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President Message

Welcome to our December 2018 Newsletter!

During the year of 2018, The Hong Kong Society of Gastroenterology continued to promote the advancement of gastroenterology. Scientific meetings were organized in March and August. Our Society also continued supporting the Medical Multispecialty Mega Conference and the IDD Forum. Two newsletters were published in the year.

On behalf of the Society, I would like to thank Dr. Wai-Fan Luk for organizing the Annual General Meeting cum Scientific Meeting 2018, Professor Justin Wu for organizing the 20th Joint Annual Scientific Meeting, Professor Wai-Keung Leung for editing the two newsletters, Professor Paul Moayyedi, Professor Joseph Sung, Professor Anthony Teoh, Dr. Loey Mak and Dr. Wai-Lok Choi for their scientific updates in this newsletter. Last but not least, all the sponsors who rendered support and contributions to the Society throughout the year.

The next newsletter will be published in June 2019.

Wishing you a merry Christmas and a happy new year.

Dr. Annie O.O. Chan
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Scientific Updates

Frontiers in gastroenterology: Looking at the next 20 years

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Over the course of the next 20 years a number of major developments in the treatment and management of gastrointestinal conditions are expected. These developments will be driven by new research into the physiology of the gastrointestinal system, including the gut microbiome, and novel technologies, such as robotics, nanotechnology and artificial intelligence.

The gut microbiome

The total number of cells in the human microbiota is likely to be equivalent to the total number of cells in the human body itself and approximately 10^{13} microbial cells are believed to be present in the colon alone.[1] The majority of cells comprising the human microbiome (approximately 10^{13}–10^{14} microbial cells) reside in the colon, accounting for up to 2 kg of body weight.[1-4] More than 1,000 microbial species have been identified in the gut microbiota and a healthy gut is characterized by the diversity of its microbiome.[3,4]

Colorectal cancer (CRC) is an example of gastrointestinal dysbiosis being associated with disease. Studies of CRC have focused on the underlying genetics of tumour development, for example, by developing targeted therapies against the epidermal growth factor receptor pathway.[2,5] However, it has become clear that genetics cannot be responsible for the rapid increase in the prevalence of CRC in Asian countries. In particular, an animal-based diet increases the prevalence of iron-tolerant microorganisms in the gut, which produce metabolites that promote inflammation.[2] Therefore, focus has turned to alternative potential causes of CRC, namely the gut microbiota and diet.

The role of the gut microbiome in colorectal cancer

The gut microbiota does not have a passive role in CRC; a number of bacteria are significantly more common in patients with CRC and gut microbiome diversity is reduced.[2] Changes in the gut microbiome also appear to be characterized by a network effect wherein the appearance and disappearance of species are interconnected.[6,7] Patterns and changes in the gut microbiome may also act as markers for identifying patients with an increased risk of CRC prior to undergoing a colonoscopy.[7]

Furthermore, changes in the gut microbiome are not a result of CRC, but represent an underlying pathology.[5] For example, the transplantation of faecal microbiota from a human with CRC to an animal host induced inflammatory cytokine production in the host and increased cellular proliferation and the prevalence of dysplasia.[8] The potential to correlate the composition of the gut microbiota with a diagnosis of CRC is also being assessed as a novel, non-invasive diagnostic approach.[9,10]

Personalized oncology

Targeted therapies are routinely used in the treatment of metastatic CRC, but opportunities to further personalize treatment for patients with CRC are being investigated. In particular, genome-wide association studies are identifying new underlying genetic abnormalities that may increase the risk of gastrointestinal cancers.[5] Data from a patient's genome may also be used to help identify the most suitable therapy.[11] In addition, *in-vitro* organoid culturing offers an opportunity to test the effectiveness of a therapy on patient-derived cells before it is administered and also represents an opportunity for automation to be used to streamline therapy selection.[12]

New techniques for detecting cell-free DNA in blood samples also provide an opportunity to improve patient outcomes by helping to[13]:

- Assess the entire genome of a tumour as opposed to selective sampling of a heterogenous tumour using a biopsy
- Detect low levels of residual tumour burden after surgery
- Monitor patients during treatment
- Identify cases of recurrent disease early

The tumour microenvironment

The role of the tumour microenvironment in maintaining and encouraging tumour growth is becoming increasingly well understood and is a potential target for future therapies. For example, cancer-associated fibroblasts and myeloid progenitor cells are known to support the growth of gastrointestinal stromal cell tumours by stimulating proliferation and modulating the response to treatment.[14,15] Likewise, the effectiveness of immunotherapy may depend on immune cell profiles in the tumour microenvironment.[16] In the future, the tumour microenvironment may influence treatment selection.

Robotics, artificial intelligence and nanotechnology

Robots and artificial intelligence are being rapidly adopted in gastroenterology. Artificial intelligence may soon be used to inform treatment decisions.[17,18] Likewise, robotic surgery and endoscopy is no longer science fiction and is being used in the clinic and can result in better outcomes for patients than surgeons operating without robotic assistance because robot-assisted surgery can be performed in a more precise and steady manner.[19] Robots do not get tired and innovative thinking may lead to new ways of operating inside the body over the next 10–20 years.

A new era in the treatment of gastrointestinal disorders may also dawn if nanotechnology and smart materials can be applied in a form that can be delivered inside a capsule.[20] For example, the 'swarming' phenomenon that has been developed for unmanned aerial vehicles (ie, drones) to operate in concert may be adapted to medical technology, for example, by directing millions of therapeutic molecules to a specific target within the body using magnetic fields and allowing different confirmations and configurations of these molecules to be produced on demand by an operator.

Summary

Research is driving an increased understanding of the underlying pathology of gastrointestinal disease and facilitating more accurate and less invasive methods of diagnosing and managing these conditions. These developments are likely to result in significant improvements in outcomes for patients over the next 20 years.

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Faecal transplantation in clinical practice and recent advances

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Faecal microbiota transplantation (FMT) involves grafting microbes from a donor to a recipient. By restoring healthy gut microbiota and altering the intestinal milieu, FMT can alleviate disease. Observational data appear to strongly support FMT for several gastrointestinal disorders, but evidence from randomized, controlled trials (RCTs) to date have produced mixed results.

Antibiotic-resistant *Clostridium difficile*-associated diarrhoea (CDAD)

FMT is significantly more effective at curing antibiotic-resistant CDAD than vancomycin or placebo (relative risk [RR], 0.41; 95% confidence interval [CI], 0.22–0.74; p=0.004), with a number needed-to-treat (NNT) of 3 (95% CI, 2–7).[1] FMT was also more effective in European than North American studies, and colonoscopy and naso-duodenal routes of administration appeared to be more effective than enema.[1] While these data support using FMT to treat antibiotic-resistant CDAD, and provides further evidence to back up European and North American guidelines for CDAD treatment, these results should be interpreted with caution due to low patient numbers. Further research is still necessary.

