (45%) were classified in stage 0-II of both OLGA and OLGIM. In addition, significantly more patients with intestinal-type gastric cancer were classified in stage III-IV of OLGA and OLGIM than those with diffuse-type gastric cancer patients (P = .05).

DISCUSSION

This study demonstrates that replacement of AG by IM in the staging of gastritis increases interobserver agreement considerably. In addition, the correlation with the severity of gastritis remains at least as strong. Therefore,

TABLE 6. Patient distribution in the OLGA staging system *versus* the OLGIM staging system

	OLGIM					
	Not fat: stage 0	**Stage 1**	**Stage 2**	**Stage 3**	**Stage 4**	**Total**
OLGA						
Stage 0	38	3	0	0	0	41
Stage 1	6	16	1	1	0	24
Stage 2	1	2	25	2	0	30
Stage 3	1	1	2	17	1	22
Stage 4	0	0	0	0	8	8
Total	46	22	28	20	9	125

OLGA, operative link on gastritis assessment; *OLGIM*, operative link on gastric intestinal metaplasia assessment.

the OLGIM may be preferred over the OLGA for the prediction of gastric cancer risk in patients with premalignant gastric lesions.

Endoscopic follow-up of premalignant gastric lesions should be limited to patients at high cancer risk. *H pylori* virulence, environmental factors, and the presence of concomitant associated lesions are well-known risk factors.[19-23] In addition, the intragastric extent, distribution, and severity of premalignant gastric lesions have consistently been related to gastric cancer risk. For instance, the severity and extent of IM are important predictors of gastric cancer risk,[16,24-27] with a more than 5-fold increased risk of gastric adenocarcinoma in patients with IM involving the lesser curvature of the corpus.[25] However, diagnoses of AG, IM, and even dysplasia are often disregarded in clinical practice.[3] Recently, the OLGA system was proposed to improve clinical relevance of histologic findings regarding prognosis, therapy, and management of patients with premalignant gastric lesions.[6] Although this system has great potential in guiding clinical decisions, the use of AG as the principal parameter may be its major drawback, most importantly for reasons of reproducibility.

The present study shows that the level of agreement on a diagnosis of AG according to the Sydney classification is moderate at best. In contrast, agreement on the presence of IM was almost perfect. These observations are in line with earlier studies. Despite the simple definition of atrophy and the introduction of visual analog scales, the agreement for presence and grading of AG was slight to moderate (kappas for AG ranged from 0.08 to 0.5), whereas agreement on the diagnosis of IM was substantial to almost perfect (kappa values from 0.68 to 0.92).[10,11,14,28] As was shown in earlier studies, we demonstrated that improved agreement was observed for AG from the oxyntic mucosa biopsies compared with biopsies from the antrum, which is explained by the small number of gastric glands in normal antral mucosa.[12,29,30]

Gastric dysplasia is often a difficult histologic diagnosis, which results in poor interobserver agreement.[31] In addition, geographic differences exist for the assessment of dysplasia and gastric cancer between the East and the West, despite the introduction of classification systems.[5,13,32-34] The present study confirmed that agreement for low-grade dysplasia still remains extremely poor (kappa value 0.2), whereas for high-grade dysplasia, agreement was moderate (kappa value 0.6). The disagreement for the diagnosis of low-grade dysplasia among our 3 expert pathologists implies that clinical decisions in difficult cases may not benefit from multiple expert opinions. In contrast, a third expert opinion adds to agreement on the diagnosis of high-grade dysplasia and may guide clinical decisions on surveillance or intervention.

In this study, IM was proposed as marker for assessing gastric cancer risk. IM is the next step in the Correa model for gastric cancer development.[1] In this model, AG progresses to IM, which can progress to dysplasia and eventually to gastric adenocarcinoma over a time frame of several years to decades. The effectiveness of IM instead of AG in predicting gastric cancer remains dependent on the reproducibility for this proposed marker and the inclusion of a subpopulation of patients at high gastric cancer risk. The present study shows that in line with the higher interobserver agreement for IM compared with AG, the replacement of AG in the OLGA by IM (OLGIM) improves reproducibility and thus leads to a more consistent gastric cancer risk assessment in patients with premalignant gastric lesions. With this adaptation, fewer patients were categorized in stage I-IV and particularly in stages III-IV in the OLGIM, creating a smaller population for whom surveillance should be considered. In addition, the correlation between the severity of gastritis for OLGA and OLGIM stages remains at least as strong for AG, IM, and dysplasia patients. For these reasons, the OLGIM may result in a smaller and better-defined subpopulation of patients at

risk of gastric cancer compared with the OLGA. As a result, use of the OLGIM might lead to more feasible and cost-effective surveillance strategies for patients at risk of gastric cancer and a more consistent gastric cancer risk assessment. This is clinically relevant, because gastric cancer remains a common condition, but other than with conditions like Barrett's esophagus or colonic adenomas, most endoscopists do not know how to manage patients with premalignant gastric lesions.

Emphasizing the OLGIM as an additional parameter to the OLGA rather than an alternative parameter seems unjustified. However, in clinical decision making, the histologic system should preferably be combined with individual risk factors for gastric cancer,[16,35,36] as was illustrated by 2 cases with moderate and marked AG, which were downgraded according to the OLGIM compared with staging with the OLGA.

A few limitations of our study warrant consideration. First, although both OLGA and OLGIM stages 0-II were common in the mucosa surrounding gastric cancer, we did not demonstrate significant differences between both classifications; however, we included only a small number of patients. Therefore, this analysis supports our main finding that assessment of AG may be replaced by assessment of IM when staging gastritis. Large prospective studies with adequate follow-up, in several countries with a wide spectrum of gastric cancer incidences, are necessary to confirm our data and to evaluate the prognostic value of both staging systems.[8,9] Second, 3 expert GI pathologists assessed gastric biopsies in this study. Therefore, interobserver agreement may be higher than in routine clinical practice. However, the far-from-perfect kappa values for AG emphasize that gastritis staging according to the OLGA should probably not be introduced for routine assessment. Third, we obtained 12 biopsy specimens instead of 5 biopsy specimens according to the Sydney classification. However, it remains controversial whether those 5 biopsy specimens are sufficient for an adequate diagnosis of IM and dysplasia.[4,37] Moreover, owing to the sometimes patchy distribution of premalignant lesions, the risk of missing these lesions is high. Therefore, we think that our biopsy strategy in the present study is justified, and that correlation between OLGIM stages and gastric cancer risk increases with this strategy. Finally, it remains unclear which patients with dysplasia will develop gastric cancer. However, an earlier large study demonstrated that 4% to 33% of patients with mild to severe dysplasia develop gastric cancer within 10 years.[3] Because the OLGIM seems to predict dysplasia more adequately than the OLGA, the use of this new staging system may lead to optimal patient identification with the aim of further reducing gastric cancer incidence in the future.

In conclusion, IM staging yields more accurate results regarding reproducibility and at least as strong results in assessing the severity of the disease compared with AG staging. These observations support the use of the proposed OLGIM for gastric cancer risk assessment instead of the OLGA, and provide clinicians with an easy tool to identify patients with advanced premalignant gastric lesions. However, owing to the lack of long-term outcomes and the relatively small number of patients with gastric cancer included in this study, larger long-term prospective studies are needed to confirm the correlation between OLGIM stages and gastric cancer risk.

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