ENDOCRINE DISORDERS
(in the hard and soft tissues of the oral cavity)

ORAL BIOLOGY DEPARTEMENT

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ENDOCRINE SYSTEM

Phytuitari

Thyroid

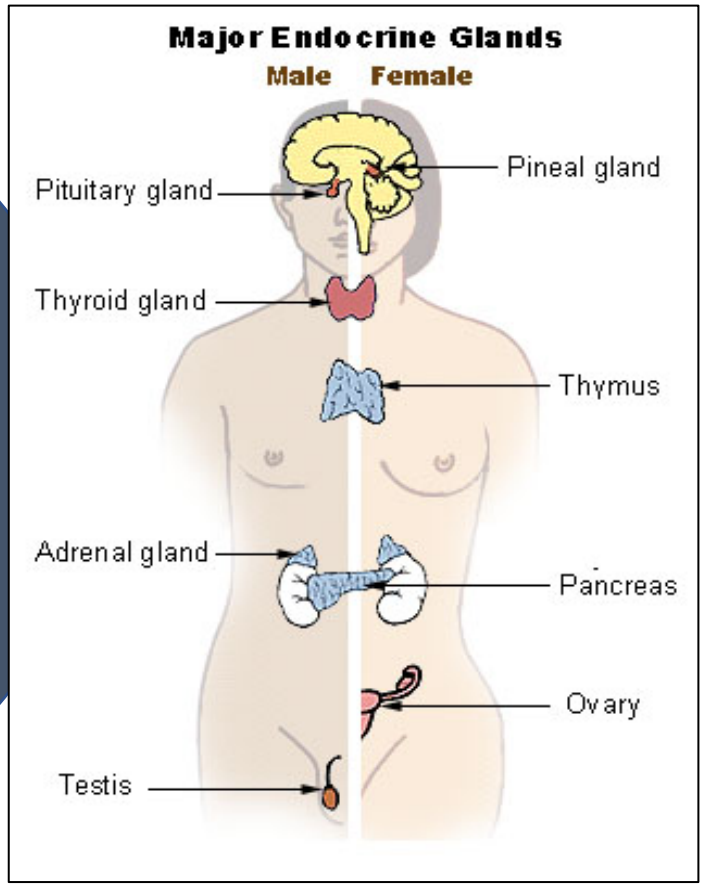
Parathyroid

Adrenal

HUMAN ENDOCRINE

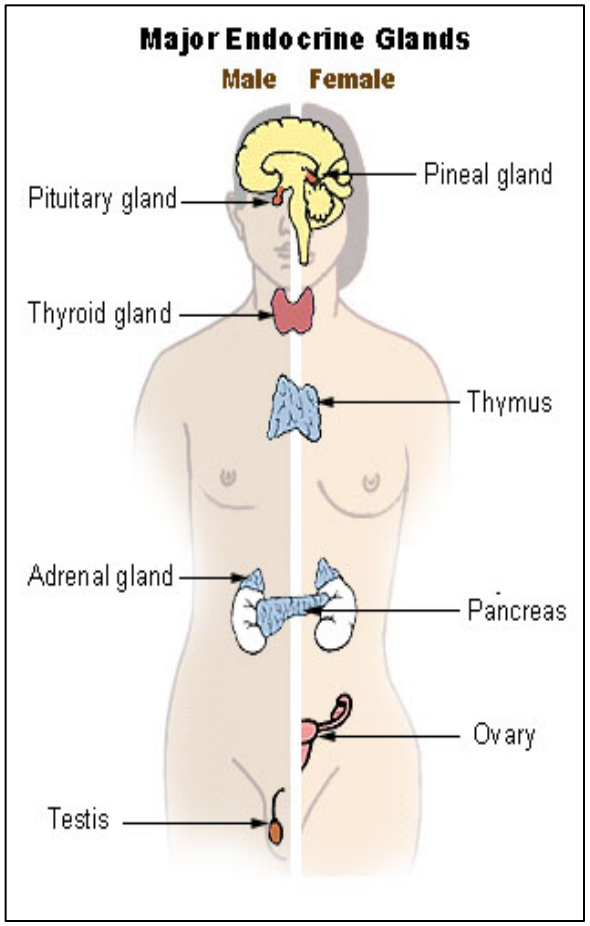
Pancreas (Islets of Langerhans)

Testes and Ovaries



ENDOCRINE SYSTEM

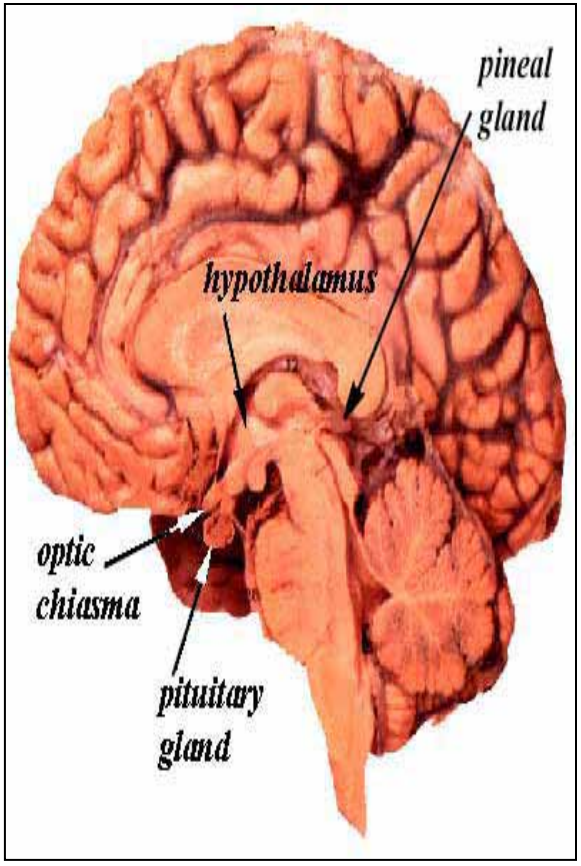
- The **endocrine system** includes the endocrine glands and their hormones
- The function of the endocrine system is to secrete **hormones** into the bloodstream.
- **Hormone**: A Chemical messenger which targets a specific group of cells, in order to cause that group of cells do some activity or stop doing an activity.