Ulcerative colitis (UC)

FMT can induce remission in some patients with UC. Specifically, among 277 patients across four RCTs, FMT was associated with a higher rate of clinical and endoscopic remission compared with placebo (28 vs 19%; RR, 0.80; 95% CI, 0.71–0.89; p<0.0001) with no increased risk of adverse events.[2] Despite moderate variation between RCTs (eg, with regard to route of administration, treatment regimen, donor source and use of fresh or frozen transplants) the majority of studies reported a positive result, with an overall NNT of 5 (95% CI, 4–10).[2] Importantly, remission rates observed with FMT are equivalent to those achieved by biologic therapies, and a comparison of NNT values suggest FMT is as effective as other medical therapies for active UC, including 5-aminosalicylic acid, steroids, azathioprine and infliximab.[3]

However, subgroup analyses have yielded inconsistent findings and raised further questions around the conditions that promote FMT efficacy in patients with UC. For example, in some cases donor specificity appears to influence FMT success,[4] while in another study certain microbes were associated with a lack of remission.[5] In addition, timing effects observed in one study – where patients with a recent diagnosis of UC (within the last year) were more likely to respond to FMT[4] – were not replicated in another.[5]

Therefore, while the data are promising, there is currently not enough evidence to support the routine use of FMT in clinical practice for patients with UC. Further research is required to understand the appropriate patient population for FMT, the underlying mechanisms, the optimal route of administration and to demonstrate efficacy in a greater number of patients.

Crohn's disease (CD)

Few studies have explored FMT for CD. However, a systematic review of case series data found that of 71 patients with active CD treated with FMT, 52% achieved clinical remission.[6] This initial result must be interpreted with caution given the uncontrolled nature of the case series and variability of methodology used in the studies. However, RCTs are currently underway to investigate the potential benefit of FMT in patients with active CD.

Irritable bowel syndrome (IBS)

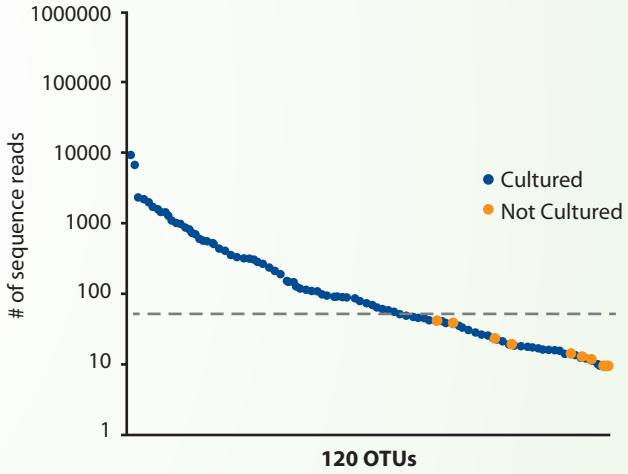
FMT was not associated with an improvement in IBS symptoms among 250 patients from four RCTs (RR, 1.11; 95% CI, 0.6–2.04).[7] However, these results are likely influenced by study design, namely FMT only being administered once or once per day for 3 or 12 days, while symptomatic assessment was performed much later at week 12.

Is dysbiosis or a specific microbe the true culprit in these gastrointestinal disorders?

Dysbiosis refers to a microbial imbalance. Certainly, altered intestinal microbial populations have been observed in patients with UC and CD.[8] However, the specific microbiota and changes that contribute to a dysbiotic state are not yet known. As numerous chronic diseases are linked to individual organisms, an emphasis on broad 'dysbiosis' may preclude any investigation of alternate pathology, such as a single organism or several organisms driving inflammation in bowel conditions.

However, investigating the gut microbiota using stool samples is challenging. Current methodology limits the number of species that can be detected in stool samples to approximately 30 using direct metagenomics. In contrast, combining bacterial culture with 16S recombinant RNA gene sequencing enables a much broader range of microbial species to be identified than culture-independent sequencing, which enables rare or under-represented organisms to be detected **(Figure)**.[9] It is anticipated that this enhanced methodology will facilitate an improved understanding of changes in the microbiota associated with gastrointestinal conditions, facilitating more effective targeting of FMT.

Figure. Culture-enriched molecular profiling of faecal samples from a healthy volunteer[9]



Variations in the 16S recombinant RNA gene enable similar sequence variants to be clustered together. Each cluster represents a particular bacterial genus or species and comprises a single OTU. Each point represents a single OTU. The dashed line indicates 0.1% relative abundance in the culture-independent sequencing.
OTU, operational taxonomic units

Summary

FMT is an effective treatment option for patients with antibiotic-resistant CDAD.[1] There is evidence that FMT induces remission in some patients with UC,[2] but more research is required before FMT is routinely applied in clinical practice. However, the benefit of FMT for CD remains unclear, so further investigation is required in this setting. Innovations in sequencing methodologies, such as culture enhanced metagenomics,[9] are expected to improve our understanding of the gut microbiota and dysbiosis, and provide insights into mechanisms underlying the efficacy of FMT.

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Updates in interventional endoscopic ultrasonography (EUS)

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In recent years there has been an exponential increase in the popularity of interventional EUS procedures, including EUS-guided[1]:
1. Celiac plexus ablations
2. Pancreatic fluid collection (PFC)
3. Biliary drainage (BD)
4. Pancreatic duct drainage (PDC)

Professor Teoh, lead author of the 2018 Consensus Guidelines on Optimal Management in Interventional EUS Procedures[1], provided a review of interventional EUS history and outlined key new developments.

History of interventional EUS

EUS procedures

In 1992 the first PFC drainage by EUS was performed.[2] There have since been additional reports of interventional EUS procedures, such as transluminal BD using EUS-guided puncture of the common bile duct in 2001[3] and transduodenal drainage of the gallbladder in 2007.[4] However, until recently these reports remained few and isolated, likely due to the prohibitive cost of EUS equipment and the lack of dedicated devices.

