

**HIGHER MEDICAL TRAINING**

CURRICULUM  
FOR  
HIGHER SPECIALIST TRAINING  
SUBSPECIALTY ACCREDITATION IN  
**METABOLIC MEDICINE**

February 2003

Joint Committee on Higher Medical Training  
Royal College of Physicians  
5 St Andrews Place  
Regent's Park  
London  
NW1 4LB  
Tel: 020 7935 1174  
Fax: 020 7486 4160  
Email: [HMT@rcplondon.ac.uk](mailto:HMT@rcplondon.ac.uk)  
Website: <http://www.jchmt.org.uk>

## TABLE OF CONTENTS

<b>INTRODUCTION</b> .....	<b>3</b>
<b>ENTRY REQUIREMENTS</b> .....	<b>4</b>
<b>CURRICULUM</b> .....	<b>4</b>
<b>THEORETICAL KNOWLEDGE</b> .....	<b>4</b>
<b>CLINICAL TRAINING PROGRAMME</b> .....	<b>4</b>
<b>i) Nutrition</b> .....	<b>4</b>
<b>ii) Inborn errors of metabolism</b> .....	<b>4</b>
<b>iii) Disorders of lipid metabolism and cardiovascular risk assessment</b> .....	<b>5</b>
<b>iv) Disorders of calcium metabolism and bone</b> .....	<b>5</b>
<b>v) Diabetes Mellitus</b> .....	<b>5</b>
<b>LABORATORY TRAINING</b> .....	<b>5</b>
<b>ORGANISATION OF THE TRAINING PROGRAMME</b> .....	<b>5</b>
<b>Entry into Chemical Pathology (Metabolic Medicine) training for Chemical Pathology trainees</b> .....	<b>6</b>
<b>CURRICULUM FOR METABOLIC MEDICINE</b> .....	<b>7</b>
<b>Teaching/learning method</b> .....	<b>7</b>
<b>Communication skills</b> .....	<b>8</b>
<b>Obesity</b> .....	<b>9</b>
<b>Disease related malnutrition</b> .....	<b>9</b>
<b>Adult inborn errors of metabolism</b> .....	<b>10</b>
<b>Lipid metabolism and cardiovascular risk assessment</b> .....	<b>11</b>
<b>Disorders of calcium metabolism and bone</b> .....	<b>12</b>
<b>Diabetes mellitus</b> .....	<b>13</b>
<b>Eye disease</b> .....	<b>14</b>
<b>Renal disease and hypertension</b> .....	<b>14</b>
<b>Neuropathy</b> .....	<b>14</b>
<b>Laboratory Training</b> .....	<b>15</b>

**SUBSPECIALTY TRAINING IN**  
**METABOLIC MEDICINE**  
**for either General (Internal) Medicine or Chemical Pathology**  
**NTN Holders**

**INTRODUCTION**

Metabolic medicine can be defined as a group of overlapping areas of clinical practice with a common dependence on detailed understanding of basic biochemistry and metabolism. It therefore falls within the areas of expertise of both the physician and the chemical pathologist. These areas include:

- Disorders of nutrition
- Inborn errors of metabolism
- Disorders of lipid metabolism and cardiovascular risk assessment
- Disorders of calcium metabolism and bone
- Diabetes mellitus

Other training programmes do not adequately meet all requirements, particularly in respect to nutritional disorders and adult patients with inherited errors of metabolism. This training programme has been developed to achieve competence in metabolic medicine in order to supplement the existing CCSTs in the career disciplines of Chemical Pathology (CP) and General Internal Medicine (GIM). Metabolic medicine is now regarded as a subspecialty, for which formal recognition of training is required, and which can be approached initially from either a laboratory or clinical base. This leads to an entry in the Specialist Register of a CCST in GIM (Metabolic medicine) or Chemical Pathology (Metabolic medicine).

This new programme is intended to achieve three objectives:

- i) To provide a scientific and clinical training for several areas of medicine which require greater knowledge of biochemistry, genetics and molecular biology than most organ based specialties.
- ii) To develop the clinical training of Chemical Pathologists who wish to practice, predominantly on an outpatient basis, in these areas of medicine.
- iii) To support the academic progress and development of metabolic medicine.

