About Diabetes

Etiology
Complications
Management & Prevention

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Definition of Diabetes

Diabetes mellitus (**DM**), also known as simply **diabetes**, is a group of metabolic diseases in which there are high blood sugar levels over a prolonged period. This high blood sugar produces the symptoms of frequent urination, increased thirst, and increased hunger.

Diabetes is due to either the pancreas (beta cells) not producing enough insulin, or the cells of the body (muscle, liver, adipose tissue) not responding properly to the insulin produced.

Types of Diabetes

Type 1 DM results from the body's failure to produce enough insulin. This form was previously referred to as insulin-dependent diabetes mellitus (IDDM) or juvenile diabetes. The cause is unknown. Autoimmune disease? Viral Infection?

Type 2 DM begins with insulin resistance, a condition in which cells fail to respond to insulin properly. As the disease progresses a lack of insulin may also develop. This form was previously referred to as non insulin-dependent diabetes mellitus (NIDDM) or adult-onset diabetes. The primary cause is excessive body weight and not enough exercise.

Gestational diabetes, is the third main form and occurs when pregnant women without a previous history of diabetes develop a high blood glucose level.

Comparison of Type 1 and 2 Diabetes

Feature	Type 1 diabetes	Type 2 diabetes
Onset	Sudden	Gradual
Age at onset	Mostly in children	Mostly in adults
Body size	Thin or normal[23]	Often obese
Ketoacidosis	Common	Rare
Autoantibodies	Usually present	Absent
Endogenous insulin	Low or absent	Normal, decreased or increased
Concordance in identical twins	50%	90%
Prevalence	~10%	~90%

Etiology of Diabetes

Insulin is the principal hormone that regulates the uptake of glucose from the blood into most cells of the body, especially muscle, liver, and adipose tissue. Therefore, deficiency of insulin or the insensitivity of its receptors plays a central role in all forms of diabetes.

The body obtains glucose from three main places: (1) the intestinal absorption of food, (2) the breakdown of glycogen, the storage form of glucose found in the liver, and (3) gluconeogenesis, the generation of glucose from non-carbohydrate substrates in the body.

Etiology of Diabetes

Insulin plays a critical role in balancing glucose levels in the body. Insulin can inhibit the breakdown of glycogen or the process of gluconeogenesis, it can stimulate the transport of glucose into muscle and fat cells, and it can stimulate the storage of glucose in the form of glycogen, mainly in liver.

Lower glucose levels in the body result in decreased insulin release from the beta cells of pancreas, and in the breakdown of glycogen to glucose. This process is mainly controlled by the hormone glucagon, which acts in the opposite manner to insulin.