EUS-guided Celiac plexus ablations

Celiac ganglia can now be visualized using EUS, facilitating direct injections as part of celiac ganglia neurolysis (CGN).[6] A randomized multicentre trial in Japan comparing EUS-guided celiac plexus neurolysis (CPN) and CGN reported that the latter was significantly better than conventional CPN for cancer pain relief.[7] Visualization of the ganglia was possible in 30 cases (88%) in the CGN group and both the positive response rate and complete response rate were significantly higher in the CGN group (73.5% vs 45.5%; p=0.026, and 50.0% vs 18.2%; p=0.010, respectively).[7]

EUS-guided drainage

Several EUS-specific stents have been developed, including dumb-bell- or tubular-shaped stents, which are designed to prevent stent migration.[8] These stents should be used when performing EUS-guided transmural luminal anastomoses in non-adherent organs. Multiple studies have shown that the use of these devices could successfully create bile duct, gallbladder and gastro-enteric anastomosis.[8]

PFC

Infected necrotizing pancreatitis is associated with high complication rates and death.[9,10] Open necrosectomy has traditionally been the standard treatment, but a minimally invasive endoscopic step-up approach, transgastrically or through the retroperitoneum, is a promising alternative.[9,10] A multicentre study of 88 patients published in 2010 indicated improved outcomes for patients treated with an endoscopic step-up approach, including for the primary composite endpoint of major complications or death, which occurred in 40% of patients compared with 69% in patients who underwent open necrosectomy **(Table)**.[9]

Furthermore, no difference in major complications or death was observed in the multicentre, randomized TENSION study that compared EUS-guided transluminal drainage with percutaneous catheter drainage.[10] A lower incidence of pancreatic fistula (5% vs 32%; p<0.01) and shorter hospital stays (53 vs 69 days; p=0.01) was also reported.[10] These studies indicate that an EUS approach should become the preferred treatment for patients with necrotizing pancreatitis.

Biliary drainage

EUS-guided BD is increasingly used as an alternative to percutaneous transhepatic BD (PTBD) to manage biliary obstruction in patients who fail endoscopic retrograde cholangiopancreatography, with the choice being influenced by whether or not the patient has accessible papilla.[11,12] A meta-analysis has indicated better clinical success (odds ratio [OR], 0.45; 95% confidence interval [CI], 0.23–0.89; I^2=0%), as well as significantly fewer adverse events (AEs) (OR, 0.23; 95% CI, 0.12–0.47; I^2=57%) and significantly lower re-intervention rates (OR, 0.13; 95% CI, 0.07–0.24; I^2=0%) for EUS-guided BD versus PTBD.[12] Overall, EUS-specific devices are important because they are more cost-effective, reduce procedural time and difficulty and reduce the risk of bile leaks and AEs compared with PTBD.

Table. Primary and secondary end points for patients with necrotizing pancreatitis treated with an EUS step-up approach or open necrosectomy [9]

	EUS step-up approach (N=43)	Open necrosectomy (N=45)	RR (95% CI)	P value
Primary composite endpoint: Major complications or death, n (%)	17 (40)	31 (69)	0.57 (0.38–0.87)	0.006
New-onset multiple-organ failure or systemic complications, n (%)	5 (12)	19 (42)	0.28 (0.11–0.67)	0.001
Death, n (%)	8 (19)	7 (16)	1.20 (0.48–3.01)	0.70
Incisional hernia, n (%)	3 (7)	11 (24)	0.29 (0.09–0.95)	0.03
New-onset diabetes, n (%)	7 (16)	17 (38)	0.43 (0.20–0.94)	0.02
New ICU admission at any time after first intervention, n (%)	7 (16)	18 (40)	0.41 (0.19–0.88)	0.01

CI, confidence interval; EUS, endoscopic ultrasonography; ICU, intensive care unit; RR, risk ratio

Gallbladder drainage (GBD)

EUS-guided GBD may be also a plausible alternative when percutaneous drainage is contraindicated.[13,14] For example, indications for EUS-guided GBD in Hong Kong include patients with:

- A high surgical risk due to their age;
- American Society of Anesthesiologists Physical Status Classification (ASA Class) of grade 3 or above; and
- Age-adjusted Charlson scores of ≥4 and/or a Karnofsky score of <50.

A meta-analysis comparing EUS-guided GBD using lumen-apposing metal stents with percutaneous cholecystostomy, which included five retrospective studies and 495 patients found EUS-guided GBD was associated with[15]:

- Better technical success (p=0.06)
- Similar clinical success (p=0.57)
- Fewer total AEs (p=0.009)
- Fewer severe AEs (p=0.009)
- No difference in mortality (p=0.14)

Conclusions

Interventional EUS is entering a period of rapid development and is challenging many traditional concepts. Recently developed FNB needles, have enabled a shift towards greater EUS use in clinical practice.[5] Furthermore, several new studies have shown improvements to patient outcomes with EUS-guided approaches in comparison to traditional surgical approaches.[7,9,10,12] Recently published guidelines provide an in-depth review of the current evidence and will assist in standardizing procedural management.[1]

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The evolution of liver fibrosis in patients with chronic hepatitis B

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Chronic hepatitis B (CHB) is a dynamic disease characterized by distinct clinical phases and fluctuating levels of hepatitis B virus (HBV) DNA and alanine transaminase (ALT).[1,2] Over 90% of patients acquire CHB via vertical transmission (ie, mother to child) or during early ages of life, and up to 40% of patients will progress to hepatocellular carcinoma (HCC) , cirrhosis or death, while liver transplantation is needed for selected patients with advanced liver disease.[1,3] The majority of these liver-related events occur in diseased liver with significant fibrosis. Therefore, understanding the pathogenesis of liver fibrosis is imperative to minimizing progressive disease in patients with CHB.

Assessing liver fibrosis in patients with CHB

Liver biopsy has traditionally been considered the gold standard for staging liver fibrosis in patients with CHB.[4] However, given the dynamic nature of CHB, repeated biopsies are required to accurately stage fibrosis. Liver biopsies are invasive by definition, and are therefore not without risks and considered undesirable by many clinicians. Sampling error, and inter- and intra-observer variability (~30%) frequently occur with liver biopsies, and the inherently restrictive nature of categorical scoring systems limits their use for unbiased and accurate disease evaluation.[5] Alternatively, non-invasive methods, such as serum-based biomarkers and imaging-based techniques, demonstrate good quality performance characteristics (0.88 and 0.96 for area under the curve of the receiver operating characteristic [AUROC]) for fibrosis staging and excluding cirrhosis, respectively.[4,6]

Determining fibrosis progression in patients with CHB

Several factors are associated with progressive fibrosis in patients with CHB. For example, viral factors such as HBV DNA, hepatitis B envelope antigen (HBeAg), genotypes and core promoter mutations, as well as host factors, such as metabolic syndrome, alcohol use and baseline fibrosis stage, are known to influence the rate of progression to cirrhosis.[1,7,8]

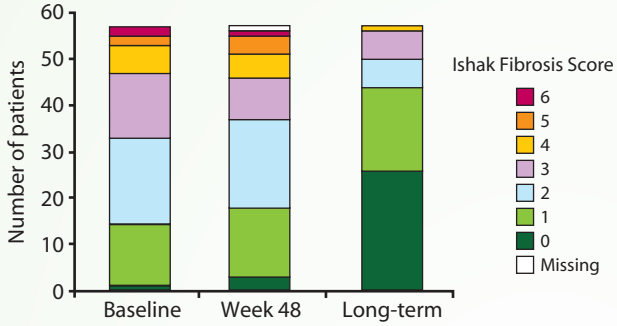
Progressive fibrosis has been observed by transient elastography assessment in patients with ongoing virologic activity and metabolic factors. After a short duration of follow-up (<4 years), 5–16% of treatment-naïve HBeAg-positive patients with CHB experienced fibrosis progression.[9] Moreover, the rate of progression was positively correlated with the number of patient metabolic risk factors.[10]