## **ENTRY REQUIREMENTS**

All applicants must have completed a minimum of two years general professional training (GPT) in approved posts and have obtained the MRCP (UK) or MRCP (I) or equivalent. Training in Metabolic Medicine (MM) will then be planned to supplement either of the existing programmes in CP or in GIM.

## **CURRICULUM**

The curriculum will provide a sound theoretical and laboratory training in relevant biochemistry (notably intermediary metabolism), genetics and molecular biology which will underpin the clinical training programme.

## **THEORETICAL KNOWLEDGE**

The required knowledge in biochemistry and molecular biology for Metabolic Medicine will be more extensive than that required for other CCSTs in medical specialties. The curriculum for the CCST in Chemical Pathology already provides a good biochemical grounding. A suitable programme will be required for entrants who wish to combine Metabolic Medicine with General Internal Medicine.

## **CLINICAL TRAINING PROGRAMME**

All trainees will be required to undertake a core training programme in the five following areas. Towards the end of their training they will have the opportunity to obtain additional specialist expertise in one or two of these areas. The core competencies are identified below.

### **i) Nutrition**

Training will require outpatient clinical experience and participation in the care of patients with nutritional problems including obesity. They should obtain experience of joint working with dieticians and with other clinicians, including surgeons, gastroenterologists, geriatricians and intensive care physicians, who are also involved in the field of nutrition. In-patient work should involve a team approach with a nutrition support team. Trainees will acquire the skills to diagnose and manage severe undernutrition, including the provision of artificial nutritional support.

### **ii) Inborn errors of metabolism**

The range of biochemical disorders is very wide although individually they are uncommon. Inherited defects of intermediary metabolism, membrane transport, lysosomal, peroxisomal and mitochondrial disorders are included, as well as disorders of metal storage. Trainees will develop skills in the laboratory diagnosis and management of inborn metabolic diseases; this will include genetic, biochemical and enzyme studies. Trainees will receive instruction in the counselling of affected families and use of specific

treatments for affected members by therapeutic manipulation of disturbed metabolism including the use of corrective drugs and specialised nutritional programmes.

### **iii) Disorders of lipid metabolism and cardiovascular risk assessment**

These include the genetic and acquired hyperlipidaemias including diabetic dyslipidaemia. Active involvement in consultant supervised lipid and cardiovascular risk assessment clinics is required. Trainees will become competent in the recognition, investigation and management of hyperlipoproteinaemias beyond the common polygenic disorders, particularly familial hypercholesterolaemia, type III hyperlipoproteinaemia and severe hypertriglyceridaemia with its attendant risk of pancreatitis. Trainees will also be able to differentiate the causes of hypolipoproteinaemia.

### **iv) Disorders of calcium metabolism and bone**

Active involvement in consultant supervised clinics for patients with: osteoporosis, Paget's disease, renal stone formation, rickets and osteomalacia, defects of renal tubular function, vitamin D metabolism and the acquired and genetic disorders of parathyroid function. Experience will be gained in the investigation and management of hypo- and hypercalcaemia, and hypo- and hyperphosphataemia. Trainees will become competent in the diagnosis and management of these disorders of calcium and phosphate metabolism and associated bone disease.

### **v) Diabetes Mellitus**

Trainees will be actively involved in consultant supervised diabetic clinics for patients with types 1, 2 and other forms of diabetes, including gestational diabetes. Trainees will become competent in the assessment and treatment of diabetes and its micro- and macro-vascular complications in an outpatient setting.

## **LABORATORY TRAINING**

All trainees in Metabolic Medicine will undertake a period of laboratory training in which they will become familiar with the laboratory techniques used in the investigation and monitoring of the various disease states included in the curriculum. They will be required to undertake a project, which would normally be laboratory based, and acquire appropriate analytical skills. They will develop competence in the interpretation and limitations of relevant complex laboratory investigations.

## **ORGANISATION OF THE TRAINING PROGRAMME**

The precise programme will depend upon the base discipline, whether Chemical Pathology or General Internal Medicine (GIM).

