- **Diabetes mellitus:**
- Diabetes mellitus **is a chronic disease complex with metabolic and vascular components. the metabolic disorder of carbohydrate metabolism due to disturbance of the normal insulin mechanism (characterized by hyperglycemia**) . the vascular component affect both macro vascular & micro vascular causing serious diseases involved heart, kidney, eyes, lower limbs & neuropathies .
- **Insulin is a hormone secreted by the β-cells of the pancreatic islets of Langerhans, it promotes the entry of glucose into the body's cells.**

The **pancreas** ; is a gland in the digestive system and endocrine system . **It is both an endocrine gland producing several important hormones, including insulin, glucagon, somatostatin, and pancreatic polypeptide,** a digestive organ, secreting pancreatic juice containing digestive enzymes that assist the absorption of nutrients and the digestion in the small intestine.

Maintenance of good glycemic control can prevent or retard the development of microvascular complications of diabetes.

The vascular component includes an accelerated onset of nonspecific atherosclerosis and a more specific microangiopathy that particularly affects the eyes and kidneys.

Retinopathy and nephropathy are eventual complications. These complications result in serious morbidity .

- **Etiology :**
- **Diabetes mellitus may be the result of any of the following:**
- • **Genetic disorder**

- • **Primary destruction of islet cells through inflammation, cancer, or surgery**

- • **An endocrine condition such as hyper pituitarism or Hyperthyroidism .**

- **An iatrogenic disease that occurs after steroids have been administered.**

- **Pathophysiology and Complications;**
- Glucose is the most important stimulus for insulin secretion. **Insulin remains in circulation for only several minutes half-life (4 to 8 minutes); it then interacts with target tissues and binds with cell surface insulin receptors.**
- Secondary intracellular messengers are activated and interact with cellular effector systems, including enzymes and glucose transport proteins. **Lack of insulin or insulin action allows glucose to accumulate in the tissue fluids and blood.**

- **The patient with uncontrolled diabetes** is deprived of insulin or its action but will continue to use carbohydrates at the usual rates in the brain and nervous system because these tissues do not require insulin. However, other tissues in the body are unable to take glucose into the cells or to use it at a normal rate.

- Increased production of glucose from glycogen, fat, and protein may occur; thus, the rise in blood glucose in diabetic persons results from a combination of **underutilization and overproduction attained through glycogenolysis and fat metabolism.**

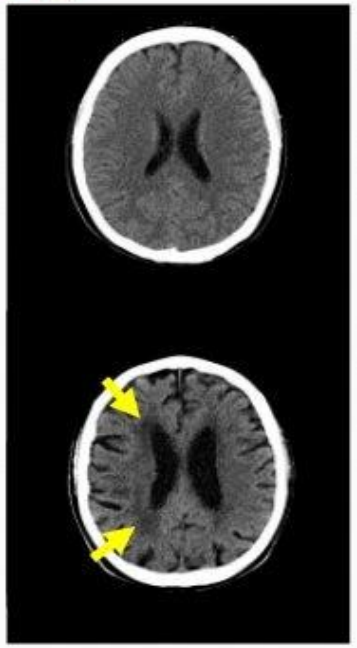
- **Types of diabetes mellitus**
- There are three main types of diabetes mellitus (DM).
- Type 1 DM results from the body's failure to produce insulin, and presently requires the person to inject insulin or wear an insulin pump. This form was previously referred to as **"insulin-dependent diabetes mellitus" (IDDM) or "juvenile diabetes".**
- Type 2 DM results from insulin resistance, a condition in which cells fail to use insulin properly, sometimes combined with an absolute insulin deficiency.
- **This form was previously referred to as non-insulin-dependent diabetes mellitus (NIDDM) or "adult-onset diabetes".** The third main form, gestational diabetes occurs when pregnant women without a previous diagnosis of diabetes develop a high blood glucose level. **It may precede development of type 2 DM.**

- **Complications of Diabetes Mellitus:**
- - Ketoacidosis (type 2 diabetes)
- - Diabetic retinopathy/blindness and Cataracts
- - Diabetic nephropathy/renal failure.
- - Accelerated atherosclerosis (coronary heart disease)
- - Ulceration and gangrene of feet .
- • Diabetic neuropathy (dysphagia, gastric distention, diarrhea , muscle weakness/cramps, numbness, tingling, deep burning pain).
- • Early death.