However, after a longer duration of follow-up (~10 years), progressive fibrosis was not associated with ongoing virologic activity. Fibrosis progression in treatment-experienced HBeAg-negative patients correlated with controlled attenuation parameter (CAP) score (odds ratio [OR], 1.017; 95% confidence interval [CI], 1.006–1.029; p=0.003), whereas progression in treatment-naïve HBeAg-negative patients was associated with metabolic syndrome (OR, 4.595; 95% CI, 1.072–17.701; p=0.040). (Mak, unpublished data)

Antiviral therapy facilitates fibrosis regression in patients with CHB

Liver fibrosis can regress when the inciting agent is removed and the liver has sufficient time to return to normal. Antiviral agents can facilitate fibrosis regression and improve short-, medium- and long-term outcomes for patients with CHB.[11] In a landmark study, long-term treatment with entecavir resulted in a mean 1.5-point change from baseline in histological staging (Ishak fibrosis scores) in patients with CHB **(Figure)**.[12] In a separate study, 51% of patients treated with tenofovir disoproxil fumarate achieved regression and exhibited continued histological improvement over 5 years.[13] Moreover, of the 96 patients who had cirrhosis at baseline, 71 patients no longer had cirrhosis after treatment.[13]

Figure. Distribution of Ishak fibrosis scores at baseline, after 48 weeks of entecavir treatment, and at the time of long-term biopsy[12]



Antiviral therapy also facilitates a decline in liver stiffness on transient elastography and reduces serum Mac-2 binding protein glycosylation isomer (M2BPGi), a diagnostic marker for fibrosis and cirrhosis, in patients with CHB.[14,15] Indeed, in a large meta-analysis, duration of antiviral therapy positively correlated with progressive reductions in liver stiffness in patients with CHB.[16] Furthermore, serum M2BPGi correlated with reductions in Ishak scores.[15]

Hepatitis B surface antigen (HBsAg) seroclearance facilitates fibrosis regression in patients with CHB

Early hepatitis B surface antigen (HBsAg) seroclearance lowers the risk of HCC development, and was significantly associated with lower liver stiffness.[17] All patients with CHB who achieved HBsAg seroclearance showed no or minimal evidence of necroinflammation and fibrosis at approximately 5 years after HBsAg seroclearance. Additionally, stratifying patients by age showed that patients who achieved seroclearance prior to age 50 years were significantly less likely to develop HCC (<50 years vs ≥ 50 years; p=0.004).[17] Regression of fibrosis was observed only in patients with persistently normal ALT levels following HBsAg seroclearance.[18]

Summary

Ongoing virologic activity and metabolic factors contribute to fibrosis progression. However, regression can occur in patients with fibrosis, and in some cases cirrhosis, following antiviral therapy or early HBsAg seroclearance. Furthermore, achieving regression minimizes the risk of developing HCC. A greater understanding of the pathogenesis of liver fibrosis will translate into better clinical outcomes for patients.

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The prevalence of asymptomatic carriage of Clostridium difficile in an institutionalized population upon hospitalization and the risk of developing pseudomembranous colitis (Summary of Thesis 2016)

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Background

Clostridium difficile (C.diff) had long been recognized as a health care associated infection with increasing incidence cases and complications over past years. Increased exposure to antibiotics and hospitalizations were contributing factors to the increasing incidence.[1]

It is known that *C.diff* infection is common in hospitalized patients.[1-3] With its unique status of a place looking after older people with more comorbidities in proximity, long term care facility has been postulated to have a higher rate of *C.diff* infection compared to general public.

Most of the studies in the literature had focused on *C.diff* infection instead of asymptomatic *C.diff* carriage. The role of *C.diff* carriage on the risk of *C.diff* infection was controversial. Little was known about the impact of asymptomatic *Clostridium difficile* carriage. Little data was available in residents of long term care facilities. Moreover, there is no local data on the prevalence of *C.diff* carriage in local long term care facilities. This group of patients may be a special population where intervention may be useful for reduction of the burden of *C.diff*.

Objectives

Primary objectives

To find out the prevalence of asymptomatic *C.diff* carriage in residents of long term care facilities upon hospitalization

Secondary objectives

- To find out the risk factors of asymptomatic *C.diff* carriage in residents of long term care facilities upon hospitalization
- To study the risk and risk factors of acquiring *C.diff* during hospitalization in this population
- To study the risk of developing pseudomembranous colitis in this population in a period of 6 months

Materials and methods

Study design

This was an observational prospective cohort study. Patients were recruited from December 2015 to February 2016 in United Christian Hospital. All patients residing in long term care facilities admitted to the two acute geriatric wards for any causes were screened within 48 hours of admission.

Study samples were obtained by rectal swab within 48 hours of admission for *C.diff* culture. Polymerase chain reaction (PCR) analysis for toxigenicity would be performed on the same stool samples that were positive for culture.

A rectal swab was repeated at 2 to 4 weeks after discharge. If a subject was re-admitted again before the designated time of repeating a rectal swab, a rectal swab was taken at the time of re-admission.

Carriers were not labelled. No specific isolation or treatment was provided to asymptomatic carriers. If a patient developed symptoms, treatment would be given according to the clinical judgement of the attending doctor.

Subjects were reviewed after 6 months. If follow-up rectal swab was not available, subjects would still proceed to statistical analysis of the risk of developing *C.diff* infection during the study period.

Inclusion criteria
- Long term care facility resident at the time of admission

Exclusion criteria
- Patients who were hemodynamically unstable upon admission
- Patients with a known condition causing chronic diarrhoea
- Patients admitted for symptomatic *C.diff* infection
- Patients who had a diagnosis of *C.diff* infection within 1 month
- Patients residing in long term care facilities which refused to participate in the study
- Patients residing in long term care facilities out of the accessibility of the geriatric team of our hospital
- Patients whom consent could not be obtained from

Definitions
In this study, the definitions of symptomatic *C.diff* infection and asymptomatic carrier state followed the suggestions in the review article in BioMed Central Infectious Disease published in 2015.[4]

Symptomatic *C.diff* infection was defined as the presence of diarrhoeal symptoms (more than 3 unformed stools in 24 or fewer consecutive hours) with the presence of one of the followings, without a more likely alternative cause: 1. a stool test result positive for *C.diff* toxins or 2. detection of toxigenic *C.diff*, or 3. colonoscopic findings demonstrating pseudomembranous colitis.