Etiology of Diabetes

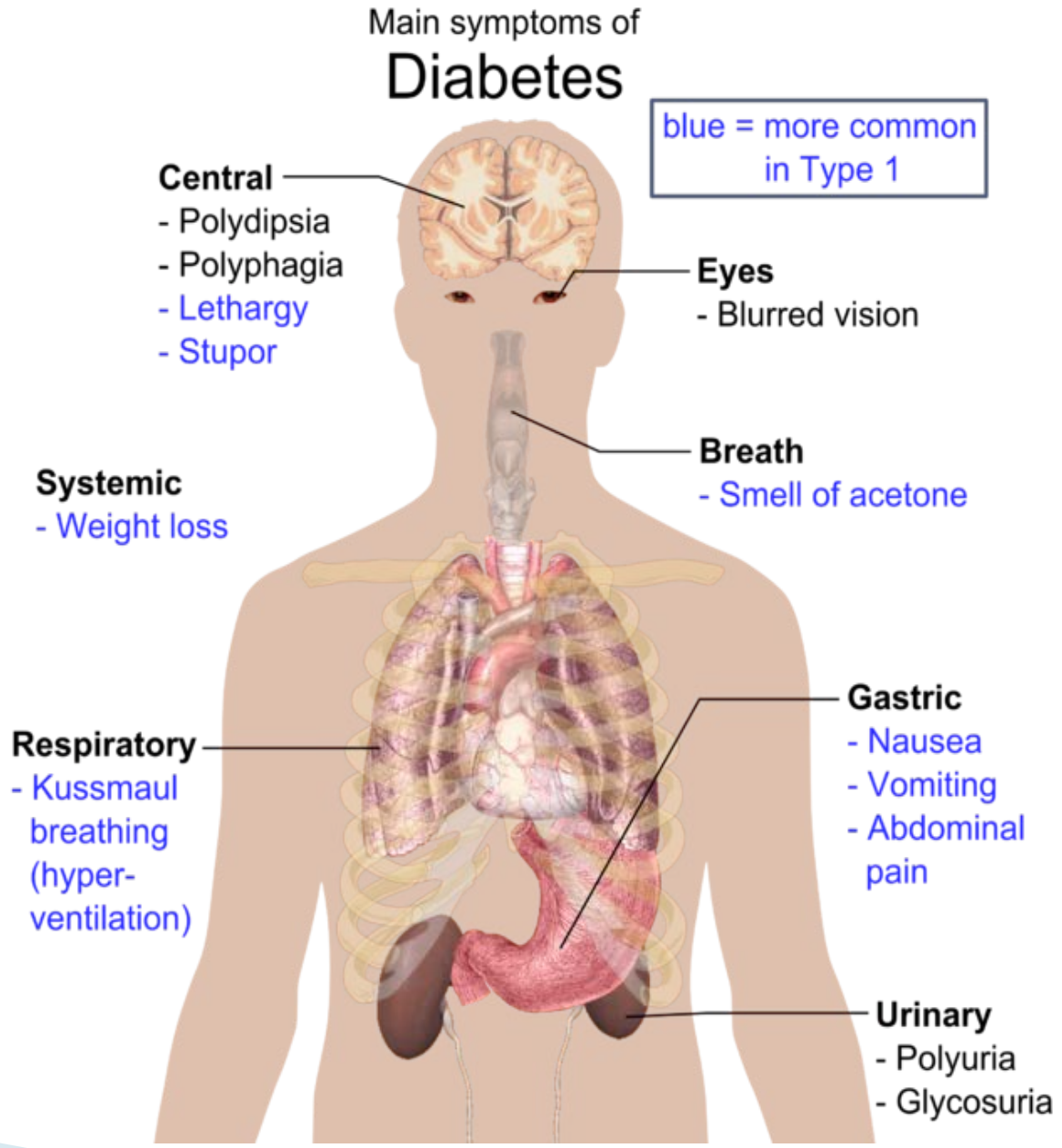
If the amount of insulin available is insufficient, if cells respond poorly to the effects of insulin (insulin insensitivity or insulin resistance), or if the insulin itself is defective, then glucose will not be absorbed properly by the body cells that require it, and it will not be stored appropriately in the liver and muscles.

The net effect is persistently high levels of blood glucose, poor protein synthesis, and other metabolic derangements, such as acidosis.

Etiology of Diabetes

When the glucose concentration in the blood remains high over time, the kidneys will reach a threshold of reabsorption, and glucose will be excreted in the urine (glycosuria). This increases the osmotic pressure of the urine and inhibits reabsorption of water by the kidney, resulting in increased urine production (polyuria) and increased fluid loss. Lost blood volume will be replaced osmotically from water held in body cells and other body compartments, causing dehydration and increased thirst (polydipsia).

Symptons of Diabetes



Diagnosis of Diabetes

Diabetes mellitus is characterized by recurrent or persistent hyperglycemia, and is diagnosed by demonstrating any one of the following:

Fasting (8 hours) plasma glucose level ≥ 7.0 mmol/l (126 mg/dl)

Plasma glucose in a glucose tolerance test ≥ 11.1 mmol/l (200 mg/dl) two hours after a 75 g oral glucose load

Symptoms of hyperglycemia and casual plasma glucose ≥ 11.1 mmol/l (200 mg/dl)

Glycated hemoglobin (Hb A1C) ≥ 6.5%.

WHO diabetes diagnostic criteria

Condition	2 hour glucose	Fasting glucose	HbA_{1c}
Unit	mmol/l(mg/dl)	mmol/l(mg/dl)	%
Normal	<7.8 (<140)	<6.1 (<110)	<6.0
Impaired fasting glycaemia	<7.8 (<140)	≥ 6.1(≥110) & <7.0(<126)	6.0–6.4
Impaired glucose tolerance	≥7.8 (≥140)	<7.0 (<126)	6.0–6.4
Diabetes mellitus	≥11.1 (≥200)	≥7.0 (≥126)	≥6.5

Complications of Diabetes

These typically develop after many years (10–20), but may be the first symptom in those who have otherwise not received a diagnosis before that time.

