Hong Kong Society of Gastroenterology

December 2002

Message from the President, Professor Joseph Sung

Merry Christmas and a Happy 2003 to all our Members and Fellows!

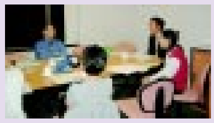
The year 2002 has been another successful year for the Hong Kong Society of Gastroenterology in promoting high standard of Gastroenterology practice in Hong Kong.

Two major meetings were held this year: the Annual General Meeting and get-together 20th Anniversary Dinner in March, 2002 and the Joint Annual Scientific Meeting in September, 2002. Both meetings were well received by fellows and members.

This year, our Joint Scientific Meeting is unprecedentedly co-sponsored by 4 sister societies, namely The Hong Kong Society of Digestive Endoscopy, The Hong Kong Association for the Study of Liver Diseases, Hong Kong Society for Coloproctology and The Hong Kong Society of Gastrointestinal Motility. Our friends and colleagues not only filled the Grand Ballroom with their presence but their enthusiasm and active participation. A number of thought-provoking questions were raised and discussed during the plenary sessions. The oral sessions were remarkable and the stimulating presentations by our distinguished speakers were particularly inspiring.

Our Society continues to promote research in Gastroenterology. Two GERD projects funded by our Society are presently in good progress and are expected to be completed by the end of 2003. I am looking forward to sharing their findings with our members.

Last but not the least, I am most thankful to Dr. W M Hui for his continuous effort in editing this newsletter. My heartfelt appreciation also goes to Dr. Michael Li and Dr. Nelson Kung for contributing scientific updates on Wireless Capsule Endoscopy *and,* Chromoendoscopy and Magnification Endoscopy *respectively. As this is the Society's only official publication, I call upon all members and fellows to embrace this project by your contributions and suggestions.*



Scientific Updates

Chromoendoscopy and Magnification Endoscopy

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Introduction

Chromoendoscopy, *(chrom-, chromo- [Gk. Chrõma] meaning color or pigment)*, synonymous with chromoscopy, is an 'old' endoscopic tissue-staining technique that has been practised in Japan since early days of fibre-endoscopy. Earlier reports in the seventies discussed on endoscopic diagnosis of gastric cancer (1) or characterisation of colonoscopic lesions (2). In essence, dye spraying allows improved visualisation of a subtle mucosal lesion that is not possible with conventional examination. The image is further enhanced by magnification technology. Since its inception, endoscopists from the rest of the world have embraced the technique with some skepticism. This review examines the resurged interest, and the advantages and pitfalls on the use of chromoendoscopy.

Methodology and Instruments

Applications of various stains are listed in Table 1. Vital stains such as methylene blue, lugol's iodine or toluidine blue, are fixed in the cell by means of diffusion or absorption through the cell membrane. On the other hand, a contrast stain is not absorbed by the epithelium, but disperses into mucosal elevations and crevices, thus defining the topography of the area better. Indigocarmine is a common example of a contrast stain, and in addition, it is inexpensive, non-toxic, and does not require prior therapy with mucolytic. Applications with indigocarmine are not exclusive to the lower GI tract, but extends to detection of subtle villous atrophy, dysplasia within Barrett's oesophagus, intestinal metaplasia of the stomach, and delineating the margins of gastric cancer (3). A zoom or high-resolution endoscope is helpful. Generally, a gentle irrigation of the area of interest with water is followed by a 0.1-0.4% strength of indigocarmine sprayed through the biopsy channel (4), or via a spray catheter (PW-1L; Olympus) (5). In 1992, Mitooka et al reported an novel attempt to stain the whole colon uniformly blue using a capsule loaded with 100mg indigocarmine prior to bowel preparation. Despite increasing the yield of non-polypoid lesions by four-fold, the distal colon is usually insufficiently stained (6). Crystal violet is a vital stain that is preferentially taken up by the crypts of the Liebekuhn glands, and helps to highlight the disrupted pit patterns overlying early cancers, especially over erosive or depressed areas of a lesion. A few drops of 0.05% are sufficient, applied through a catheter, with prior irrigation, and the lesion viewed with magnification. Lugol's iodine has an affinity for glycogen containing squamous epithelium which is stained green-brown. Severe dysplasia and neoplasia disturbs the glycogen content and causes the lesion to be unstained in contrast to the surrounding mucosa. Its specificity is limited by the fact that decreased staining also occurs with severe inflammation, oedema and atrophy. Toluidine blue, a stain from the thiazine group, has an affinity for RNA and DNA which are richer in nuclei than normal mucosa. It reveals pre-invasive and malignant lesions, and locates satellite centres and carcinoma-in-situ. The best example of reactive stain is Congo Red (biphenylene napthadene sulfonic acid), which decomposes at a pH less than 3, causing a distinctive colour change from red to blue-black and can define the acid producing mucosa.