C.diff colonization was defined as the absence of diarrhoea (or if present, attributable to a cause other than *C.diff* infection), and 1. the detection of *C.diff* or 2. the presence of *C.diff* toxins.

In this study, colonization and carriage/carrier are used interchangeably.

Statistical analysis
Background information, subject characteristics and known risks factors of *C.diff* carriage used in the analysis were listed in **Table 1**.

These variables were used in the analyses of *C.diff* status upon admission, and acquisition of toxigenic *C.diff* during admission. Antibiotic or steroid exposure during admission were also used in the analysis of toxigenic *C.diff* acquisition during admission.

C.diff status and the variables were tested with the use of Chi-square or Fisher's exact test or linear regression. Multivariate analyses were performed on variables that were tested significant in univariate analyses with the use of logistic regression.

Toxigenic *C.diff* carriage and symptomatic infection were tested with Fisher's exact test.

Result was regarded as statistically significant if $p<0.05$.

Results
During the study recruitment period of 3 months, 327 patients had been screened. A total of 170 patients were recruited into the study after application of exclusion criteria. Stool samples were collected in 164 patients within 48 hours of admission. One patient was admitted for symptomatic *C.diff* infection and was excluded from the study. A total of 163 subjects were included in statistical analysis. The background characteristics of the subjects were shown in **Table 1**. Risk factors of *C.diff* colonization were listed in **Table 2**.

Upon admission, the stool sample of 140/163(85.9%) subjects were negative for *C.diff* culture. 23/163 (14.1%) subjects had positive *C.diff* culture. Six of them (6/163, 3.7%) were carriers of non-toxigenic *C.diff*. Seventeen (17/163, 10.4%) were tested positive of toxigenic *C.diff*. Among all subjects with toxigenic *C.diff* upon admission, only one had symptoms (1/18, 5.6%) and the subject was excluded from the study, as mentioned. The majority of subjects (17/18, 94.4%) with toxigenic *C.diff* were asymptomatic carrier.

One toxigenic *C.diff* carrier had a previous symptomatic *C.diff* infection 4 months prior to recruitment into the study. One non-carrier had a previous symptomatic *C.diff* infection 2 months ago. Both cases had been treated with a course of metronidazole in the previous episodes. Both were asymptomatic in the index hospitalization.

No subjects developed *C.diff* infection during the index hospitalization. Among the 6 carriers of non-toxigenic *C.diff*, 1 developed diarrhoeal symptoms at day two of admission and was treated with a course of metronidazole despite the negativity of toxigenicity. This was not counted a case of *C.diff* infection according to the study definition. Two toxigenic *C.diff* carriers were treated during the index admission despite the lack of symptoms.

After discharge, 93 subjects (93/163, 57.1%) had follow-up stool samples collected. Eighteen of the initially recruited patients (18/163, 11.0%) died before collection of follow-up samples. One still remained hospitalized at the end of the study (remained hospitalized for more than 6 months from the index admission). Stool samples could not be collected in the remaining subjects due to lack of collaboration of the long term care facilities. Seventy of the 93 subjects (75.3%) were tested negative for *C.diff* culture. Twenty-three subjects (24.7%) had a positive growth of *C.diff*, with fourteen of them being toxigenic (60.9%), nine being non-toxigenic (39.1%). Among all subjects with follow-up stool samples collected, the percentage of subjects tested toxigenic *C.diff* positive was 15.1% (14/93).

Among the 140 initial non-carriers, 78 had follow-up samples collected (55.7%). Sixty-three remained non-carriers, 6 became carriers of non-toxigenic *C.diff* and 9 became carriers of toxigenic *C.diff*. Counting only subjects with follow-up samples collected, 19.2% (15/78) of the initial non-carriers became carriers of *C.diff*, while 11.5% (9/78) of the initial non-carriers harboured the toxigenic strain after a single admission **(Table 3)**.

Predictive factors of *C.diff* carriage (inclusive of both toxigenic and non-toxigenic strains) upon hospitalization had been analysed **(Table 1 & 2)**. None of the variables predicted *C.diff* positivity upon admission ($p>=0.05$). Analysis of toxigenic *C.diff* carriage again showed no significant predictive factors ($p>=0.05$).

Table 1. Background characteristics of recruited subjects and correlation with *Clostridium difficile* positivity upon admission.

Demographics	N=163	*Clostridium difficile* culture upon admission			Toxigenic *Clostridium difficile* upon admission		
		Negative	Positive		Negative	Positive	
Age (years old)	Median 86 (59-101) Mean 85.4, SD 7.8	Mean 85.1, SD 8.2	Mean 85.8, SD 4.9	p=0.715	Mean 85.2, SD 8.1	Mean 86.0, SD 5.2	p=0.794
Gender	F = 100 M = 63	84 56	16 7	p=0.536	88 57	11 7	p=0.972
Mode of Feeding	Self = 130 (79.8%) Assisted = 33 (20.2%)	114 26	16 7	p=0.232	117 28	13 5	p=0.399
Mobility	Ambulatory = 22 (13.5%) Assisted = 50 (30.7%) Chairbound/bedbound = 91 (55.8%)	20 41 79	2 9 12	p=0.603	21 42 82	1 7 10	p=0.479
Faecal incontinence	No = 103 (63.2%) Yes/stoma = 56+4 = 60 (36.8%)	90 50	13 10	p=0.531	92 49+4	12 6+0	p=0.770
Charlson comorbidity index	Mean 5.8, SD 2.2	Mean 5.8, SD 2.3	Mean 6.1, SD 2.1	p=0.610	Mean 5.8, SD 2.3	Mean 6.1, SD 2.0	p=0.756
Clinical frailty scale	Mean 6.7, SD 0.9	Mean 6.7 SD 0.9	Mean 6.7, SD 0.9	p=0.809	Mean 6.7, SD 0.9	Mean 6.8, SD 0.9	p=0.734

N=number of subjects, SD=standard deviation

Table 2. Risk factors of the recruited subjects and correlation with *Clostridium difficile* positivity upon admission.

Risk factors upon admission	N=163	*Clostridium difficile* culture upon admission			Toxigenic *Clostridium difficile* upon admission		
		Negative	Positive		Negative	Positive	
Proton pump inhibitor use within 3 months	No = 78 (47.9%) Yes = 85 (52.1%)	69 71	9 14	p=0.285	70 75	8 10	p=0.759
H_2-receptor antagonist use within 3 months	No = 137 (84.0%) Yes = 26 (16.0%)	117 23	20 3	p=0.626	121 24	16 2	p=0.552
Either Proton pump inhibitor or H_2-receptor antagonist use within 3 months	No = 52 (31.9%) Yes = 111 (68.1%)	46 94	6 17	p=0.445	46 99	6 12	p=0.89
Antibiotics 3 months before admission	No = 94 (57.7%) Yes = 69 (42.3%)	83 57	11 12	p=0.218	86 59	8 10	p=0.229
Recent admission within 3 months	No = 99 (60.7%) Yes = 64 (39.3%)	87 53	12 11	p=0.261	91 54	8 10	p=0.133
Steroid within 3 months	No = 148 (90.8%) Yes = 15 (9.2%)	125 15	24 0	p=0.093	130 15	18 0	p=0.152

N=number of subjects

Table 3. *Clostridium difficile* status of the subjects.

