

University of Cambridge: Programme Specifications

Every effort has been made to ensure the accuracy of the information contained in this programme specification. At the time of publication, the programme specification has been approved by the relevant teaching Faculty or Department. It is, however, natural for courses to develop and change over time and we reserve the right, without notice, to withdraw, update or amend this programme specification at any time.

MPhil in Medical Sciences Option B (Obesity and Related Metabolic Diseases)

1.	Awarding Body	University of Cambridge
2.	Teaching Institution	Faculty of Clinical Medicine
3.	Accreditation Details	None
4.	Name of Final Award	MPhil
5.	Programme Title	MPhil in Medical Sciences (Option B) (Obesity and Related Metabolic Diseases)
6.	UCAS Code	None
7.	Benchmark Statement(s)	None
8.	Qualifications Framework Level	M
9a.	Date of Revision	April 2009
9b.	Last Reviewed	April 2009

Introduction

Obesity is a major and growing threat to public health. It is the major risk factor for Type 2 diabetes and substantially increases the risks of cardiovascular disease, stroke, certain cancers, osteoarthritis, and gastrointestinal and reproductive disorders. Obesity is also associated with psychosocial morbidity and social exclusion. In England about 43% of men and 33% of women are overweight. An additional 22-23% are obese (an increase of 50% in the last decade). The increasing prevalence of obesity in children is of particular concern, with as many as 8% of 6 year olds and 15% of 15 year olds already clinically obese. As current pharmacological, nutritional or behavioural therapies have met with only limited success, a better understanding of the biology of obesity and diabetes is vital to identify mechanisms that could be targeted for more effective interventions.

In 2007, the Medical Research Council (MRC) agreed to support a Centre for translational research in Obesity and Related Diseases (CORD) at Cambridge University. The provision of studentships for a new 4 year PhD programme was a key part of that support. The managers of the programme took the decision that it should be formally structured as a 1 year MPhil + 3 year PhD.

The aim of the integrated Masters and Doctoral programme in Obesity and Related Metabolic Diseases is to provide training in the study of fundamental mechanisms in obesity and its adverse consequences, with the goal of informing improved prevention and treatment. The programme combines formal training in molecular and cellular biology, physiology of model organisms, human physiology, human genetics, genomics and population health sciences, with a clear commitment to inter-disciplinary research and translational implications for human health.

The programme brings together world-leading expertise in metabolic biochemistry and medicine, genomics and population sciences. It draws on faculty at the University's Schools of Clinical Medicine and Biological Sciences (Departments of Clinical Biochemistry, Medicine, Obstetrics & Gynaecology, Clinical Neurosciences, Paediatrics, Biochemistry, Pharmacology) and several affiliated institutes (the Wellcome Trust Sanger Institute, the MRC Epidemiology Unit and the MRC Human Nutrition Research Unit). The programme's 33 principal investigators are at the international forefront of their scientific disciplines, and provide breadth of expertise from molecules and cells through animals to large population studies. The MRC 4-year PhD programme has close links and shares investigators with the Wellcome Trust funded 4-year PhD programme in Metabolic and Cardiovascular Diseases and the BHF funded 4 year PhD programme in Cardiovascular Research.

Educational aims of the programme

The PhD programme exists to provide graduate-level training consistent with the overall aims of the MRC-CORD, which are:

- To train the next generation of basic and clinical scientists in translational metabolic research
- To provide an environment that fosters the development of new cross-disciplinary research programmes
- To foster the career development of junior faculty by providing them with the intellectual and technical environment where they can flourish
- To ensure that advances in the basic sciences of obesity and diabetes can inform, and be informed by, research in population sciences and improve and refine the targeting of preventive trials.
- To actively engage with industry; to lend our collective expertise to the UK biopharmaceutical sector; to learn from them and to collaboratively develop new diagnostic and therapeutic tools.
- To actively engage the public not only by providing "public information" but by embracing public involvement in advising us how best to make information about the Centre and its research more widely accessible.

The MPhil in Obesity and Related Metabolic Diseases is offered by the Faculty of Clinical Medicine as a full-time research degree under regulations for the MPhil in Medical Sciences (Option B). The course introduces students to several different experimental approaches and research environments as a preparation for a specific 3 year PhD project, within an integrated Masters and Doctoral training programme.

Teaching and Learning Methods and Opportunities

The MPhil is full time and research based, commencing on 1 October each year. It starts with a 2 week induction and orientation period, during which students have an opportunity to meet investigators participating in the programme and to learn about courses organised by the Graduate School of Life Sciences (<http://www.biomed.cam.ac.uk/gradschool/>) including laboratory safety, science ethics, starting a PhD, keeping laboratory notebooks and intellectual property. Following discussion with their mentor and potential supervisors, students select 3 complementary projects for execution (10 weeks duration) in the Michaelmas, Lent and Easter terms. On completion of each project, students prepare a detailed report (written, poster or oral) which is discussed with the supervisor and an independent assessor who then provide verbal and written feedback on both the conduct of the project and the presentation of the report. The reports of the supervisor and assessor also contribute to the formal assessment of the MPhil (see below).