ENDOCRINE SYSTEM

Pituitary

- **Pituitary** gland is a round organ about the size of a pea (~1 cm in diameter), located behind the bridge of the nose at the base of the brain
- Secretes 9 different hormones, which affect many different areas of the body, including:
  - Growth
  - Blood pressure
  - Regulation of Pregnancy
  - Breast milk production
  - Sex organ functions in both men and women
  - Thyroid gland function
  - Metabolism
  - Water regulation in the body (kidneys)
  - Temperature regulation



ENDOCRINE SYSTEM

Pituitary

Growth hormone (GH)	To increase body size during childhood and adolescence, to maintain body size during adulthood
Tyroid Stimulating Homone (TSH)	To stimulate the thyroid to produce thyroid
Follicle Stimulating Homone (FSH)	Regulate puberty, development and reproductive processes
Liteinizing Hormone (LH)	Stimulate the production of estrogen and testosteron

ENDOCRINE SYSTEM

Oral Manifestations of Patients With Pituitary Disorders

Hyperpituitarism

In edentulous patients enlargement of the alveolus may cause discomfort while wearing complete dentures. Teeth in gigantism are proportional to the size of the jaw and the rest of the body and root may be longer than normal

Palatal vault is usually flattened and the tongue increases in size and may cause crenations on its lateral border. Soft tissue growth may produce uniform macroglossia in patients. Lips are found thick.

The teeth become spaced partly because of enlargement of the tongue and partly because upper teeth are situated on the inner aspect of the lower dental arch. The prominent growth of mandibular condyles will be present. Overgrowth of mandible may lead to prognathism. Mandible may be extraordinary in proportions creating a major discrepancy between the upper and lower jaws and results in a pronounced class III malocclusion

ENDOCRINE SYSTEM

Oral Manifestations of Patients With Pituitary Disorders

Hypopituitarism

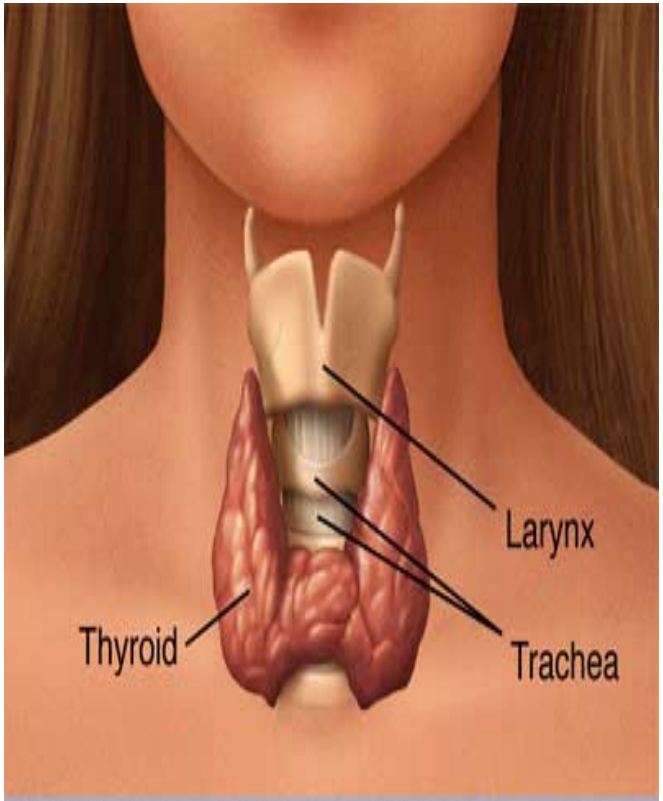
Two important hormones are secreted by this gland- the somatotrophic and thyrotrophic hormones which are responsible for the normal eruption of teeth and the alveolar bone growth.

Marked failure of development of maxilla and mandible with the lack of condylar growth and short ramus are seen. This can lead to severe malocclusion and crowding of the teeth.

ENDOCRINE SYSTEM

Thyroid

- Located in the **neck**
- Releases hormone **thyroxin**
- Function is to regulate rates of **metabolism** in the body
  - Essential for normal physical and mental development
- Oversecretion of thyroxin:
  - Results in nervousness and weight loss
- Undersecretion of thyroxin:
  - Results in cretinism (mental retardation, small size) in children



ENDOCRINE SYSTEM

Oral Manifestations of Patients With Thyroid Gland Disorders

Hypothyroidism

Definition
Hypothyroidism is a decrease in thyroid hormone production and thyroid gland function

Etiology and symtom

It is caused by, chronic thyroiditis (Hashimoto's disease), radioactive iodine, surgery and pharmacological agents such as lithium and amiodarone. Insuf cient levels of thyroid hormone cause symptoms such as slower metabolic rate, weight gain, lethargy, intolerance to cold, dry and cool skin, and puf ness of the face and eyelids, as well as others. The blood pressure appears to be normal, but the heart rate is slow.

ENDOCRINE SYSTEM

Oral Manifestations of Patients With Thyroid Gland Disorders

Hyporthyroidism

- Childhood hypothyroidism known as cretinisim is characterized by thick lips, large protruding tongue (macroglossia), malocclusion and delayed eruption of teeth. Thickening of the lips and macroglossia is due to increased accumulation of subcutaneous mucopolysaccharides i.e., glycosaminoglycans due to decrease in the degradation of these substances.
- The long-term effects of severe hypothyroidism on craniofacial growth and dental development have also included impaction of the mandibular second molars. This seems to be caused by a dissociation of ramus growth and failure of normal resorption of the internal aspect of the ramus, resulting in insuf cient space for proper eruption of these teeth.

- The common oral findings in hypothyroidism include the characteristic macroglossia, dysgeusia, delayed eruption, poor periodontal health, altered tooth morphology and delayed wound healing

ENDOCRINE SYSTEM

Oral Manifestations of Patients With Thyroid Gland Disorders

Hyperthyroidism

Hyperthyroidism is a condition caused by unregulated production of thyroid hormones. It is characterized by tremor, emotional instability, intolerance to heat, sinus tachycardia, marked chronotropic and ionotropic effects, increased cardiac output (increased susceptibility to congestive heart failure), systolic heart murmur, hypertension, increased appetite and weight loss

ENDOCRINE SYSTEM

Oral Manifestations of Patients With Thyroid Gland Disorders

Burning mouth syndrome, a condition that causes a burning pain in the mouth, and Sjogren's syndrome, a condition that causes dry mouth, are more common in people with thyroid disease.[4]

Hyperthyroidism

In Graves disease, on extra-oral examination the thyroid may be enlarged or noticeably palpable. The enlarged gland may be more visually noticeable when the patient is in a supine position in the dental chair. But in more severely enlarged thyroids, the bulge in the neck is noticeable even when the patient is sitting upright or standing.