The major long-term complications relate to damage to blood vessels. Diabetes doubles the risk of cardiovascular disease and about 75% of deaths in diabetics are due to coronary artery disease.

Other "macrovascular" diseases are stroke, and peripheral vascular disease.

Complications of Diabetes

The primary microvascular complications of diabetes include damage to the eyes, kidneys, and nerves.

Damage to the eyes, known as diabetic retinopathy, is caused by damage to the blood vessels in the retina of the eye, and can result in gradual vision loss and potentially blindness.

Damage to the kidneys, known as diabetic nephropathy, can lead to tissue scarring, urine protein loss, and eventually chronic kidney disease, sometimes requiring dialysis or kidney transplant.

Complications of Diabetes

Damage to the nerves of the body, known as diabetic neuropathy, is the most common complication of diabetes. The symptoms can include numbness, tingling, pain, and altered pain sensation, and lead to damage to the skin.

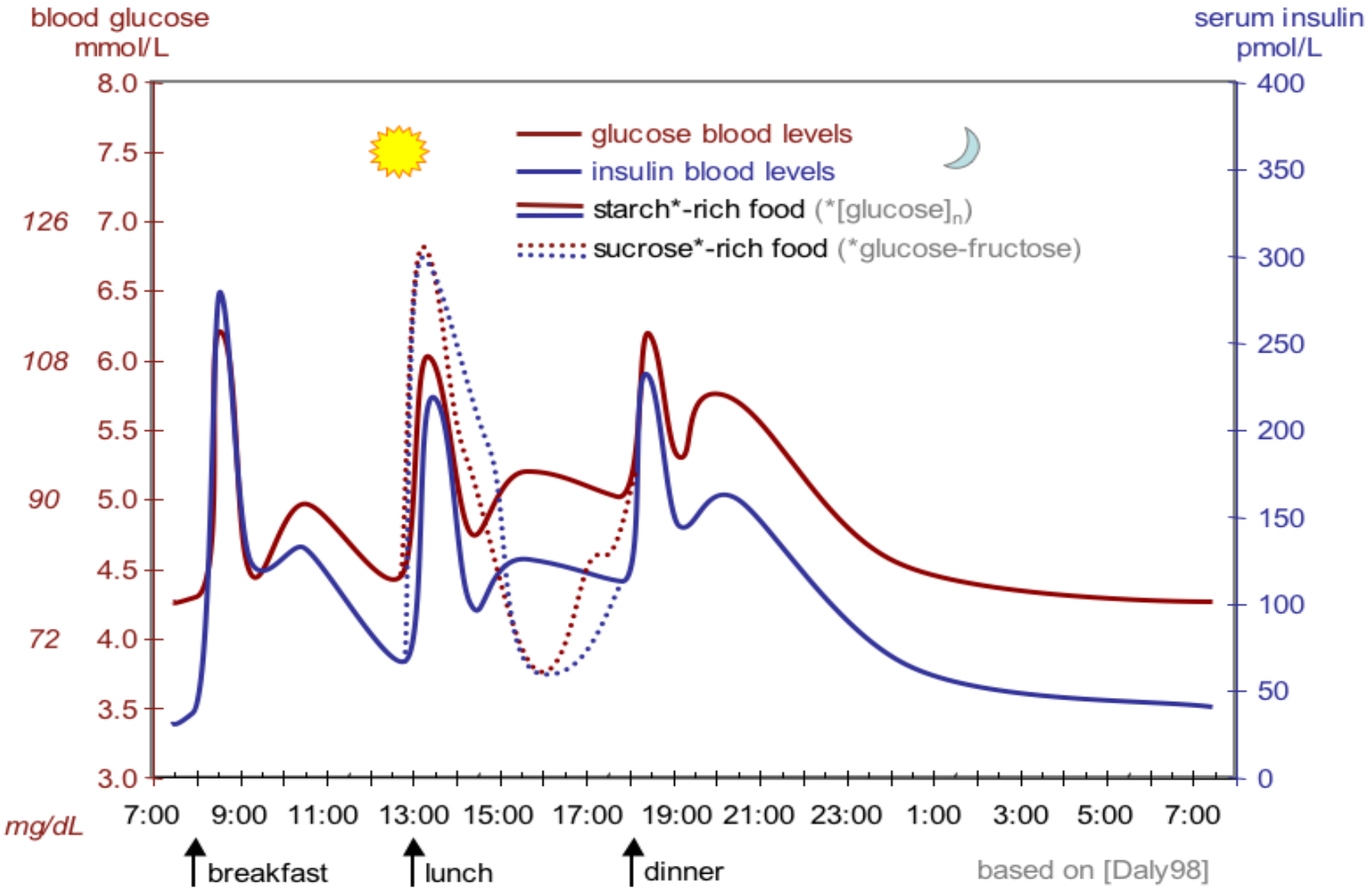
Diabetes-related foot problems (such as diabetic foot ulcers) may occur, and can be difficult to treat, occasionally requiring amputation. Additionally, proximal diabetic neuropathy causes painful muscle wasting and weakness.