In 1975, Tada et al. described the first fiber-colonoscope with magnification up to 10 times. Recent magnifying endoscopes generally employ a zoom mechanism rather than a fixed focal point system. The zoom endoscopes have overcome previous shortcomings, notably, able to attain distant images during normal examination; a brighter field of view at magnification; lighter weight and an elevator-like control lever for easy operation (Olympus CF-Q240Z, 150x magnification on a 20 inch monitor; Pentax EC-3430 upper GI series, EC-3830 lower GI series, up to 150x magnification). High resolution endoscopes have a 410,000-pixel color chip (Fujinon Σ 400 series), wide focus, and high speed electronic shutters that provide high-resolution video images of clarity despite a modest area-ratio magnification. The latest developments include 850,000-pixel resolution as well as high-magnification functions up to 200x, but requires two separate switches for controlling optical and electrical zoom (Fujinon, EG-485ZH upper GI magnifying endoscope, EG-485ZW magnifying colonoscope). It is noteworthy that a magnifying video-endoscope with a large diameter may be more difficult to handle, resulting in a lower-than-average success rate for reaching the caecum (7).

Diagnosis of colorectal polyps and non-polypoid lesions

Two main areas in which chromo-colonoscopy confers significant advances include a) discrimination between benign and malignant polyps or non-polypoid lesions and b) correlating the extent of invasion in malignant flat adenomas or depressed lesions. Using indigocarmine with magnification or a high resolution system, the orderly arranged circular pits (crypts of Lieberkühn) as seen in hyperplastic polyps versus the "groove" and "sulcus" appearance of adenomatous polyps can be readily differentiated. In a German study, 'new' lesions that are not initially apparent at conventional colonoscopy were revealed with dye spraying in 27 of 48 subjects (56%). 93% of these small lesions were hyperplastic, a minor proportion (7%) were adenomatous. Among the adenomatous lesions, one had high-grade intraepithelial neoplasia (5). A study performed at Georgetown University, USA, using Fujinon 400 series high-resolution colonovideoscope, showed that the sensitivity and specificity in separating adenomatous from non-adenomatous polyps reached 93% and 95% respectively (7). Other similar studies from Taiwan and America confirmed an overall diagnostic accuracy of 80.1% and 82% respectively (8, 9). Because adenomatous polyps tend to bleed in reaction to a spray-jet, a technique known as pressure dye spray using dilute 0.035% indigocarmine ejected via a spray-type cannula (PW-5V-1, Olympus) by a water pump system can also be used to achieve the differentiation (10). Ideally, the negative predictive value (percentage rate predicting the polyp is not an adenomatous polyp) should be 100% so that adenomas are not overlooked. Although some investigators propose that diminutive (<5mm) polyps which are chromoendoscopically "hyperplastic" may be left un-biopsied or unresected (5), others consider the current level of diagnostic accuracy suboptimal to replace mucosal biopsy as the gold standard (8,11). Furthermore, a subset of hyperplastic polyps may not be innocuous. Large, multiple and proximally located ones have a potential for neoplastic progression (12), and a proportion may exhibit microsatellite instability, which is present in some sporadic colorectal cancers (13). With a 'normal' video-colonoscopic finding, the unmasking of new adenomatous lesions using routine dye spraying to the distal colon (5) generates some debate, whether this approach should be adopted routinely currently lacks consensus.

Flat adenomas, or superficially elevated mucosal neoplasia of the colon, characteristically demonstrate high-grade dysplasia despite their small size. This crucial finding is not confined to Japanese studies alone (14), but also observed in North American population (15), and asymptomatic British population (16). Saitoh et al used 0.1% indigocarmine in identifying four features which correlate with invasive submucosal cancer (sm2-3 depressed-type lesions), namely a) expansion appearance b) deep depression surface c) irregular depression surface and d) converging folds (17). Utilising high magnification, Kudo et al. had pioneered the concept of "pit patterns" which correlates well with histology, and has led to improved differentiation of endoscopically inapparent colonic 'flat' or 'depressed' lesions (18). A classification of pit pattern has been described (Table 2). Types I and II are characteristic of non-cancerous lesions, most lesions with types III_S or III_L, IV, V_I patterns represent intramucosal neoplastic lesions, and pattern V_N represents deep invasive carcinomas. Small depressed lesions have important connotations in colorectal cancer screening, since fifty percent of these show severe dysplasia or carcinoma despite a small size (< 10mm) (19). Other applications of indigocarmine dye and magnification include confirmation of residues of neoplastic lesions after EMR (Endoscopic Mucosal Resection), and endoscopic surveillance of longstanding ulcerative colitis (20). Chromoscopy and magnification serves a lesser role in large polyps and advanced cancers. For optimal results of the above techniques, adequate bowel preparation is a prerequisite.