For Chemical Pathology trainees, a significant proportion of the Metabolic Medicine training programme will be completed during the core training for the CCST, but greater

emphasis will be required on the acquisition of clinical skills, The additional elements for the training programme in Metabolic Medicine will add one year to the time required for the CCST in Chemical Pathology (which will include obtaining the MRCPPath), that is a total of 5.5 years.

GIM trainees may undertake specific training in Metabolic Medicine after completion of their CCST in GIM. They will have a requirement for laboratory aspects of training, for specific areas of clinical training, and for project work. This will normally add a 2 year period to the time required for a CCST in GIM, that is a total of 5 years at SpR level. Alternatively, they may enrol in a programme that is constructed to allow for joint training in GIM and Metabolic Medicine and which will add one year to the time required for a CCST in GIM. Provided this programme has been approved by the Sub-Committee (vide infra) they may then train in a total of 4 years at SpR level.

### **Entry into Chemical Pathology (Metabolic Medicine) training for Chemical Pathology trainees**

The normal route will be that trainees will be appointed to a post of SpR in Chemical Pathology with subspecialty training in Metabolic Medicine. The trainee will already have achieved the MRCP(UK) or equivalent and will have two years General Professional Training.

A trainee with MRCP(UK) and two years GPT may already be in post as SpR in Chemical Pathology. Such a trainee can enter an approved Metabolic Medicine programme, with the approval of the Post-Graduate Dean and the local Chemical Pathology Specialty Training Committee, although open competition for such a transfer will normally be required. Some credit may be awarded for previous training in appropriate areas whilst in an SpR post. Trainees who wish to apply for such credit will require to complete the appropriate form (obtainable from the JCHMT office) .The Metabolic Medicine committee will advise the training needed to complete the training programme, and confirm the programme proposed by the local training committee.

Exceptionally, a Chemical Pathology trainee without the MRCP may wish entry to a Metabolic Medicine programme. This process would be complex and would require the trainee:

- i) to resign their post in Chemical Pathology
- ii) to obtain a post which would permit completion of GPT and passing the MRCP examination
- iii) to apply competitively for an approved Chemical Pathology/ Metabolic Medicine training post. Training undertaken during the previous SpR post would be recognised for the Chemical Pathology CCST.

## **CURRICULUM FOR METABOLIC MEDICINE**

All trainees will be expected to develop the theoretical, clinical and laboratory competence to provide a service in any of these, with additional expertise in one or two areas. Where laboratory experience is required (as coded 'c' below) trainees in GIM will be expected to spend sufficient time in the laboratory as part of their structured weekly activities, to obtain a basic knowledge of relevant methods and their limitations, and more detailed knowledge of interpretation of results. Trainees in Chemical Pathology will integrate this into their programme of training in laboratory medicine.

### **Teaching/learning method**

The following teaching/learning methods will be used, and the appropriate letter has been used in the tables to identify how individual objectives will be achieved.

- a. Observation of, assisting and discussion with senior staff
- b. Task specific on the job training
- c. Observation of laboratory methods
- d. Personal study
- e. Appropriate post-graduate education courses
- f. Tailored clinical experience
- g. Taking part in multidisciplinary team meetings to plan service provision and individual patient care
- h. Undertaking a laboratory based project

## **Subject matter**

### **Communication skills**

Trainees must be able to conduct a consultation in a way that: -

<b>Objective:</b>	<b>To be achieved by:</b>
Identifies patients ideas, concerns and expectations as well as the facts of their case	a, b ,f
Supports and reinforces self-care	a, b, f
Communicates information comprehensibly and helps patients adopt preventative self-care behaviours	a, b, f
Demonstrates an understanding of the impact of disease on the individual patient	a, b, e, f

### **i) Disorders of nutrition**

#### **Objectives**

By the end of training, trainees should be able to manage:-

- The assessment and treatment of adult patients with obesity, in an out-patient setting
- The assessment and treatment of adult patients with disease related malnutrition, in an out-patient and in-patient setting
- Nutritional support by enteral and intravenous routes, on a short-term or long-term basis