Mechanism of Insulin Release in Normal Pancreatic Beta Cells

Insulin production is more or less constant within the Beta cells of pancreas. Its release is triggered by food, chiefly food containing absorbable glucose.

Insulin is released into the blood in response to rising levels of blood glucose, typically after eating. Insulin is used by about two-thirds of the body's cells to absorb glucose from the blood for use as fuel, for conversion to other needed molecules, or for storage.

The fluctuation of blood sugar (red) and the sugar-lowering hormone insulin (blue) in humans during the course of a day with three meals



Management of Diabetes

Diabetes Mellitus is a chronic disease, for which there is no known cure except in very specific situations.

Management concentrates on keeping blood sugar levels as close to normal (euglycemia) as possible, without causing hypoglycemia.

This can usually be accomplished with diet, exercise, life style change and use of appropriate medications.

Type 1 Diabetes: insulin ;

Type 2 Diabetes: oral medications, & possibly insulin.

Medications for Diabetes

Type 1 Diabetes is typically treated with a combinations of regular and NPH insulin, or synthetic insulin analogs.

The dose on insulin required to control the diabetes varies from patient to patient and from time to time in the same patient.

It rises when the patients gain weight, receive or secret more glucocorticoids or other diabetogenic hormones, during pregnancy, having infection, and in fever.

It falls when patients loose weight and during exercise.

Medications for Diabetes

Type 2 Diabetes is typically treated with oral hypoglycemic Agents:

Sulfonyureas: These drugs appear to *act essentially by causing release of insulin from the patient's own pancreas*, thus useless in insulin-dependent diabetes. Example: Glyburide.

Side effects include nausea, vomiting, peptic ulcer, headache, and rare case of serious skin rash and leukopenia.

Biguanides: These drugs do not release endogenous insulin, but *act directly on muscle to increase glycogenesis*, thus only effective in non-insulin-dependent diabetes. Example: Metformin.

Side effects include nausea, diarrhea, and gastrointestinal upset. Lactic acidosis is rare but serious complication.

Prevention of Diabetes

Growth Hormone is synthesized, stored, and secreted by the somatotropic cells within the lateral wings of the anterior pituitary gland. It is a stress hormone that acts to raise the concentration of glucose and free fatty acids in the cell.

Growth Hormone has three functions:

Stimulate the production of Insulin GF in the liver – anti-diabetic

Regulate the burning of fat for energy – in response to stress

Prevent the degeneration of protein collagen – anti-aging

How to maintain the optimal level of Growth Hormone ?

Intensive exercise training with intervals

Sleep at least 7 hours daily

Prevention of Diabetes

In addition to regular exercise and observe good life style, a balance diet is essential to keep diabetes away.

As one Potassium molecule is required for each glucose molecule to form the stored sugar, glycogen, the daily requirement for Potassium is over 4000 mg.

As liver (having 100 times Insulin GF) and pancreas reciprocate each other to regulate the blood glucose level, any way of enhancing liver function helps to prevent diabetes.

We need to consume at least 15 kinds of vegetables and fruits (7 cups) daily, in order to ingest the required amount of potassium and achieve the enhancing effect on liver.

