

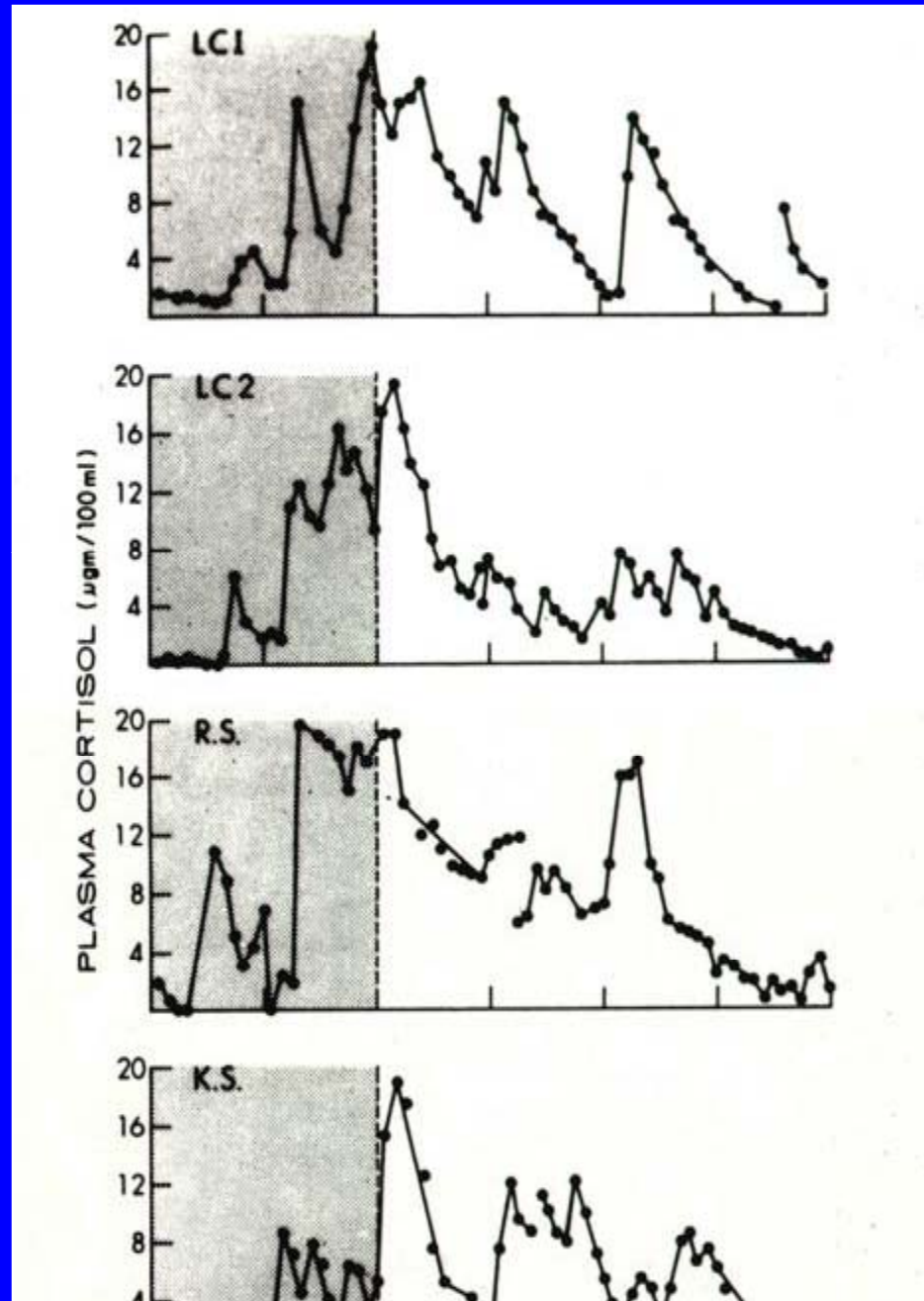
# Physiology of the Adrenals

Thomas P. Jacobs MD

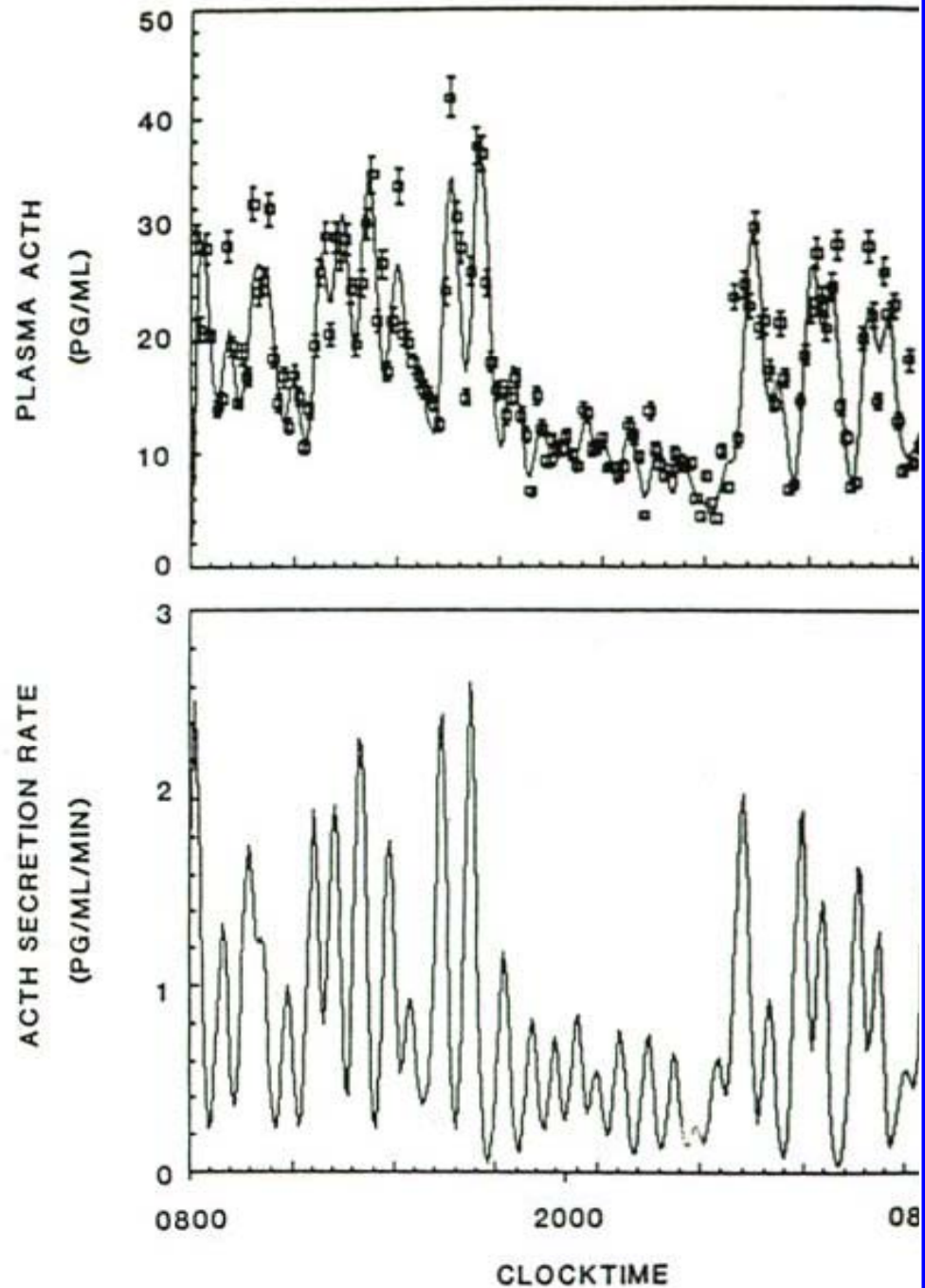
# Regulation of ACTH

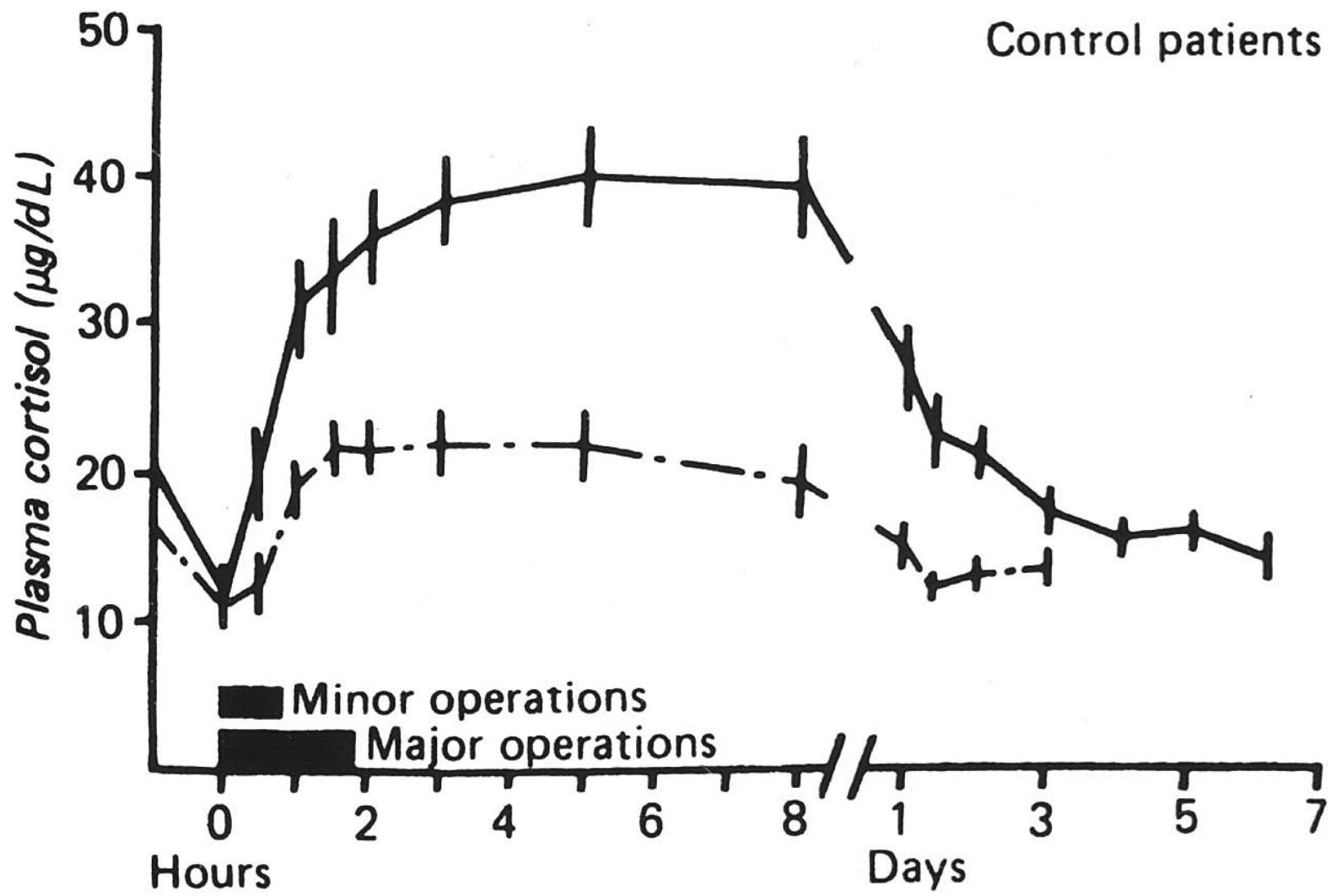
- 1. DIURNAL PERIODICITY
- 2. NEGATIVE FEEDBACK
- 3. STRESS

