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Practical Biochemistry

with Clinical Correlation



As per the Revised Competency-based Medical Education Curriculum (NMC)

2nd Edition

Shuchi Goyal

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CHAPTER 32: INVESTIGATIONS IN CLINICAL BIOCHEMISTRY

COMPETENCY

BC14.24: Observe, interpret and discuss the baseline, diagnostic, prognostic, and discharge investigations of clinical biochemistry.

1. BASLINE INVESTIGATIONS

These are routine tests performed to establish a reference point for a patient's health. They are usually done at the onset of clinical evaluation or admission.
Purpose: To identify underlying conditions or risk factors.
Examples:
- **Complete metabolic panel (CMP):**
  - Electrolytes (sodium, potassium, chloride)
  - Kidney function markers (urea, creatinine)
  - Liver enzymes [alanine transaminase (ALT), aspartate aminotransferase (AST) and alkaline phosphatase (ALP)]
  - Glucose
- **Lipid profile:**
  - Cholesterol [total low-density lipoprotein (LDL) and high-density lipoprotein (HDL)]
  - Triglycerides
  - Complete blood count (CBC) (overlaps with hematology but aids biochemistry-related decisions).
- **Thyroid function tests:** TSH, free T4, and T3

Interpretation:
- Deviations from the normal range suggest abnormalities that warrant further investigation.
- Baseline results are compared with follow-up results to monitor disease progression or treatment efficacy.

2. DIAGNOSTIC INVESTIGATIONS

These tests aim to confirm or rule out specific diseases based on clinical suspicion.
Purpose: To identify the exact cause of a patient's symptoms.
Examples:
- **Cardiac markers:** Troponin I/T and CK-MB for acute myocardial infarction.
- **Blood glucose tests:** Fasting glucose or HbA1c for diabetes.
- **Liver function tests (LFTs):**
  - Bilirubin (total, direct, and indirect) for jaundice.
  - Albumin and prothrombin time (to assess synthetic function).
- **Kidney function tests:** eGFR, serum creatinine, and urea for renal impairment.
- **Hormonal tests:**
  - Cortisol for adrenal insufficiency.
  - Luteinizing hormone (LH), follicle-stimulating hormone (FSH) estrogen anti-Müllerian hormone (AMH) for reproductive health issues.
- **Electrolytes:** Sodium/potassium imbalance in dehydration, Addison's disease or syndrome of inappropriate antidiuretic hormone (SIADH).
- **Enzymatic tests:** Amylase and lipase for acute pancreatitis.

Interpretation:
- Test results are analyzed alongside clinical findings and imaging.
- Diagnostic algorithms often combine tests to improve sensitivity and specificity.

3. PROGNOSTIC INVESTIGATIONS

These are used to predict the disease course, assess severity, or evaluate response to treatment.
Purpose: To determine disease outcomes and guide treatment plans.

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Examples:

- **Inflammatory markers:** C-reactive protein (CRP), erythrocyte sedimentation rate (ESR), and procalcitonin (PCT) for infection or systemic inflammation.
- **Tumor markers:**
  - PSA (prostate cancer)
  - CA 125 (ovarian cancer)
  - CEA (colorectal cancer)
- **Cardiac prognostic tests**:
  - NT-proBNP for heart failure severity.
  - Lactate Indicates tissue hypoxia and severity of sepsis.
- **Renal/diabetic monitoring**: Microalbuminuria as a predictor for diabetic nephropathy progression.
- **Coagulation studies:** PT/INR and D-dimer for bleeding or clotting disorders.

Interpretation:

- Elevated markers may suggest worsening disease or poor prognosis.
- Repeated tests over time help assess the trajectory of the condition.

4. DISCHARGE INVESTIGATIONS

These are done to assess the patient's readiness for discharge and ensure stabilization or recovery from a medical condition.
Purpose: To confirm clinical stability and monitor residual disease.
Examples:

- **Renal function:** Creatinine and eGFR after acute kidney injury or dehydration treatment.
- **Liver function:** Improvement in ALT, AST, bilirubin after hepatitis or liver disease management.
- **Diabetes control:** Fasting glucose or HbA1c to ensure stable glucose levels.
- **Cardiac biomarkers:** Decline in troponin levels postcardiac event.
- **Infection resolution:** CRP and procalcitonin to confirm recovery.
- **Electrolytes:** Ensure normalization of sodium, potassium, or calcium after therapy.

Interpretation:

- Stabilization of parameters indicates readiness for discharge.
- Persistently abnormal results may necessitate further intervention or delayed discharge.

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Practical Biochemistry
with Clinical Correlation

The second edition of the *Practical Biochemistry with Clinical Correlation* is designed to align with the competency-based medical education (CBME), ensuring academic rigor and practical relevance for students.

Key Features

- *CBME-competent syllabus:* The manual adheres to the CBME guidelines, making it a valuable resource for medical undergraduates.
- *Real-world applications:* Topics such as food adulteration are introduced to enhance understanding of everyday biochemical issues.
- *Clinical correlation:* Cases related to various colorimetric exercises and urine analysis provide a deeper understanding of biochemical principles in clinical contexts.
- *Comprehensive coverage:* All essential practical topics are thoroughly addressed, offering a complete learning resource.
- *Highlights and illustrations:* Important points and diagrams are emphasized in bold for easier comprehension and retention.
- *Advanced biochemistry:* Selected topics in advanced biochemistry are included to give students a glimpse into emerging fields.
- *Practical tools:* Worksheets and graphs are incorporated to aid hands-on practice and practical workup.

This manual is an indispensable tool for medical students, offering a blend of theoretical knowledge and practical insights critical for their academic and professional growth.

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