

## BSc in Medical Sciences with GASTROENTEROLOGY AND HEPATOLOGY

### Introduction

The BSc in Gastroenterology and Hepatology allows a science-based study of the physiology, cell biology, pathology and pharmacology of the gastrointestinal tract and liver in health and disease. Gene-environmental interactions, including metabolic, genetic and nutritional disorders, principles underlying diagnosis and therapy, with the emphasis on the science underlying imaging and neoplasia, and infective, immunological and inflammatory mechanisms as applied to the gastrointestinal tract and liver will be studied.

This course will comprise a two week Introductory course followed by three 5-week taught modules and either a research project or a specialist course.

### Course Director

Professor Julian Walters      [julian.walters@imperial.ac.uk](mailto:julian.walters@imperial.ac.uk)

### Course Administrator

Ms Olive Thomas              [o.thomas@imperial.ac.uk](mailto:o.thomas@imperial.ac.uk)

### Aims

The course aims to give a firm grounding in the scientific basis of gastroenterology and hepatology. Students will acquire a wider, more generally applicable knowledge of genetics, immunology, metabolism, infectious disease and pathology.

### Objectives

After taking this course students will have:

- A broad knowledge of the physiology of the GI tract and liver in health, and the pathophysiological mechanisms which lead to disease.
- An appreciation of various genetic and environmental influences on disease including nutritional science and metabolism.
- A knowledge of the scientific principles underlying diagnostic techniques and modern therapies.
- Familiarity with epidemiology, mechanisms and treatment of neoplasia in the GI tract and liver.
- An understanding of immunological, infective and inflammatory mechanisms in general and in specific GI and liver diseases.

### Specific Skills

Students will gain a practical knowledge of gastrointestinal investigation. Students will have a more general understanding of scientific method and experience in literature searches, assessment of publications and presentation of scientific reviews will be gained.

### Format of teaching

The course will be taught in a mixture of lectures, seminars, practicals and site visits to various institutions across the Imperial campus.

### Introductory Course

#### Leaders

Professor Julian Walters      [julian.walters@imperial.ac.uk](mailto:julian.walters@imperial.ac.uk)  
Dr Marco Purbhoo              [marco.purbhoo@imperial.ac.uk](mailto:marco.purbhoo@imperial.ac.uk)

## Aims

- To provide an introduction to the study of medical sciences related to the liver and gastrointestinal tract

## Content

- Introductory talks on immunology, genetics, metabolism and pathology
- A basic review of complex diseases of the liver and GI tract
- Introductory lectures on key generic skills including statistics and critical analysis

## Module 1: Gene-environmental interactions: metabolic, genetic and nutritional disorders of gut and liver

### Module Leaders

Professor Julian Walters      [julian.walters@imperial.ac.uk](mailto:julian.walters@imperial.ac.uk)  
Professor Salim Khakoo      [s.khakoo@imperial.ac.uk](mailto:s.khakoo@imperial.ac.uk)  
Dr Horace Williams      [h.williams@imperial.ac.uk](mailto:h.williams@imperial.ac.uk)

## Aims

- To appreciate how genetic and environmental factors contribute to GI and liver diseases.
- To learn about the scientific principles linking metabolic, genetic and nutritional factors to GI function and disorders.

## Content

- Specific gene/environment interactions in GI diseases such as IBD and coeliac disease will be studied, together with metabolic influences on the immune system and novel therapies for GI disease
- Genetic factors underlying GI and liver disease will be discussed in detail.
- Principles of human nutrition in health and disease, the assessment of nutritional state, and interactions of GI function, nutrition and metabolic diseases will be explored.

## Module 2: Diagnostic and therapeutic principles in gastrointestinal and liver disease (with the emphasis on the science underlying imaging, and on neoplasia)

### Module Leaders

Dr Belinda Smith      [belinda.smith2@imperial.nhs.uk](mailto:belinda.smith2@imperial.nhs.uk)  
Dr Shahid Khan      [shahid.khan@imperial.ac.uk](mailto:shahid.khan@imperial.ac.uk)  
Dr Lakshmana Ayaru      [lakshmana.ayaru@imperial.nhs.uk](mailto:lakshmana.ayaru@imperial.nhs.uk)

## Aims

- To gain a broad knowledge of diagnostic and therapeutic principles relevant to the GI tract and liver
- To develop a greater understanding of development and diagnosis of neoplasia in the GI tract and liver, and the rationale for various therapeutic approaches.

## Content

- Lectures and coursework on the science underlying diagnostic imaging and therapeutic techniques: including endoscopy, CT, magnetic resonance imaging, MR spectroscopy, position emission tomography, physiological studies and nuclear medicine.
- Physiological and pathological changes defined by these techniques will be discussed with an emphasis on neoplastic diseases of the liver and GI tract.

## **Module 3: Infective, immunological and inflammatory mechanisms in gut and liver disease**

### **Module Leaders**

Dr Ashley Brown

[ashley.brown@imperial.nhs.uk](mailto:ashley.brown@imperial.nhs.uk)

### **Aims**

- To learn about interactions between pathogenic infectious agents and the host immune response in the liver and gastro-intestinal tract.

### **Content**

- To become familiar with the host immune responses to infection
- To develop an understanding of the interactions of infectious agents with the immune system in Liver and GI disease
- To appreciate aspects of autoimmunity in Liver and GI disease

### **Modules 4 and 5**

#### **Projects or Specialist Courses**

A wide variety of laboratory-based, clinical and computer-based projects will be offered. Students may elect to carry out a library project if they wish.