The oral manifestations of thyrotoxicosis, includes increased susceptibility to caries, periodontal disease, enlargement of extraglandular thyroid tissue (mainly in the lateral posterior tongue), maxillary or mandibular osteoporosis, accelerated dental eruption[8] and burning mouth syndrome.

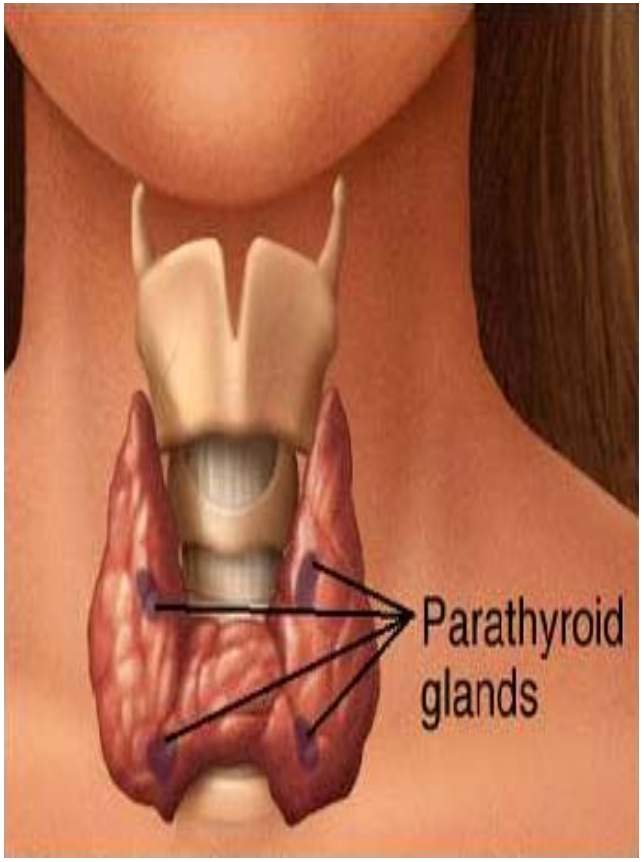
ENDOCRINE SYSTEM

Parathyroid

Function is to control **metabolism of calcium**

- Necessary for normal nerve and muscle function, blood clotting, healthy bones and teeth

- Located in back of thyroid gland (in neck)
- Hormone released is **parathormone**
- Undersecretion of parathormone results in nerve disorders, brittle bones and clotting problems



ENDOCRINE SYSTEM

Oral Manifestations of Patients With Parathyroid Gland Disorders

It results from excessive secretion of PTH with consequent osteoclastic resorption and hypercalcemia.

Hyperparathyroidism

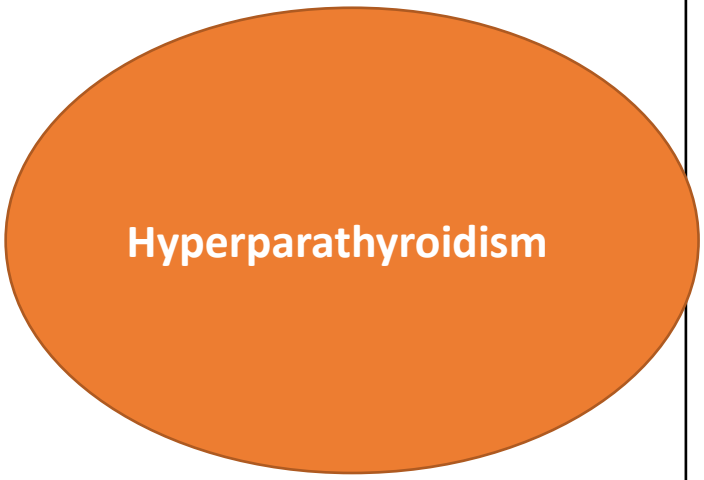
Etiology Tertiary
When long-standing secondary hyperplasia becomes autonomous in spite of correction of the underlying stimulant (renal transplant)

Etiology Primary
Usually caused by a tumor (adenoma in 85% of all cases) or hyperplasia of the gland that produces an increase in PTH secretion resulting in hypercalcemia and hypophosphatemia

Etiology Secondary
When the parathyroid glands are stimulated to produce increased amounts of hormones to correct abnormally low serum calcium levels in different physiologic or pathologic conditions like renal failure, intestinal malabsorption syndrome, decrease of Vitamin D production, thus resulting in parathyroid hyperplasia.

ENDOCRINE SYSTEM

Oral Manifestations of Patients With Parathyroid Gland Disorders



Dental abnormalities

- Obliteration of pulp chamber by pulp stone
- Alterations in dental eruption
- Loosening and drifting of teeth
- Malocclusions
- Spacing of teeth
- Partial loss of lamina dura
- Pariodontal ligament widening
- Teeth become sensitive to percussion and mastication
- Floating teeth
- Brown tumor
- Generalized bone rari cation of jaw
- Soft tissue calcifications
- Hypercalcemia may result in sialolithiasis
- Mandibular tori
- Complaint of vague jaw bone pain

ENDOCRINE SYSTEM

Oral Manifestations of Patients With Parathyroid Gland Disorders

Hypoparathyroidism is a metabolic disorder characterized by low serum calcium and high serum phosphorus concentrations due to a de ciency or absence of PTH secretion.