- Complications of diabetes are related to the level of hyperglycemia and pathologic changes that occur within the vascular system and the peripheral nervous system . **Vascular complications result from microangiopathy and atherosclerosis.**

Microangiopathic change

- You may encounter the term "microangiopathic change" in reports and wonder what it is
- Microangiopathic change refers to age-related white matter ischemia due to microvessel disease
- Very commonly seen in the elderly
- Its clinical significance is still not known





- **Clinical presentation**
- **Signs and Symptoms ;**
- In patients with type 1 diabetes, the onset of symptoms is sudden and more acute, symptoms include: **polydipsia , polyuria, polyphagia, loss of weight, loss of strength, marked irritability, drowsiness, and malaise.**

- Other signs and symptoms related to the complications of diabetes include:
- **skin lesions, cataracts, blindness, hypertension, chest pain, and anemia. The rapid onset of myopia in an adult is highly suggestive of diabetes mellitus.**

- **Blood Glucose Determination**
- **1-Fasting venous blood glucose**. The 1997 ADA
- criteria for the diagnosis of diabetes mellitus state that diabetes is present if the fasting blood glucose level is 126 mg/100 mL or greater on two or more occasions.

- **2-Two-hour postprandial glucose** : For the 2-hour postprandial glucose test, the patient is given a 75- or 100-g glucose load after a night of fasting. Blood glucose levels taken at 2 hours that are 200 mg/100 mL or higher on two or more occasions are **diagnostic of diabetes mellitus** .

- **3-Glycohemoglobin.**

- The extent of glycosylation of hemoglobin A (a nonenzymatic addition of glucose) that results in formation of HbA1c in red blood cells is used for general assessment of the long-term level (and control) of hyperglycemia in patients with diabetes.

- Measurement of HbA1c levels is of value in the detection and evaluation of patients .

- HbA1c is an electrophoretically fast-moving hemoglobin component found in normal persons; it increases in the presence of hyperglycemia and may reflect glucose levels in the blood over the 6 to 12 weeks preceding administration of the test. Normally, patients should have{ 6% - 8%} HbA1c.

- **In well-controlled diabetes cases**, the level should stay below 7%.
- **The level of hyperglycemia as indicated by the HbA1c may reach as high as 20% in some uncontrolled cases**. Patients do not have to fast before they undergo testing, which can be useful in monitoring the progress of the disease.
- Normal values must be established for each laboratory. It is now standard practice to
- measure HbA1c levels at least quarterly in patients who are taking insulin for diabetes mellitus.
- **Complications from diabetes are accelerated in individuals with elevated HbA1c. Therefore, this monitoring is particularly important for those patients who are not monitoring their blood glucose at home**

- **Medical management**
- **Diabetes mellitus is not a curable disease.** The patient with diabetes may be treated through control of **diet and physical activity**, along with administration of **oral hypoglycemic agents and insulin** . In many cases of type 2 diabetes, the disease can be controlled by **weight loss, diet, and physical activity.**
- **Pharmacologic Treatment of Type 1 Diabetes:** Patients with Type l diabetes are treated with insulin, available human insulin & analogues **include rapid-acting, short-acting, intermediate-acting, and long-acting preparations.** Rapid-acting and short-acting preparations are used as meal (or bolus) insulin and intermediate-acting and long-acting insulin serve as basal insulin.

- **Intensive insulin therapy**; Intensive insulin therapy is recommended for all patients with Type 1 diabetes two regimens are available: multiple daily injection (MDI) of insulin and continuous subcutaneous infusion of insulin (CSII).

- Both regimens attempt to mimic physiologic insulin secretion through appropriate meal and basal insulin replacement.

- The choice is generally determined by patient directed factors, such as lifestyle, finances, and personal preference. In MDI therapy using pen-and-catridge device to deliver insulin .using MDI therapy the insulin pen mode of delivery has become the choice for most diabetics and then the insulin is injected subcutaneously.

- **Treatment of Type 2 Diabetes** The management of Type 2 diabetes involves **lifestyle interventions, drug therapy, and control of risk factors for cardiovascular disease. This includes control of blood glucose levels, blood pressure, lipid levels, and antiplatelet therapy as indicated.**

- Recent evidence shows that tight control of blood glucose levels reduces mortality rate due to microvascular (renal and retinal) and neuropathic complications of Type 2 diabetes. It has also been shown to slow the onset of macrovascular (coronary artery disease, myocardial infarction, and stroke) complications.

- **Insulin Shock:** Patients who are treated with insulin must closely adhere to their diet. If they fail to eat in a normal manner but continue to take their regular insulin injections, they may experience a hypoglycemic reaction caused by an excess of insulin (insulin shock).
- A hypoglycemic reaction also may be due to an overdose of insulin or an oral hypoglycemic agent. Reaction or shock caused by excessive insulin usually occurs in three well-defined stages, each more severe and dangerous than the one preceding it .

