ENDOCRINE "PITUITARY" EMERGENCIES

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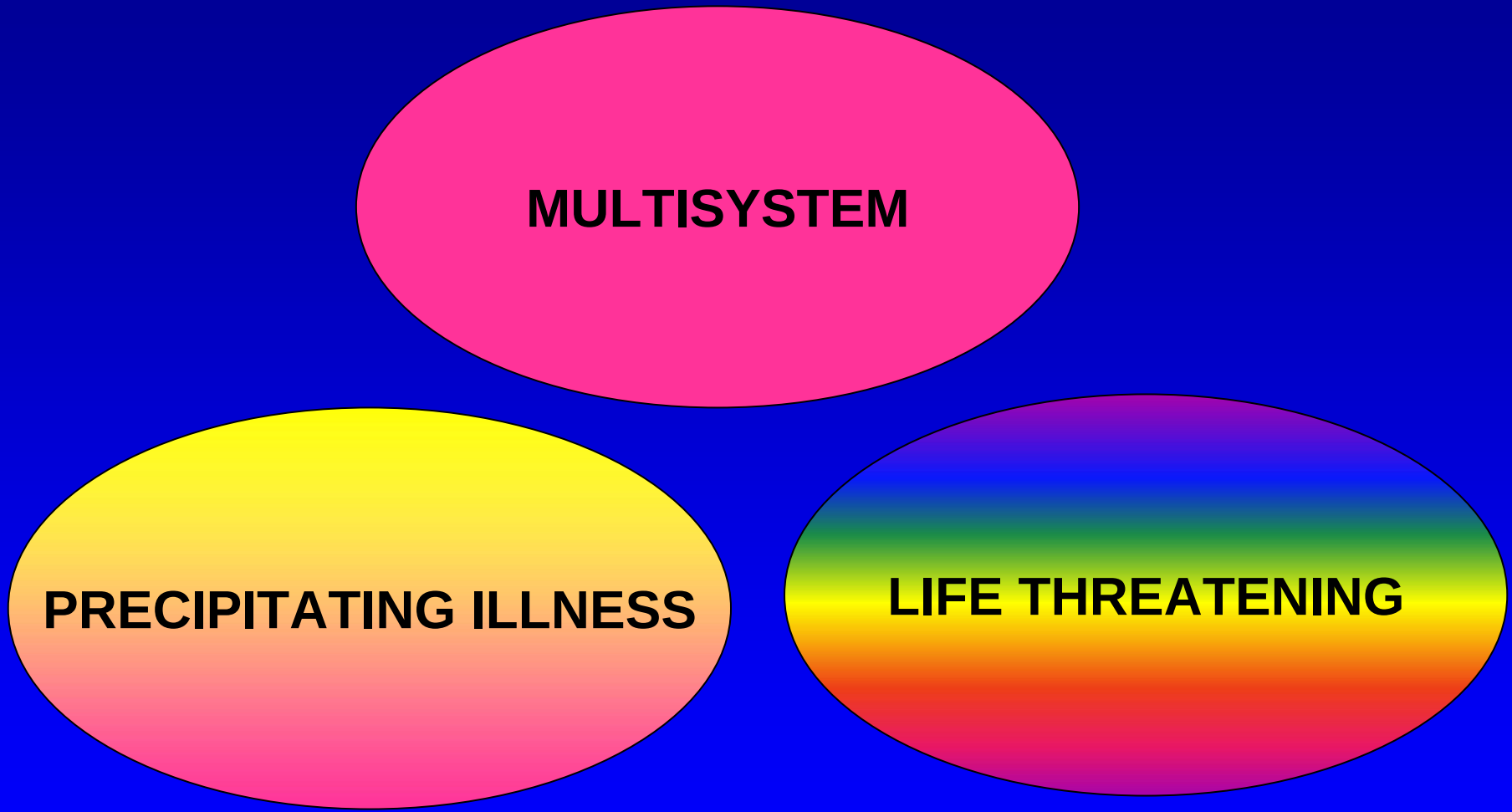
What is Emergency ?

- Emergency: A sudden need for immediate action.
- Medical emergency: Life threatening condition.

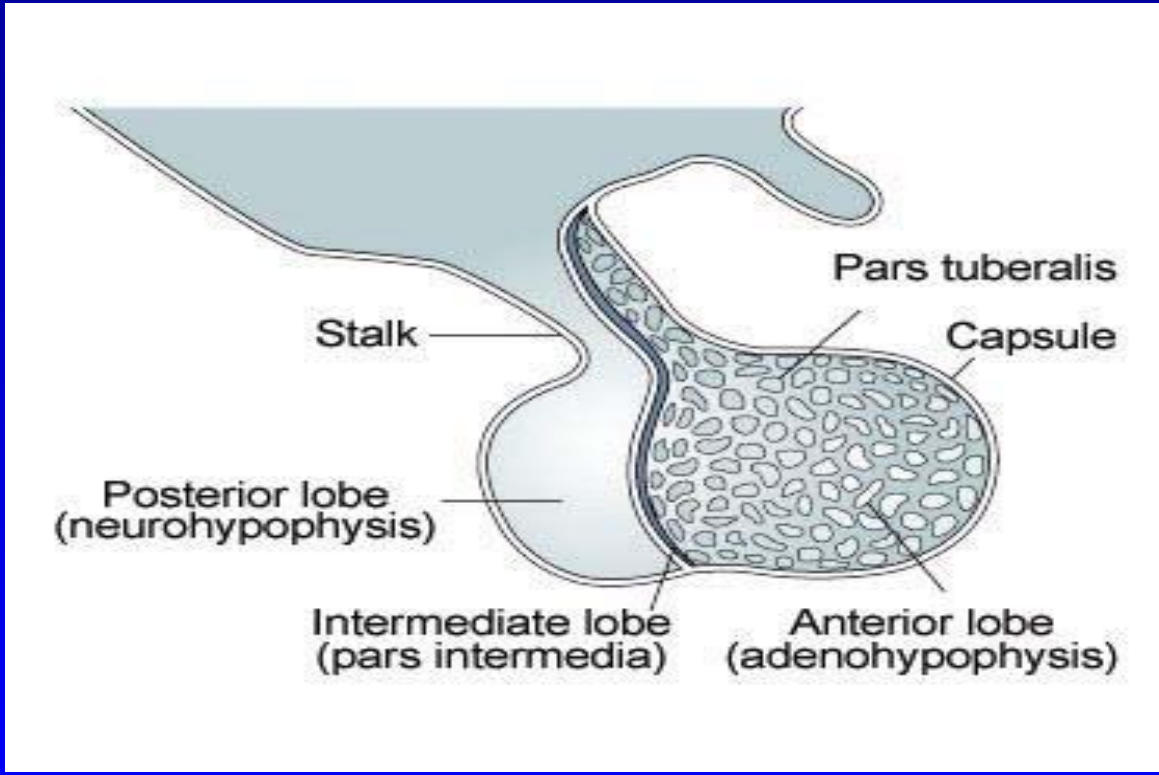
ENDOCRINE EMERGENCIES:



