High resolution micro-endoscopy for the diagnosis of gastric carcinoma and precancerous lesions

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Objectives

In this study, experiments were designed and conducted to explore the value of high resolution micro-endoscopy (HRME) to the diagnosis of gastric cancer and precancerous lesions in clinics.

Methods
Firstly, HRME was examined in the gastric biopsy specimens of 5 gastric cancers, 5 gastric precancerous lesions, 5 normal gastric antrum mucosae, and 5 normal gastric fundus mucosae obtained by endoscopy. Secondly, the characteristics of the HRME images were analysed. Diagnostic criteria of HRME were summed up for the normal gastric mucosa, gastric cancer and gastric precancerous lesion. Thirdly, the 15 human gastric cancer specimens obtained during surgery were imaged for HRME. Each gastric cancer specimen has 4 imaging positions. 60 HRME images were analysed. Based on the diagnostic criteria, HRME results were obtained. Lastly, the results were compared with the pathological findings. The value of HRME to the diagnosis of gastric cancer and precancerous lesions was evaluated.

Results

Diagnosis was realized by analysing the nucleus size, shape, arrangement, gland, the structure of the glandular tube, and calculating the nucleo-cytoplasmic ratio in the ROI. Normal gastric mucosa has the following characteristics: the nuclei were in the same size, regular shape, neat structure of the glands and the glandular tube. Gastric pit openings were tubular or elliptic shaped, and cells around gastric pit arranged regularly.

Gastric fundus mucosa is showed in Figure 1(a). A large number of closely packed glands were seen. Gastric pit openings were oval or long
branching, fracture was linear, and the nuclei were arranged regularly. HRME of gastric antrum mucosa is shown in Figure 1(b). Gastric pit openings were irregular or tubular shaped, glandular cavity was fissure shaped. Cells around gastric pit arranged regularly, and the nuclei were small and densely distributed. Figure 1(d) is the HRME of the gastric cancer. Nuclei were more irregularly sized, arranged disorderly. Gland size difference was very big, and structure was not clear or unable to discern glands. Gastric pit structure was destroyed, and normal gastric pit structures disappeared. The characteristics of precancerous lesion are between the gastric cancer and the normal gastric mucosa, as shown in Figure 1(c).

HRME results indicated that the number of normal gastric mucosa, gastric precancerous lesions, and gastric cancer was 18, 14, and 28, respectively. Pathological results showed that 21 normal gastric mucosa, 16 gastric precancerous lesions, and 23 gastric cancers. After statistical analysis, diagnostic accuracy, specificity, sensitivity, negative predictive value and positive predictive value of HRME for gastric carcinoma and precancerous lesions are shown in the Table 1.

**Conclusions**

Data showed that HRME this novel imaging method had great value in the detection of gastric cancer and precancerous lesions.
Figure 1. (a)-(d) is the HRME of gastric fundus mucosa, gastric antrum mucosa, gastric precancerous lesion, and gastric cancer, respectively.
Table 1. Diagnostic accuracy, specificity, sensitivity, negative predictive value and positive predictive value of HRME for gastric carcinoma and precancerous lesions.

<table>
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<td>gastric precancerous lesions</td>
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<td>91.0%</td>
<td>83.3%</td>
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<td>87.0%</td>
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