## **Subject matter**

**i) (a)**

### **Obesity**

<b>Objective:</b>	<b>To be achieved by:</b>
Diagnosis of obesity	a, b, f
How to give basic dietary advice	a, b, f, g
Referral of patients appropriately for dietetic advice	a, b, f, g
Initiating drug therapy	a, b, d, f
Referral of patients appropriately for surgical treatment	a, b, f, g
Managing the complications of obesity – diabetes, hypertension, hyperlipidaemia	a, b, c, d, e, f, g

**i) (b)**

### **Disease related malnutrition**

<b>Objective:</b>	<b>To be achieved by:</b>
Assessment of protein energy nutritional status	a, b, c, d, e, f, g,
Assessment of vitamin and mineral status	a, b, c, d, e, f, g,
Assessment of nutritional requirements of patients with acute disease e.g stroke; with chronic disease e.g inflammatory bowel disease, stroke, gut failure pre-operation following surgery- abdominal, ENT following severe accidental trauma	a, b, c, d, e, f, g,
Provision of nutritional support : by oral route-diet, sip feeds by enteral route –nasogastric, nasojejunal, PEG feeding by intravenous route- peripheral vein, PICC, and central vein	a, b, f, g

ii)

**Adult inborn errors of metabolism**

**Objectives**

**By the end of training trainees should be able to manage: -**

- The diagnosis and assessment of a range of inborn errors of metabolism which affect adult patients
- The use of specialised laboratory investigations and their interpretation, including their limitations.
- The use of specialised dietary interventions to minimise the impact on health and optimise long-term outcome
- The use of specific corrective treatments to optimise long-term disease outcome
- The counselling of affected families including genetic considerations

**Subject matter**

**Trainees must be able to undertake:-**

<b>Objectives – The diagnosis of :-</b>	<b>To be achieved by:</b>
Inborn errors of intermediary metabolism	a, b, c, f, g
Inborn errors of membrane transport	a, b, c, f, g
Inborn errors of lysosomal metabolism	a, b, c, f, g
Inborn errors of peroxisomal metabolism	a, b, c, f, g
Inborn errors of mitochondrial metabolism	a, b, c, f, g
Disorders of metal metabolism	a, b, c, f, g
Have a working knowledge of prenatal diagnosis and odds-ratio assessment	a, b, c, f, g
For each of the above:- Appropriate use of molecular, genetic, metabolic and enzyme studies	a, b, c, f, g
The clinical assessment of patients with the above disorders	a, b, c, f, g
The counselling of affected families	a, b, c, f, g
Specific treatments by a specialised nutrition programme	a, b, f, g
Specific corrective treatments by drugs	a, b, f, g

iii)

**Lipid metabolism and cardiovascular risk assessment**

**Objectives**

By the end of training, trainees should be able to manage :-

- The diagnosis and assessment of genetic and acquired hyperlipidaemia and other dyslipidaemias
- The overall assessment of cardiovascular risk in primary and secondary prevention settings
- The provision of dietary advice to patients with hyperlipidaemia to optimise long-term outcome
- The use of drugs together with diet to manage the variety of lipid disorders to optimise long-term outcome
- The use of specialised laboratory investigations and their interpretation including limitations

**Subject matter**

**Trainees must be able to:-**

<b>Objective:</b>	<b>To be achieved by:</b>
Evaluate cardiovascular risk in genetic and acquired hyperlipidaemia	a, b, c, f, g
Assess cardiovascular risk due to non-lipid factors e.g. hyperhomocysteinaemia, fibrinogen, smoking	a,b,c,f,g
Identify Vascular Complications Of Hyperlipidaemia	a, b, f
Recognise Cutaneous And Other Signs Of Hyperlipidaemia	a, b, f
Give basic dietary advice to patients with hyperlipidaemia	a, b, f, g
Institute appropriate drug therapy for the management of dyslipidaemia	a, b, c, f, g
Evaluate And Manage Other Lipid Disorders	a, b, c, f, g
Counsel affected families with genetic dyslipidaemias	a, b, c, f, g
Interpret and critically appraise biochemical and genetic investigations for dyslipidaemia	a, b, c, d, f, g

iv)

**Disorders of calcium metabolism and bone**

**Objectives**

**By the end of training, trainees should be able to manage: -**

- Newly presenting patients with suspected disorders of calcium metabolism or bone function
- The use of specific diets and where necessary drug therapy, in a way that minimises the impact of the abnormality on health, and which optimises long-term disease outcome
- Optimal use of laboratory and imaging services in the assessment of individual patients