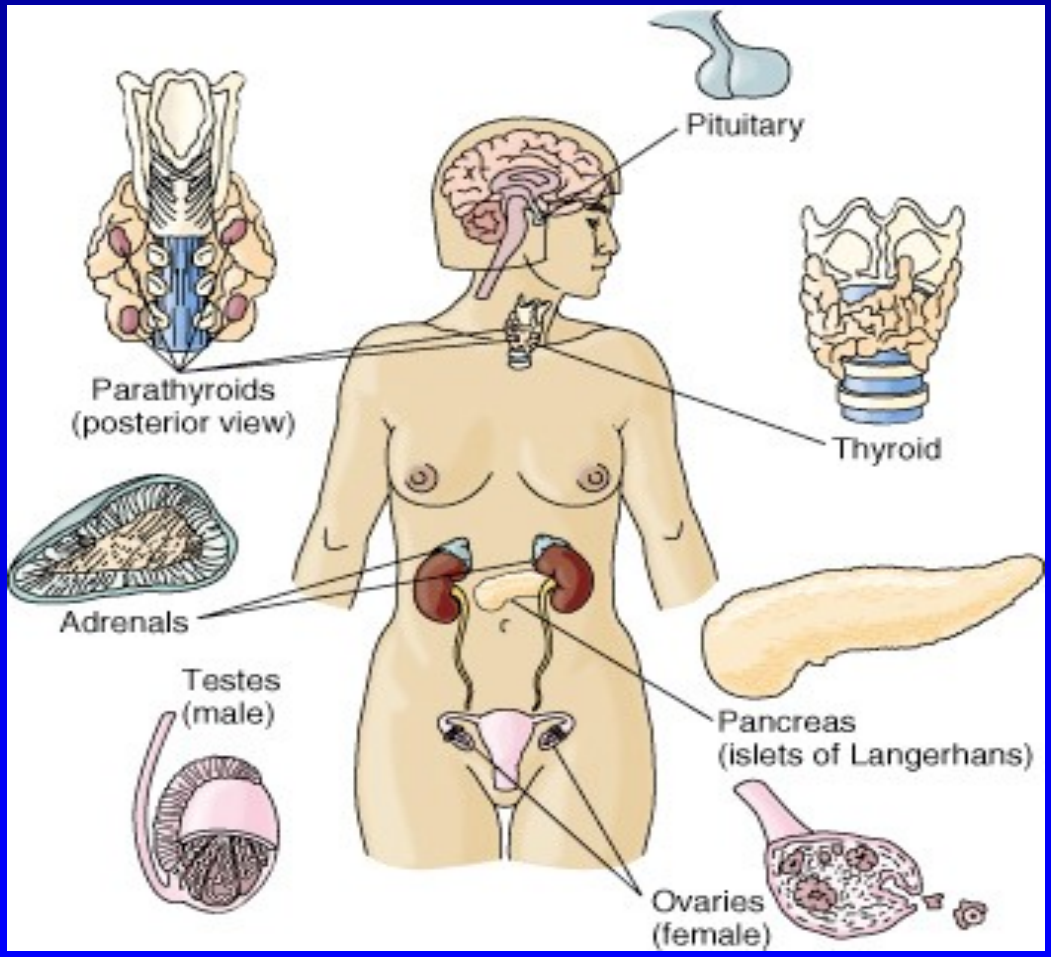
What is Pituitary ?