Chromoendoscopy for Barrett's oesophagus

Barrett's oesophagus, defined by the histological presence of specialised intestinal-type metaplasia (SIM) within an endoscopically visible columnar-lined oesophagus, confers a significant risk in dysplastic changes and oesophageal adenocarcinoma. Beyond the naked eye, the columnar lined oesophagus can be a mosaic of different types of epithelia including junctional, cardiac, or SIM. Methylene blue is a vital stain which is selectively taken-up by the cytoplasm of actively absorptive cells in normal intestine, colon, and in this context, specialised intestinal metaplasia. It does not stain non-absorptive epithelia e.g. squamous or gastric mucosa, or gastric-type metaplasia within the distal oesophagus. Positive staining is defined as the presence of blue-stained, non-eroded mucosa that persists despite water irrigation. Non-dysplastic long segment Barrett's, > 3cm, generally stains in a diffuse and homogeneous fashion. In contrast, non-dysplastic short-segment Barrett's oesophagus can stain in a focal or diffuse pattern. An increasing grade of dysplasia (loss of goblet cell, increased nuclear size, decreased cytoplasm) is associated with decreasing stain intensity. Staining for SIM in long segment Barrett's is highly accurate (92%), but less so in short segment Barrett's (74%) because of inherent problems of patchy distribution of intestinal metaplasia (21). In addition, false positive staining are possible in active oesophagitis or underwashing with water. Overall, directed-biopsies can be fewer in number and more precisely located (22). An additional 5-7 minutes of procedural time is usually needed (21). The technique involves several steps: removal of surface mucus with 10-20mL of 10% N-acetylcysteine with a washing catheter; spraying of 0.5% of methylene blue on the columnar line oesophagus with a one to two minute dwell time; then given vigorous washing of excess dye using a 60mL syringe with up to 300mL of water (23,24). Magnification may further improve discrimination of SIM from gastric metaplasia and non-dysplastic from dysplastic specialised columnar epithelium (25,26). Currently, surveillance biopsy for Barrett's associated early carcinoma is costly and at best, random even with established biopsy protocols. The difficulty in identifying pockets of dysplasia with unaided endoscopy is undisputed. Some reports indicated that abnormal staining pattern (unstained or heterogeneous staining) strongly correlated with high-grade-dysplasia or early-staged adenocarcinoma (21,24). Directed-biopsy may reduce the cost of surveillance compared with four-quadrant random biopsy technique (23), and can lead to effective endoscopic mucosal resection in early-staged cancers (27). Others have used 1% toluidine blue to provide a qualitative mapping of Barrett's (28), or 0.05% crystal violet following methylene blue under magnification has also been attempted to further improve characterisation of the mucosal surface (24). Notwithstanding the advantages of MB staining being inexpensive and simple to perform, the accuracy reported by other studies were conflicting. E.g. in Wo's series with 35 patients, the sensitivity and specificity of MB staining to detect SIM was poor, at 56% and 51%, and for dysplasia 51% and 48% respectively, with no demonstrable advantage over conventional biopsies (29). Variability of results may be accounted by the subjective nature of stain interpretation, differences in study design and data expression, as well as staining techniques such as variations in strength of methylene blue, dwell time, washing techniques amongst different studies. The procedure is generally safe with low morbidity. The main theoretical risk is aspiration especially with large volumes of water irrigation. One report revealed significant side effects with vomiting and patient discomfort related to MB staining (30).

Early detection of oesophago-gastric cancer

Two major applications of Lugol staining are i) surveillance of squamous cell carcinoma (SCC) of oesophagus in alcohol / tobacco users and ii) evaluation of tumour-extent in oesophageal SCC. In one report, the use of 3% Lugol's iodine solution demonstrated well demarcated iodine-unstained lesions in 12% of high-risk asymptomatic subjects. Biopsy yielded dysplastic lesions in 26% of unstained areas, eight times higher than that from random biopsies of uniformly stained mid-oesophagus (31). The major drawback however, was a low sensitivity (46%), because random biopsies also detected similar percentage of dysplastic lesions overall. Side effects of Lugol staining include retrosternal burning, oesophageal spasm, or laryngospasm. Iodine allergy is a contradindication for its use. The maximum volume used should be limited to 20mL and spraying close to the larynx should be avoided (32). Iodine-induced irritation can be neutralised by spraying of 20mL 5% sodium thiosulfate solution at the end of procedure (33). Toluidine blue can also be used for detecting squamous cell oesophageal cancer in isolated reports, though the technique is not commonly adopted (34). For early detection of gastric cancer, Congo-red-methylene blue dye has been used, but recent reports are few in number. Visibility of gastric chromoscopy is often hampered by the mucus layer. Mucolytic pre-treatment with pronase (proteolytic enzyme from the culture filtrate of *Streptomyces griseus*) has been recommended (35).