# Diurnal Cortisol In Four Subjects



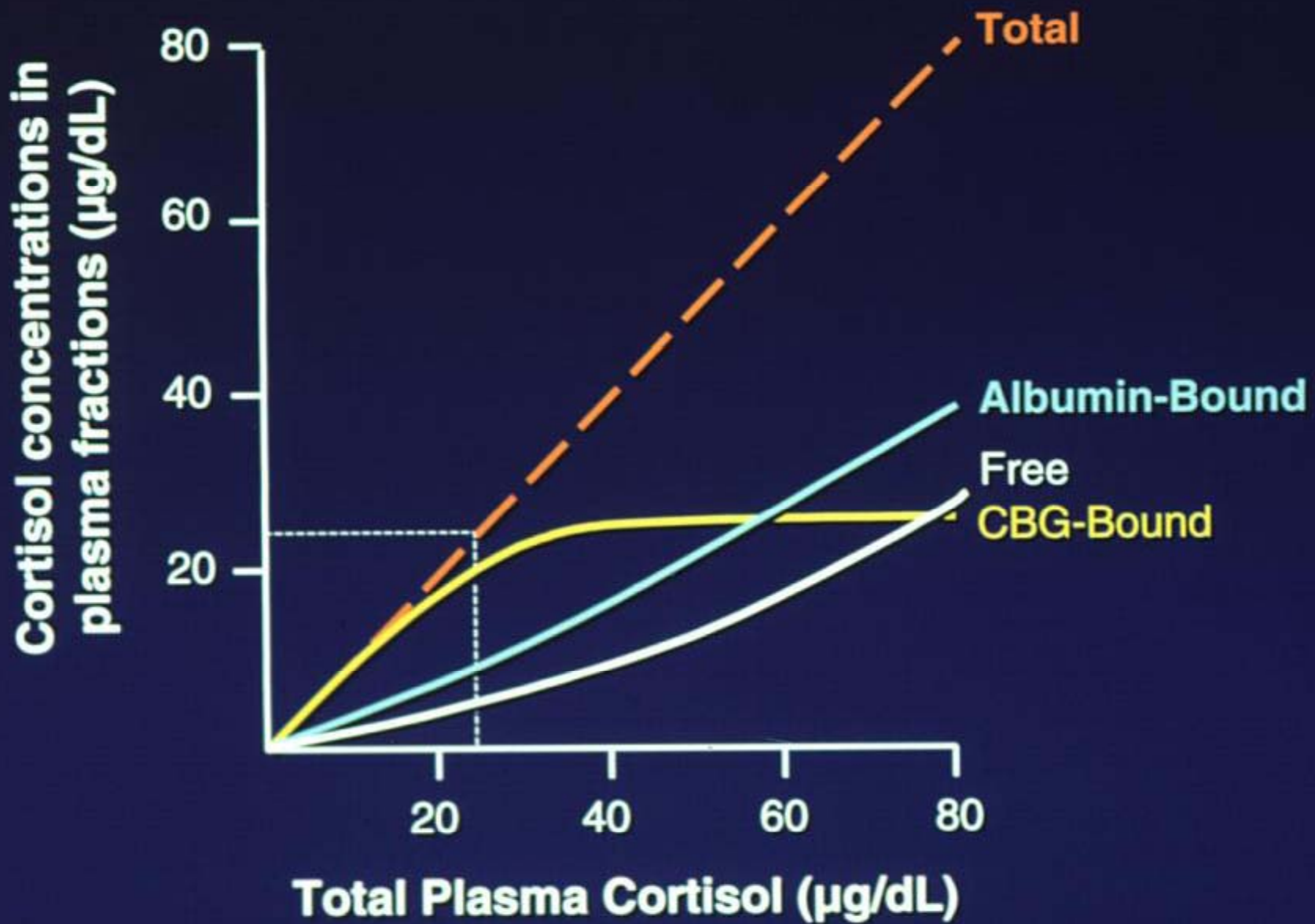
# ACTH Pulsatility Over 24 Hours





# ASSESSING THE HPA AXIS

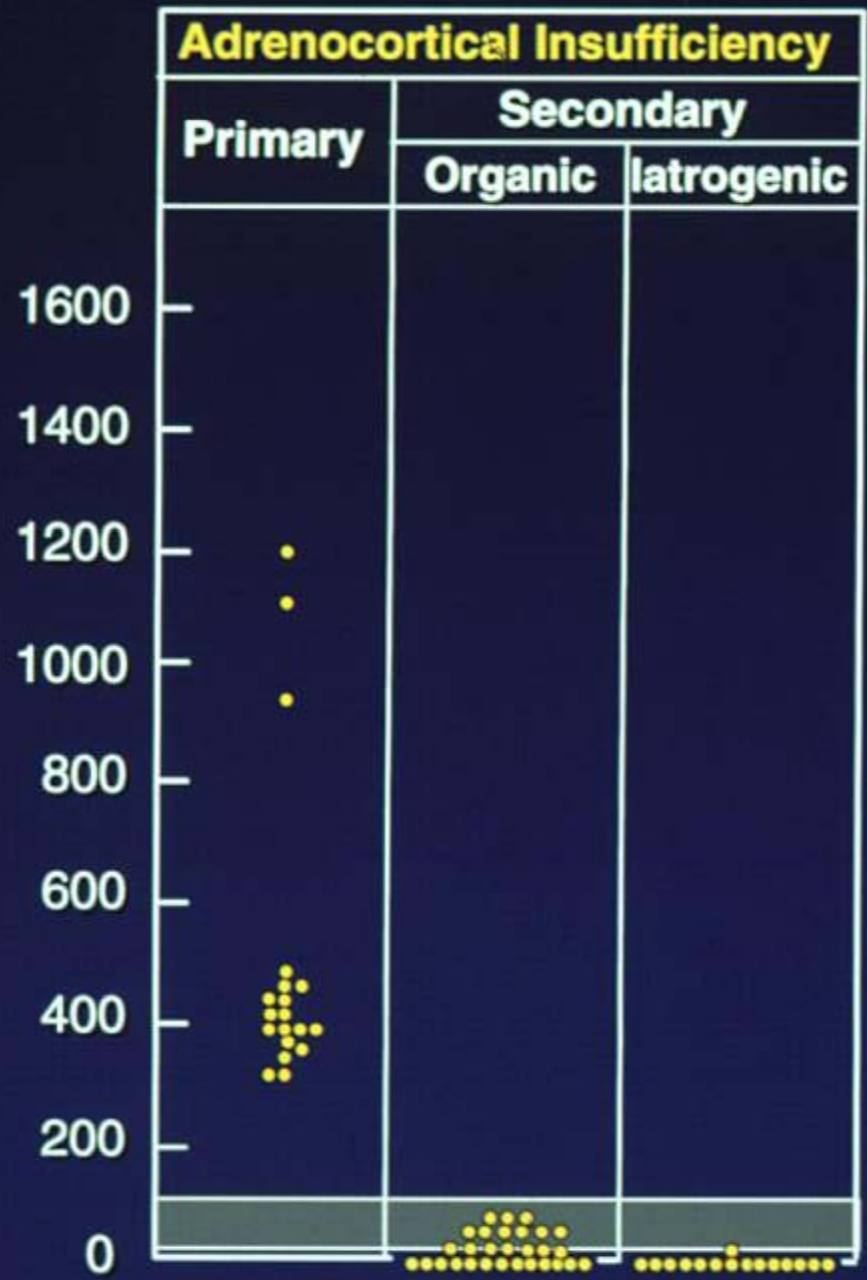
- CRH
- ACTH
- Androgens: DHEA, DHEA-S, androstenedione
- Cortisol: Serum levels fluctuate
  - Transcortin, albumin binding
  - 24 hour urine free cortisol
  - Salivary cortisol