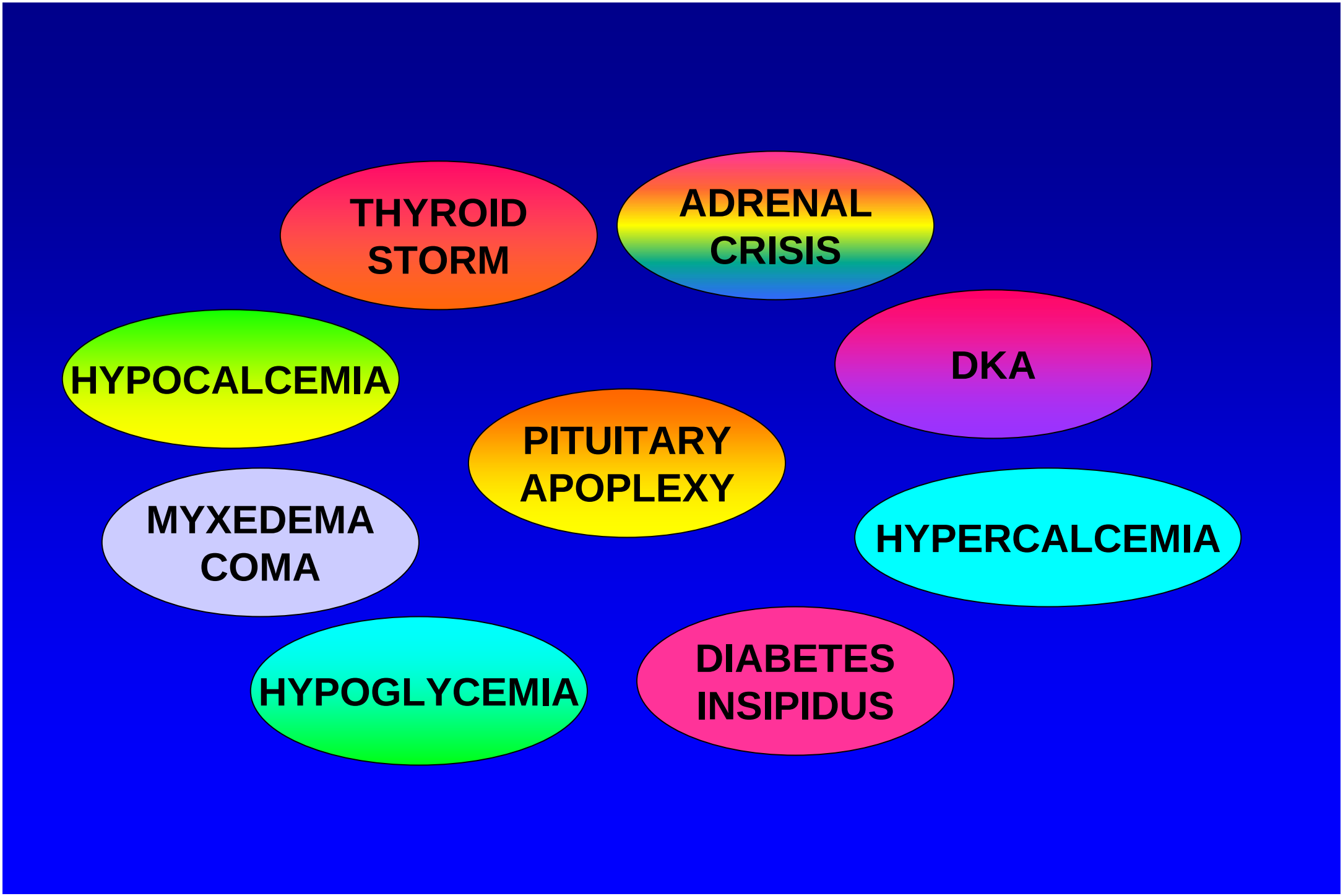
- Master of endocrine glands.
- A federation of many specific hormone secreting cells inspite of its small weight & size ~ 600 mgm (13x6x9 mm).
- Beside secreting growth hormone& prolactin ,it is the director of gonads (FSH, LH) ,thyroid (TSH), suprarenal cortex (ACTH).
- A good master feels the requirements of its target glands, being suppressed by over function and vice versa.
- Rarely unnecessary hormone secretion → inappropriate TSH, IADHS.

