Aim: Estimation of serum biochemical parameters using semi-autoanalyzer

References

1. Burtis, C. A., & Bruns, D. E. (2015). *Tietz Fundamentals of Clinical Chemistry and Molecular Diagnostics*. Elsevier.

2. Gowenlock, A. H. (1988). *Practical Clinical Biochemistry*. Heinemann Medical Books.

3. Kaplan, L. A., & Pesce, A. J. (1996). *Clinical Chemistry: Theory, Analysis, and Correlation*. Mosby.

1. Objective

To estimate various serum biochemical parameters such as glucose, cholesterol, urea, creatinine, and liver function markers using a semi-autoanalyzer.

2. Principle

A semi-autoanalyzer is a photometric instrument used to measure biochemical parameters in serum samples. The method relies on specific chemical reactions producing a color change, which is then measured using a photometric detector at a particular wavelength. The intensity of the color is proportional to the concentration of the analyte in the sample.

3. Materials Required

- **Biological Sample:** Serum from collected blood samples

- **Reagents and Kits:**

  o Glucose reagent kit

  o Cholesterol reagent kit

  o Urea reagent kit

  o Creatinine reagent kit

  o Liver function test (LFT) reagents (ALT, AST, ALP, Bilirubin)

- **Equipment:**

  o Semi-autoanalyzer (e.g., Erba Chem-5, Mindray BA-88A, etc.)

  o Micropipettes and tips

- o Centrifuge

- o Test tubes and cuvettes

- o Distilled water

4. Experimental Procedure

4.1. Sample Preparation

1. Collect venous blood (about 3-5 mL) in a plain vacutainer.

2. Allow the blood to clot at room temperature for 30 minutes.

3. Centrifuge the sample at 3000 rpm for 10 minutes to separate the serum.

4. Transfer the clear serum into labeled microtubes for analysis.

4.2. Running the Semi-Autoanalyzer

1. Switch on the semi-autoanalyzer and allow it to warm up.

2. Select the test parameter (e.g., glucose, cholesterol, urea) from the analyzer menu.

3. Pipette the appropriate volume of reagent and serum into a test cuvette as per the kit instructions.

4. Insert the cuvette into the analyzer and start the measurement.

5. The optical density (OD) is measured at a specific wavelength, and the analyzer calculates the concentration based on a pre-programmed calibration curve.

6. Record the results displayed on the screen.

5. Sample Data

Parameter	Measured Value	Normal Range	Interpretation
Glucose (mg/dL)	95	70-110	Normal
Total Cholesterol (mg/dL)	180	<200	Normal
Urea (mg/dL)	35	10-50	Normal
Creatinine (mg/dL)	1.2	0.6-1.3	Normal

ALT (U/L)	30	7-56	Normal
AST (U/L)	28	10-40	Normal

6. Interpretation of Results

- Elevated glucose levels may indicate diabetes mellitus.

- Increased cholesterol levels are associated with hyperlipidemia and cardiovascular diseases.

- Elevated urea and creatinine levels suggest renal dysfunction.

- Abnormal ALT and AST levels indicate liver disease or hepatotoxicity.

7. Precautions

- Use fresh serum samples to ensure accurate results.

- Follow the reagent kit instructions for correct volumes and incubation times.

- Properly calibrate the semi-autoanalyzer before running tests.

- Dispose of biological waste as per laboratory safety guidelines.

8. Conclusion

The semi-autoanalyzer provides a rapid and reliable method for estimating serum biochemical parameters. This method is widely used in clinical diagnostics to assess metabolic and organ functions, aiding in early disease detection and patient management.