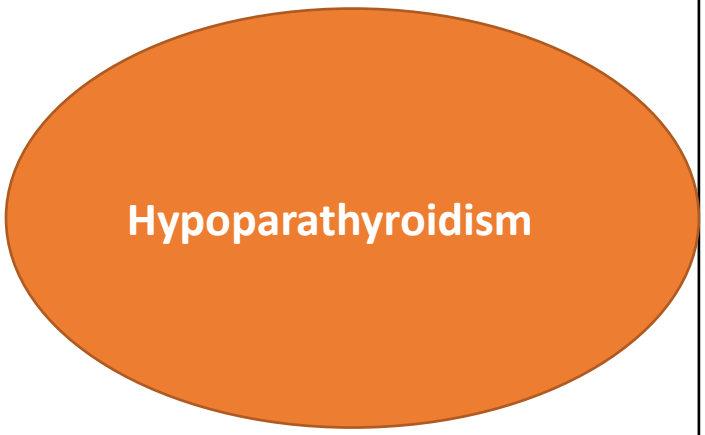
Hyporparathyroidism

Etiology

It may also develop as an isolated entity of unknown etiology (idiopathic), or in combination with other disorders such as autoimmune diseases or developmental defects

ENDOCRINE SYSTEM

Oral Manifestations of Patients With Hypoparathyroidism Gland Disorders



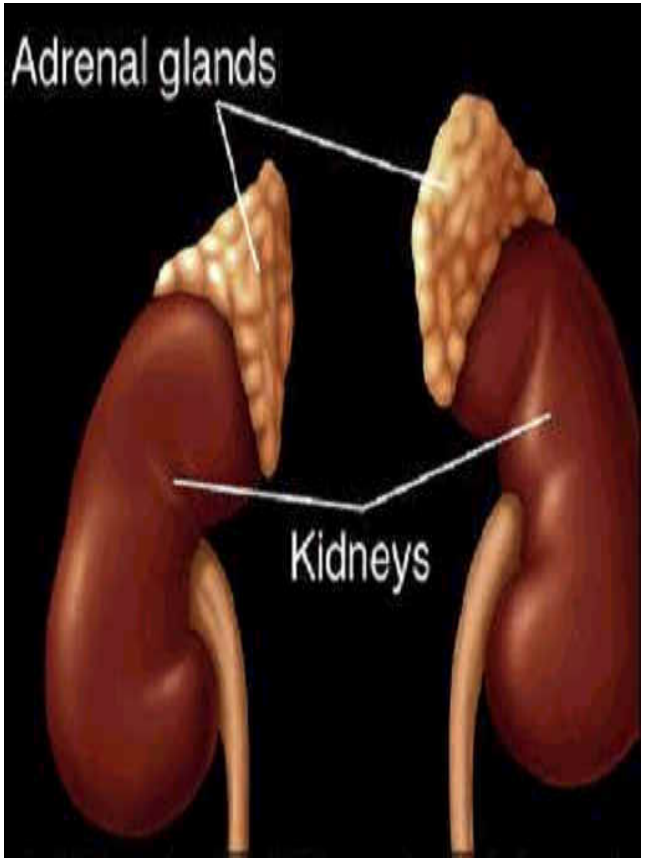
Dental abnormalities

- Enamel hypoplasia
  Delayed eruption
- Hypodontia and microdontia
- Poorly calci ed dentin
- Widened pulp chambers
- Dental pulp calci cations
- Shortened roots with blunt apex
- Malformed roots
- Delay or cessation of dental development
- Dental malocclusion
- Ankylosis
- Caries
- Chronic candidiasis
- Paresthesia of the tongue or lips
- Alteration in facial muscles

ENDOCRINE SYSTEM

Adrenal Glands (Kidney Hats)

- Located at the top of each **kidney**
- Hormones released are **cortisone** and **adrenaline**
- Function of cortisone is to regulate carbohydrate, protein and fat metabolism
  - promotes conversion of fats and proteins to glucose
- Function of adrenaline is to raise blood sugar levels and increases heartbeat and breathing rates



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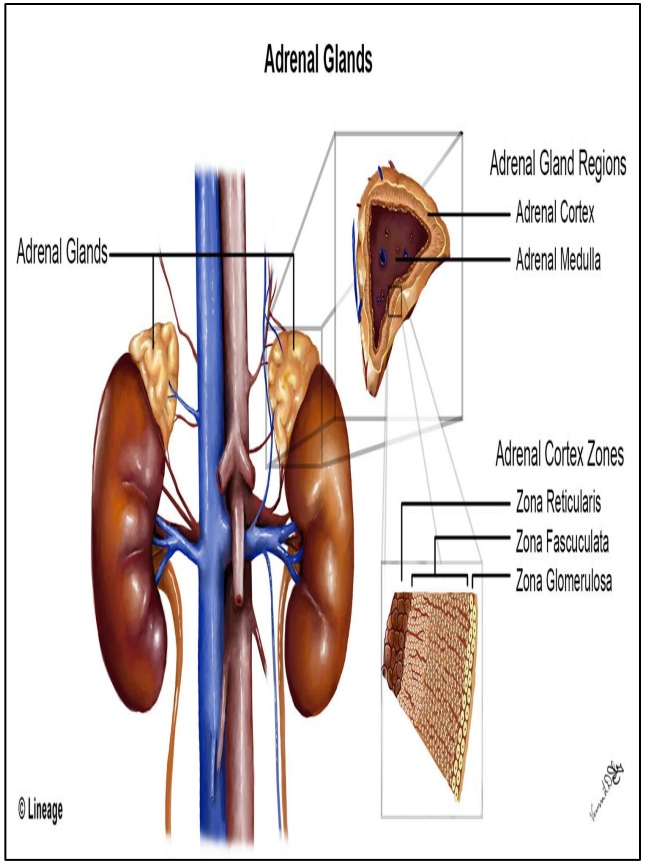