PITUITARY GLAND



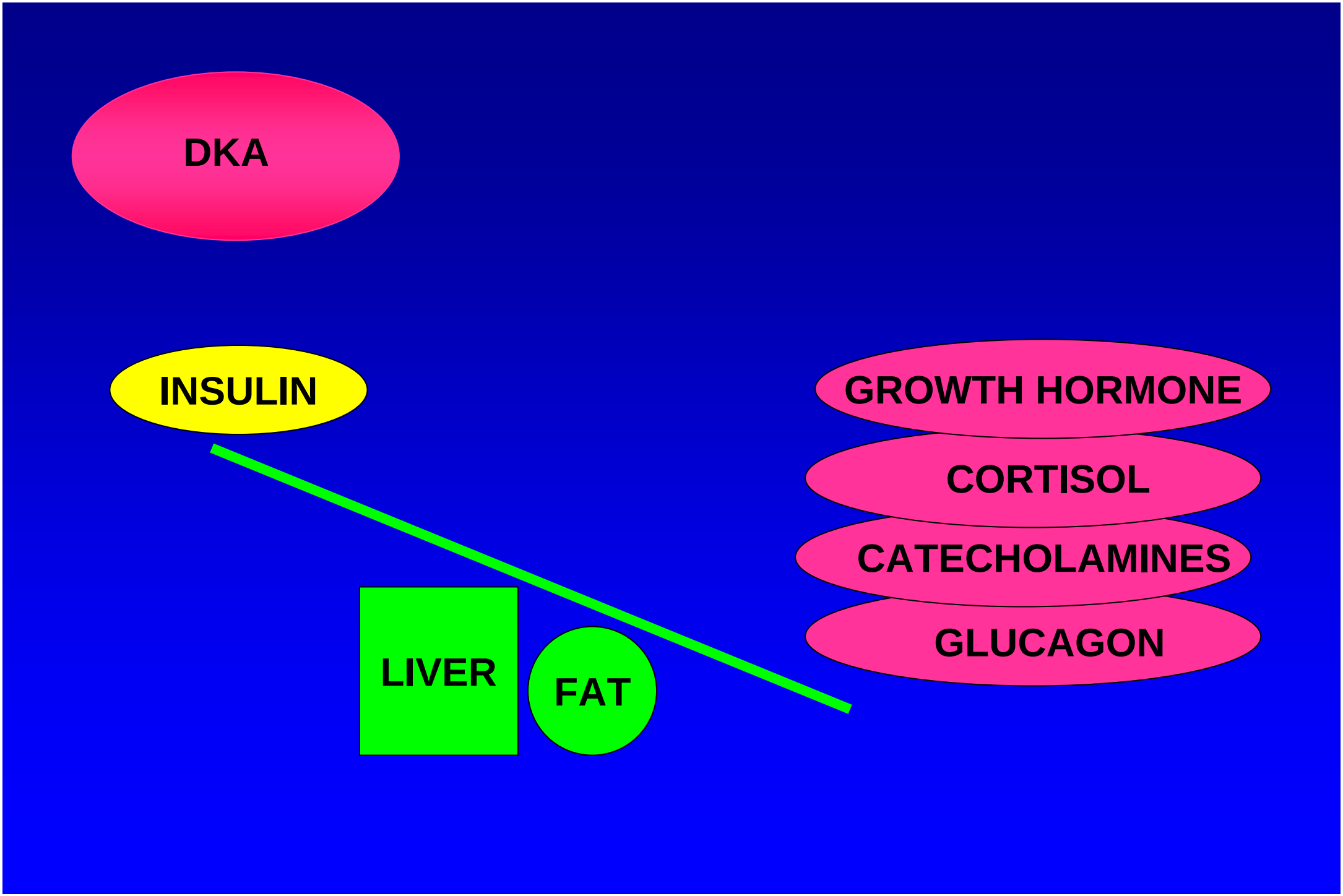
ENDOCRINE SYSTEM

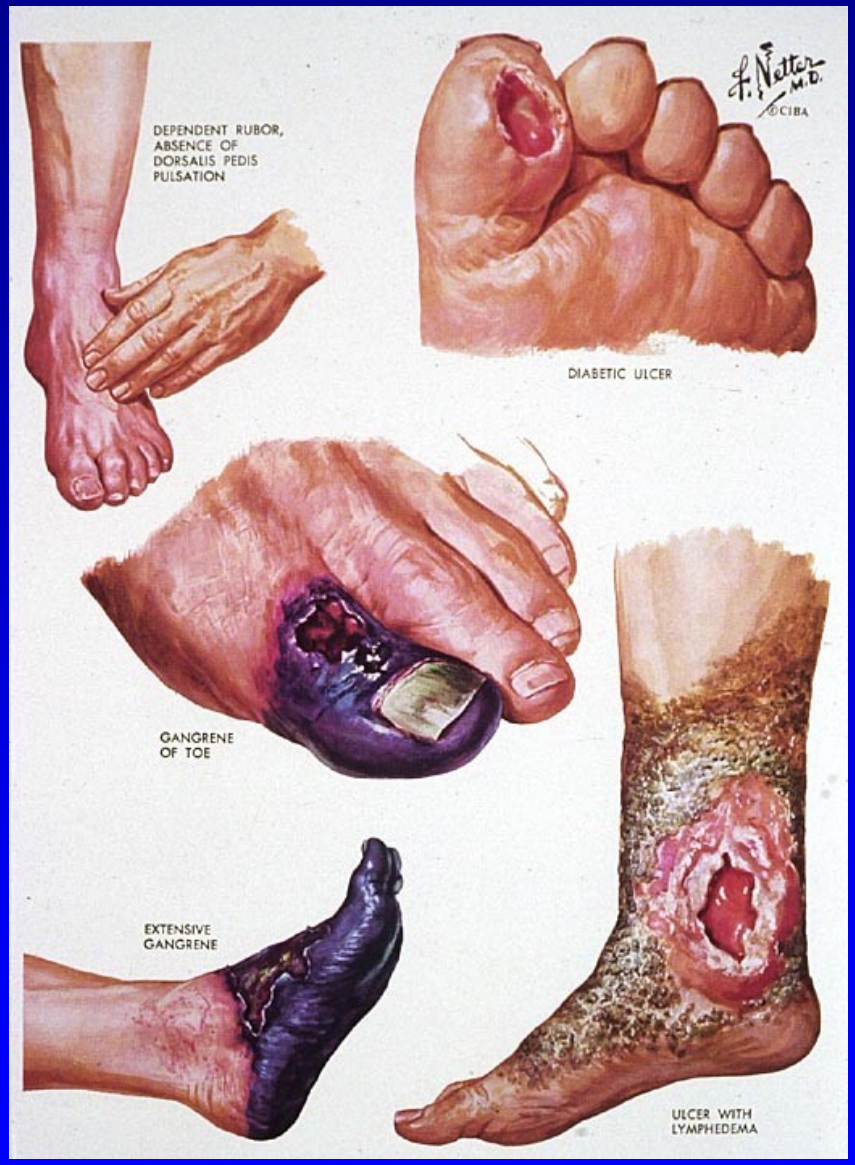



THYROID STORM
ADRENAL CRISIS
HYPOCALCEMIA
DKA
PITUITARY APOPLEXY
MYXEDEMA COMA
HYPERCALCEMIA
HYPOGLYCEMIA
DIABETES INSIPIDUS

Endocrine Emergencies

- **Diabetes mellitus:**
  - DKA - Hypos - HONK.
  - CVD (DM is a CAD equivalent).
  - HTN emergencies.
  - Kidney - AN papillitis - fulminant, emphysematus, pyelonephritis, ARF, acute on top of CRF, Sphincteric disturbance.
  - CNS, strokes, neuropathies.
  - PAD.
  - D. foot, amputations.


DKA
INSULIN
GROWTH HORMONE
CORTISOL
CATECHOLAMINES
GLUCAGON
LIVER
FAT


DEPENDENT RUBOR, ABSENCE OF DORSALIS PEDIS PULSATION
F. Netter M.D.
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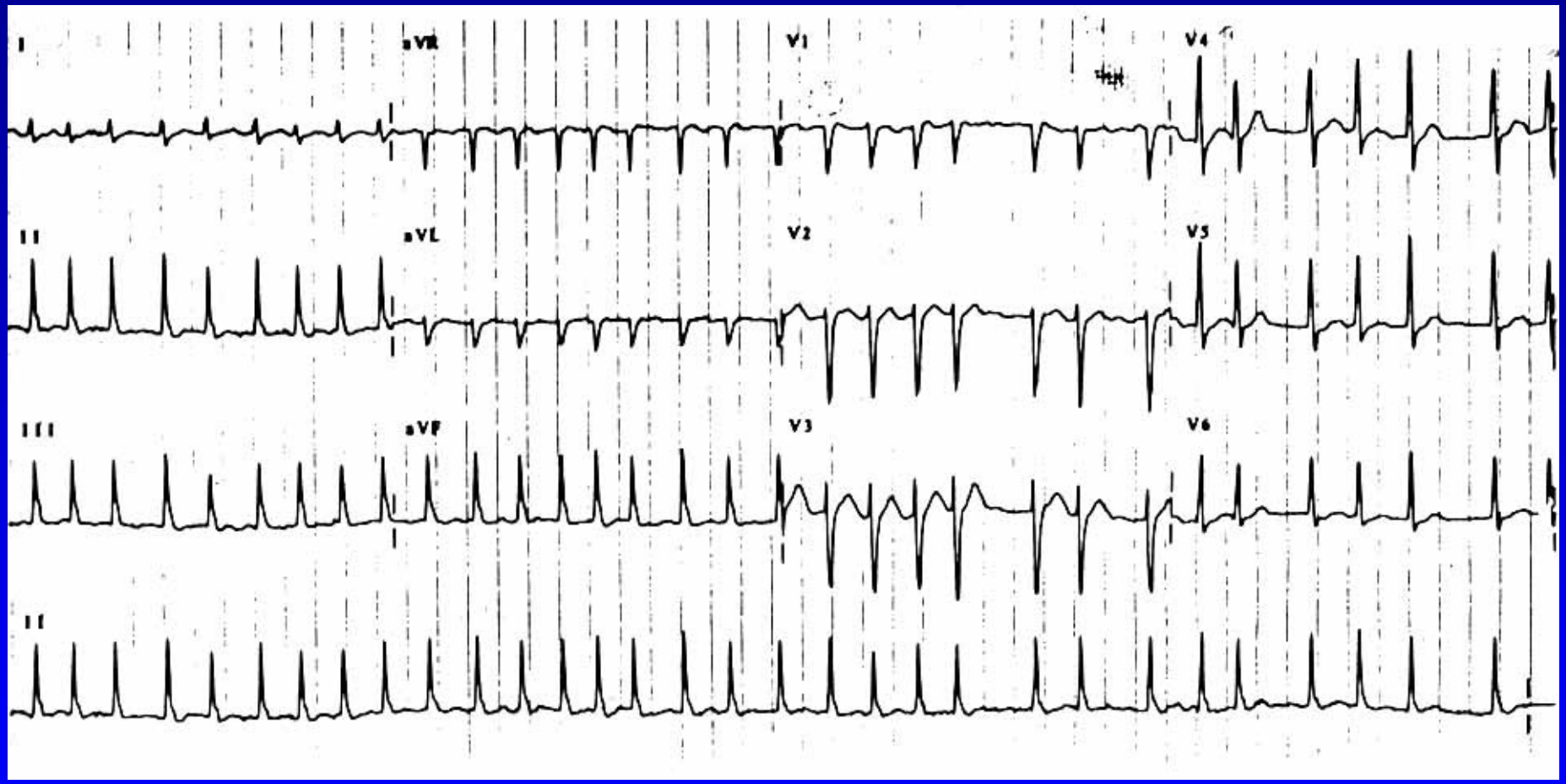
DIABETIC ULCER
GANGRENE OF TOE
EXTENSIVE GANGRENE
ULCER WITH LYMPHEDEMA