Conclusion

Dye spraying is invaluable in displaying the topography of small and non-polypoid mucosal lesions of the lower GI tract. 'Pit pattern' observation by magnification endoscopes allows analysis of microstructures of small, flat lesions. By distinguishing hyperplastic from adenomatous polyps, 'endoscopic-forecast' with indigocarmine may have a role in reducing histopathologic evaluation for diminutive colonic polyps, but larger polyps should be resected irrespective of visual characteristics. Histological confirmation should continue to play an important role in lesions of doubt and in exclusion of malignant invasion. Since the dye is normally applied onto faintly suspicious areas, it follows that chromo-magnified endoscopy is no substitute for an unhurried, careful routine examination. Although a potential reduction in the number of histologic evaluation may lead to cost-savings, procedure is lengthened using dye spraying and additional cost of video-magnification equipment needs to be considered. Hence, the cost-effectiveness of the technique remains to be firmly evaluated with rigorous prospective randomized studies. Methylene blue staining enhances the accuracy in diagnosing specialised intestinal metaplasia in Barrett's oesophagus, however, its applicability in detecting Barrett's related dysplasia and early cancer remains controversial because of the inconsistent and variable results. More data on the optimal staining techniques and interpretation of methylene blue or other dyes is needed to achieve a consensus. The use of Lugol's iodine stain assists surveillance of early squamous cell cancer of the oesophagus, but areas close to the larynx should be avoided. Endoscopy units should emphasize on training and the need to derive a protocol for the application and indications of various stains. An element of inter-observer and intra-observer variability in interpretation of findings is inevitable. Regular audits will be essential to evaluate if the accuracy of the adopted technique is close to that reported in the literature. An expansion of technology to detect early gastrointestinal mucosal cancers is currently being evaluated. These include endoscopic optical coherence tomography, laser induced fluorescence endoscopy, and fluorescein electronic endoscopy. Comparative results of the sensitivity and specificity of each modality would be made available in the future.

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Table 1 Characteristics of various types of stains used in chromoendoscopy

Stain	Strengh / dose	Mucolysis	Mechanism	Main clinical use
Indigocarmine	0.1 - 0.5% 3 - 5mL	not required	contrast stain	colonoscopie lesions
Crystal violet	0.05% drops	required	vital stain, taken up by crypts of gland	colonoscopic lesions
Methylene blue	0.5%	required	vital stain, taken up by cytoplasm of colonic or small bowel epithelium	Barrett's oesophagus - (SSBE diagnosis & mapping, dysplasia surveillance)
Lugol's solution	1 - 3% 20 - 30mL	not required	vital stain, glycogen in non-keratinized epithelium	surveillance for squarmous cell ca of oesophagus
Toluidine blue	1% 10mL	required	vital stain, stains maligant cellular nuclei blue	squamous ca oesophagus head and neck carcinoma mapping Barrett's metaplasia
Congo Red	0.3 - 0.5%	required	pH reactive stain defines acid - producing mucosa	early gastric carcinoma diagnosis of *H. Pylori*

Table 2 Classification of "Pit pattern" under magnification videoendoscopy *(Kudo et al, Ref.36)*

Pit Pattern Type	Morphological description	Histological Types
Type I	Round pits, regular in size and spacing	Normal colonic mucosa
Type II	Larger than normal, regular spaced pits, Star or onion - like shapes	Hyperplastic (69.4%) Adenomatous (30.5%)
Type III$_L$	Long or large, elongated pits	Adenomatous (92.7%) Carcinomas (4.2%)
Type III$_S$	Short, compactly arranged pits	Adenomatous (86.3%) Carcinomas (12.7%)
Type IV	Branched, elongated, ceribriform pits	Adenomatous (74.9%) Carcinomas (22.4%)
Type V	irregular pit pattern; or non - structural, with a rough often ulcerated surface	Irregular pattern : ca (60.9%) Non - structural pattern : ca (93%)

Figure 1
(a) inconspicuous ascending colonic polyp, 0.2cm
(b) after indigocarmine, showing the groove and sulcus pattern and bleeding with spray jet; histology: tubular adenoma with mild dysplasia


a


b

Figure 2
(a) T1 (SM) gastric adenocarcinoma at antrum
(b) indigocarmine spray delineates lateral margin
(c) after EMR


a


b


c

Figure 3
(a) Unstained area at mid-oesophagus, 3% Lugol's iodine applied
(b) after EMR, histology confirmed T1 squamous cell carcinoma

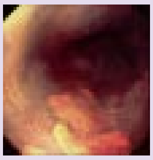
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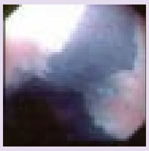
Figure 4
(a) Barrett's oesophagus
(b) uniform staining with methylene blue 0.5% in a tongue of specialised intestinal metaplasia
(c) biopsy of focal unstained area showed gastric-type metaplasia


a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A New Frontier in Endoscopy : Wireless Capsule Endoscopy