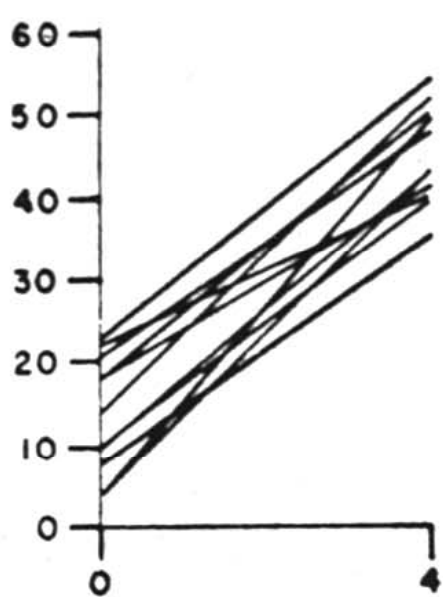
# HYPOADRENALISM



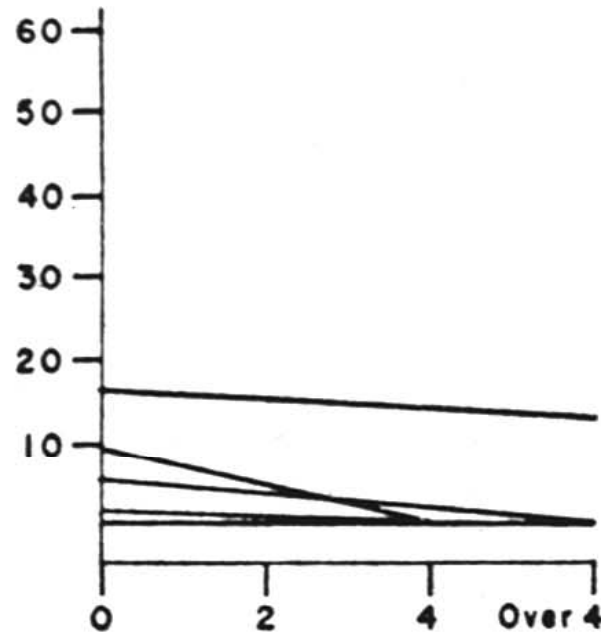
**Plasma ACTH  
(ng/l)**



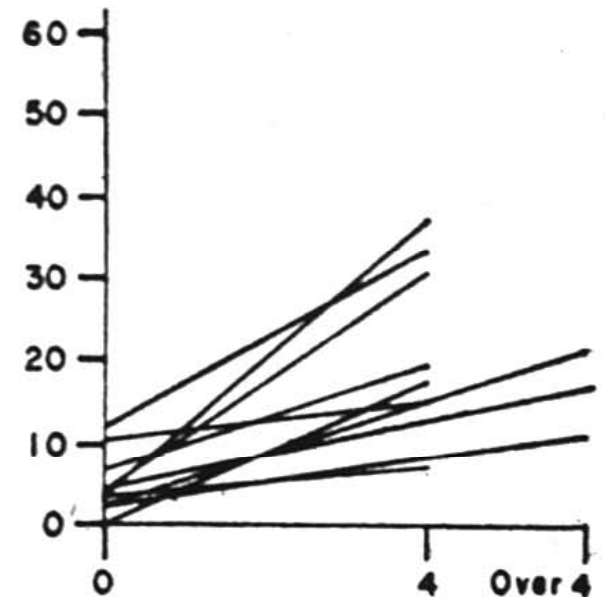
# ACTH (Cortrosyn) Stimulation Test



NORMAL SUBJECTS



ADDISON'S DISEASE

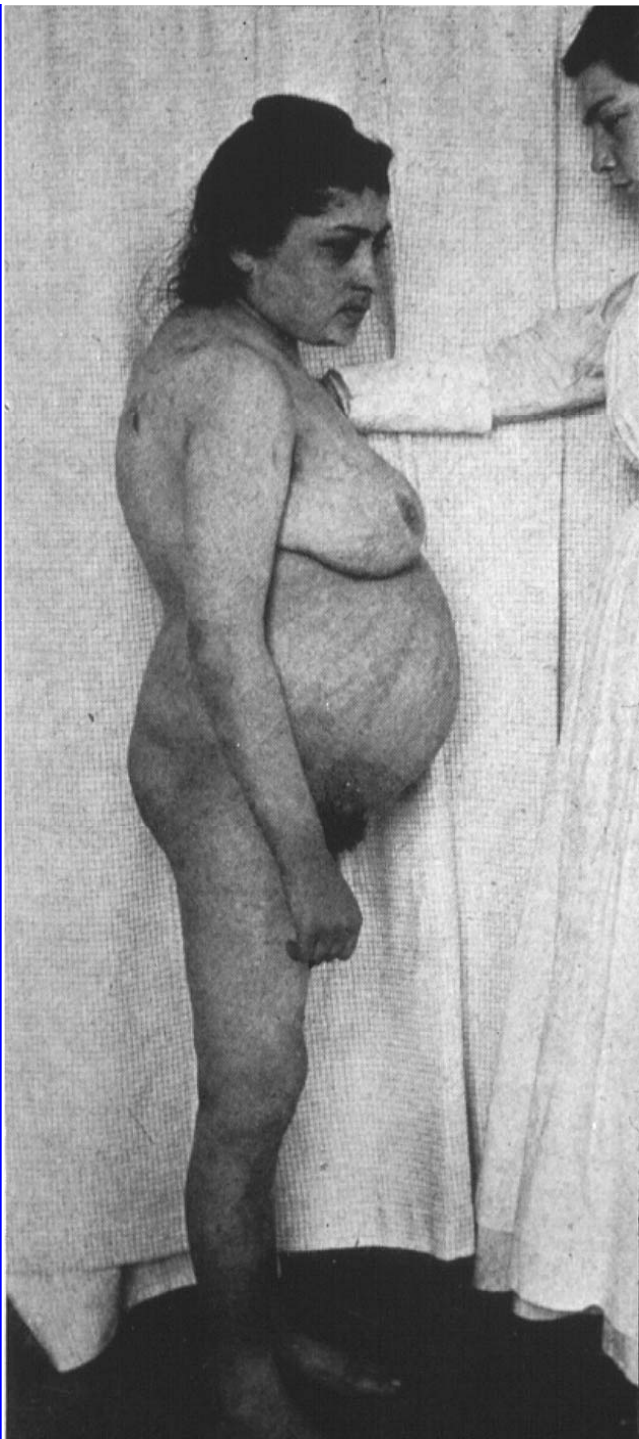


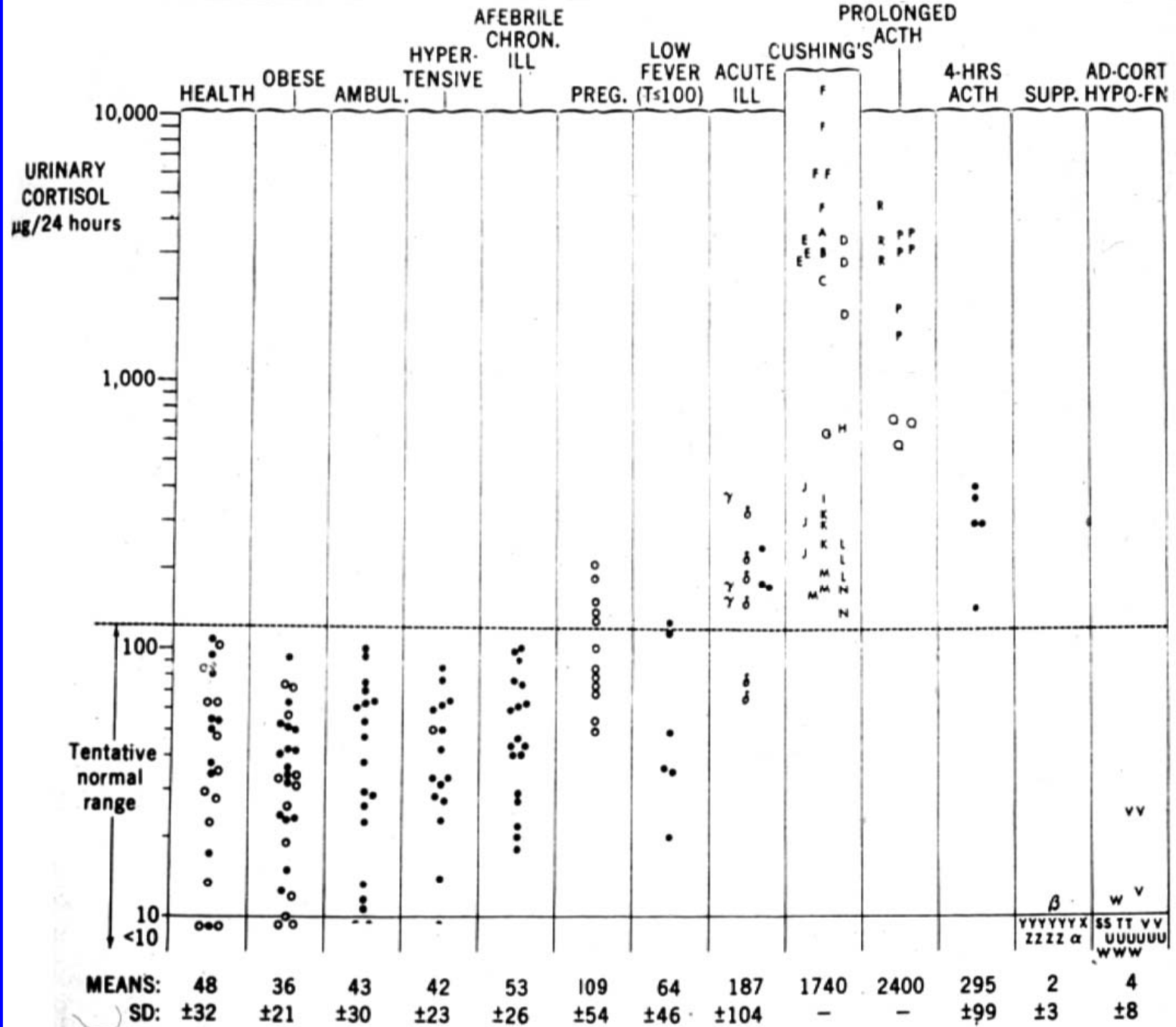
HYPOPITUITARISM

# Diagnosis of Central Hypoadrenalism

- 8-9 AM cortisol, ACTH
- Cortrosyn (ACTH) stimulation test
- Response to physiologic dose of glucocorticoids
- Insulin tolerance (hypoglycemia) test