- **Signs and-Symptoms of Insulin Reaction**

- **MILD STAGE .**
- • Hunger • Weakness • Tachycardia • Pallor • Sweating• Parasthesias

- **MODERATE STAGE**
- • Lack of judgment • Uncooperativeness • Incoherence
- • Poor orientation

- **SEVERE STAGE**
- • Hypothermia • Hypotension • Tonic or clonic movements • Unconsciousnes
- .• Rapid thready pulse

- **Detection of the Patient With Diabetes**
- **KNOWN DIABETIC PERSON**
- 1. Detection by history:
- a. Are you diabetic?
- b. What medications are you taking?
- c. Are you being treated by a physician?
- 2. Establishment of severity of disease and degree of control.
- a. When were you first diagnosed as diabetic?
- b. What was the level of the last measurement of your blood glucose?
- c. What is the usual level of blood glucose for you?
- d. How are you being treated for your diabetes?
- e. How often do you have insulin reactions?
- f. How much insulin do you take with each injection, and how often do you receive injections ?

- g. Do you test your urine for glucose?
- h. When did you last visit your physician?
- i. Do you have any symptoms of diabetes at the present time?

- **UNDIAGNOSED DIABETIC PERSON :**

- 1. History of signs or symptoms of diabetes or its complications.
- 2. High risk for developing diabetes:
- a. Parents who are diabetic .
- b. Gave birth to one or more large babies
- c. History of spontaneous abortions .
- d. obese .
- e. Over 40 years of age .
- 3. Referral or screening test for diabetes.

- **Dental Management of the Patient With Diabetes mellitus :**
- **Non-insulin-dependent patient:** If diabetes is well-controlled, all dental procedures can be performed without special precautions.

- **Insulin-controlled patient:** -
- If diabetes is well-controlled all dental procedures can be performed without special precautions,
- - Morning appointments are usually best.
- - Patient advised to take usual insulin dosage and normal meals on day of dental appointment. Information confirmed when patient comes for appointment.
- - Advise patient to inform dentist or staff if symptoms of insulin reaction occur during dental visit.
- - Glucose source (orange juice) should be available and given to the patient if symptoms of insulin reaction occur.

- **1.** If extensive surgery is needed: -
- Consult with patient's physician concerning dietary needs during postoperative period.
- - Antibiotic prophylaxis can be considered for patients with brittle diabetes and those taking high doses of insulin who also have chronic states of oral infection.

- **2.** If not well-controlled (i.e., does not meet any of above criteria; fasting blood glucose <70 mg/dL or >200 mg dL and any complications [post Ml(myocardial infection), renal disease, congestive heart failure, symptomatic angina, old cardiac dysrrhythmia, cerebrovascular accident, blood pressure >180/110 mm Hg, - Provide appropriate emergency care .
- - Request referral for medical evaluation, management, and risk factor modification
- - If symptomatic, seek IMMEDIATE referral. - If asymptomatic, request routine referral.

- **Dental Management of the Patient with Diabetes and Acute Oral Infection;**
  1.Non-insulin-controlled patients; may require insulin , and consultation with physician .
- **2.** insulin-controlled patients; ***usually require increased dosage of insulin;*** consultation with physician required.
- **3.** Patient with **brittle (hard to control diabetes)/ labile diabetes** or receiving high insulin dosage, should have culture taken from the infected area for antibiotic sensitivity testing,& Antibiotic therapy should be initiated . In cases of poor clinical responses to the first antibiotic , a more effective antibiotic is selected according to sensitivity test results.

4. Infection should be treated with the use of standard methods

a. Warm intraoral rinses .

b. b. Incision and drainage ;

c. c. Pulpotomy, pulpectomy, extractions, etc.

d. d. Antibiotics .

- **Local Anesthetics and Epinephrine:**

- However epinephrine has a pharmacologic effect opposite that of insulin, so blood glucose could rise with the use of epinephrine . In diabetic patients with hypertension, myocardial infarction, cardiac arrhythmia caution may be indicated with epinephrine.

- Guide- lines for these patients are similar to those for Patients with cardiovascular conditions and may be even more strict for those with diabetes and cardiovascular conditions, as along with determination of functional capacity.

- **Oral Manifestations:** This include the following ; in poorly controlled diabetes , patient has xerostomia ,bacterial ,viral, fungal, infections including candidiasis & more rare are mucormycosis ,poor wound healing , high caries incidence, gingivitis & periodontal disease ,periapical abscesses &burning mouth .
- lichen planus may also more in diabetic patient due to alter in immune system.

- Diabetic neuropathy may lead to paresthesias & tingling, numbness or pain caused by pathologic changes involving nerves in oral region .

- early diagnosis & treatment may allow for regression of the symptoms but in long standing cases the changes will be irreversible .





