

# Module II-2

## Pathophysiology

### Overview

Diabetes is a chronic disease, characterized by hyperglycaemia. It is caused by deficient insulin production, insensitivity to the action of insulin, or a combination of both of these. Knowledge of the relationship between glucose, insulin and counter-regulatory hormones and glucose homeostasis is important to understand these defects and how they result in abnormal glucose and fat metabolism.

### Goal

To provide the participants with an understanding of normal pathophysiology and the defects that lead to abnormal glucose metabolism

### Objectives

After completing this module the participant will be able to:

- Describe the structure and function of key organs, such as the pancreas, liver, muscle, adipose tissue, kidney, etc.
- Describe the basic physiology of digestion, absorption and metabolism
- Describe the relationship between blood glucose and insulin in healthy people including gluconeogenesis, glycogenolysis, lipolysis and ketogenesis
- Describe normal insulin synthesis and secretion
- Understand the hormonal, metabolic and neural control of insulin production and secretion
- Discuss insulin action
- Explain the role of insulin receptors
- Explain the incretin system and its importance in glucose regulation
- Discuss the effect of insulin and counter-regulatory hormones on fuel homeostasis (carbohydrate, fat and protein)
- Describe the results of insulin deficiency and its effects on lipid and protein metabolism, as well as carbohydrate metabolism
- Discuss how increased blood glucose levels lead to diabetes complications, including the polyol pathway, oxidative stress, glycation and protein kinase C

- Describe the effect of defective insulin action or 'insensitivity to insulin' (also known as 'insulin resistance') in terms of genes, adiposity, gender, diet, exercise, hyperglycaemia, drugs and infection
- Discuss the characteristics of the metabolic syndrome and the importance of its being recognized and treated

<b>Teaching strategies</b>	Lectures Self-directed learning
<b>Suggested time</b>	Lecture: 2 hours
<b>Who should teach this module</b>	Endocrinologist, diabetes educator
<b>Evaluation of learning</b>	Examination or assignment
<b>References</b>	<p>Alberti KG, Zimmet P. Definition, diagnosis and classification of diabetes mellitus and its complications. Part I: diagnosis and classification of diabetes mellitus provisional report of a WHO consultation. <i>Diabet Med</i> 1998; 15: 539-53.</p> <p>Alberti KG, Zimmet P, DeFronzo RA, Keen H (Eds). <i>International textbook of diabetes mellitus</i> volume 1, 2<sup>nd</sup> edition. John Wiley and Sons. Chichester, 1997.</p> <p>Atkinson MA, Maclaren NK. The pathogenesis of insulin-dependent diabetes mellitus. <i>N Engl J Med</i> 1994; 331: 1428-36.</p> <p>King H, Aubert RE, Herman WH. Global burden of diabetes, 1995-2025: prevalence, numerical estimates and projections. <i>Diabetes Care</i> 1998; 21: 1414-31.</p>

Detailed content for this module is available as a slide presentation at [www.idf.org](http://www.idf.org)