# CUSHING'S SYNDROME

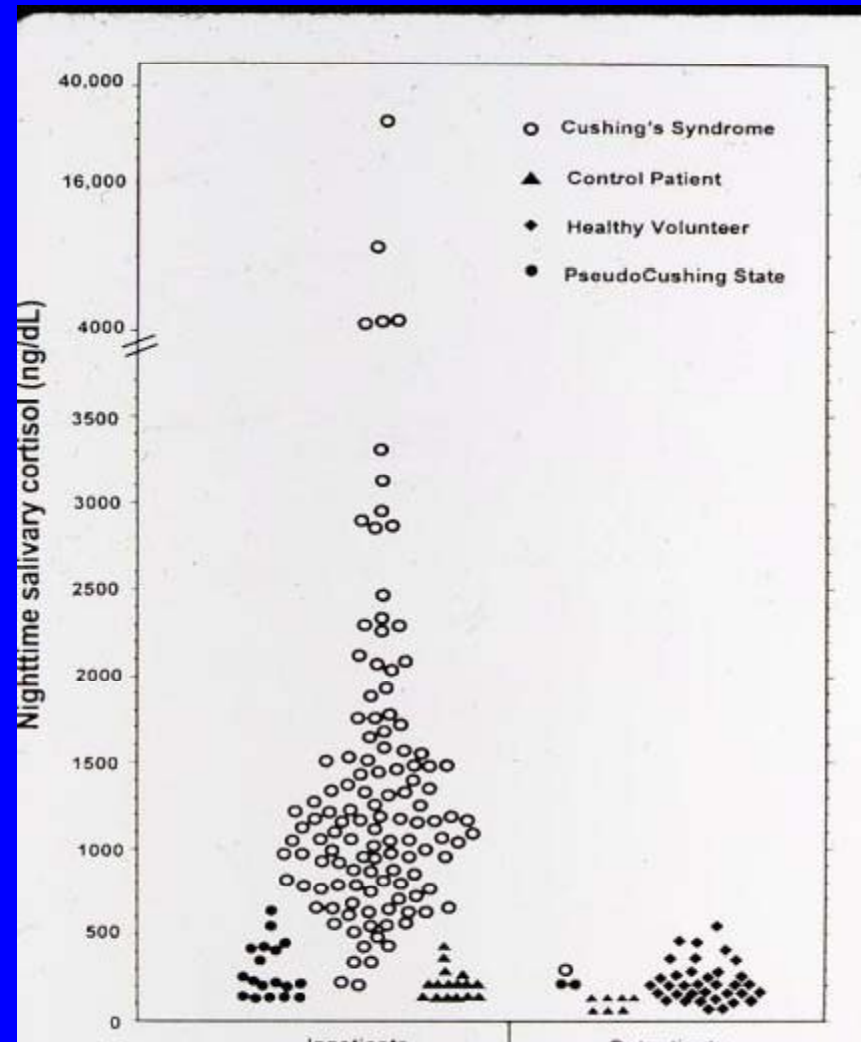




# 2mg Dexamethasone Suppression Test

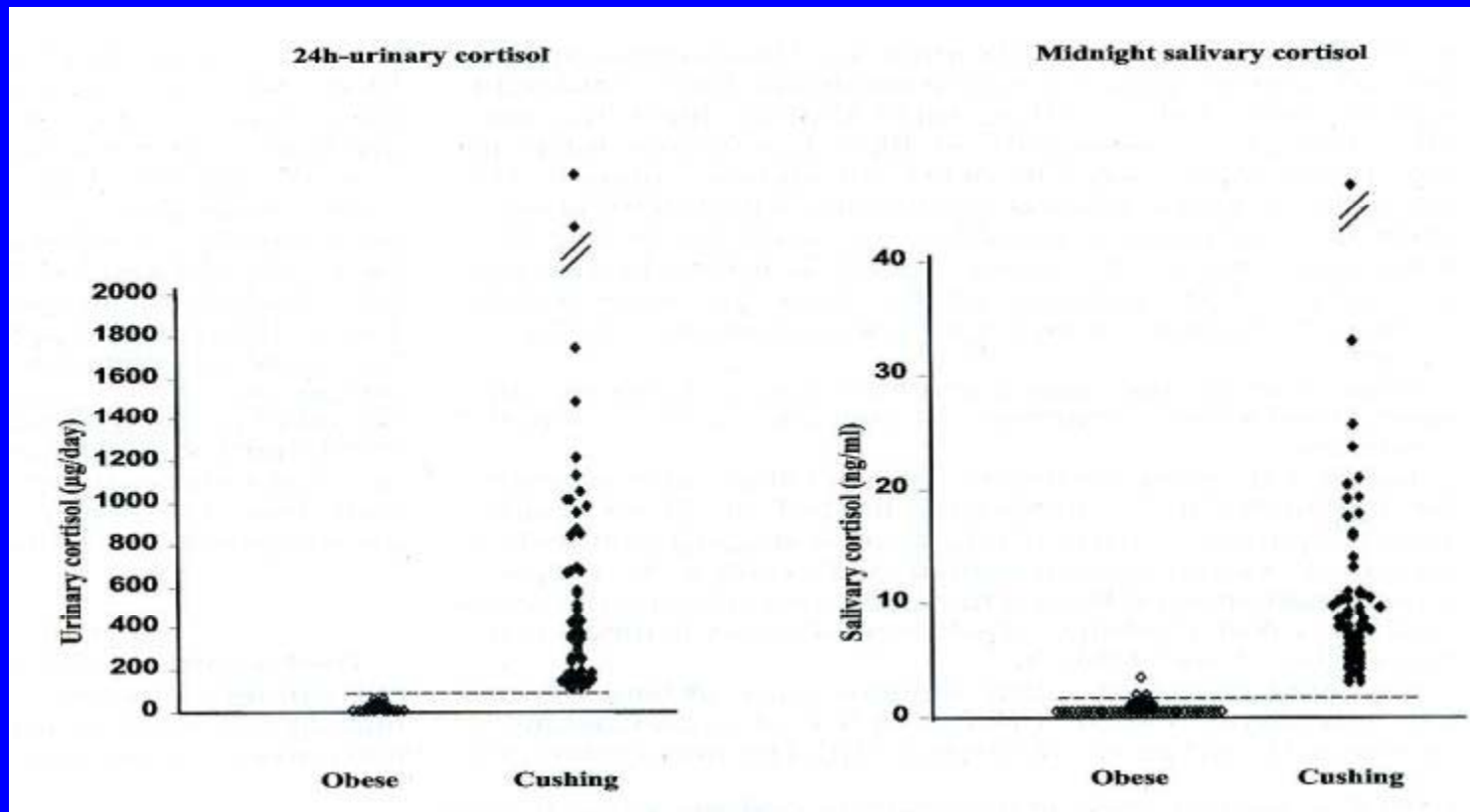
1. Collect 24 hour urine cortisol
2. Start dexamethasone 0.5mg q6h for two days
3. On day 2, collect 24 hour cortisol
4. Normal response  $<20\text{mcg}/24\text{hr}$

# Salivary Cortisol in Cushing's D





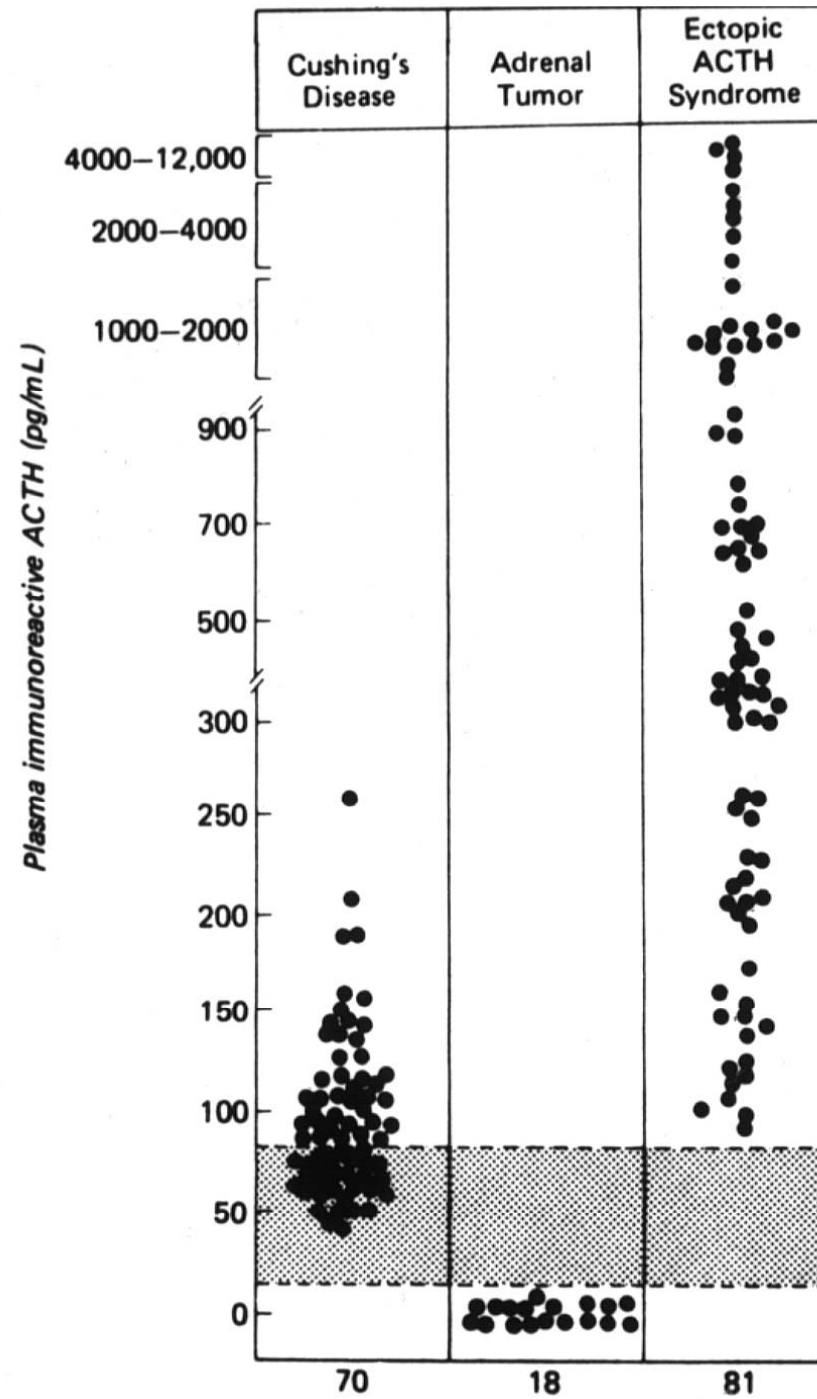
# Cushing's disease: Urinary vs Salivary Cortisol