#### **Past BSc Project Titles in Gastroenterology and Hepatology**

- Screening for Viral Hepatitis in Patients Newly Diagnosed With Tuberculosis
- Evaluating and standardising peri-operative analgesia in single-incision surgery
- Maintaining patency of metal stents for malignant bile duct obstruction
- Genetic and phenotypic associations in IBD in different ethnic groups
- The development of a VR colonoscopy training curriculum
- Audit in Bowel Cancer Screening Project
- Detecting appetite change with visual analogue scales on an ascent to altitude.
- A review of Delta hepatitis diagnosis and management 2005-2009
- Can patients with an Upper GI bleed be discharged from A&E without the need for endoscopy-Utility of the Blatchford Score
- The burden of liver pathology in Inflammatory Bowel Disease
- Surveillance for gastrointestinal neoplasia
- The role of IFN- $\lambda$ 3 receptor in the outcome of HCV infection.
- Value of point-of-care testing in coeliac follow-up
- Investigating the mechanism of direct cell-to-cell transmission of Hepatitis C virus
- Systemic stress following single-incision laparoscopic cholecystectomy

- Introduction of Entecavir Resistance Mutations in an Infectious Hepatitis B virus (HBV) Construct
- Metabolic profiling in chronic hepatic encephalopathy
- The effects of HCV on liver cell gene expression
- Quantitative Comparison of Microbubble Ultrasound Techniques for the Assessment of Hepatic Fibrosis in Chronic Hepatitis C
- Metabonomics of Blood and Urine in Hepatocellular cancer
- Genomic variation in bile acid diarrhoea patients
- Who benefits most from gastric bypass, sleeve gastrectomy and gastric banding surgery?
- Assessment of hepatic encephalopathy in patients with cirrhosis
- The PopCol study: epidemiology by endoscopy in a normal adult Swedish population, pathology in irritable bowel syndrome?
- The effect of genetic testing on surveillance for familial colorectal cancer
- Study of Disease Phenotype and Correlation with Biliary Transporter Polymorphisms in Cholangiocarcinoma.
- Does activation of the coagulation system promote liver fibrosis in patient with chronic liver disease
- Translational Efficiency of Mutated GBV-C IRES Elements
- Prevalence of non-alcoholic fatty liver disease in a diabetic clinic
- Pathology of the Upper Gastrointestinal Tract in Functional Dyspepsia in an Australian Cohort
- An analysis of viral hepatitis in patients undergoing TB therapy
- Investigating the mechanism of direct cell-to-cell transmission of Hepatitis C virus
- Impact of aspirin, NSAIDs and anti-coagulants on findings in Bowel Cancer Screening
- Artificial Neural network as a predictive tool for the risk stratification of acute upper gastrointestinal bleeding
- Curriculum development on a virtual reality colonoscopy simulator
- Exploring possible contributors to severe *C. difficile* disease; new ribotype infection, nasogastric feeding, immunosuppression
- Does the 3' non-coding region affect the translational efficiency of the HCV IRES?
- Comparative serum proteomics in fluke and non-fluke associated cholangiocarcinoma
- Stem cell in the human intestine: roles in cancer and gut homeostasis
- An evaluation of the clinical impact of a specialist cirrhosis clinic
- Biomarkers in iron deficiency anaemia
- Proteomic analysis plasma of hepatobiliary cancer

- Liver Enzymes in the Diabetic Foot Clinic
- Genetic factors in the ileal production of FGF19 in primary bile acid diarrhoea.
- Hepatitis C and HLA-G: a novel immunological role
- Can additional glycaemic control after metabolic surgery improve outcomes while maintaining safety? The GLUCOSURG Trial.
- Oesophageal varices in Malawi
- Effectiveness of the Multidisciplinary NASH clinic
- The demographic picture of hepatocellular carcinoma across Imperial College NHS Healthcare Trust.
- Pathology of Paediatric Helicobacter pylori and Concurrent Infections in a Chilean Cohort.
- Clonal analysis of HBV resistant isolates from patients treated with nucleos(t)ide analogues
- How does obesity surgery work? Effects on Taste.
- Analysis of the final pathological outcome in patients with mild ulceration on capsule endoscopy
- Functional Bowel disorders & Bile Acid Malabsorption: a potential interrelationship
- Aspirin and Cyclooxygenase based chemoprevention in colonic cancer - literature
- Endoscopic ultrasound with fine needle aspiration for the diagnosis of pancreatic cystic neoplasms
- Diagnostic methods in hepatic encephalopathy; systematic review and meta-analysis
- Abnormal changes in liver cell lipid metabolism during hepatitis C virus infection.
- Effects of inflammation on the ileal production of FGF19.

### **What do the students think of the BSc in Gastroenterology and Hepatology?**

'Gastroenterology and Hepatology was a fantastic mix of basic sciences, always backed with clinical relevance. The course was largely based at the Hammersmith Hospital and St Mary's Hospital, London. Each of the three modules covered widely different themes, from genetics to imaging and nutrition to virology. Within each topic there is a real opportunity to learn fundamental aspects of sciences - for example physics and biochemistry. The course leader and module supervisors were leaders in their fields, great teachers, and well organised - none of the students had a bad word to say about them! Each module is largely lecture-based, interspersed with the odd presentation and piece of written coursework - however afternoons tend to be free. The project options are fairly diverse. There is a mixture of laboratory, clinical and library based projects, so there is something for everyone. There is often the option of a few projects abroad; this year's group were offered Tanzania and Nigeria. Overall, I would thoroughly recommend Gastroenterology and Hepatology as a BSc option. It offers an interesting mix of subjects, plenty of time for extra reading, fantastic module leaders, and a diverse choice of projects.'