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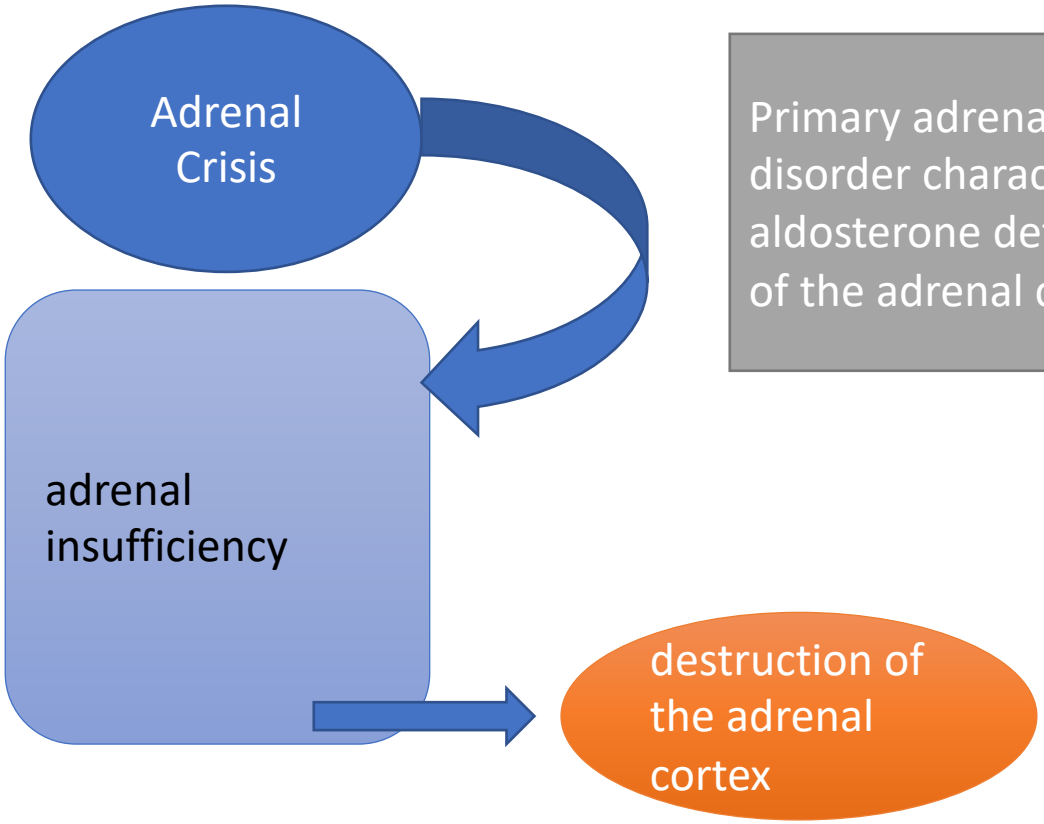
Adrenal Glands (Kidney Hats)



Primary adrenal insufficiency is an endocrine disorder characterized by cortisol and aldosterone deficiency caused by destruction of the adrenal cortex

ENDOCRINE SYSTEM

Adrenal Glands (Kidney Hats) disordes

adrenal insufficiency

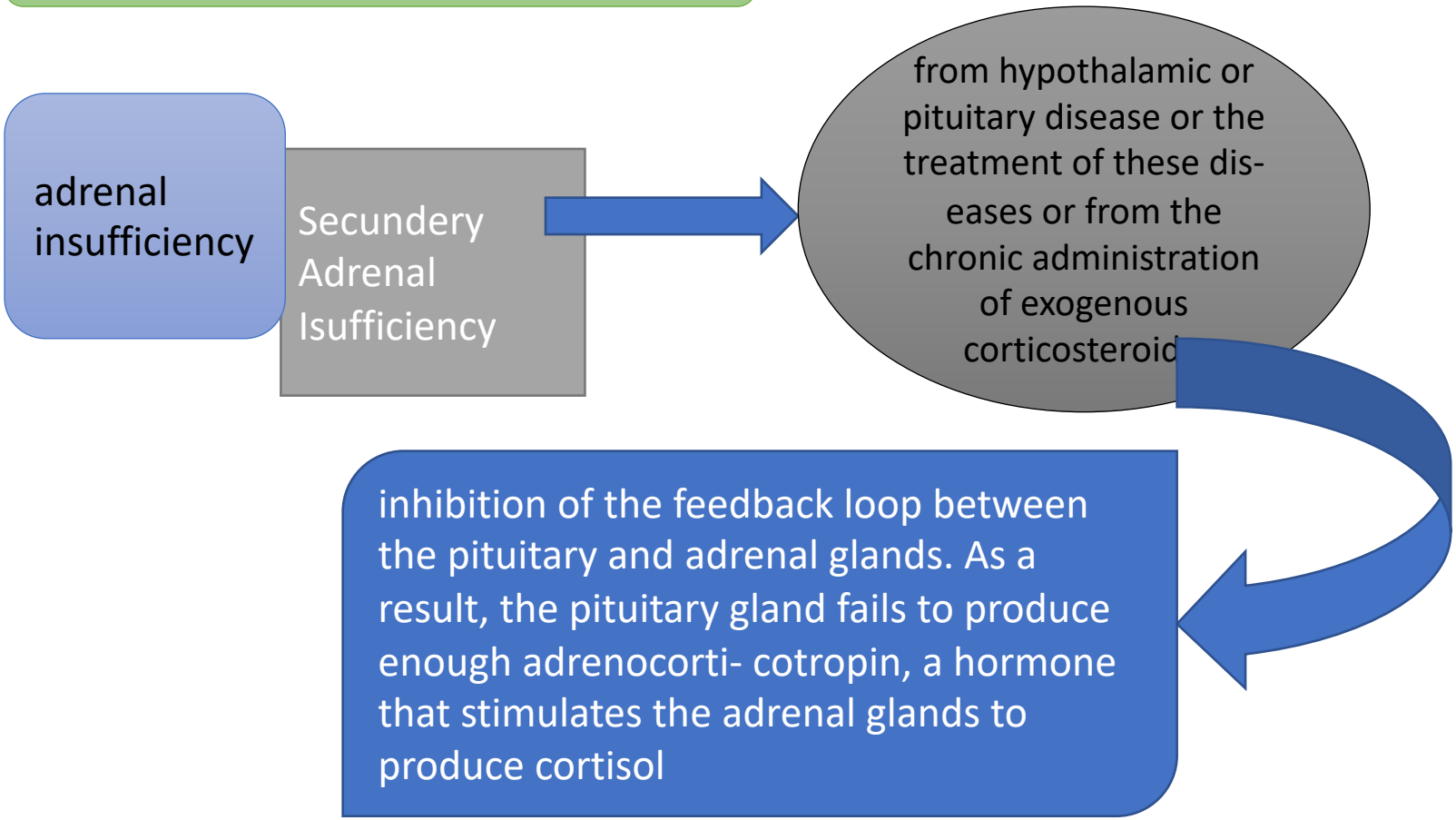
Primary AI, also known as Addison disease

is caused by a progressive destruction of the adrenal cortex, which usually is of

- idiopathic nature (most commonly autoim- mune) but also can result from hemorrhage
- sepsis,
- infectious diseases (such as tuberculosis,
- human immunodeficiency virus,
- Cytomegalo- virus and fungal infection),
- Malignancy,
- adrena- lectomy,
- Amyloidosis,
- Administration of certain drugs or congenital disorders.