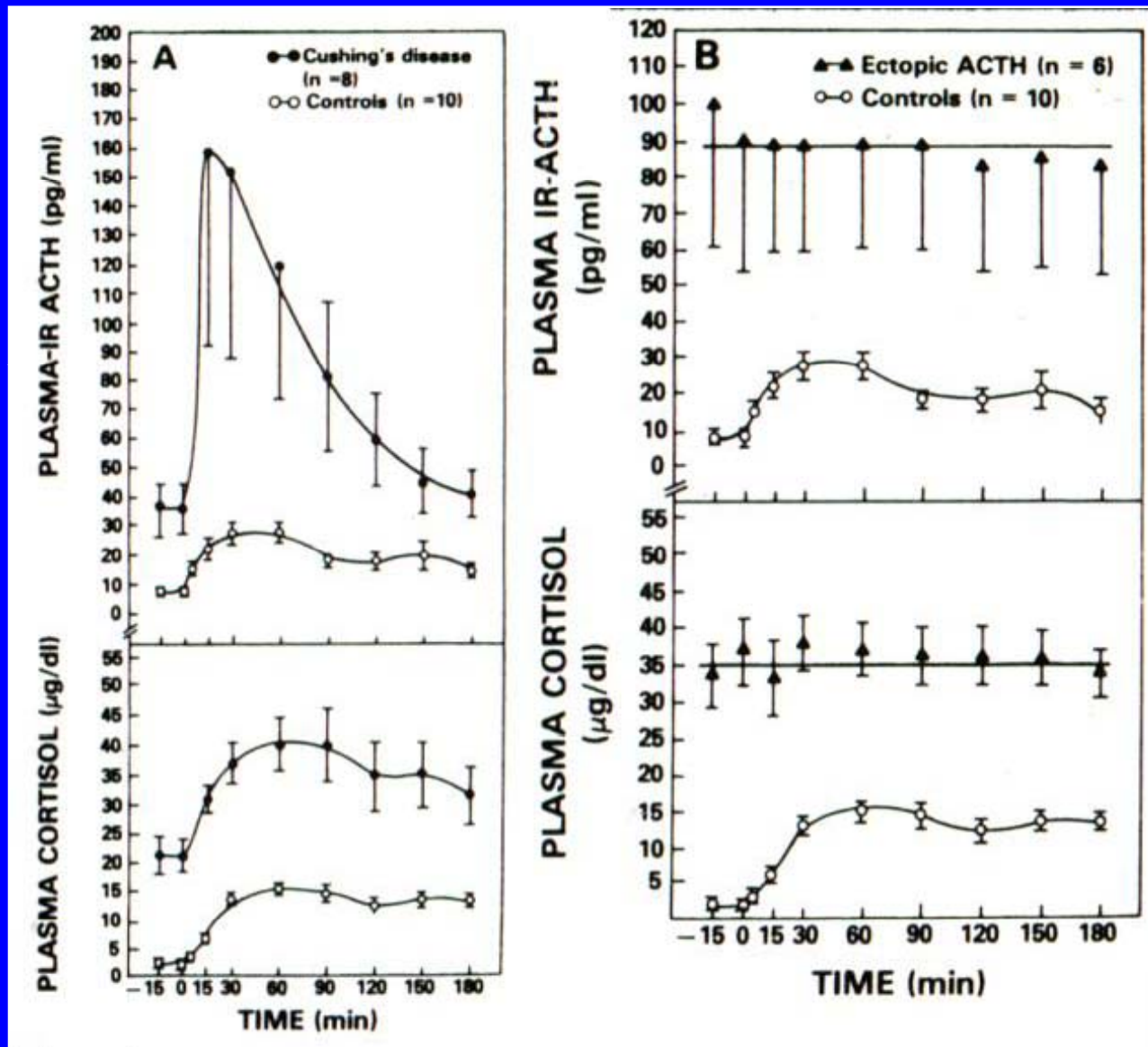
# Differential Diagnosis of Cushing's Syndrome