"Kale"

E. Excel Products for Diabetes

Cactus Containing Products
Millennium Red, Millennium Power, Millennium God Powder, Oxyginberry

Grape Seed Extract Containing Products
E-view, Oxyginberry, Vision

Kumazasa, Ashitaba, Platycodon Containing Product
Orchestra

Mulberry and Potassium Containing Product
Nutricardia

Soy Containing Product
Nutriall

E. Excel Products for Diabetes

Appetite and Weight Control Product
Evernew-D, I-Shape Lite

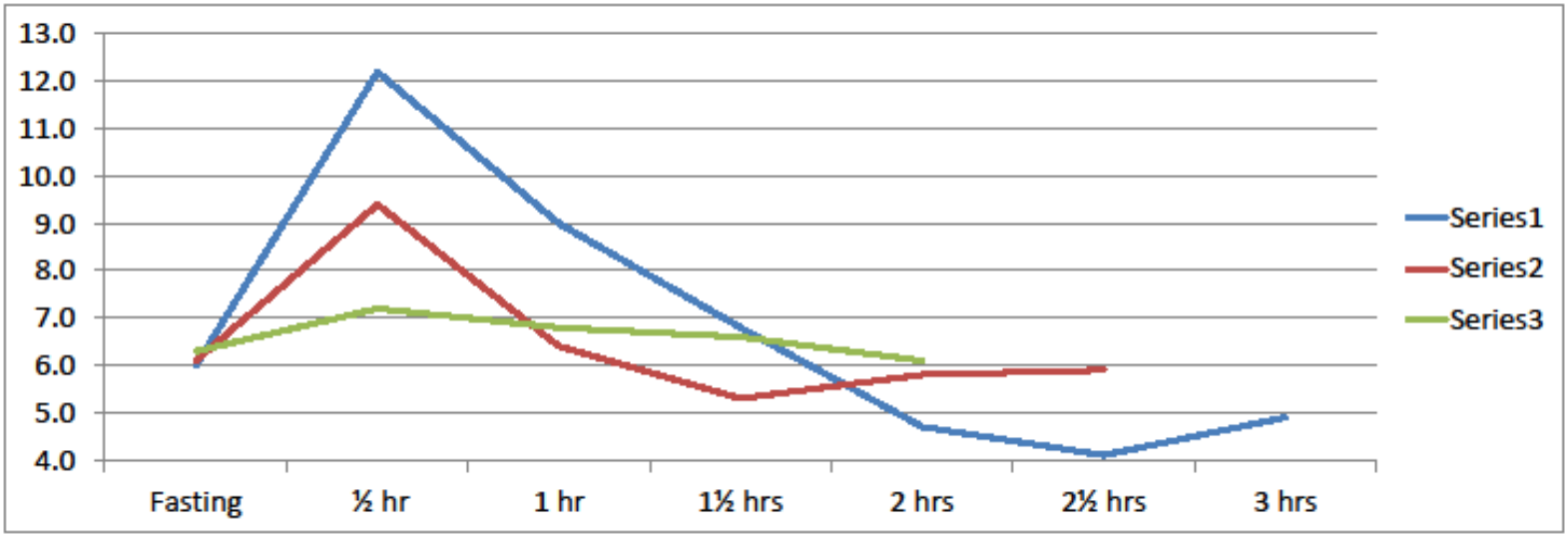
Heart and Liver Protecting Products
Nutricardia, Vision

Kidney Protecting Products
Refresh, Vision

Nerve Protecting Products
Aromatic, O-Seed, Pearl, S.T.

Blood Glucose Level Over Time after Drinking E. Excel Products:

Glucose (mmol/L)							
Fasting	½ hr	1 hr	1½ hrs	2 hrs	2½ hrs	3 hrs	Series
6.0	12.2	9.0	6.8	4.7	4.1	4.9	1 E. Excel: 1 nutriall, 1 enjoy, 1 nutrifresh, 1 nutricardia
6.1	9.4	6.4	5.3	5.8	5.9		2 E. Excel: 1 nutriall, 1 enjoy
6.3	7.2	6.8	6.6	6.1			3 E. Excel: 2 Orchestra



Series 1: 18g sugar (1 Nutriall + 1 Enjoy + 1 Nutrifresh + 1 Nutricardia)
Series 2: 8g sugar (1 Nutriall + 1 Enjoy)
Series 3: 2g sugar (2 Orchestra Lime)

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