	Clostridium difficile culture negative	*Clostridium difficile* culture positive		
		Toxigenic PCR positive	Toxigenic PCR negative	Total
Clostridium difficile status on admission (Total = 163)	140/163 (85.9%)	17/163 (10.4%)	6/163 (3.7%)	24/163 (14.7%)
Clostridium difficile status of all subjects at first follow up Total = 163, valid = 93 (57.1%), missing =70 (42.9%)	70/93 (75.3%)	14/93 (15.1%)	9/93 (9.7%)	23/93 (24.7%)
Clostridium difficile status of initial non-carriers at first follow up Total = 140, valid = 78 (55.7%), missing =62 (44.3%)	63/78 (80.8%)	9/78 (11.5%)	6/78 (7.7%)	15/78 (19.2%)

Among the 140 initial non-carriers, ambulatory subjects (either independent or assisted walker) and faecal incontinence were associated with acquisition toxigenic *C.diff* (p=0.002 and p=0.018 repectively) **(Table 4 & 5)**. Multivariate analysis showed that mobility was associated with acquisition of toxigenic *C.diff* (p=0.042), while faecal incontinence was not (p=0.709) **(Table 6)**.

During the follow-up period of 6 months, 35 subjects (21.5%) died before the end of the study. Two subjects developed *C.diff* infection within the follow-up period. One subject, who was a toxigenic *C.diff* carrier upon admission, developed symptoms three days after discharge. Another subject, who was a non-carrier both upon and after the index admission, developed *C.diff* infection at 1.5 months during another episode of hospitalization. The proportion of *C.diff* infection was 1.2% (2/163) among the whole cohort over the period of 6 months. The proportion of toxigenic *C.diff* carrier developing *C.diff* infection was 5.9% (1/17). 0.68% (1/146) of all non-carriers and non-toxigenic *C.diff* carriers developed *C.diff* infection. There was no significant difference among the two groups (toxigenic *C.diff* carriers versus others, p=0.20).

Discussion

Our study found a carrier rate of 10.4% of toxigenic *C.diff* upon admission in subjects from long term care facilities. No significant risk factors of toxigenic *C.diff* carriage upon admission could be found in our study. Mobility was the only significant risk factor predictive of acquisition of toxigenic *C.diff* after a single admission. Overall, the majority of toxigenic *C.diff* carriers were asymptomatic. Our studies did not find significant difference in the risk of *C.diff* infection between carriers and non-carriers.

To our knowledge, our study was the first one focusing on long term care facilities resident in the setting of hospitalization.

Compared with the meta-analysis Ziakas et al had performed in 2015 trying to find out the average rate of asymptomatic *C.diff* carriage in long term care facilities,[5] our result of 10.4% was lower than the 14.8% in the meta-analysis. However, the meta-analysis had included studies in facilities having a prior *C.diff* outbreak which had a higher average prevalence compared to those without, 30.1% versus 6.5%.

Since none of the long term care facilities included in our study had had an outbreak, it would be more reasonable to compare our result to the prevalence of those studies conducted in facilities without history of outbreak. Our result of 10.4% was higher. There are several possible explanations to this discrepancy. Differences in the location and timing of sample collection could contribute to this discrepancy as samples were taken in the long term care facilities instead of upon admission. Another possible explanation was the different methods of toxigenicity detection between the studies. Our study utilized PCR to detect toxigenicity, while most studies in the meta-analysis utilized enzyme immunoassay or cell culture cytotoxicity assays with lower sensitivity.[5-6]

In the meta-analysis, significant risk factors of asymptomatic toxigenic *C.diff* carriage identified included history of symptomatic *C.diff* infection, prior antibiotics within 3 month, and hospitalization within 3 – 12 months. Effects of PPIs and continence status were not significant. In another meta-analysis by Zacharioudakis et al in 2015 on general population upon hospitalization[3], the only significant risk factor was admission within 3 months. Compared with these two studies, our study failed to identify any risk factors of toxigenic *C.diff* carriage. One may suggest that our study population may have contacted *C.diff* in the long term care facilities and become colonized, rendering the role of recent hospitalization less significant. However further study would be needed to look at the environmental spore load before one can conclude so.

Acquisition of *C.diff* and the impact of *C.diff* carriage

Our study found that the rate of toxigenic *C.diff* acquisition after a single admission was 11.5%. Our value was in the middle of the reported values (6% to 24%) in the literature.[7-9]

Ambulatory subjects and subjects with faecal incontinence were associated with acquisition of toxigenic *C.diff* after an episode of admission by univariate analysis. Ambulatory subjects may come into contact with the hospital environment more than chairbound subjects, giving them more exposure to environmental *C.diff* spores. Faecal incontinent subjects may acquire *C.diff* from health care workers during changing of diapers. The association between mobility and toxigenic *C.diff* acquisition was confirmed with multivariate analysis. Although faecal incontinence was not identified to be associated with toxigenic *C.diff* with the use of multivariate analysis, it may be due to small number of subjects.

The same two variables were not identified as associated with toxigenic *C.diff* carriage upon admission. One possible explanation may be the difference of the load of environmental *C.diff* spores between long term care facilities and hospital.

In our study, only two subjects (1.2%) developed symptomatic *C.diff* infection. We could not identify the role of *C.diff* carriage in the development of symptomatic *C.diff* infection. None of our patients developed symptoms during the index admission. The risk of symptomatic *C.diff* infection, during hospitalization, including both carriers and non-carriers, was 3.6% (103/2858) according to the meta-analysis in 2015.[3] Our study had a lower proportion of subjects developing *C.diff* infection, which might be the result of our sample size, as our study was designed as a prevalence study of *C.diff* carriage.

Limitations

A portion of residents of long term care facility could not be recruited into the study due to the inability to consent. This might represent a group of elderly who were frailer and more dependent. Although there had not been any supporting evidence in the literature supporting higher risk of *C.diff* carriage in this group of individuals, this was an overlooked aspect with minimal data available.