**STEP 1: Measure ACTH**

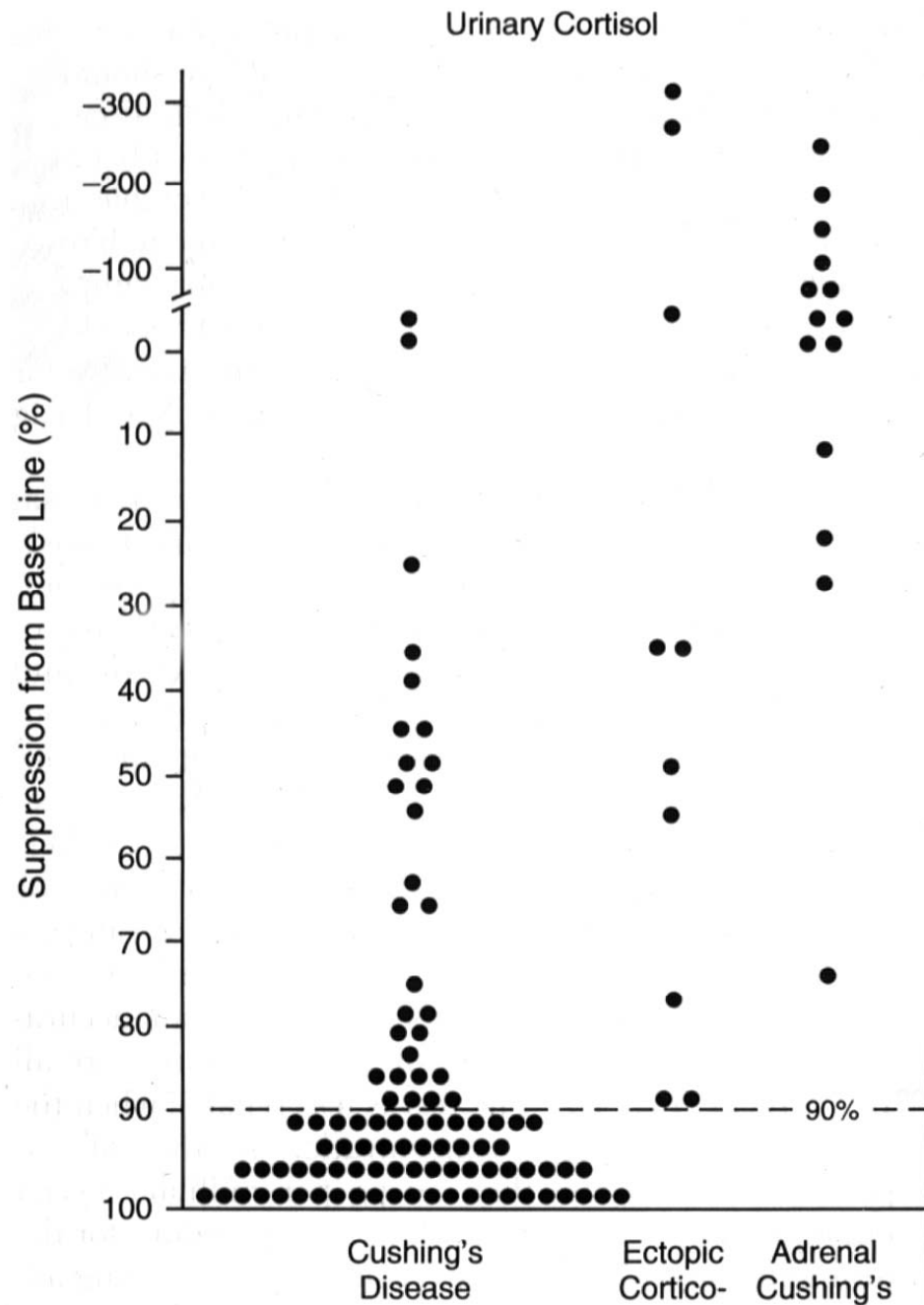
# ACTH in Cushing's

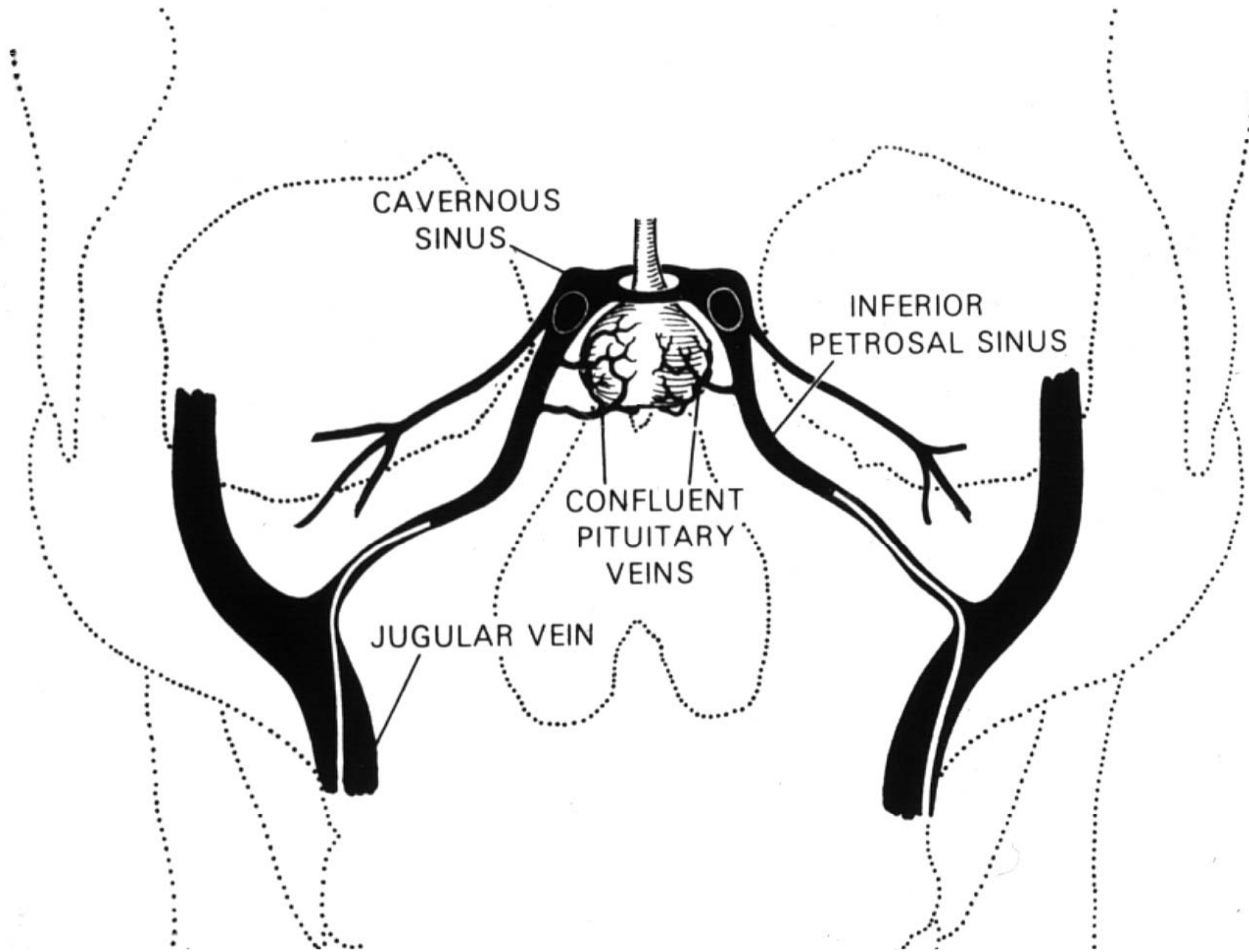


# CRH Test in Cushing's Syn.



# 8mg Dex Suppression Test





# Unusual Causes of Cushing's S.

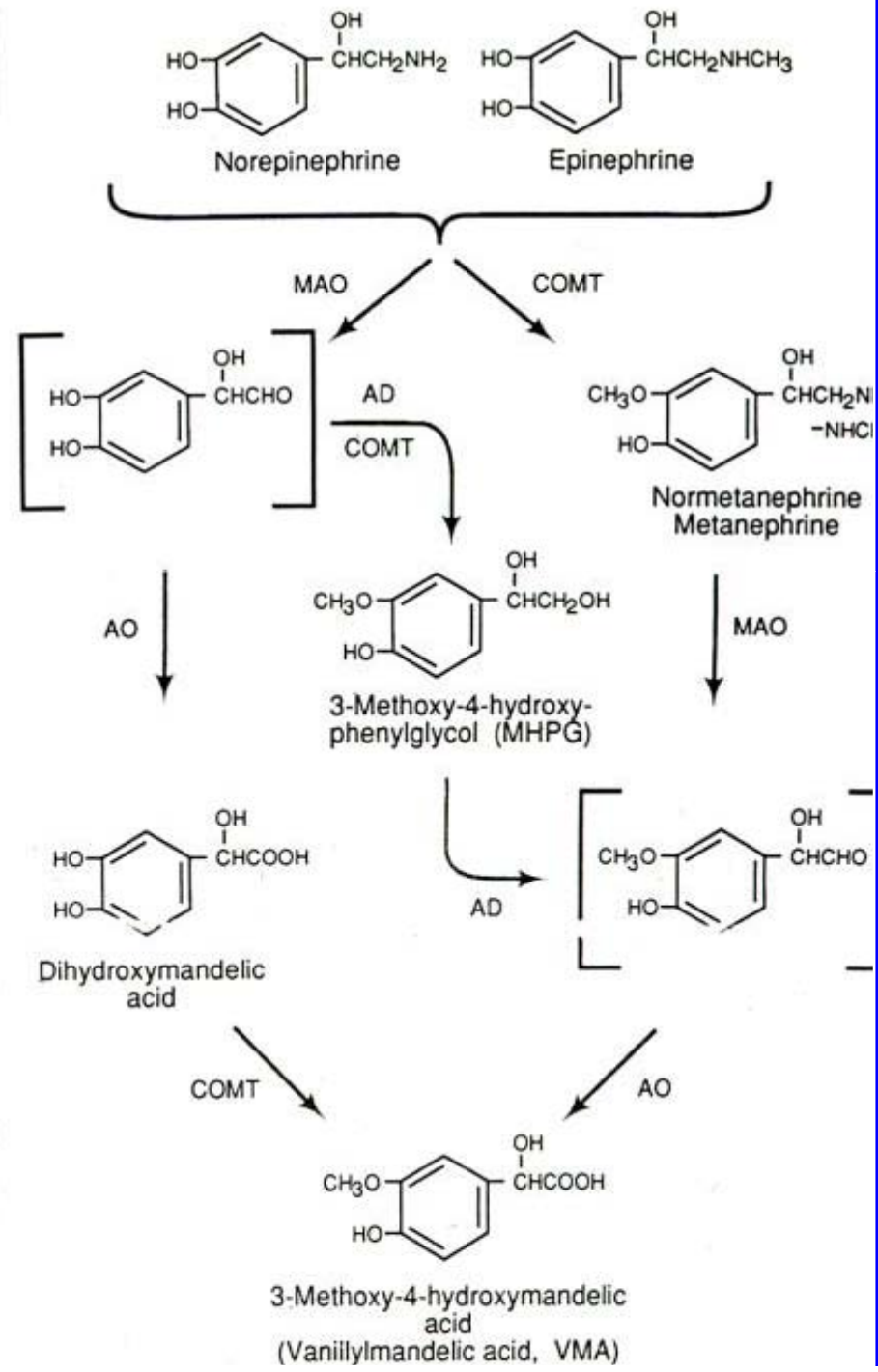
- Ectopic CRH secretion by tumor
- Alcoholic pseudo-Cushing's
- Adrenal adenomas with ectopic receptors to LH, vasopressin, GIP, etc
- Bilateral adrenal nodular hyperplasia
- Munchausen's syndrome
- Excessive topical exposure (skin, lungs, etc)