Throughout the year students attend weekly "hot topics" discussion sessions, at which investigators present work from their own or other laboratories that is judged to be at the forefront of their fields. These sessions aim to convey both important scientific questions and the experimental approaches with which these questions can be addressed. Additional "techniques" sessions will specifically cover relevant practical and analytical methods, including 'omics technologies, microscopy, bioinformatics and statistics. Some of these "hot topics" and "techniques" sessions will be shared with other 4-year PhD programmes (particularly Metabolic and Cardiovascular Disease, Cardiovascular Research, Cambridge Institute for Medical Research).

In addition to programme-specific training, students are required to participate in generic/transferable skills training courses organized by Graduate School of Life Sciences, including career planning and personal development, communication skills, computing and information technology, and research ethics.

(<http://www.biomed.cam.ac.uk/gradschool/current/courses/trans-courses.html>).

After 9 months, participating PIs (as potential supervisors) submit outline PhD projects for students to consider. Students select supervisors for their PhD project in discussion with their mentor and will prepare a research proposal in the format of a grant application, including background, detailed research plan and costing. This project proposal is discussed and refined in a viva with the MPhil examiners.

Conditions of admission

The University's standard academic requirement for a 2.i honours degree or better, and English Language requirements as specified in the current Graduate Studies Prospectus, both apply.

Applicants should already have or expect to obtain at least an upper second class honours or equivalent in any subject relevant to the programme (including for instance Biochemistry, Molecular Biology, Genetics, Physiology, Pharmacology, Population Sciences and related subjects).

Assessment

Assessment of the MPhil in Medical Sciences Option B: Obesity and Related Metabolic Diseases will be as published:

<http://www.admin.cam.ac.uk/reporter/current/weekly/6121/30.html>

The examination shall consist of:

(a) either (i) a written report of a practical project of not less than eight weeks' duration, not exceeding 8,000 words in length, including tables, figure legends, and appendices, but excluding bibliography, on a topic approved by the Degree Committee for the Faculties of Clinical Medicine and Veterinary Medicine
or (ii) one essay, not exceeding 4,000 words in length, on a topic approved by the Degree Committee;

(b) a critical appraisal, not exceeding 8,000 words in length, including tables, figure legends, and appendices, but excluding bibliography, of a research project proposal approved or prescribed by the Degree Committee;

(c) practical work as prescribed by the Degree Committee; each candidate shall present for the inspection of the Examiners records of such practical work.

The examination shall include an oral examination on the work submitted by the candidate under (a)-(c) above and on the general field of knowledge within which such work falls.

The Degree Committee of the Faculty of Clinical Medicine will appoint two Examiners for each student, who will assess the materials submitted under (a)-(c) and conduct an oral examination focusing particularly on (b). The Degree Committee will also appoint an External Examiner for each cohort who will scrutinize the materials prepared by students and the reports of assessors and examiners before recommending approval for students to proceed to the degree.

Learning Outcomes

Upon successful completion of the MPhil, graduates will have

- (1) Developed a broad understanding of modern research techniques and a thorough knowledge of literature relevant to obesity and related metabolic diseases;
- (2) Demonstrated originality in the application of knowledge, together with a practical understanding of how research and enquiry are used to create and interpret new knowledge in the field;
- (3) Acquired knowledge of a broad range of interdisciplinary research areas and supervisors to inform their choice of PhD projects.
- (4) Acquired training in generic and transferable research skills including the critical evaluation of current research and methodologies and the preparation of research reports and applications.

Support for learning and completion of the programme

The participating Departments conform to the general University guidelines for the supervision of graduate students.

A **Management Committee** will meet at least once per term, comprising the Programme Director or his nominated Deputy, the Director of Graduate Studies in the University Metabolic Research Laboratories (as Programme Co-ordinator), the Research Manager for the University Metabolic Research Laboratories, at least three additional investigators with experience in research supervision and representing different Departments affiliated to the Programme, and at least one student representative. The Committee will have responsibility for design and delivery of the training programme, for selection and evaluation of students by appointed interview panels, and for allocation of research projects. The Programme Co-ordinator and Research Manager will be responsible for day to day management matters such as advertising the programme, arranging interviews, setting out timetables for skills training, and soliciting and distributing reports. The Programme Co-ordinator or another senior investigator will act as formal supervisor and will also be responsible for pastoral care, in liaison with the Graduate School of Life Sciences, the Board of Graduate Studies and the Colleges. In particular, the Co-ordinator will ensure that students undertaking projects in the different university departments to which participating PIs are affiliated remain fully involved in the broader aims and activities of the programme.

All students will participate in an annual Programme Symposium where they will have the opportunity for presenting their research. Students will be encouraged to join cognate learned Societies and to give presentations arising from their projects at relevant conferences.