A few long term care facilities withdrew their collaboration with the study due to worries about the potential infectiousness of carriers. There had been evidence that asymptomatic toxigenic *C.diff* carrier and patients recovered from *C.diff* infection continued to shed spores into the environment.[10-11] However, their infection potential had not been proven in the literature, mainly due to a lack of studies. Since evidence had begun to show that carriers may have higher risk of *C.diff* infection, further studies are urgently needed in this aspect as this has significant impact on infection control.

Our study found a low rate of symptomatic *C.diff* infection and failed to confirm the effect of carriage on *C.diff* infection. This was because our study was not powered to detect the difference. Moreover, our laboratory did not specify the ribotypes of the *C.diff* isolated. Identification of the more virulent NAP1 strain may provide clues and explanations towards our carriage and infection rate.

Conclusions

This was the first study on the prevalence of *C.diff* carriage in long term care facility residents upon hospital admission. This was also the first study pertaining to *C.diff* carriage in Hong Kong. The carrier rate of our long term care facility residents was higher than the average in Western countries. Our study supported the latest evidence that PPIs and antibiotics did not confer higher risk of *C.diff* carriage. Mobility was identified as a predictive factor of acquisition of *C.diff* during admission. Our findings shed light to the issue of

Table 4. Background characteristics of initial non-carriers and correlation with toxigenic *Clostridium difficile* acquisition after an episode of hospitalization.

Demographics	N=78	Toxigenic *Clostridium difficile* after discharge		
		Negative	Positive	
Age	Mean 84.5, SD 8.2	Mean 84.4, SD 8.3	Mean 85.9, SD 6.9	p=1.00
Gender	F = 45 M = 33	40 29	5 4	p=0.89
Mode of Feeding	Self = 63 Assisted = 15	55 14	8 1	p=0.511
Mobility	Ambulatory = 32 Chairbound = 46	24 45	8 1	p=0.002*
Fecal incontinence	No = 53 Yes/Stoma = 23+2	50 19	3 6	p=0.018*
Charlson comorbidity index	Mean 5.6, SD 1.9	Mean 5.7, SD 2.0	Mean 5.7, SD 1.9	p=0.409
Clinical frailty scale	Mean 6.6, SD 0.9	Mean 6.7, SD 0.9	Mean 6.7, SD 0.7	p=0.429

N=number of subjects, SD=standard deviation
Only those with follow-up samples available were included (78/140).
Asterisk denotes significant association (p<0.05).

Table 5. Risk factors of initial non-carriers and correlation with toxigenic *Clostridium difficile* positivity after an episode of hospitalization.

Risk factors upon admission	N=78	Toxigenic *Clostridium difficile* after discharge		
		Negative	Positive	
Proton pump inhibitor use within 3 months	No = 40 Yes = 38	37 32	3 6	p=0.252
H_2-receptor antagonist use within 3 months	No = 63 Yes = 15	56 13	7 2	p=0.809
Either Proton pump inhibitor or H_2-receptor antagonist use within 3 months	No = 25 Yes = 53	24 45	1 8	p=0.152
Antibiotics during admission	No= 16 Yes= 62	15 54	1 8	p=0.458
Recent admission within 3 months	No = 52 Yes = 26	46 23	6 3	p=1.000
Steroid within 3 months	No= 69 Yes= 9	60 9	9 0	p=0.249
Steroid before or during admission	No= 62 Yes= 16	54 15	8 1	p=0.458

N=number of subjects
Only those with follow-up samples available were included (78/140).
Asterisk denotes significant association (p<0.05).

Table 6. Multivariate analysis of significant factors in univariate analyses with *Clostridium difficile* positivity.

	Association with *Clostridium difficile* after discharge	Association with toxigenic *Clostridium difficile* after discharge	Association with acquisition of toxigenic *Clostridium difficile* after discharge
Mobility	p=0.15	p=0.01*	p=0.04*
Faecal incontinence	p=0.31		p=0.71
Either Proton pump inhibitor or H_2-receptor antagonist use within 3 months	p=0.03*		
Proton pump inhibitor use within 3 months		p=0.32	
Antibiotics during admission	p=0.07		

Asterisk denotes significant association (p<0.05).

C.diff in our long term care facility residents, which may have significant infection control implications. Future studies should be carried out to identify the prevalence of NAP1 strain in our locality, and to confirm carriage as a risk factor to symptomatic infection.

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Welcome! New Members

Dr Peter Yiu-Hang MAK
Department of Medicine & Geriatrics
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Dr Chun-Kit WONG
Department of Medicine
Tseung Kwan O Hospital
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Dr Edmund Siu-To WU
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Princess Margaret Hospital
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Dr Jason Xern-E YONG
Department of Medicine & Geriatrics
Princess Margaret Hospital
Hong Kong

20th Joint Annual Scientific Meeting

Date: 26 August 2018

Venue: Cordis, Hong Kong at Langham Place, Kowloon

Organizing Chairperson: Professor Justin C.Y. Wu

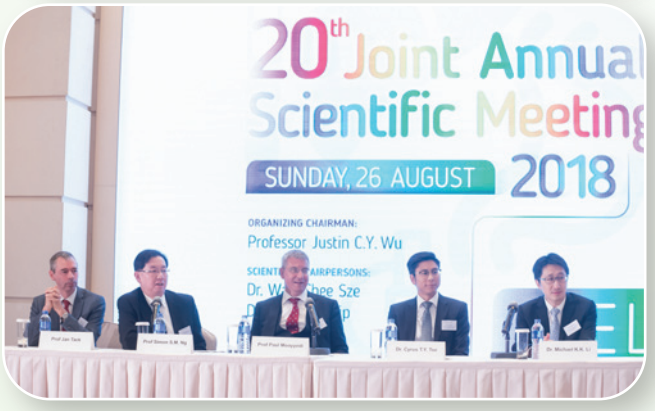
Scientific Chairpersons: Dr. Wan-Chee Sze, Dr. Wai-Man Yip

Sponsored by: AbbVie, AstraZeneca, Boston Scientific, DCH Auriga, Ferring, Gilead, A.Menarini, Novartis, Olympus, Otsuka & Takeda

The 20th Joint Annual Scientific Meeting was successfully held on 26 August 2018 and attended by 270 healthcare professionals. The conference is an annual landmark scientific event jointly organized by six societies for gastrointestinal and hepatobiliary diseases in Hong Kong, namely The 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 and Hong Kong IBD Society.

This year marked the 20th anniversary of the conference which was much honoured to have Professor Joseph Sung to deliver a keynote lecture on this special occasion. Other lectures, as in previous years, covering hot topics in gastroenterology, hepatology, endoscopy and surgery were delivered by renowned speakers. Guest speakers from overseas included Professor Paul Moayyedi from Canada and Professor Jan Tack from Belgium. Other honorable local speakers included Professor Simon Ng, Dr. Loey Mak and Professor Anthony Teoh.