Endocrine Emergencies

- **Thyroid:**
  - Thyroid strom.
  - Myxedema coma.
  - Arrhythmias.
  - Ophthalmic Grave's.


I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
II

Thyroid Storm

Fever

Delerium

Cardiovascular collapse

Gastrointestinal distress

Thyroid Storm

- Life-threatening hypermetabolic state due to decompensated hyperthyroidism
- Usually results from previously unrecognized or poorly treated hyperthyroidism
- Precipitating factors:
  - Infection

Thyroid Storm

- Trauma/Surgery
- Parturition
- DKA
- MI
- CVA
- PE
- Withdrawal of thyroid meds
- Iodine load

Thyroid Storm

- 20-25% cases no precipitant found
- With treatment, mortality 20-50%

Thyroid storm

- Uncontrolled and potentailly life-threatening hyperthyroidism caused by sudden excessive release of thyroid hormone (rare)
- Precipitating factors:
  - Stress,
  - Infection,
  - Unprepared thyroid surgery with manipulation of the thyroid gland

Assessment of thyroid storm

- Fever (up to 106 degree f)
- Tachycardia
- Nausea, vomiting, diarrhea
- Anxiety, agitation
- Heart failure, respiratory distress, delirium, coma

Thyroid storm management

- Maintain patent airway, adequate ventilation
- Administer antithyroid drugs, corticosteroids, sedatives, iodine solution, inderal and cardiac drugs as prescribed.
- Cooling blanket and antipyretics

Classic Features

- Fever >38.5
- Sinus tachycardia out of proportion to fever
- SVT or dysrhythmias with or without CHF
- GI symptoms (nausea, vomiting, diarrhea, rarely jaundice)

Classic Features

- Volume depletion
- CNS dysfunction (agitation, confusion, delirium, stupor, coma, seizure)

Pathophysiology

- Uncertain
- Old theory: “dumping” of T3/T4 into bloodstream
- Problem: serum levels of T3/T4 are not higher than in hyperthyroid patients not in thyroid storm

Pathophysiology

- Evidence that in thyrotoxicosis, number of catecholamine binding sites increases: heart and nervous tissues have heightened sensitivity to circulating catecholamines
- Decreased binding of T4 and T3 to TBG

Pathophysiology

- Stress triggers outpouring of catecholamines which, in association with high levels of free thyroid hormone precipitates thyroid storm
- Alternative hypothesis
  - Increased sensitivity of thyroid hormone receptor in target tissues secondary to acidosis or other common intermediary during times of metabolic stress

Investigations

- Clinical diagnosis
- TSH, fT4
- CBC: leukocytosis, elevated Hb
- Ca elevated in 10% due to bone resorption
- Alk phos often elevated due to activated bone remodeling

Investigations

- Hyperglycemia seen in 30-55%
  - Insulin resistance
  - Decreased insulin secretion
  - Rapid intestinal absorption
  - Increased glycogenolysis
- Minimal elevations in liver transaminases and bilirubin

Myxedema Coma

Decompensated hypothyroidism

Altered mental status

Defective thermoregulation

Preciptating illness

Myxedema Coma

IV thyroxine

IV steroids

Rewarming blankets

Respiratory support
Cardiovascular support

Myxedema Coma

IV L-thyroxine 200 -500 ug bolus then 100 ug IV daily

IV solucortef 100 mg IV q 6h

Rewarming blankets

Respiratory support
Cardiovascular support

Myxedema Coma

- Rare condition in which an individual with long-standing hypothyroidism presents with life-threatening decompensation
- Occurs in 0.1% of patients with hypothyoidism
- Most common in older patients with underlying pulmonary or vascular disease

Myxedema Coma

- Decompensation usually triggered by precipitating event or condition
  - Cold exposure
  - *Infection (usually pulmonary)
  - *CHF
  - Trauma
  - CVA
  - Hemorrhage (especially GI)

Myxedema Coma Precipitants

- Drugs (phenothiazines, phenobarbital, Li, narcotics)
- Hypoxia, hypercapnea, hyponatremia, hypoglycemia

Pathophysiology

- 3 primary features:
  - CO2 retention and hypoxia
  - Fluid and electrolyte imbalance
  - hypothermia

