

# ANALYSIS OF SEX HORMONES

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# Sex Hormones Analytes

- Gonadotropins
- Androgens
- Estrans
- Progestins
- Others

# Methodology

- Bioassays
- Immunoassays
- Chromatography
- Mass Spectrometry

# IMMUNOASSAYS

## Advantages

- Are Fast
- Are Easy to Perform
- Has Low Cost

## Disadvantages

- Analyte Heterogeneity
- Antigenic Epitopes
- Antibody Affinity
- Detection Limits
- Binding to Proteins
- Calibration

# Immunoassays

- RIA
- EIA
- FIA
- CL or ECL

# Gonadotropins (FSH, LH, hCG)

- Are Glycoproteins with two subunit
  - 1)  $\alpha$  subunit is identical
  - 2)  $\beta$  subunit is different
- Methods problems include
  - 1) Cross-reactivity
  - 2) Detection limit
  - 3) Calibration

# Gonadotropins (FSH, LH)

- FSH and LH has periodical, diurnal, and pulsatile secretion
- Serum is the preferred specimen
- Are stable for 8 days at RT, 2 weeks at 4°C, and up to one year at -20°C
- Measurement in urine

# ANDROGENS

- Total testosterone
- Free testosterone
- Dihydrtestosterone
- DHEA and DHEAS
- Androstendione
- 17-KS



# Total Testosterone

- Measuring all three forms
- DHT Has Interference
- First morning sample is preferred
- Serum or heparinized plasma can be used
- Specimen is stable for 3-7 days refrigerated and up to 1 year at -20°C

# Total Testosterone

- No steroid, thyroid, ACTH, estradiol or gonadotropin medications should be given for 48 hours before sample collection
- Interpretation may need SHBG Concentration

# Free Testosterone

- Is better for assessing androgen status, specially when total testosterone results are abnormal or there is variation in SHBG concentration

# Dihydrotestosterone

- Is a marker of peripheral disorders of androgen action and formation
- May increase in hirsutism
- May decrease in testosterone function impairment

# DHEA and DHEA-S

- In female exclusively and in male mainly Is produced by adrenals
- Is useful in assessing increased androgen production by adrenals (due to tumor or hyperplasia)
- DHEA show a circadian rhythm which is a reflection of ACTH secretion. It also varies during the menstural cycle

# DHEA and DHEA-S

- Because of longer half-life, DHEA-S show no circadian rhythm
- Serum is Preferred
- Early morning, before 1030 is preferred for DHEA
- No steroid, ACTH, estradiol or gonadotropin medications should be given for 48 hours before sample collection

# 17-KETO STEROIDS (17-KS)

- Mainly Includes DHEA, Androsterone, Epiandrosterone, Ethiocholanolone
- In men, approximately one third originate from testes, and remaining from adrenals
- In women, are derived almost exclusively from adrenals
- Increased 17-KS seen in testicular tumors and adrenal hyperplasia or carcinoma

# ESTERANS

- Estradiol
- Estron
- Estriol
- Unconjugated estriol



# PROGESTINS

- Progesterone
- 17-OH Progesterone
- Pregnanediol
- Pregnantriol