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Background

The advent of endoscopy has indisputably revolutionized our understanding and management of gastrointestinal disorders by identification of the luminal lesions. Although this method provides excellent visualization of the upper and lower gastrointestinal tracts, progress in small bowel imaging is slow-moving. Different endoscopic methods have been devised to achieve this goal *(Table 1)* in the last 2 decades. Yet their widespread uses are still hampered by incompleteness of small bowel visualization, patient intolerance, procedure related morbidity and mortality. Nevertheless, they play an important role in the algorithm for investigation of small bowel diseases.[1-3]

Table 1

Endoscopic methods		Advantage	Disadvantage
Push enteroscopy	- Procedure time (10-45min) - Diagnostic yield (38-75%) - Length of insertion (15-160cm)*	- Excellent visualization - Therapeutic intervention possible	- Complication (mucosal tear, perforation) - Limited insertion length
Sonde enteroscopy	- Prolonged procedure time (insertion 4hrs, withdrawal 45min) - Insertion length (ileal intubation in 60-75%) - Diagnostic yield (26-54%)	- Longer insertion length	- Complication (perforation) - Patient intolerance - Limited visualization - Therapeutic intervention impossible
Intra-operative enteroscopy	- Diagnostic yield (70-100%)	- High dianostic yield - Therapeutic intervention possible	- High complication rate (0-52%) - Mortality up to 11% - False-positivity due to manual manipulation

**Beyond ligament of Treitz*

Wireless Capsule Endoscopy (WCE)

In May 2000, an innovative device, which was capable of small bowel imaging, was announced by a dedicated team represented by Dr Paul Swain at the ASGE plenary session and it was published in the same issue of *Nature*.[4] It is a miniaturized radio-telemetry video-camera incorporated into a small swallowable capsule with a transparent optical dome. It consists of the following electronic components: 4 white light-emitting diodes (LED), one complimentary metal oxide silicon (CMOS) image sensors, one application-specific integrated circuit (ASIC) transmitter, and silver oxide batteries *(Fig 1)*. An aerial system *(Fig 2)* is applied to the skin of the subject's abdomen and is connected to a portable solid-state data recorder carried by the subject. The technology involves the capturing of video image by the CMOS, transmission of the image via telemetry to the data recorder, image processing in the computer workstation, and image display on the computer monitor with a software package which allows image manipulation at various speed either by manual control or in automated fashion *(Fig 3)*.

Patient preparation

The study subject generally requires an overnight fast prior to the procedure. The capsule is then swallowed with water in the morning. Beverage is allowed after 1 hour and a light meal is permitted after 4 hours. In one study, if the bowel is prepared with a 24-hour fluid diet followed by an oral purge with PEG solution the day before the procedure, a better quality small bowel image results.[5] The aerial system can be disconnected from the patient after about 7 hours of recording.

Experimental studies

The device was first tested in 10 normal human volunteers who were asked to swallow the capsules.[4] High-quality images were obtained for up to 6 hrs. The capsules were all evacuated after 24 hrs (10-48 hrs). No discomfort was reported. Later, WCE was compared to push enteroscopy (PE) in 9 dogs with 9-13 surgically placed radiopaque, colored beads (3-6 mm diameter) inside their small bowels.[6] The overall sensitivity of bead detection by WCE was 64% compared with 37% by PE (p<0. 001) whereas the specificities were similar (92% vs. 97%). Besides, WCE detected more unexpected pathology at the bowel segment beyond the reach of PE. Interestingly, if the sensitivity of WCE within the range of PE was compared, PE showed higher sensitivity (53% vs. 94%).

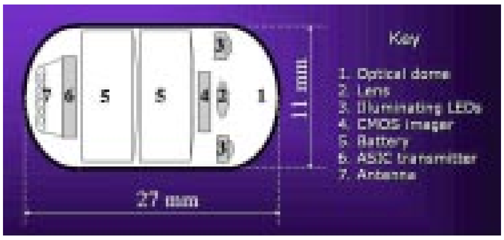

Figure 1 (a)


Figure 2

Figure 1 (b)