# DISORDERS OF CHROMAFFIN TISSUE

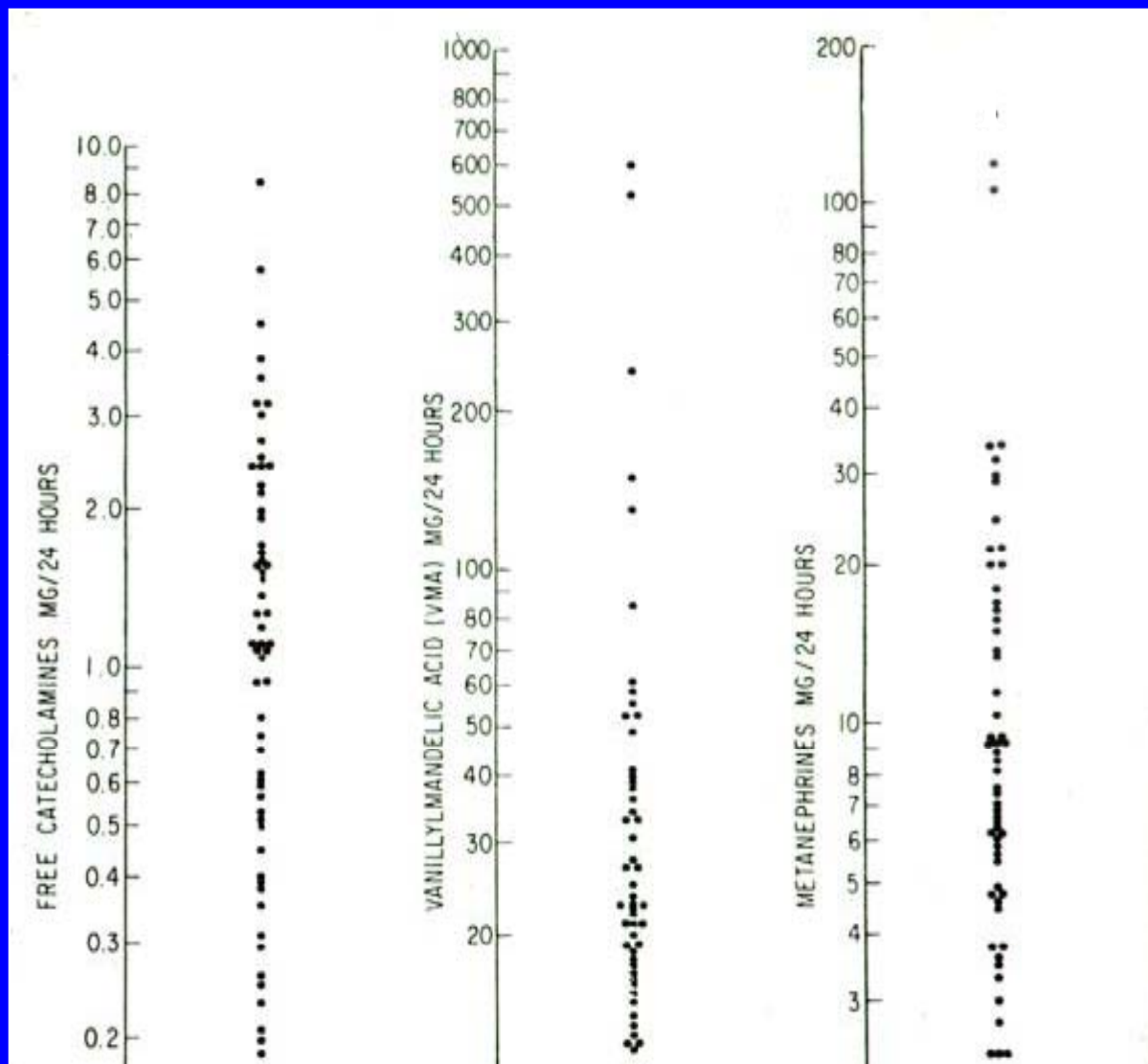


# Sympathetic Spells

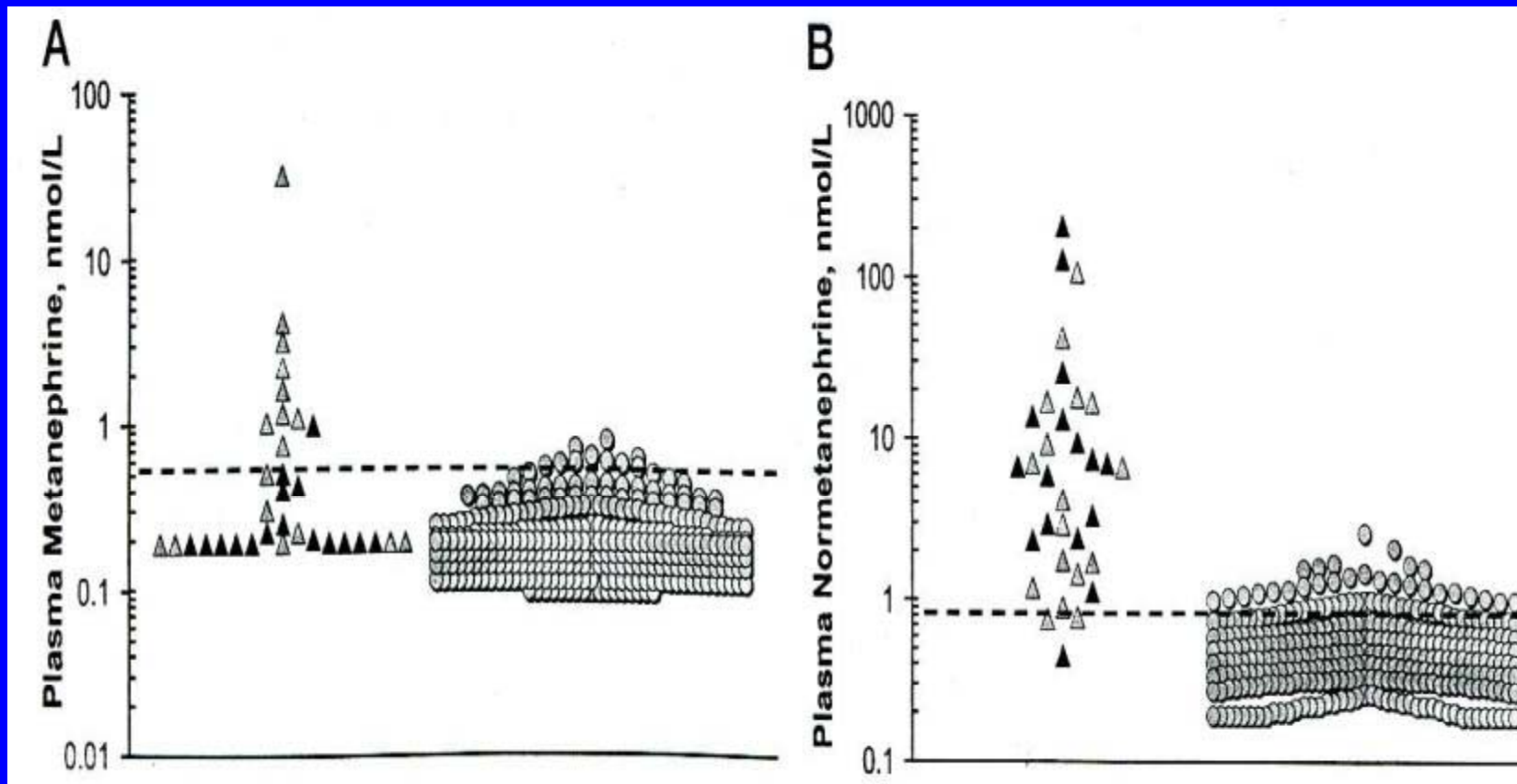
- Anxiety-panic disorder
- Tachyarrhythmias
- Hyperbeta adrenergic syndrome
- Crack cocaine
- Beta-blocker, clonidine withdrawal
- Temporal Lobe (autonomic) seizure
- MAOI's, amines, sympathomimetics