Hypercapnea and Hypoxia

- Primarily arise due to diminished medullary respiratory drive due to thyroid hormone deficiency
- Exacerbating factors:
  - Anatomic effects of severe hypothyroidism (ex. resp muscle weakness, obesity) impair normal ventilatory function
  - Pneumonia, pleural effusions

Hypercapnea and Hypoxia

- Hypercapnea is prime cause of altered sensorium
- Early neuropsychiatric features: slow responses to questions, poor short-term memory, cerebellar signs (ataxia, dysarthria, tremor) weakness, lethargy
- Later: delerium with hallucinations (myxedema madness), coma, seizures

Endocrine Emergencies

- **Parathyroid:**
  - **Hyperparathyroidism, the disease of stones, bones, abdominal groans & psychosis.**
  - **Hypocalcemic emergencies, seizures: generalized tetany without loss of consciousnes.No tongue biting, or incontinance or post-icteal confusion.**
  - **Psychosis, calcification of basal ganglia.**

HYPOCALCEMIA

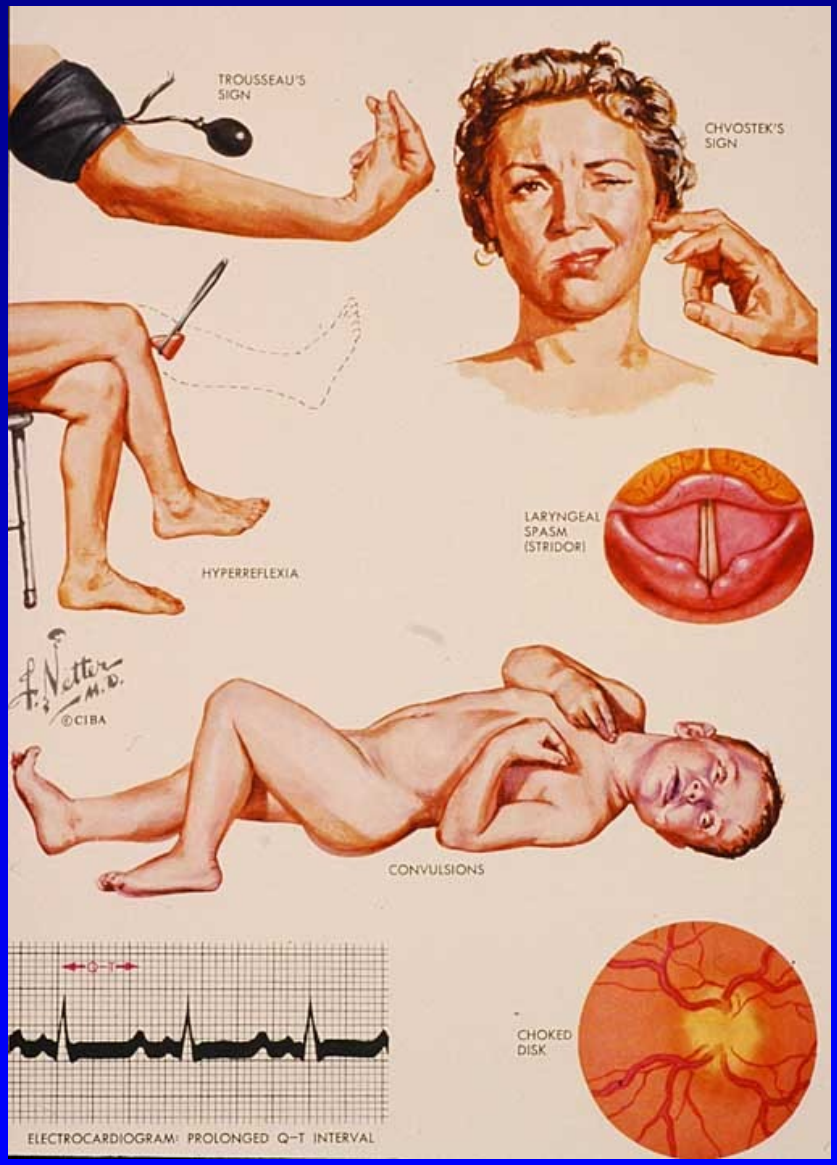
- **Perioral numbness**
- **Tingling**
- **Carpal pedal spasm**
- **Tetany**
- **Laryngospasm**

HYPOCALCEMIA

- **IV ampule of calcium gluconate push**
- **IV infusion of calcium gluconate**
  - **5 amps in 500 cc D5W , run at 50 - 75 cc / hr**
- **Monitor Chvostek, Trousseau's signs & ionizedCa2+**
- **Overlap oral with IV**

Chvostek's sign

- Elicited by tapping over facial nerve causing twitching of ipsilateral facial muscles


TROUSSEAU'S SIGN
CHVOSTEK'S SIGN
HYPERREFLEXIA
LARYNGEAL SPASM (STRIDOR)
F. Netter M.D.
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CONVULSIONS
CHOKED DISK
ELECTROCARDIOGRAM: PROLONGED Q–T INTERVAL

Trousseau's sign

- Carpal spasm in response to inflation of BP cuff to 20 mm Hg above SBP for 3 min

HYPERCALCEMIA

- **Mental confusion**
- **Dehydration**
- **Abdominal pain**
- **Renal stones**
- **Ulcers**
- **Bony pain**

HYPERCALCEMIA

- **IV Hydration - Normal saline**
- **IV Furosemide diuresis**
-
- **IV Pamidronate 60 - 90 mg IV over 6 - 24 hrs**
- **Calcitonin 200 IU nasally BID**

- **Investigate the cause**

Osteitis Fibrosa Cystica

- Occurs in 10%
- Cystic bone lesions of cortical bone
- Secondary to excessive bone resorption from high PTH
- Presents with bone pain and pathologic fractures or osteoporosis

Endocrine Emergencies

- **Adrenal:**
  - Addisonian Crisis.
  - HTN complications.
  - Electrolyte disturbances.
  - Cushing's psychosis and osteoporosis.
- **Obesity:**
  - Sleep apnea.
- **Pituitary emergencies:**