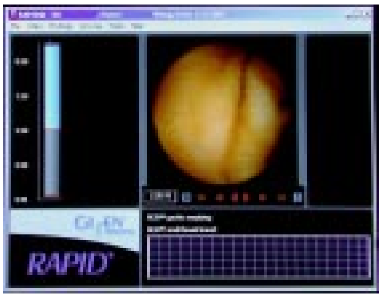

Figure 3

Table 2

Author	Subject No.	Indication*	Positive Findings	References
Lewis, New York	75	66 OGIB 9 Suspected SI lession	39 (59%) 0 (0%)	7
Schulmann, Germany	12	OGIB	9 (75%)	8
Jensen, L.A.	21	OGIB	8 (38%) 48% change in treatment	9
Lo, L.A.	37	OGIB	22 (59%) likely 6 (16%) probable	10
Janowski, Boston	39	OGIB	29 (74%) 59% change in treatment	11
Chutkan, Washington	20	OGIB	14 (70%)	12
Hahne, Germany	11	OGIB	8 (73%)	13
Mascarenhas-Saraiva, Portugal	28	OGIB	22 (82%)	14
Soriano, Boston	46	OGIB	5 (8.7%) had gastric or SI Dieulafoy's lessions	15
Firemen, Israel	17	Suspected SI Crohn's	12 (71%)	16
Mow, L.A.	10	Suspected IBD	9 (90%)	17
Sant'anna, Canada	9	Pediatric patients (3 OGIB, 3 suspected Crohn's, 3 suspected polyposis)	All confirmed Dx	18

**OGIB = Obscure GI bleeding, SI = Small intestinal, IBD = Inflammatory bowel disease*

Clinical studies

Although most of the clinical studies of WCE were available in case reports or abstract forms, its application had been quite diverse. In the DDW 2002, VCE had been reported in different conditions such as iron deficiency anemia, obscure GI bleeding, inflammatory bowel disease, small bowel transplantation, coeliac disease, GI polyposis syndromes, and pediatric GI disorders.

Obscure GI bleeding (OGIB)

Many studies examine the usefulness of WCE in OGIB, either after extensive conventional investigations or by comparison to PE.

Non-comparative trials

In most studies, the diagnostic yield by WCE is over 70%, ranging from 38-82% *(Table 2)*. Small bowel lesions identified include angiodysplasias, AV malformation, Dieulafoy's lesions, Crohn's lesions, tumors, varices, ulcers, Meckel's diverticulum and polyps. These findings frequently result in change of management plan.[9,11] Similar to reported experience with enteroscopy, WCE detected a substantial proportion of lesions within the reach of OGD or colonoscopy such as reflux esophagitis, Cameron's lesions, upper GI ulcers, esophageal varices, caecal tumor or angiodysplasia. It further emphasizes the necessity to repeat the "bidirectional" endoscopies in OGIB.

Comparative trials

In identification of lesions in OGIB, the sensitivity of WCE is clearly superior to that of PE *(Table 3)*. Delvaux et al. demonstrated that WCE identified lesions in 43 of 57 patients with OGIB compared to 32 by PE.[21] While the lesions were identical with both techniques in 27 patients, WCE detected lesions not seen at PE in 26 patients and conversely PE detected lesions missed by WCE in only 6 patients. Demedts et al. found that WCE was superior to PE only in identification of small intestinal and not gastric lesions as WCE missed 3 gastric lesions (Cameron's ulcer, small esophageal varix and cardiac lesions) in 2 of 10 patients.[24]

WCE is also showed to be superior to small bowel barium radiography (100% vs 15%) in 20 patients.[25] However, the exact site of the abnormal findings in small bowel identified by WCE could not be located in 9 patients. The author concluded that localization of the lesion by WCE is a major limitation.

Cost-effectiveness

An interesting study by Lo et al. looks at the issue of potential savings by WCE. 37 OGIB patients with a minimum of 97 admissions, 429 units of RC transfusion, 133 units of RC within preceding 3 months, 112 OGDs, 106 colonoscopies, 20 PEs, 48 small bowel barium studies, 32 RC scintigraphy, and 14 mesenteric angiograms underwent WCE.[26] The WCE images were revealed by 3 endoscopists. 23 patients were identified to have findings likely to be definite source of bleeding. Hence, it was concluded that if the definite diagnosis led to a curative therapy, about 2/3 of the patients would avoid subsequent hospitalization, transfusions and procedures. This study indicates a potential impact of WCE in health care resource utilization.

Inflammatory bowel disease

Small bowel involvement in inflammatory bowel disease may sometimes pose diagnostic difficulties. Fireman et al. applied this technology in 17 patients with suspected Crohn's disease of the small bowel that could not be confirmed by radiological or endoscopic methods. WCE was able to detect evidence of small bowel Crohn's disease in 12 (71%) patients.[16] Voderholzer et al. confirmed Crohn's disease of the small bowel in 3 similar patients.[27] One of these patients was treated as coeliac disease for 3 years and subsequently responded to steroid therapy.