# CA VMA MN



# Pheochromocytoma: Plasma metanephrines vs normetanephrines



# Localization of Pheochromocytomas

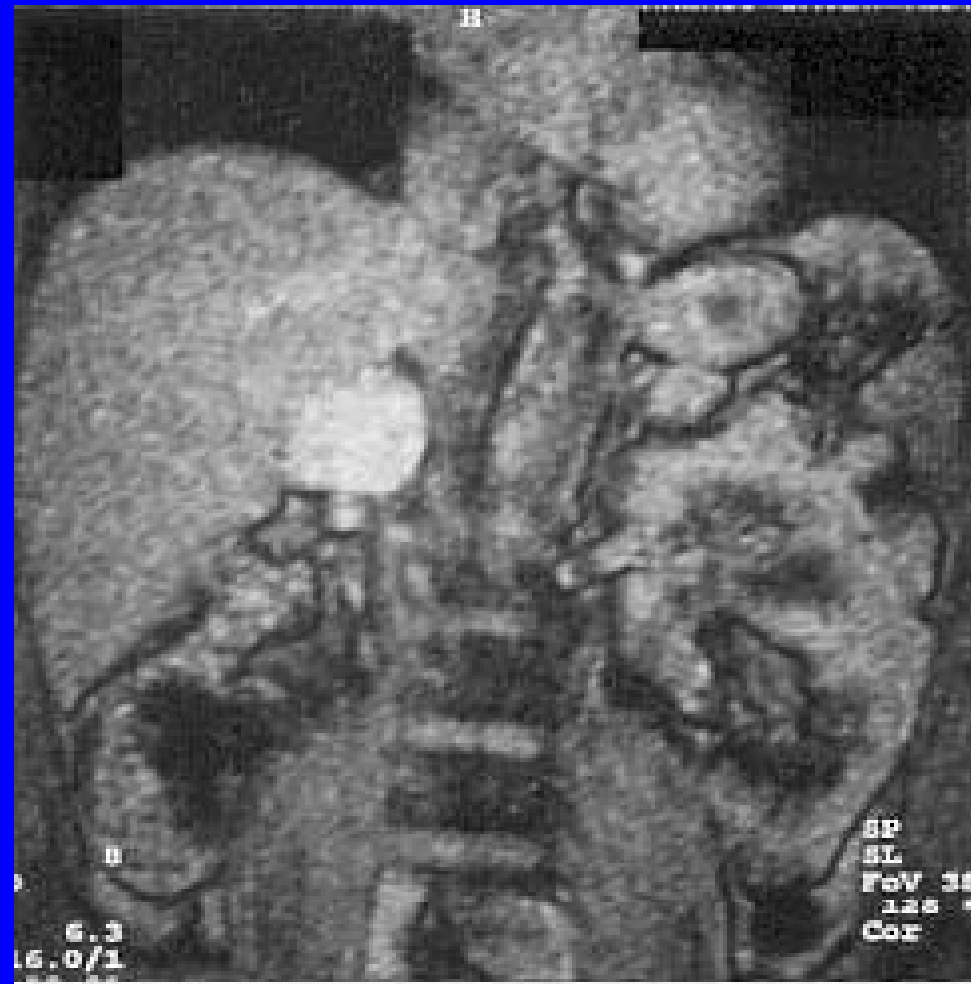
CT scan

MRI scanning

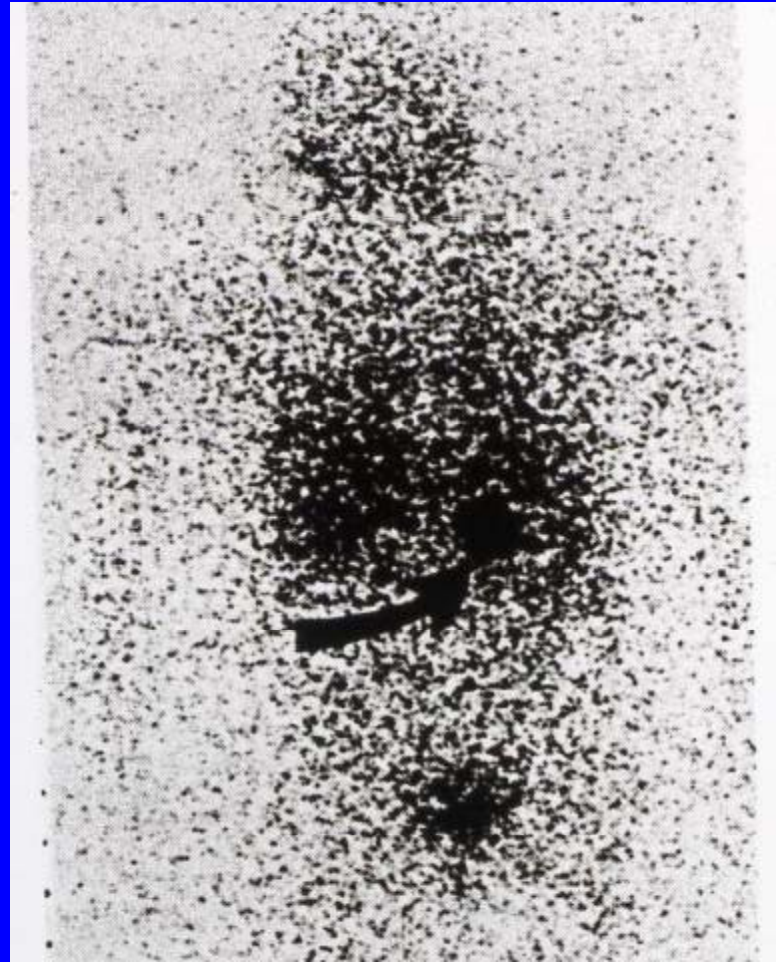
Octreotide Scanning

MIBG Scanning

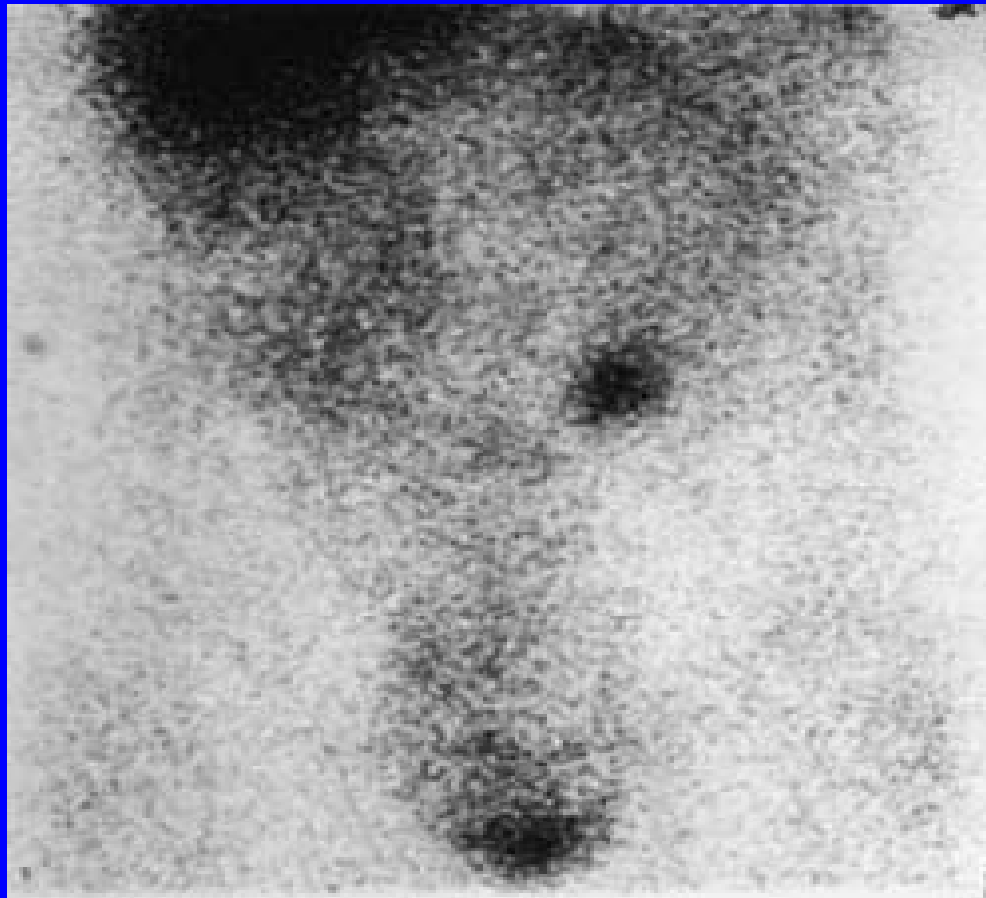
# MRI of Pheochromocytoma



# MIBG Scan in Pheochromocytoma

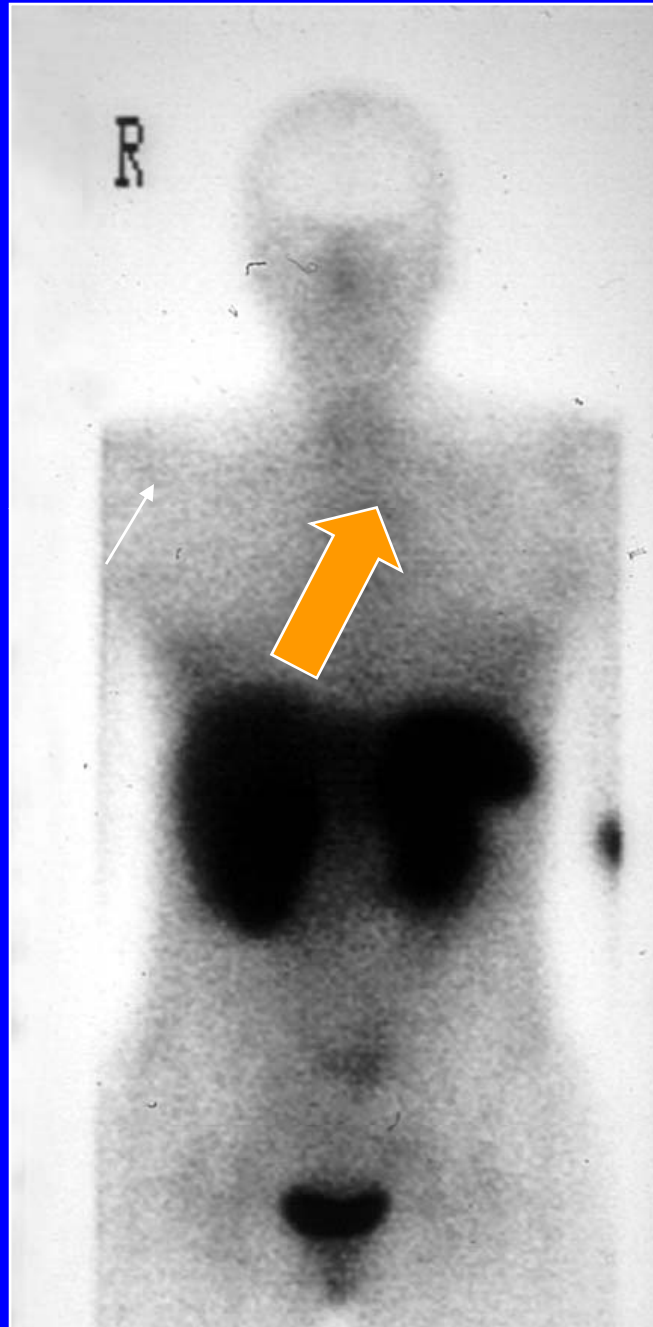


# Octreotide Scan in Pheochromocytoma

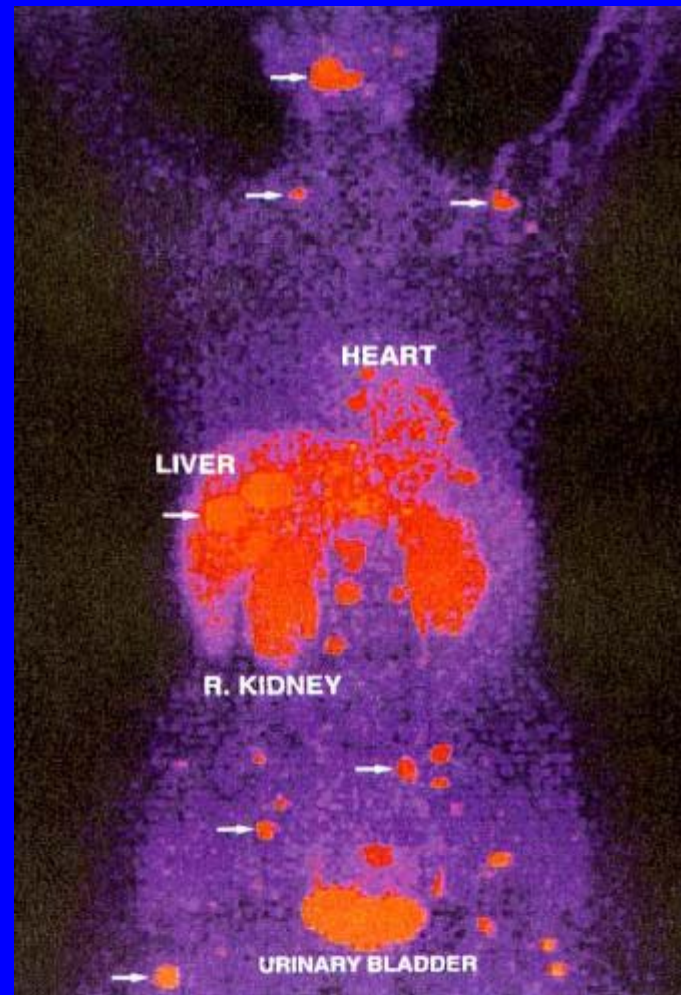




Patient AK  
Octreotide  
Scan



# FDG-PET Scan of Metastatic Pheochromocytoma



That's all about the adrenals!

