ISHITA KANODIA

Organ Function Tests

Abnormal Constituents of Urine:

Glucosuria: – diabetes mellitus
– renal glycosuria

Benedict's Test: To 5ml of Benedict's reagent, add 8 drops of urine & boil for 2 minutes
(semi-quantitative test)

Colour	Blue	Green	Yellow	Orange	Brick Red
glucose (gm%)	Nil –	0.5 +	1 ++	1.5 +++	⩾ 2 ++++

Proteinuria (albuminuria): – Kidney diseases (nephrotic syndreme)
↳ Heat & Acetic acid test / Heat coagulation Test

Ketone Bodies – Ketoacidosis (Diabetes mellitus / Stagvation)
↳ Rothera's test

Bile Salts – hepatic ⩾ obstructive jaundice
↳ Hay's test

Bile pigments – hepatic ⩾ obstructive jaundice
↳ Fouchet's Test

Blood – Benzidine test
↳ glomerulonephritis

Urinary Urobilinogen → Ehlirch's test
Serum bilirubin → van den Bergh reaction

Liver Function Tests:

ISHITA KANODIA

Based on Excretory/Secretory Functions

- Serum bilirubin
- Urinary bilirubin
- Urinary Urobilinogen
- Urinary Salts

Based on Synthetic Functions

- Serum proteins
- Prothrombin time (PT)

Based on metabolic functions

- Galactose tolerance test (GTT)

Based on detoxifying function

- Hippuric acid test

Based on Measurement of Serum Enzymes

- Enzymes indicating hepatic jaundice
- Enzymes indicating obstructive jaundice

Hyperbilirubinemia > 1 mg/dL } bilirubin
Jaundice manifests > 2 mg/dL }

	Serum			Urine		
	Total BLB	Uncon. BLB	Con. BLB	UBG	Bilirubin	Bile Salt
Normal	0.2 - 1 mg/dL	0.2 - 0.8 mg/dL	0.0 - 0.2 mg/dL	upto 4 mg/day	–	–
Prehepatic	↑	↑	Normal	↑	–	–
Hepatic	↑	↑	↑	Normal	↑	↑
Post-hepatic	↑	Normal	↑	↓	↑ (+++)	↑ (+++)

Total Serum Proteins: 6-8 g/dl
Serum Albumin: 3.5-5 g/dl
} ↓ during liver diseases

ISHITA KANODIA

Prothrombin time ⇒ prolonged in liver diseases (vitamin K deficiency also)

GTT: galactose is exclusively metabolised in liver
→ half life of galactose = 10 minutes
→ 30g galactose is given
→ capillary blood is tested at 10min intervals for 1 hour
} half-life of galactose increases during liver diseases

Hippuric Acid Test:

In liver, Benzoic acid —detoxified→ Hippuric acid → excreted in urine
↓ decreased during liver diseases

Enzymes Indicating Hepatic Jaundice:

ALT (SGPT): upto 35 U/L
AST (SGOT): upto 40 U/L
} increase in liver damage

Enzymes Indicating Obstructive Jaundice:

ALP: 3-13 KA units/dL
GGT: 7-50 U/L
5'-nucleotidase: 2-17 U/L
} increase in obstructive jaundice

Renal FT:

- glomerular function
- tubular function

Glomerular FT:

Clearance of a Substance: volume of blood / plasma completely cleared off that substance per minute.

$$C = \frac{U \times V}{P}$$

- U = conc. of substance in urine
- V = volume (mL) of urine excreted per minute
- P = conc. of substance in plasma
- C = clearance in mL/min.

Substance	Filtration	Reabsorbed	Secretion	CV (clearance value)
• Inulin • Creatinine	✓	✗	✗	CV = GFR (120 mL/min)
• Urea	✓	✓	✗	CV < GFR (75 mL/min)
• PAH	✓	✗	✓	CV > GFR (700 ml/min)

Tubular FT:

Specific gravity: 1.012 – 1.024

↳ decreases during tubular dysfunction

Volume of Urine: 1.5 L / day

↳ increases during tubular dysfunction

Also – Increased volume, increased specific gravity: diabetes mellitus

– Increased volume, decreased specific gravity: diabetes insipidus

Cystacin 3 in blood: (Additional Test)

↳ increased during kidney diseases.

Thyroid FT:

ISHITA KANODIA

Normal Serum Values:

Free T_3 : 80 – 220 ng/dL

Free T_4 : 0.8 – 2.4 ng/dL

TSH : < 10 μU/mL

Total T_4 : 5 – 12 μg/dL

	T_3	T_4	TSH
1° hypothyroidism	↓	↓	↑
2° hypothyroidism	↓	↓	↓
1° hyper "	↑	↑	↓
2° hyper "	↑	↑	↑
T_3 thyrotoxicosis	↑	Normal	↓

Thyroid Uptake Study: Radioactive iodine uptake (RAIU) — I^{131}

Normal value: 25% uptake in 2 hours, 50% uptake in 24 hours } ↑ in hyperthyroidism, ↓ in hypo "

Thyroid Scanning: specialized imaging after 24 hours of giving I^{131}.

Detection of Thyroid Antibodies: (anti-tpo antibodies)

Graves disease: TSIg (Thyroid Stimulating Igs) are seen in circulation.

Hashimoto's disease: anti-thyroglobulin antibodies " " " ".

Adrenal FT:

ISHITA KANODIA

Adrenal cortex FT:

		9 am	10 pm
Blood level of cortisol:	Normal ⇒	5-25 µg/dL	2-5 µg/dL
Addison's disease ⇒ ↓		Cushing's Syndrome ⇒ ↑	

Diurnal variation in cortisol secretion: loss of diurnal variation ⇒ adrenal hyperfunction

Plasma ACTH: Hyperadrenalism ⇒ decreased ACTH

Hypoadrenalism ⇒ increased ACTH

Cushing's disease ⇒ increased ACTH

Dexamethasone Suppression Test: failure of suppression of early morning concentration of cortisol following administration of 1mg dexamethasone (potent synthetic glucocorticoid) at midnight ⇒ adrenal hyperfunction

Blood aldosterone:

Conn's Disease ⇒ increased aldosterone

Addison's Disease ⇒ decreased aldosterone

Synacthen Stimulation Test: Failure to increase serum cortisol following single dose of synacthen (synthetic analogue of ACTH) ⇒ adrenal hypofunction

Adrenal Medulla FT:

Measurement of Urinary VMA (vanillyl mandelic acid):

→ Normal level in urine: 6-8 mg/day

→ increased level of VMA in urine ⇒ Pheochromacytoma.