ENDOCRINE SYSTEM

Adrenal Glands (Kidney Hats) disordes



ENDOCRINE SYSTEM

Adrenal Glands (Kidney Hats) disordes

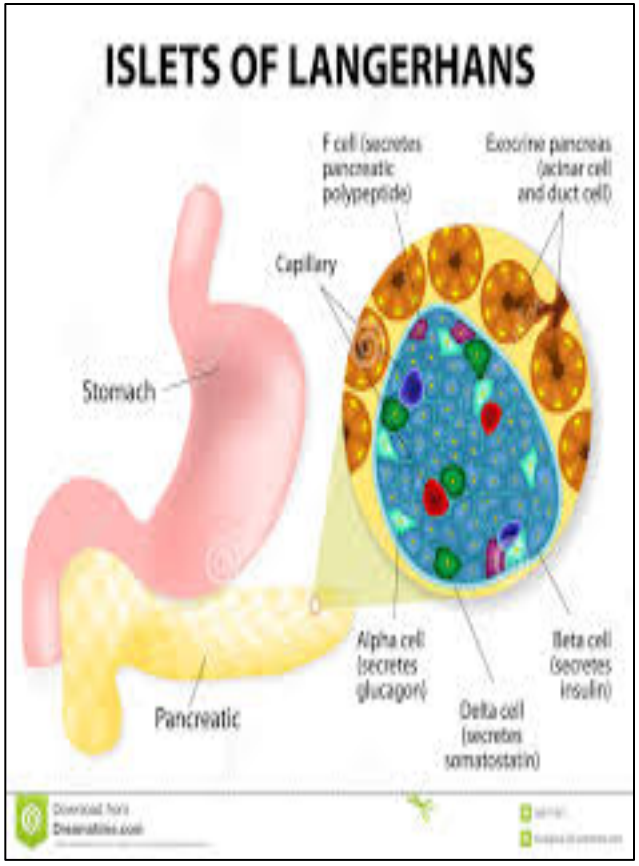
Oral Manifestations of Adrenal disordes

Oral pigmentations may be focal, diffuse or multifocal, and macular or raised

ENDOCRINE SYSTEM

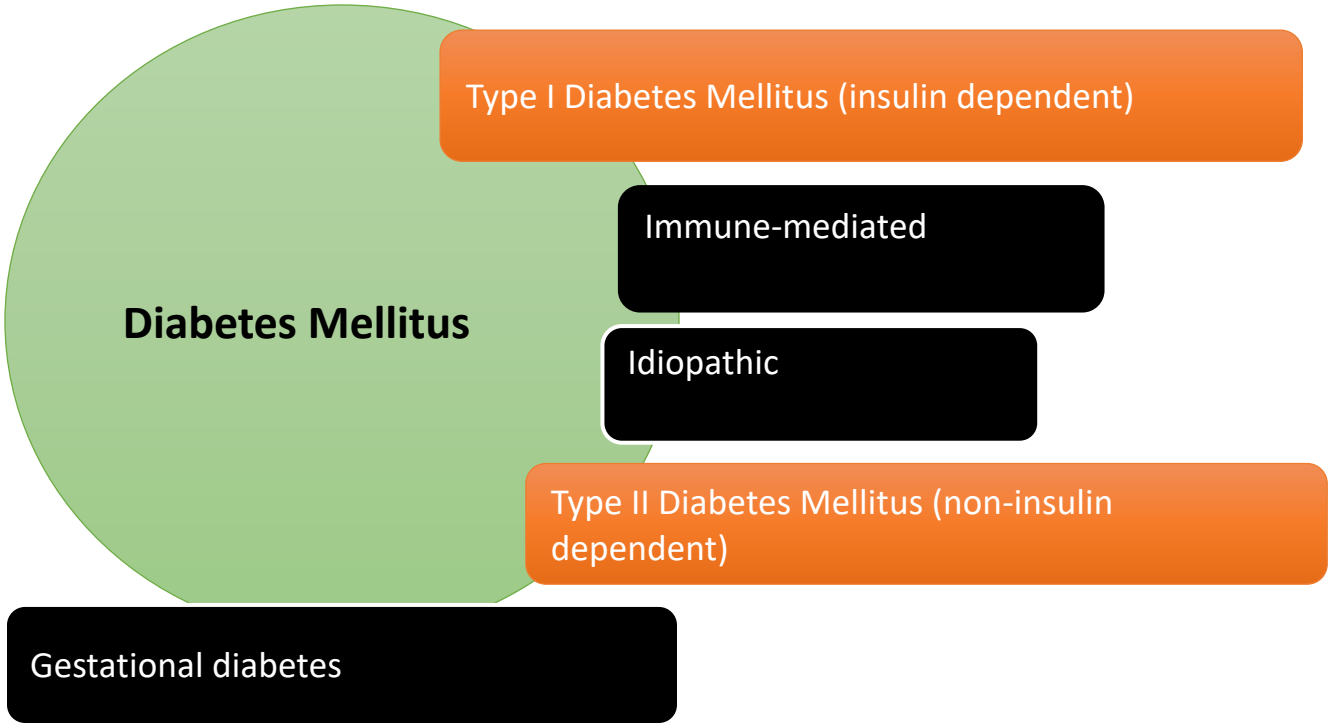
Islet of Langerhans

- Located **on** the pancreas
- Hormones secreted are insulin and glucagon
- **Insulin** stimulates glucose uptake by cells
- **Glucagon** promotes conversion of glycogen (animal-based carbohydrate) to glucose



ENDOCRINE SYSTEM

Pancreas Disorders



ENDOCRINE SYSTEM

Pancreas Disorders

Diabetes Mellitus

Diabetes Mellitus (DM) is a metabolic disorder characterized by the presence of chronic hyperglycemia accompanied to greater or lesser extent by alterations to carbohydrate, protein, and lipid metabolisms. Among the oral

manifestations related to DM described are: dry mouth, tooth decay, periodontal disease and gingivitis, oral candidiasis, burning mouth syndrome (BMS), taste disorders, rhinocerebral zygomycosis (mucormycosis), aspergillosis, oral lichen planus, geographic tongue and fissured tongue, delayed wound healing, and increased incidence of infection, salivary dysfunction, altered taste and other neurosensory disorders, impaired tooth eruption, and benign parotid hypertrophy

ENDOCRINE SYSTEM

Pancreas Disorders

Etiology
Diabetes Mellitus

Type I diabetes mellitus affects people at a very young age, hence is also known as juvenile diabetes. The defect lies in the insulin producing beta cells of the islets of Langerhans in the pancreas, as they undergo autoimmune destruction. This results in lack of insulin secretion, leading to the disease.