Risk factors for Addisonian Crisis

- History of other endocrine disorders
- Taking glucocorticoids for more than 3 weeks with sudden cessation
- Taking glucocorticoids more than once every other day
- Adrenalectomy
- TB

Clinical manifestations

- Fatigue, muscle weakness
- Anorexia, nausea, vomiting, abdominal pain, wt. Loss
- Hypotension, weak pulse
- Bronzelike pigmentation of the skin

Diagnostic findings

- Low cortisol levels
- ACTH stimulation test (failure of cortisol levels to rise over basal levels)
- Hyponatremia <130meg/ml
- Hyperkalemia >5meq/l
- Hypoglycemia
- CT
- MRI

Adrenal Crisis

- Weight Loss
- Fatigue
- Weakness
- Severe Hypotension
- Abdominal Symptoms

Adrenal Crisis

IV steroids:
Solucortef or Dexamethasone

IV hydration

Medical Alert Bracelet
Cortisone Acetate or Prednisone
Florinef

Adrenal Crisis

IV steroids:
Solucortef 100 mg IV q 6h
or
Dexamethasone 4 mg IV q 6h

IV hydration

Medical Alert Bracelet
Cortisone Acetate or Prednisone
Florinef

Adrenal crisis

- Severe exacerbation of Addison's disease
- Precipitating factors: trauma strenous exercise, infection, stress, withdrawal of exogenous steriods in a client on long term steriod therapy
- Assessment: severe muscle weakness, severe hypotension, hypovolemia, shock (vascular collapse)

Adrenal crisis interventions

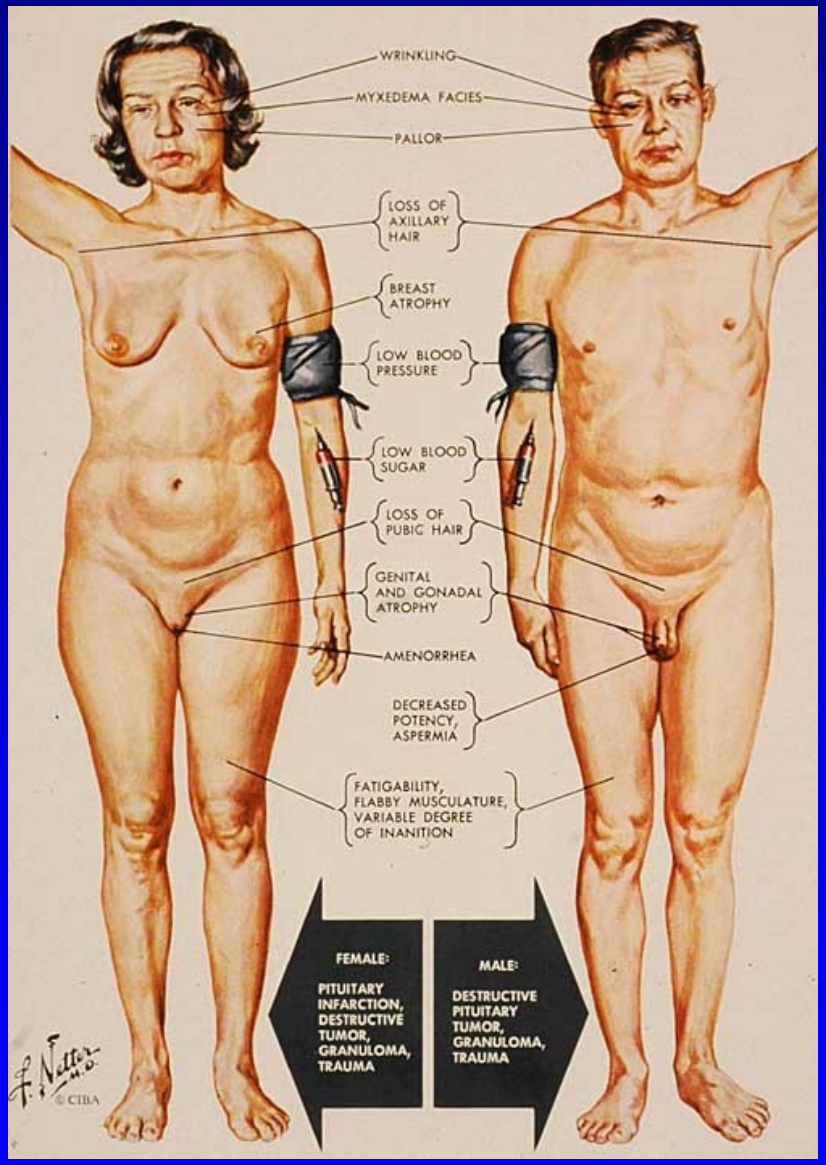
- Solu-cortef iv
- Strict bedrest
- Eliminate stressful stimuli
- If infection present, administer iv antibiotics

Pituitary Emergencies

- Pituitary insufficiency → failure → secondary Addisonian Crisis.
- Pituitary infarction.
- Pituitary apoplexy.
- Posterior pituitary: SIADH secretion.

Panhypopituitarism

- Pallor, Yellowish Tinge to Skin, Alabaster skin, Failure to tan on exposure to sun
- Fine Wrinkling of Skin
- Absent Axillary & Pubic Hair
- Face Puffy & Expressionless
- Amenorrhea, Loss of libido
- Fatigability&Weakness
- Poor tolerance to RAMADAN Fasting


WRINKLING
MYXEDEMA FACIES
PALLOR
LOSS OF AXILLARY HAIR
BREAST ATROPHY
LOW BLOOD PRESSURE
LOW BLOOD SUGAR
LOSS OF PUBIC HAIR
GENITAL AND GONADAL ATROPHY
AMENORRHEA
DECREASED POTENCY, ASPERMIA
FATIGABILITY, FLABBY MUSCULATURE, VARIABLE DEGREE OF INANITION
FEMALE:
PITUITARY INFARCTION, DESTRUCTIVE TUMOR, GRANULOMA, TRAUMA
MALE:
DESTRUCTIVE PITUITARY TUMOR, GRANULOMA, TRAUMA
F. Netter M.D.
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Pituitary Insufficiency (hypopituitarism)

- Failure of the pituitary to produce adequate amounts of one or more of its hormones.
- Lesions involving the pituitary, hypothalamus or parasellar diseases that distruct, displace or infiltrate.
- The nine I: 9 i.