Transit time

As the battery life of WCE is a major limiting factor in the completeness of small bowel visualization, realizing the gastrointestinal transit time of the capsule is crucial. The result is shown in *Table 4*. Fisher et al. found that the progress of the capsule was particularly slow in the pylorus, ileocaecal valve and caecum.[28] Besides, only 27 (47%) capsules entered the colon during the study. Balba et al. also noticed in 6 (30%) of 20 patients, the capsule did not reach colon by the end of recording time.[5] Lo et al. found that small intestinal ulcers are associated with slow transit or obstruction.[10] The average physician review time was 94 min and some physician concerned about tedium, definition of normal variations, and

Table 3

Author	Subject No.	Sensitivity of WCE vs PE No (%)	References
Andre, Belgium	21	3 (17%) vs 6 (31%)	19
Mylonaki, UK	38	21 (55%) vs 12 (30%)	20
Delvaux, France	57	43 (75%) vs 32 (56%)	21
Remke, Germany	32	Likely: 20 (62%) vs 7 (21%) Probable: 7 (21%) vs 3 (9%)	22
Pennazio, Italy	29	17 (59%) vs 8 (28%)	23
Demedts, Belgium	10	8 (80%) vs 5 (50%)	24

Table 4

Author	Subject No.	EsTT* (min)	GTT* (min)	SITT* (min)	Mean recording time (min)	References
Fisher, L.A.	57	2.2	56	210	411	28
Balba, Washington	20	n.a.	65.2	246	n.a.	5
Korman, Israel	10	n.a.	31	234	n.a.	29
Leighton, Arizona	15	2.0	37.6	201.2	418.9	30

**EsTT = Esophageal transit time, GTT = Gastric transit time, SITT = Small intestinal transit time*

identification of ileocaecal valve in the study by Leighton et al.[30]

Safety issues

Major adverse events were seldom reported in most of the clinical studies. This may be related to the exclusion of patients with suspected/confirmed intestinal stricture or those underwent bowel surgery. Failure of exit of the capsule resulting in surgical removal was reported by some investigators.[31,32] Bhinder et al. reported retention of the capsules in 4 of 46 patients investigated for OGIB.[31] 2 patients had a mean retention time of 39 (21-57) days prior to surgical intervention (stricture resection). The remaining 2 patients had the capsules passed after a mean of 5 (3-7) days. The resected specimen was confirmed to NSAID strictures with circumferential webs and few associated ulcers. Cave et al. suggested that the pre-procedure consent should include statement that the capsule may be retained and require surgical removal.[32] Retention of the capsule in a jejunal diverticulum for 5 hr was also reported.[7] Despite capsule retention, no obstructive symptom was experienced by these patients.

New developments

As mentioned above, localization of the lesions detected by the capsule is unsatisfactory, if not impossible. A new localization algorithm is developed by Jacob et al. with the cumulative percentage of better than 6 cm accuracy of 87%.[33] This initial result is impressive and warrants further validation in more patients. Lack of maneuverability resulting in inadequate esophageal and prolonged gastric/small intestinal imaging time leads to incomplete small bowel visualization because of limited battery life. Swain et al. shed light on solving these problems by incorporating an electro-stimulation device into the capsule.[34] By stimulating the electrodes on the back or the front of the device, the wireless capsule could be propelled forwards or backwards remotely. In the pig models, remote controlled movement of wireless capsule endoscopes was feasible in the esophagus, small intestine and colon. This exciting modification is certainly intriguing and we await its use in human subjects in the near future.

Future perspectives

WCE is definitely a fascinating technology at least in identification of small bowel lesions. With better understanding of the diagnostic capabilities of this device, certainly our algorithms in the management of some GI conditions (OGIB, malabsorption, protein-losing enteropathy, diarrhea...etc) may need dramatic revision sooner or later. Besides, imagine if this device is affixed to the GI tract, it may allow studies of the GI physiology and pathology just as we can see it with our naked eyes. This tremendous potential shall bring us to a new frontier in gastroenterology.
Note: Excellent video images obtained from WCE can be viewed at *www.givenimaging.com* .

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Highlights from The Fourth Joint Annual Scientific Meeting

Dr. Chan Ka Leung Francis, Associate Professor , Department of Medicine & Therapeutics, Prince of Wales Hospital

Date: September 28, 2002 — *Time: 2:00 - 9:00 p.m.*

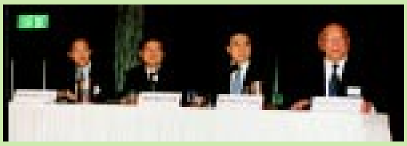
Venue: 3/F, Sheraton Hong Kong Hotel & Towers — *Sponsor: AstraZeneca (H.K.) Ltd.*

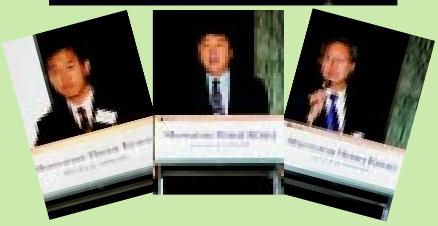
Co-organizers: Hong Kong Society of Gastroenterology
Hong Kong Society of Digestive Endoscopy
Hong Kong Society for Coloproctology
The Hong Kong Association for the Study of Liver Diseases
The Hong Kong Society of Gastrointestinal Motility

This Fourth Joint Annual Scientific Meeting was a tremendous success. Some 330 doctors attended the conference and took part actively in the 3 penal discussions. The Meeting started with the Oral Presentation. The seven abstracts on different subjects including colonoscopes, polypectomy and ulcer bleeding, esophageal carcinomas, EMR, and *Helicobacter pylori* eradication were all well-presented and, time restrained, 2 to 3 questions were raised at the end of each presentation. The judging panel was given a difficult task this time but in the end Dr. Lawrence Hung was announced to have won The Young Investigator's Award.