Type II diabetes mellitus affects adults. It is primarily caused due to lifestyle factors and genetics. It results from insulin resistance. Insulin secretion may also reduce with age, thus leading to the onset of diabetes. Gestational diabetes mellitus is similar to type II diabetes mellitus in that, there‟s a combination of relatively insufficient insulin secretion and responsiveness. It occurs in about 2-10% of pregnancies and may improve or disappear after delivery

ENDOCRINE SYSTEM

Oral Manifestations of Patients With Pancreas Disorders

Oral symptoms and conditions associated with both type 1 and type 2 diabetes

- Gingivitis
- Periodontitis
- Dental caries
- Tooth loss
- Oral candidiasis
- Oral mucosal lesions such as traumatic ulcers and
- irritation fibroma
- Impaired wound healing Xerostomia
- Salivary gland hypofunction Sialosis
- Burning mouth sensations Impairment of taste

ENDOCRINE SYSTEM

Oral Manifestations of Patients With Pancreas Disorders

Oral symptoms and conditions associated with both type 1 and type 2 diabetes

Gingivitis and Periodontitis

Patients with uncontrolled diabetes show exaggerated response to local factors leading to the sequelae of gingivitis, periodontitis and alveolar bone loss

This is characterized by greater loss of attachment, increased bleeding on probing, increased tooth mobility, increased bone loss and delay of post surgical healing of periodontal tissues and recurrent periodontal abscesses. Patients having type I diabetes mellitus tend to have more periodontal destruction around first molars and incisors and anaerobic organisms make up the majority of their subgingival flora.

There are various factors involved in increasing the susceptibility of patients suffering from diabetes to periodontal diseases. These are alterations in host response; increase in number of anaerobes in subgingival microflora; changes in vascularity, collagen metabolism, gingival crevicular fluid and hereditary patterns. Increased alveolar bone loss could also be attributed to compromised neutrophil function, decreased phagocytosis and leukotaxis [3].

ENDOCRINE SYSTEM

Oral Manifestations of Patients With Pancreas Disorders

Oral symptoms and conditions associated with both type 1 and type 2 diabetes

Recurrent infections of oral cavity

Diabetic patients are more prone to suffer from multiple and recurrent infections because of increased blood glucose level and compromised host immune response. Recurrent periodontal abscess is typically seen in patients with uncontrolled diabetes. They form owing to the predominance of gram negative anaerobic rods and the presence of fungi such as Candida species which are secondary invaders in the area of pre-existing infection, resulting in candidiasis.

Poor wound healing

Complications faced in oral surgery in diabetics are poor soft tissue regeneration and delayed osseous healing. Reasons for delayed wound healing are delayed vascularisation, reduced blood flow, a decline in innate immunity, decreased growth factor production and psychological stress.

ENDOCRINE SYSTEM

Oral Manifestations of Patients With Pancreas Disorders

Oral symptoms and conditions associated with both type 1 and type 2 diabetes

Dry socket

Dry socket is a complication of extraction which occurs due to dislodgement of blood clot formed postoperatively. It is most common after mandibular teeth extractions because of reduced blood supply to the mandible caused by atherosclerosis caused by long standing diabetes. Use of epinephrine in local anaesthetics further reduces blood supply to the area, thereby increasing the likelihood of dry socket.

Salivary dysfunction

People with diabetes usually complain of xerostomia, i.e. dry mouth and experience salivary gland dysfunction. A recent study detected impaired salivary uptake and excretion by salivary scintigraphy in adults with type II diabetes [4]. This may be resulting due to either excessive loss of water via urination or from alterations in basement membranes of salivary glands, or from medications.

ENDOCRINE SYSTEM

Oral Manifestations of Patients With Pancreas Disorders

Oral symptoms and conditions associated with both type 1 and type 2 diabetes

Grinspan syndrome

When diabetes mellitus is associated with lichen planus and hypertension, it is known as grinspan syndrome. It usually occurs as a result of medications for diabetes and hypertension. Patients taking sulphonylureas are more prone to suffer from this syndrome.

Taste disturbances

Taste is an essential component of oral health. It is adversely affected in patients with diabetes. According to a report, more than one-third of all adults suffering from diabetes had hypogeusia [5], i.e. diminished taste perception. Because of this, patients tend to eat more, leading to obesity. This symptom, known as hyperphagia, would prevent the patient from maintaining a proper diet and this would subsequently result in poor glycemic regulation.

ENDOCRINE SYSTEM

Oral Manifestations of Patients With Pancreas Disorders

Oral symptoms and conditions associated with both type 1 and type 2 diabetes

Neurosensory disorders

- Patients with diabetes have reported increased complaints of glossodynia and/or stomatopyrosis .
- A common, yet poorly understood orofacial neurosensory disorder, burning mouth syndrome, has been associated with diabetes mellitus. They may experience long-lasting oral dysesthesias which would adversely affect oral hygiene maintenance.
- Peripheral neuropathies have oral implications as well. It may impair the patient in using devices for oral hygiene maintenance.
- Neuropathies like retinopathy could cause blindness in diabetics which in turn would affect daily oral and prosthesis hygiene.
- Dysphagia may also result due to altered strength, speed and/or coordination of the cranial nerve musculature.

