



Diagnosis, classification and presentation of diabetes

MODULE



Overview

In the past, diabetes was considered to be a single condition. However, it is now clear that diabetes is a heterogeneous metabolic condition caused by many different mechanisms. Diabetes is now categorized based on differences in the cause, natural history and clinical characteristics.

Goal

To provide participants with a sound knowledge of the different metabolic disorders of glucose metabolism, pathogenesis, clinical characteristics and diagnostic criteria.

Objectives

After completing this module, the participant will be able to:

- Define diabetes mellitus
- Discuss the incidence and prevalence of diabetes both globally and locally
- Classify the different disorders of glycemia: Type 1 diabetes, Type 2 diabetes, other specific types (such as maturity onset diabetes of the young [MODY], latent autoimmune diabetes in adults [LADA] and steroid-induced diabetes), gestational diabetes, impaired glucose tolerance and impaired fasting glucose, secondary to chronic disease in childhood, eg cystic fibrosis, hemoglobinopathies
- Understand the difference between Type 1 and Type 2 diabetes in relation to the clinical presentation, patient characteristics and pathogenesis
- Describe the role of genetic and environmental factors and immunology in the development of Type 1 diabetes
- Describe the role of genetic and environmental factors, obesity, insulin deficiency and resistance in the development of Type 2 diabetes

Objectives cont'd	<ul style="list-style-type: none"> • Describe the emerging trend of Type 2 diabetes in young people • Describe the signs and symptoms of Type 1 and Type 2 diabetes • Identify the laboratory investigations used to diagnose diabetes and their appropriate use (fasting blood glucose, post-prandial blood glucose, oral glucose tolerance test) • Describe factors that can affect the accuracy of laboratory investigations • Discuss the appropriate use of the following tests: C-peptide, insulin antibodies, islet cell antibodies and GAD antibodies assays, as well as urinalysis (urine glucose and ketones) and HbA_{1c} estimation • Explain the World Health Organization diagnostic criteria for the different disorders of glycemia • Identify appropriate treatment options for the different disorders of glycemia, including early discussion about the likely need for insulin therapy in the future for Type 2 diabetes • Describe the natural history of diabetes, including primary and secondary failure of glucose-lowering medication
Teaching strategies	Case studies, lecture
Suggested time	<p>Lecture: 1–2 hours</p> <p>Case studies: 1–2 hours</p>
Who should teach this module	Diabetes educator, endocrinologist
Evaluation of learning	Successful completion of case studies

References

Akerblom HK, Knip M. Putative environmental factors in Type 1 diabetes (review). *Diabetes Metab Rev* 1998;14:31-67.

Alberti KGGM, Zimmet PZ. 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;15:539-553.

American Diabetes Association (ADA). Report of the Expert Committee on the Diagnosis and Classification of Diabetes Mellitus. *Diabetes Care* 1997;20:1183-1197.

Bach JF. Insulin dependent diabetes mellitus as an autoimmune disease (review). *Endocr Rev* 1994;15:516-542.

King H, Rewers M. Global estimates for prevalence of diabetes mellitus and impaired glucose tolerance in adults. *Diabetes Care* 1993;16:157-177.

McCarty D, Zimmet P. Diabetes 1994 to 2010: global estimates and projections. Melbourne: International Diabetes Institute; 1994.

Yki-Jarvinen H. Pathogenesis of non-insulin dependent diabetes mellitus. *Lancet* 1994;343:91-95.



Pathophysiology

Overview

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

Goal

To provide 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 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
- Discuss the effect of insulin and counter-regulatory hormones on fuel homeostasis (carbohydrate, fat and protein)
- Describe the results of insulin deficiency, its effects on lipid and protein metabolism as well as carbohydrate metabolism

Objectives cont'd	<ul style="list-style-type: none"> • Discuss how increased blood glucose levels lead to diabetes-related complications including the polyol pathway, oxidative stress, glycation and protein kinase C • Describe the effect of defective insulin action or 'insulin resistance' in terms of genes, adiposity, gender, diet, exercise, hyperglycemia, drugs and infection • Describe the basic physiology of digestion, absorption and metabolism • Discuss the characteristics of the metabolic syndrome • Describe the microvasculature and macrovasculature
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	<p>Alberti KGMM, Zimmet P, DeFronzo RA, Keen H (eds). <i>International textbook of diabetes mellitus</i>, Vol. 1 (2nd edn). Chichester: Wiley; 1997.</p> <p>Alberti KGMM, Zimmet PZ. Definition, diagnosis and classification of diabetes mellitus and its complications. Part 1: diagnosis and classification of diabetes mellitus provisional report of a WHO consultation. <i>Diabet Med</i> 1998;15:539-553.</p> <p>Atkinson MA, Maclaren NK. The pathogenesis of insulin-dependent diabetes mellitus. <i>N Engl J Med</i> 1994;331(21):1428-1436.</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(9):1414-1431.</p>