The five captive and enlightening lectures by distinguished local and overseas specialists embracing Advances in on GERD and Non-cardiac Chest pain, Cirrhosis & Portal Hypertension and Lower Gastrointestinal Hemorrhage marked another highlight of the day. Participants were stimulated by the scientific updates and responded enthusiastically. At the end of each session, the chairman presented to the speaker on behalf of the Organizing Committee, a plague in appreciation of his attendance and valuable contributions. The Scientific Meeting was another important and remarkable event of the year.

Taking this opportunity, this Society wishes to express its thanks to the subspecialty co-organizers, the speakers, oral presenters, the participants, AstraZeneca (Hong Kong) and all who have contributed to the great success of the Joint Annual Scientific Meeting 2002 and look forward to similar co-operation next year.





Major Meetings

January 10-12, 2003
Hong Kong Surgical Forum -Winter
Organizer: Department of Surgery, University of Hong Kong Medical Centre, Queen Mary Hospital
For further information, please contact -
Forum Secretary
Tel: (852) 2818 0232 / 2855 4235
Fax: (852) 2855 4235
E-mail: mededcom@hku.hk
Website: www.hku.hk/surgery

January 13, 2003
Croucher Advanced Study Institute on Molecular Science of Liver Diseases
Organizer: Centre for the Study of Liver Disease, The University of Hong Kong
For further information, please contact -
Ms. Irene Chan
Tel: (852) 2855 3995
Fax: (852) 2816 5284

February 19-25, 2003
Canadian Digestive Disease Week 2003
Organizer: Canadian Association of Gastroenterology
For further information, please contact -
Conference Secretariat
Tel: (604) 681 5226
Fax: (604) 6812503
Email: congress@venuewest.com
Website: www.cag-cag.org

Welcome !!!

New Member
Dr. Wong Mon Ching
Department of Medicine,
Caritas Medical Centre

March 1-9, 2003
Canadian Digestive Week Conference
Organizer: Canadian Association of Gastroenterology
Location: Banff, Canada
For further information, please contact -
Digestive Disease Week Administration
Tel: (301) 272 0022
Fax: (301) 654 3978
Website: www.cag-acg.org

March 4-6, 2003
5th International Congress of The African Association for Study of Liver Diseases (AFASLD)
Organizer: Alfa Medical
Location: Cairo, Marriott Hotel
For further information, please contact -
Tel: (20) 245 32916
Fax: (20) 245 33515
E-mail: alfa@alfamedical.com
Website: www.alfamedical.com

March 20, 2003
Annual General Meeting & Scientific Meeting 2003
Organizer: Hong Kong Society of Gastroenterology
Location: Ballroom, Sheraton Hotel
For further information, please contact -
Ms. Rainbow Chan
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March 23-26, 2003
British Society of Gastroenterology Scientific Meeting
Organizer: British Society of Gastroenterology
Location: Birmingham, International Convention Centre
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March 29 -April 1, 2003
38th Annual Meeting of the European Association for the Study of the Liver
Organizer: European Association for the Study of the Liver
Location: Istanbul, Turkey
For further information, please contact -
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E-mail: nslutzky@kenes.com or info@easl.ch
Website: www.easl.ch/easl2003

April 6-10, 2003
11th International Symposium on Viral Hepatitis & Liver Disease
Organizer: ISVHLD 2003
Location: Sydney Convention & Exhibition Centre, Australia
For further information, please contact -
Fax: +61 292 623 135
Website: www.tourhosts.com.au/isvhld

April 22-25, 2003
Train the Trainers Workshop 2003
Organizer: OMGE/OMED Education Committee
Location: Island of Crete, Greece
For further information, please contact -
Fax: + 49 89 4141 9245
E-mail: Laura.Myers@medc.de

May 18-21, 2003
Digestive Disease Week 2003
Location: Orange Country Convention Centre, Orlando, Florida
For further information, please contact -
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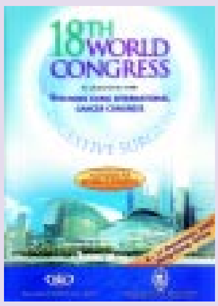
Website: www.ddw.org



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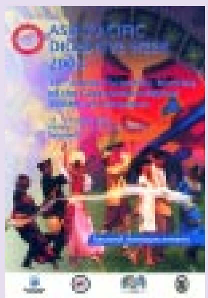

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