ENDOCRINE SYSTEM

Oral Manifestations of Patients With Pancreas Disorders

Oral symptoms and conditions associated with both type 1 and type 2 diabetes

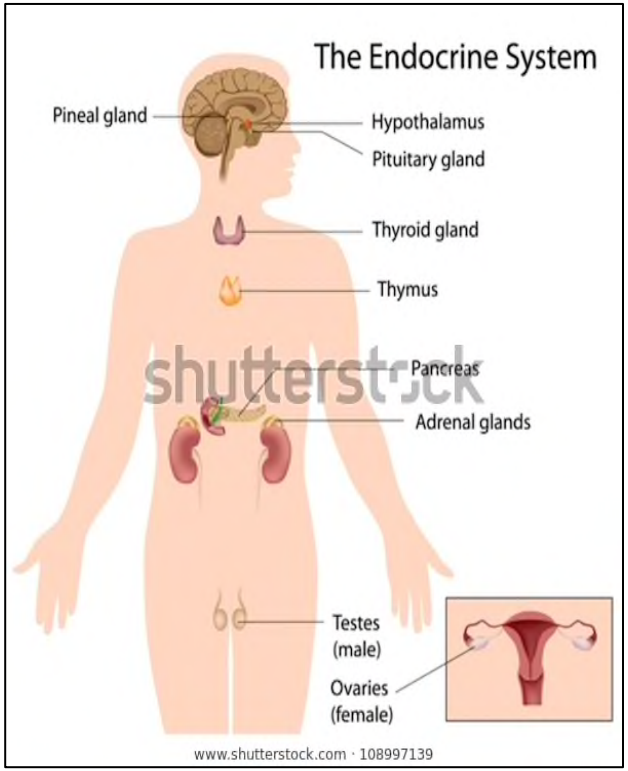
Dental caries

It could be said that dental caries occurs as a sequelae to other oral manifestations in diabetics. Patients having complaints of xerostomia are more susceptible to caries because of reduced salivary flow. Patients with periodontal problems also are more prone to develop caries. Other factors responsible are increased levels of streptococcus mutans and poor metabolic control of diabetes

ENDOCRINE SYSTEM

Testes and Ovaries

- Reproductive hormone disorders can affect fertility and may have long-term effects on metabolic, cardiovascular and bone health. The reproductive hormones
- E**strogen** and **progesterone** in women and **testosterone**in men. They originate from the primary reproductive glands (ovaries in women and testes in men) and are regulated by hormone signals from the pituitary gland; **luteinizing hormone** (LH) and **follicle stimulating hormone** (FSH)



ENDOCRINE SYSTEM

Oral Manifestations of Patients With Testes and Ovaries Disorders

Oral symptoms and conditions associated with Hypergonaidism

Bilateral brown facial pigmentations are seen in pregnant women, which disappears after delivery. Susceptibility to periodontal diseases and gingival hyperplasias are common.

Following are the features seen in hypogonadism. Decreased salivary flow, dental caries, unpleasant metallic taste, oral candidiasis, atrophy of gingival tissues, the higher tendency for plaque accumulation, increased risk of gingivitis and Periodontitis rapid resorption of edentulous ridge.

Oral symptoms and conditions associated with Hypogonaidism

ENDOCRINE SYSTEM

Oral Manifestations of Patients With Testes and Ovaries Disorders

Oral symptoms and conditions associated with manoupose

Effects on gingival tissues
Estrogen has been found to increase epithelial keratinization, stimulate fibroblast proliferation and the proliferation of basal epithelial cells with a specific basal membrane area of the gingiva, and thus increase the number of gingival epithelial cells.

postmenopausal women (estrogen deficient) might exhibit accordingly a decreased epithelial keratinization of marginal gingiva, and desquamation of gingival tissues (as in benign mucous membrane pemphigoid and lichen planus) where gingiva decreases in size and has a smooth surface with mottled appearance. These observations are specically reported in poor middle-aged women who would subsequently suffer from irregular or early ceased menopause.

ENDOCRINE SYSTEM

Oral Manifestations of Patients With Testes and Ovaries Disorders

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ENDOCRINE SYSTEM

Oral Manifestations of Patients With Testes and Ovaries Disorders

symptoms and conditions associated with manoupose

Effects on the alveolar bone and osteoporosis

- Osteoporosis is a skeletal condition in which there is a decrease in the mineral density (mass/volume unit) of normally mineralized bone.
- It is the most common metabolic bone disease affecting 75 million people in United States, Europe, and Japan.4 It's a reduction in bone mass with deformity, pathological fractures that are usually accompanied with pain, caused by the uncoupling of bone formation/ resoption process, either by exaggerated resorption, reduced bone formation, or both combined together

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ENDOCRINE SYSTEM

Oral Manifestations of Patients With Testes and Ovaries Disorders

Oral symptoms and conditions associated with manoupose

- A decrease by 1 mm in the mandibular cortical width (MCW) increases the susceptibility of moderate or severe erosion of cortex by 96%.
- An increase in one unit in number of teeth loss increases the susceptibility of moderate or severe erosion to 6%.
- Females who have suffered fracture have less number of teeth than those who didn't. Postmenopausal women lose their teeth after the age of 50. Teeth that are more frequently lost are rst and second mandibular and maxillary premolars, anterior teeth and canines.
- Generalized bone loss due to osteoporosis makes the jaws susceptible to accelerated alveolar bone resorption. Decreased mass and density of maxilla and mandible, in osteoporotic
- patients, might be accompanied with increased rate of bone loss in edentulous ridges or around the tooth.

Terima kasih

Refferences

- Human Physiology an integrated approve,2013. 6ed. Dee Unglaub Silverthorn, Ph.D. Universitas of Texas, Austin
- Sanjeev Mittal, Deepak Gupta1, Sahil Sekhri, Shivali Goyal, 2020. Oral Manifestations of Parathyroid Disorders and Its Dental Management. Journal of Dental and Allied Sciences. DOI: 10.4103/2277-4696.156527
- Atreja Gaurav, Atreja Shikha Handa1, Jain Nitul2, Sukhija Urvashi.2016. Oral manifestations in growth hormone disorders. Indian Journal of Endocrinology and Metabolism. DOI: 10.4103/2230-8210.95678
- Reeta Jha*, Preeti Kalyani**, Riddhi Bavish.2014. Oral Manifestations of Diabetes. Journal of Research in Medical and Dental Science . DOI : 10.5455/jrmds.2014232
- Shalu Chandna, Manish Bathla .2016. Oral manifestations of thyroid disorders and its management. Indian Journal of Endocrinology and Metabolism. DOI: 10.4103/2230-8210.83343
- Hari S Prabhu1., Thiruneervannan, R2 and Benjamin Premkumar, J3. 2016. ORAL MANIFESTATIONS OF ENDOCRINE DISORDERS. nternational Journal of Recent Scientific Research. Vol. 7, Issue, 10, pp. 13697-13699
- Racha Hariri,1 Emad Eddin Alzoubi2, 2017. Oral manifestations of menopause. Journal of Dental Health Oral Disorders & terapy. 7(4);306-309
- Mohd W. Khalaf, BDS; Ruba Khader, BDS; Gregory Cobetto, DMD; Juan Fernando Yepes, DDS, MD, MPH, DrPH; Dennis G. Karounos, MD; Craig S. Miller, DMD, MS.2013. Risk of adrenal crisis in dental patients Results of a systematic search of the literature *.JADA 2013;144(2):152-160.*