3



4



2B



5A



5B



6A



6B





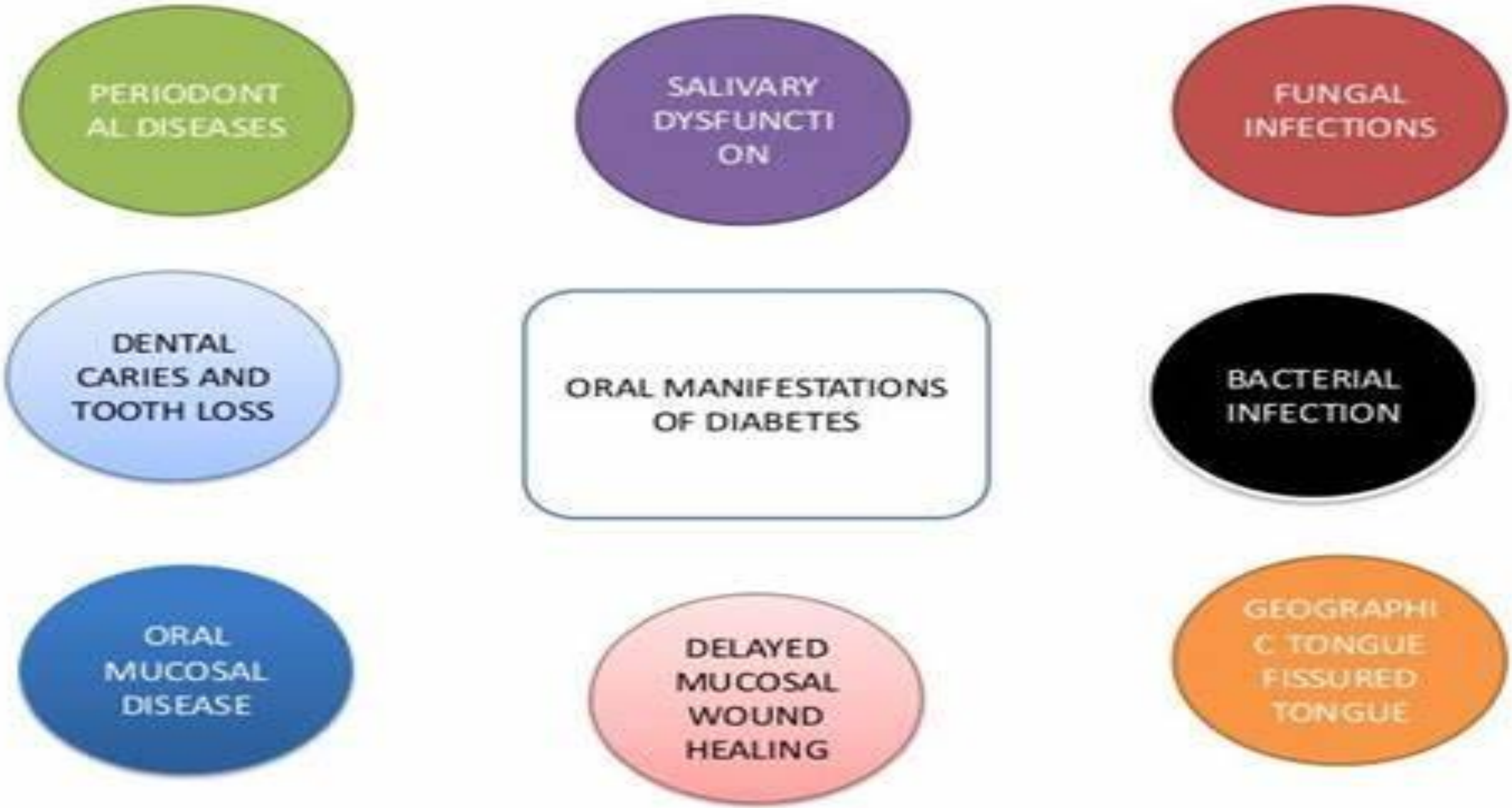
Diabetes & Dental Care

The most common oral health problems associated with diabetes are:

- tooth decay;
- periodontal (gum) disease;
- salivary gland dysfunction;
- fungal infections;
- lichen planus and lichenoid reactions (inflammatory skin disease);
- infection and delayed healing;
- taste impairment.






PERIODONTAL DISEASES
SALIVARY DYSFUNCTION
FUNGAL INFECTIONS
DENTAL CARIES AND TOOTH LOSS
ORAL MANIFESTATIONS OF DIABETES
BACTERIAL INFECTION
ORAL MUCOSAL DISEASE
DELAYED MUCOSAL WOUND HEALING
GEOGRAPHIC TONGUE FISSURED TONGUE

Periodontal Disease Signs and Symptoms