The 9 i producing pituitary insufficiency

- Iatrogenic.
- Injury.
- Infection.
- Infarction.
- Irradiation.
- Invasion.
- Infiltration.
- Immunologic.
- Idiopathic.

1- Iatrogenic pituitary insufficiency

- Sudden cessation of steriod treatment → HPA suppression and withdrawal syndrome.
- The longer the duration > 3 weeks (> 5 days).
- The higher the dose → >7.5 mgm/d
- The timing of steriod administration being. worst at midnight (the last thing before sleep).
- T4 alone to patient with pituitary insufficiency → adrenal crisis.
- High doses of synthetic progestogens (medroxy progesterone acetate).
- After successful surgical removal of ACTH secreting pituitary adenoma.

Rule for administration of steriods

- No other option.
- How to start ? What is the dosage, the duration, when & how to stop ?.
- Non systemic routes are preferable (ointments, inhalers, rectal).

2- Pituitary injury

- Pituitary injury, head trauma specially with fracture base.
- Surgical trauma after hypophysectomy.

4- Irradiation

ostoperative radiation therapy is beneficial (old erature).

ow only radiation for large tumour remnants.

TEROTACTIC rather than conventional diotherapy.

5- Invasion

umours, meningiomas, crainopharyngioma,
ordoma, glioma and parasellar aneurysms.

6- Infiltration

arcoidosis.
stocytosis.
mphocytic hypophysitis.
aemochromatosis.

3- Pituitary infections

vogenic: acute abscess, perisellar arachnoiditis
th sinus infections specially after
ansphenoidal surgery. MR imaging, more in
munocompromized patient.

ommon viral infections (influenza, measles,
erpes) rare.

B and syphilis.

7- Immunologic

ymphocytic hypophysitis:

- An autoimmune inflammatory disorder.
- That occurs during pregnancy, or in the first six weeks postpartum, rarely after menopause.
- Lymphocytic and plasma cell infiltrates.
- Circulating anti-pituitary antibodies.

8- Idiopathic

9- Pituitary infarction

ostpartum pituitary infarction (Sheehan's yndrome).

- **During pregnancy, pituitary gland, normally enlarge in response to estrogen stimulation becoming hypervascular, vulnerable to changes in BP & more prone to hemorrhage & infarction.**
- **Now relatively rare.**
- **Hypovolemic shock ➔ adenohypophyseal vessels vasospasm and pituitary necrosis of >75% of the gland.**

Diagnosis of Sheehan’s Syndrome

inical: ***severe PP hemorrhage, shock, potension following labour:***

- **Severe hypos.**
- **Severe hyponatremia .**
- **Diminished Na/K ratio.**
- **Hormonal verification.**
- **Diminished cortisol.**
- **Diminished TSH nocturnal surge.**
- **Diminished TSH pulse frequency & pulse amplitude.**

tuitary Apoplexy:

- Acute hemorrhage into a pituitary tumor
- Neurosurgical emergency
- Panhypopituitarism

ry Apoplexy

Headache

Hypotension

Lethargy

Coma

Pituitary apoplexy

tuitary apoplexy means loss of consciousness
llowed by paralysis.

ontaneous hemorrhage into a pituitary adenoma
after fracture base or due to HTN and/or DM,
ckle-cell anemia or acute hypovolemic shock.

thin 1-2 days:

- Very severe headache and collapse
- Neck stiffness
- Progressive cranial nerve damage 3,4,5,6,7 (bilateral visual distrubances, ptosis, ophthalmoplegia).

Pituitary apoplexy

bacute forms of pituitary apoplexy occurring in
M (Houssay phenomenon) → cure of hyperglycemia
d frequent episodes of hypos.

eatment of pituitary apoplexy:

- **Cortisol 100 mgm every 6 hours.**
- **Glucose saline.**
- **Urgent trans-sphenoidal decompression.**

ry Apoplexy

Neurosurgery

IV steroids

IV hydration

ry Apoplexy

Neurosurgery

IV Solucortef 100mg IV q6h

IV hydration

Watch for diabetes insipidus

Pituitary

ypopituitarism:

- GH lost first
- LH, FSH next
- TSH
- ACTH
- Prolactin

he pattern (the march) of pituitary failure

- rowth hormone ➔
- SH, LH ➔
- SH ➔
- CTH)

endocrine emergencies ?

Common.

Curable.

agnose the common and treat the curable.

Take home message

ndocrine emergencies other than those ssociated with diabetes DO exist and must be onsidered in our differential diagnoses

yxedema coma is a rare condition haracterized by respiratory failure, ypothermia, and fluid and electrolyte sturbances. Treatment consists of airway and entilatory support, initiation of levothyroxine erapy, and treatment of the precipitating use.

Take home message

hyroid storm is an acute exacerbation of all of
e symptoms of thyrotoxicosis which can be
e-threatening. Treatment consists of ABC
pport, blockade of excessive catecholamine
tivity with propranolol, inhibition of the
nthesis of new thyroid hormone with PTU,
ockade of peripheral conversion of T4 to T3
th hydrocortisone, and treatment of the
ecipitating cause.

Take home message

Hypoparathyroidism is most commonly iatrogenic following neck surgery. It may result in hypocalcemia which, if severe, should be treated with IV Ca.

Take home message

rimary hyperparathyroidism is the most ommon cause of symptomatic ypercalcemia. Severe cases of ypercalcemia should be treated with a ombination of vigorous rehydration, loop uretics, and medications such as amidronate and calcitonin to inhibit steoclastic bone resorption.

Take home message

ndocrine emergencies are NOT rare and are
e threatening.

ompt recognition and treatment makes a
fference to outcome.

ook for the precipitating factor and remember
evention.

Take home message

- tuitary failure as adult endocrinopathies are e not uncommon.
- inical suspicion is the corner stone for their ediction.
- ressful conditions usually trigger the ubacute or the chronic silent ndocrinopathies.
- evious head trauma, irradiation, steroid lministration can precipitate secondary drenal crisis.

ansoura Center of Endocrinology & Diabetes

(Medico Surgical & Research Center)

uture hope.

art now.

ould I live to see this dream.

Thank You