

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

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- 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

Teaching strategies

Lectures
Self-directed learning

Suggested time

Lecture: 2 hours

Who should teach this module

Endocrinologist, diabetes educator

Evaluation of learning

Examination or assignment

References

Alberti KG, Zimmet P. Definition, diagnosis and classification of diabetes mellitus and its complications. Part 1: diagnosis and classification of diabetes mellitus provisional report of a WHO consultation. *Diabet Med* 1998; 15: 539-53.

Alberti KG, Zimmet P, Defronzo RA, Keen H (Eds). *International textbook of diabetes mellitus* volume 1, 2nd edition. John Wiley and Sons. Chichester, 1997.

Atkinson MA, Maclaren NK. The pathogenesis of insulin-dependent diabetes mellitus. *N Engl J Med* 1994; 331: 1428-36.

King H, Aubert RE, Herman WH. Global burden of diabetes, 1995-2025: prevalence, numerical estimates and projections. *Diabetes Care* 1998; 21: 1414-31.

Detailed content for this module is available as a slide presentation at www.idf.org