Rapid Communication

Annals of Clinical and Laboratory Research
ISSN 2386-5180

2023
Vol.11 No.3:461

Clinical Chemistry in Pharmacokinetic Monitoring and Therapeutic Drug Optimization

Matthieu Wang*

Department of Chemical and Biological Metrology, Korea Research University of Standards and Science, Yuseong-gu, Daejeon, Republic of Korea

Received: 24-Apr-2023, Manuscript No. IPACLR-23-13937; **Editor assigned:** 26-Apr-2023, PreQC No. IPACLR-23-13937(PQ); **Reviewed:** 10-May-2023, QC No. IPACLR-23-13937; **Revised:** 13-May-2023, Manuscript No. IPACLR-23-13937(R); **Published:** 20-May-2023, DOI: 10.36648/2386-5180.23.11.461

Abstract

Clinical laboratory chemistry is a branch of medical science that focuses on the analysis of body fluids and tissues to aid in the diagnosis, monitoring, and management of diseases. It involves a wide range of methods and techniques for the detection, measurement, and interpretation of various chemical components in biological specimens, such as blood, urine, cerebrospinal fluid, and others. Clinical laboratory chemistry plays a critical role in modern healthcare, providing valuable information to clinicians for the diagnosis and treatment of patients.

Keywords: Clinical laboratory, Chemistry, Biological specimens, Blood, Urine, Cerebrospinal fluid, Treatment.

***Corresponding author:**
Matthieu Wang

wangmatthieu@kriss.re.kr

Department of Chemical and Biological Metrology, Korea Research University of Standards and Science, Yuseong-gu, Daejeon, Republic of Korea

Citation: Wang M (2023) Clinical Chemistry in Pharmacokinetic Monitoring and Therapeutic Drug Optimization. Ann Clin Lab Res. Vol.11 No.3:461

Introduction

One of the key aspects of clinical laboratory chemistry is the use of methods and techniques for sample preparation and analysis. Sample preparation involves the collection and processing of biological specimens to obtain a representative sample for analysis. This may include techniques such as centrifugation, filtration, and extraction, which are used to isolate the target analyses from the complex matrix of the specimen. Sample preparation is a crucial step in clinical laboratory chemistry as it directly affects the accuracy and reliability of the results [1].

Once the samples are prepared, various analytical methods are employed to measure the concentration or activity of specific chemical components. These methods can be classified into different categories, such as spectrophotometry, chromatography, immunoassays, electrophoresis, and molecular diagnostics. Spectrophotometry involves the use of light absorption or emission to quantify the concentration of a specific analyse in a sample. Chromatography is a separation technique that uses a stationary phase and a mobile phase to separate and quantify different chemical components based on their physical and chemical properties. Immunoassays utilize the specific interaction between antigens and antibodies to measure the concentration of target analyses. Electrophoresis is a technique that separates charged particles based on their size and charge using an electric field. Molecular diagnostics involve the detection and measurement of nucleic acids, proteins, and other molecules using techniques such as polymerase chain reaction (PCR) and nucleic acid sequencing [2].

Interpretation of the results obtained from these methods is a critical step in clinical laboratory chemistry. It requires knowledge of normal reference ranges, clinical correlation with patient symptoms and medical history, and consideration of potential interference factors that may affect the accuracy of the results. Reference ranges are established based on a large population of healthy individuals and provide a framework for interpreting the results obtained from patient samples. Clinical correlation involves comparing the results with the patient's symptoms, medical history, and other relevant information to aid in the diagnosis and management of diseases. Interference factors, such as medications, diet, and other physiological conditions, can affect the accuracy of laboratory results and must be taken into consideration during result interpretation [3].

Clinical laboratory chemistry is a branch of medical laboratory science that involves the study of chemical processes and reactions occurring in the human body for the purpose of diagnosing, monitoring, and treating diseases. Mechanism of action refers to the specific way in which a substance, such as a drug or a diagnostic test, interacts with biological molecules or cellular processes to produce its effects. In the context of clinical laboratory chemistry, the mechanism of action can vary depending on the specific test or assay being used.

Enzyme assays: Enzymes are proteins that catalysed chemical reactions in the body. Enzyme assays measure the activity of specific enzymes in biological samples, such as blood or urine, to assess organ function, diagnose diseases, or monitor treatment efficacy. The mechanism of action for enzyme assays typically involves the enzymatic reaction between the enzyme and its substrate, resulting in the production of a measurable product or change in a detectable property (e.g., colour change, fluorescence, or absorbance) that can be quantified to determine enzyme activity.

Immunoassays: Immunoassays utilize the specific binding of antibodies to antigens to detect and quantify various analyses in biological samples, such as hormones, proteins, drugs, or infectious agents. The mechanism of action for immunoassays typically involves the formation of an immune complex between the antibody and the antigen, followed by detection using various techniques, such as enzyme-linked immunosorbent assays (ELISAs), radioimmunoassay (RIAs), or chemiluminescent immunoassays (CLIAs). The measurement of the detectable signal generated by the immune complex formation provides information about the concentration of the analyse of interest in the sample [4].

Spectrophotometry: Spectrophotometry is a common technique used in clinical laboratory chemistry to measure the amount of light absorbed or transmitted by a sample at specific wavelengths. Spectrophotometric assays typically involve the use of a spectrophotometer, which measures the intensity of light before and after it passes through a sample. The mechanism of action for spectrophotometric assays relies on the interaction of the sample molecules with light, resulting in the absorption or transmission of specific wavelengths of light that can be quantified to determine the concentration of an analyse in the sample.

Chromatography: Chromatography is a separation technique used in clinical laboratory chemistry to separate and quantify different components in a mixture, such as drugs, metabolites, or other analyses. The mechanism of action for chromatographic assays involves the differential partitioning of analyses between a stationary phase (e.g., solid or liquid) and a mobile phase (e.g., gas or liquid), based on their physicochemical properties, such as polarity, size, or charge. The separated analyses are then detected and quantified using various methods, such as UV or mass spectrometry, to determine their concentration in the sample [5].

Conclusion

These are just a few examples of the mechanisms of action for clinical laboratory chemistry tests. The specific mechanism of action for a particular test will depend on the type of assay, the analyse of interest, and the detection technique used, among other factors. Understanding the mechanism of action of different laboratory tests is critical for accurate interpretation of test results and proper clinical decision-making in patient care.

References

1. Cavalier E (2023) Role of the Clinical Laboratory in the Assessment of Metabolic Musculoskeletal Diseases. Calcified Tissue International. 112(2):123-5.
2. Frezzotti A, Giordano G, Margarucci Gambini AM (1999) Analytical performance of a monoclonal digoxin assay by dry chemistry on the Vitros 950. Scand J Clin Lab. 59(6):431-7.
3. Humble RM, Ehlers A, Pakalniskis BL, Morris C, Drees D, et al (2015). Therapeutic drug monitoring of pentobarbital: experience at an academic medical center. Ther Drug Monit. 37(6):783-91.
4. Kieviet WD, Blaton V, Kovacs GL, Palicka V, Pulkki K (2000). The management of clinical laboratories in Europe: a FESCC Survey. 312-319.
5. Zheng H, GhavamiNejad A, GhavamiNejad P, Odinotski S, Poudineh M (2022). Micro-Enabled Technologies for Next-Generation Health Monitoring. The Electrochemical Society Inc. 61:2221-2221.