Employment and Careers

A key purpose of the programme will be to train a new cadre of scientists in cross-disciplinary research in the field of obesity and related metabolic diseases, who can work effectively across traditional disciplines and lead collaborative research projects to maximise scientific

opportunities in the post-genome era, using an integrated approach and a broad range of complementary methods. We anticipate that most graduates from our programme will pursue postdoctoral research, and will be encouraged to apply for competitive travelling fellowships and make early contact with potential host laboratories via the worldwide network of contacts available through the programme directors and PIs. Those wishing to consider other career options will be encouraged to use the careers adviser recently appointed by and reporting to the Graduate School of Life Sciences and to make use of the Careers Service.

Appendix: List of Principal Investigators, their departments and research interests (as at 01.01.2009)

Director of Programme

Professor Steve O'Rahilly (Clinical Biochemistry and IMS-MRL)
Molecular basis of obesity and insulin resistance

Director of Graduate Studies and Programme Co-ordinator

Professor Ken Siddle (Clinical Biochemistry and IMS-MRL)
Insulin receptor structure and intracellular signalling pathways

Dr Ines Barroso (Wellcome Trust Sanger Centre)
Genetics of human obesity and Type II Diabetes

Dr Les Bluck (MRC Human Nutrition Research Unit)
Application of mathematical modelling to the study of integrated physiology

Dr Denis Burdakov (Pharmacology)
Brain circuits regulating energy balance

Professor Krish Chatterjee (Medicine and IMS-MRL)
Nuclear receptors and metabolic disease

Dr Anthony Coll (Clinical Biochemistry and IMS-MRL)
Roles of products of the POMC gene in the control of energy balance

Dr Miguel Constancia (Obstetrics and Gynaecology and IMS-MRL)
Epigenetic programming

Professor David Dunger (Paediatrics and IMS-MRL)
Genetic determinants of size at birth and early growth

Dr Ulf Ekelund (MRC Epidemiology Unit)
Epidemiology of physical activity

Dr Mark Evans (Medicine and IMS-MRL)
Mechanisms by which the brain senses glucose and nutrient status

Dr Sadaf Farooqi (Clinical Biochemistry and IMS-MRL)
Genetic approaches to find novel genes and characterise their role in severe human obesity

Professor Keith Frayn (Oxford Centre for Diabetes Endocrinology and Metabolism)
Genetics of human obesity

Dr Fiona Gribble (Clinical Biochemistry and CIMR)

Identification of the mechanisms underlying secretion of incretin hormones, using electrophysiological and imaging techniques

Dr Julian Griffin (Biochemistry)

Metabolomics

Dr Mark Gurnell (Medicine)

Nuclear receptors in human disease

Dr Lora Heisler (Pharmacology)

Neuroendocrinology of food intake, body weight and type 2 diabetes

Dr Roman Hovorka (Paediatrics and IMS-MRL)

Virtual human physiome of insulin resistance with specific applications to insulin titration

Dr Susan Jebb (MRC Human Nutrition Research Unit)

Nutrition and human disease

Dr Frederik Karpe (Oxford Centre for Diabetes Endocrinology and Metabolism)

Genetics of human obesity

Dr Ruth Loos (MRC Epidemiology Unit)

How environmental exposures modify the effects of genes contributing to obesity and weight gain

Dr Ken Ong (MRC Epidemiology Unit)

Determinants of fetal growth and childhood obesity

Dr Susan Ozanne (Clinical Biochemistry and IMS-MRL)

Developmental programming of diabetes and obesity

Dr Akhilesh Reddy (Clinical Neuroscience and IMS-MRL)

Circadian rhythms

Dr Frank Reimann (Clinical Biochemistry and CIMR)

Glucose-dependent insulintropic polypeptide (GIP)

Dr Justin Rochford (Clinical Biochemistry and IMS-MRL)

Regulation of adipogenesis

Dr David Savage (Clinical Biochemistry and IMS-MRL)

Understanding mechanisms of insulin resistance and type 2 diabetes using extreme human phenotypes

Dr Rob Semple (Clinical Biochemistry and IMS-MRL)

The genetic, cellular and molecular basis of human severe insulin resistance and extreme insulin hypersensitivity

Dr Jazz Sethi (Clinical Biochemistry and IMS-MRL)

Cytokine Signalling and Energy Homeostasis

Dr Toni Vidal-Puig (Clinical Biochemistry and IMS-MRL)
Molecular mechanisms of lipid induced insulin resistance and therapeutic strategies involved in lipid oxidation

Dr Dietrich Volmer (MRC Human Nutrition Research Unit)
Biological mass spectrometry and lipidomics

Professor Nick Wareham (MRC Epidemiology Unit)
Gene-environment interaction and human metabolic disease

Dr Giles Yeo (Clinical Biochemistry and IMS-MRL)
Application of novel genomic and transcriptomic technologies in understanding the central control of energy homeostasis