Interactive panel discussions were held at the end of the each of the three symposia. Delegates participated actively throughout the discussions. This years' meeting continued to provide a valuable platform for local and overseas gastrointestinal professionals and experts to exchange knowledge and share experience in different perspectives of GI diseases. It was proven to be an enjoyable and rewarding event.



More photographs are available online http://www.hksge.org/photogallery.htm

Coming Soon

The Hong Kong Society of Gastroenterology
38th Annual General Meeting cum Scientific Meeting
Thursday, 7 March 2019 6:15 pm

Venue: Level 7, Cordis Hong Kong at Langham Place
555 Shanghai Street, Mongkok, Kowloon

Organizing Chairperson: Dr. Wai-Fan Luk

Presentation of Honorary Fellowship by President, Dr. Annie O.O. Chan

Helicobacter pylori and gastric cancer:
A case of tragic triangulations
Professor Richard M. Peek, Jr.
Director, Division of Gastroenterology
Professor of Medicine
Vanderbilt University Medical Centre
Nashville, USA
Editor-in-Chief, *Gastroenterology*

Case presentation:
A case of dilated small bowel
Dr Aston Tin-Chak TAM
Department of Medicine
Pamela Youde Nethersole Eastern Hospital
Hong Kong

Annual General Meeting

(More information will be available soon from www.hksge.org)

Major Meetings

19-20 January 2019
International Colorectal Disease Symposium 2019
Organizer: Hong Kong Society for Coloproctology
Location: Hong Kong Convention and Exhibition Centre, Hong Kong
Website: www.icds-hk.com/

20-24 February 2019
28th Annual Conference - Asian Pacific Association for the Study of the Liver (APASL 2019)
Organizer: The Asian Pacific Association for the Study of the Liver
Location: Manila, Philippines
Website: www.apasl2019manila.org/

6-9 March 2019
14th Congress of ECCO – Inflammatory Bowel Diseases
Organizer: European Crohn's and Colitis Organisation
Location: Copenhagen, Denmark
Website: www.ecco-ibd.eu/ecco19.html

7 March 2019
38th Annual General Meeting cum Scientific Meeting of The Hong Kong Society of Gastroenterology
Organizer: The Hong Kong Society of Gastroenterology
Location: Cordis Hong Kong at Langham Place, Hong Kong
Website: www.hksge.org/

13-15 March 2019
12th Annual Sydney International Endoscopy Symposium (SIES)
Host: Westmead Hospital, Sydney
Location: Sydney, Australia
Website: www.sies.org.au/

14-17 March 2019
17th Congress of Asia Pacific Federation of Coloproctology (APFCP 2019)
Organizers: Asia Pacific Federation of Coloproctology and Malaysia Society of Colorectal Surgeons
Location: Kuala Lumpur, Malaysia
Website: www.apfcp2019.com/

20-23 March 2019
8th Biennial Meeting of the International Society for Gastrointestinal Hereditary Tumours (InSiGHT 2019)
Location: Auckland, New Zealand
Website: http://insight2019.com/insight19

20-24 March 2019
Americas Hepato-Pancreato-Billiary Association 2019 Annual Meeting
Organizer: Americas Hepato-Pancreato-Billiary Association (AHPBA)
Location: Florida, USA
Website: www.ahpba.org/annual-meeting/

29-30 March 2019
Falk Symposium 214 - Inflammatory Bowel Disease: From Pathophysiology to Personalized Medicine
Organizer: Falk Foundation e.V.
Location: Oxford, U.K.
Website: www.falk-foundation-symposia.org/uploads/tx_tocfpshoperw/S214_Oxford_2019_Preliminary_Program_02.pdf

3-6 April 2019
Society of American Gastrointestional and Endoscopic Surgeons (SAGES) 2019
Organizer: Society of American Gastrointestional and Endoscopic Surgeons
Location: Baltimore MD, USA
Website: www.sages2019.org/

5-7 April 2019
6th Biennial Congress of the Asian Neurogastroenterology and Motility Association in conjunction with 2nd KSM Education Program & 30th Annual Conference of the Korean Society of Neurogastroenterology and Motility
Organizers: Asian Neurogastroenterology and Motility Association (ANMA), Korean Society of Neurogastroenterology and Motility (KSNM)
Location: Seoul, Korea
Website: http://anma2019.org/

10-14 April 2019
EASL - The International Liver Congress 2019
Organizer: European Association for the Study of the Liver
Location: Vienna, Austria
Website: www.easl.eu/discover/events/detail/2019/the-international-liver-congress-2019

11-13 April 2019
Korea International Gastric Cancer Week 2019 (KINGCA Week 2019)
Organizer: Korean Gastric Cancer Association
Location: Incheon, Korea
Website: www.kingca.org/html/

12-14 April 2019
Asian EUS Congress
Organizer: Asian EUS Group
Location: Tokyo, Japan
Website: http://aeg2019.org/

18-20 April 2019
APASL Single Topic Conference on Liver Immunology and Genetics
Host: The Asian Pacific Association for the Study of Liver
Location: Tokyo, Japan
Website: www.apaslstc2019tokyo.org/

24-27 April 2019
11th EFR - The European Federation For ColoRectal Cancer Congress
Organizer: EFR - European Federation for coloRectal Cancer
Location: Vienna, Austria
Website: www.efrcancer.org/

26-28 April 2019
Tokyo International Endoscopy Live Seminar 2019
Location: Tokyo, Japan
Website: http://www.coac.jp/tokyolive/english/

8-11 May 2019
13th International Gastric Cancer Congress (IGCC 2019)
Location: Prague, Czech Republic
Website: http://igcc2019-prague.org/

18-21 May 2019
Digestive Disease Week (DDW 2019)
Organizers: American Association for the Study of Liver Diseases (AASLD), American Gastroenterology, Association (AGA), American Society for Gastrointestinal Endoscopy (ASGE) and The Society for Surgery of the Alimentary Tract (SSAT)
Location: San Diego CA, USA
Website: www.ddw.org/home

9-10 June 2019
The International Digestive Disease Forum 2019 (IDDF 2019)
Organizer: Institute of Digestive Disease (IDD) of The Chinese University of Hong Kong (CUHK)
Location: Hong Kong Convention and Exhibition Centre, Hong Kong
Website: www.iddforum.com

14-16 June 2019
The 7th Annual Meeting of Asian Organization for Crohn's & Colitis
Organizers : Asian Organization for Crohn's & Colitis (AOCC), Taiwan Society of Inflammatory Bowel Disease
Location: Taipei, Taiwan
Website: http://aocc2019.org/

21-24 September 2019
World Congress of Gastroenterology (WCOG) 2019
Organizer: The World Gastroenterology Organization, in partnership with The Turkish Society of Gastroenterology
Location: Istanbul, Turkey
Website: http://wcog2019.org/

(More information is available from www.hksge.org)

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