**Subject matter**

Trainees must be able to:-

<b>Objective:</b>	<b>To be achieved by:</b>
Diagnose patients with the following metabolic states:-	
Disorders of calcium metabolism-hypercalcaemia -hypocalcaemia	a, b, c, f a, b, c, f
Disorders of magnesium metabolism	a, b, c, f
Disorders of phosphate metabolism	a, b, c, f
Diagnose patients with the following disease states :-	
Osteoporosis	a, b, c, f
Osteomalacia and rickets	a, b, c, f
Paget's disease	a, b, c, f
Renal stone disease	a, b, c, f
For each of the above conditions:- Undertake clinical assessment of disease severity and prognosis of these patients	a, b, c, f
Use laboratory and radiological methods to confirm diagnosis and progress	a, b, c, d, h
Give dietary advice to patients with these disease states	a, b, c, f
Institute appropriate therapy to optimise outcomes	a, b, c, f

v)

**Diabetes mellitus**

**Objectives**

By the end of training, trainees should be able to manage:-

- Newly presenting diabetes in out-patient hospital settings in a way that restores health and well-being efficiently and effectively
- Glycaemic control in type 1 and 2 diabetic patients in a way that minimises the impact on health and optimises long-term disease outcomes
- The screening for, prevention and treatment of microvascular, macrovascular, neurological and other complications to optimise the intermediate and final outcomes of diabetes
- Have a working knowledge of the management of diabetic metabolic emergencies

**Subject matter**

Trainees must be able to:-

<b>Objective:</b>	<b>To be achieved by:</b>
Diagnose diabetes and glucose intolerance disorders	a, b, c, f, g
Give basic dietary advice, emphasising its importance as first line therapy in type 2 patients	a, b, c, g
In the event of dietary failure institute appropriate therapy	a, b, c
Recognise the need for insulin treatment in diabetic patients	a, b, c
Institute insulin therapy	a, b, c
Educate patients in the use of insulin syringes, injection pens, home blood glucose monitoring and urinalysis	a, b, f, g
Give advice about the insulin dose adjustment	a, b, f, g
Provide life style advice with regard to employment, driving, exercise, weight control and smoking	a, b, g
Advise with regard to avoidance of complications in the eye, kidney, peripheral nerve, foot and cardiovascular systems	a, b, g

### Eye disease

Trainees must be able to:-

<b>Objective:</b>	<b>To be achieved by:</b>
Diagnose cataract, maculopathy, background and proliferative retinopathy and advanced diabetic eye disease	a, b, g
Refer patients appropriately for ophthalmological assessment	a, b, g

### Renal disease and hypertension

Trainees must be able to:-

<b>Objective:</b>	<b>To be achieved by:</b>
Diagnose nephropathy and distinguish between microalbuminuria and clinical nephropathy	a, b, g
Advise patients about the significance of the diagnosis of nephropathy	a, b, g
Show awareness of the importance of blood pressure and manage hypertension according to current guidelines	a, b, g
Show awareness of the significance of proteinuria in the increased incidence of macroangiopathy	a, b, g
Refer patients appropriately to the nephrology service	a, b, g

### Neuropathy

Trainees must be able to:-

<b>Objective:</b>	<b>To be achieved by:</b>
Recognise and manage the different types of diabetic neuropathy	a,b,f,g
Assess vascular supply and neurological status of the lower limb	a,b,f
Identify patients at risk of foot problems and advise them how to prevent them	a,b,f
Manage established foot problems appropriately	a,b,f,g
Supervise care of the patient with foot problems in a multidisciplinary setting	a,b,f,g

## **Laboratory Training**

All trainees in Metabolic Medicine will undertake laboratory training as an integral part of each section of the curriculum. During this time, they will become familiar with the laboratory techniques used in the investigation and monitoring of the various disease states included in the curriculum. They will develop competence in the interpretation and limitations of relevant complex laboratory investigations. They will be required to undertake a project which would normally be laboratory based, acquire appropriate analytical skills, and write a dissertation.