www.acclmp.com

Journal of Applied Biochemistry & Laboratory Medicine

Vol 4 Issue 1, Apr 2023

Printed by
Art-O-Print
43B, Rupnarayan Nandan Lane
Bhowanipur, Kolkata - 700 025

JABLM : The official open-access peer reviewed journal of Association of Clinical Chemistry and Lab Medicine Practitioners (ACCLMP).

ISSN: 2583-4142 (Online)

Official Address:
969, Jessore Road
Kolkata - 700 055

Journal Website: www.jablm.acclmp.com

ACCLMP website : www.acclmp.com

First Edition: April 2023

Printed at Art-O-Print

CONTENTS

Editorial Team of JABLM

Sl No.	Name of Editor	Qualifications	Current Affiliation	Official Address	Official Email Id
1.	Prof. Anindya Dasgupta 	MD (Biochemistry)	Chairman, Scientific Committee, ACCLMP West Bengal Chapter	The Association of Clinical Chemistry & Lab Medicine Practitioners (ACCLMP) 969, Jessore Road Kolkata - 700 055 West Bengal, India	editor.jablm@acclmp.com
2.	Dr. Barnali Das 	MD (Biochemistry), DNB, PGDHHM	Consultant, Laboratory Medicine, Chair, AACC (India Section) Executive Committee member, Scientific Division, IFCC	Kokilaben Dhirubhai Ambani Hospital & Medical Research Institute, Mumbai	Barnali.Das@kokilabenhospitals.com
3.	Dr. Madhumita Das 	MD (Biochemistry), PhD (IIT-Guwahati), President ACCLMP (Assam Chapter)	Chief Consultant & HOD	GNRC Medical Lab North Guwahati	madhumita.das@gnrchospitals.com
4.	Dr. Partha Chakrabarti 	MD (Biochemistry), PhD (Cell &Molecular Biology)	Principal Scientist	CSIR-Indian Institute of Chemical Biology 4, Raja SC Mullick Road Kolkata-700032	pchakrabarti@iicb.res.in
5.	Dr. Mrinal Pal 	DMRT, MD (Biochemistry),	Assistant General Secretary, ACCLMP, Central	The Association of Clinical Chemistry & Lab Medicine Practitioners (ACCLMP) 969, Jessore Road Kolkata - 700 055 West Bengal, India	mrinalpal@acclmp.com

Editorial Team of JABLM

Sl No.	Name of Editor	Qualifications	Current Affiliation	Official Address	Official Email Id
6.	Dr. Sharmistha Choudhuri 	MD Biochemistry (AIIMS, New Delhi), PGDIP Hospital Management (National Institute of Health and Family Welfare (NIHFW), New Delhi)	Assistant Professor	Department of Biochemistry, RG Kar Medical College 1 Khudiram Bose Sarani Kolkata -700004	sharmistha_choudhuri@yahoo.in
7.	Dr. Sayantan Dasgupta 	MD (Biochemistry)	Associate Professor	Department of Biochemistry, North Bengal Medical College Sushrutanagar Siliguri-734012	dr.sayantandasgupta@gmail.com
8.	Dr. Susruta Sen 	MD (Biochemistry), DNB, PG Dip Diabetology, PGDHHM (Symbiosis)	Director, Department of Lab Medicine NABL Lead Assessor President, ACCLMP	CK-Birla Hospitals-CMRI (The Calcutta Medical Research Institute) & BM Birla Heart Research Centre, Kolkata	susrutasen@ckbirlahospitals.com

From the desk of Editor-In-Chief

Digitalisation And Artificial Intelligence In Laboratory Automation: A big leap for a better patient care service.

Along with the enormous advances in the digital technology and artificial intelligence (AI) in last few years, the laboratory medicines are continuously being equipped with newer digital improvisation and their integration with AI, that help in all domains of preventive, diagnostic, prognostic and monitoring capability of a laboratory. Recent developments in the automated analyzers have helped in removing many menaces of laboratory procedures in hematology, biochemistry tests and microbiology sections starting from collection of samples to their discarding in appropriate places following the standard operating rules. Today, total laboratory automation (TLA), a result of generations of technical advancements, have enabled several instruments to be operated using a robotic track system with artificial intelligence (AI) integrating all stages of analysis and operation. This has substantially brought down the time consuming and cumbersome sample preparation procedures like sample identification, centrifugation and placement in the pre-analytical stage, a more accurate and less time consuming sample analysis in the analytical stage and report generation, verification, quality control procedures, specimen storage and their discard in the post analytical phase.

Use of liquid chromatography (LS) with tandem mass spectrometry (MS) has furthermore supplemented these TLA system by providing more holistic and wide range parameters of proteomics and metabolomics. LC-MS is being successfully utilized now in several sophisticated labs to diagnose a wide range of inborn errors of metabolism and to generate potential biomarkers for different stages of metabolic disorders like diabetes mellitus.

In addition to the hematological and biochemical investigations, the recent techniques of automated plating methodology, invention of methods for generating digital culture plate images and their capture using electronic methods has made significant advances in implementation of TLA in the microbiology labs also. All these TLA procedures have great potentiality to reduce complicated and error prone processes for technicians, lesser and more effective uses of reagents, lesser power, water and space consumption, a more accurate report, a better turnaround time, a better maintenance of quality control procedures and an overall improvement in the lab performance.

Furthermore, with recent advancements in omics technology and their increasing role in diagnostic methodologies, a substantial development has occurred in the fields of genomics, transcriptomics, metabolomics and proteomics. Traditional microarray techniques are being replaced by next generation sequencing (NGS) techniques for analyzing genome wide assay of DNA or a real time transcriptome wide assay of RNAs. These techniques are rapidly proving to be significantly more efficacious and much less time consuming for a wide scale of genetic investigations including that in a single cell environment for providing a more precise scenario of cell specific and tissue specific genetic heterogeneity in different disorders including cancers. NGS is playing also a crucial role in detection and identification of cell free DNA that has been a milestone development in early cancer detection. Accompanied with NGS, developments in microfluidic and fabrication techniques and a significant improvement in nanotechnology have enabled detection of cell free nuclear DNA, cell free mitochondrial DNA, and circulating tumour cells much more easier. Breakthrough advances has been made in real time laboratory diagnosis of cancers and other genetic disorders by inventing micro-reactors that can encapsulate a single cell within it using the microfluidic technology and a measurable RNA sequence barcoding in a single cell using the hydro-dynamic methodology. This technique yields a high throughput circulating tumour cell assay and has helped in developing targeted drug therapy in breast cancer. Thus, all these recent advances in laboratory methodologies are paving the ways for developing a more successful precision based personalized medicine.

So, starting from diagnosing the metabolic diseases to development of precision based personalized medicine, recent developments in laboratory medicine have revolutionized the whole patient care and management system. Use of a TLA system integrated with AI has cut down the TAT as well as cost along with a much better accuracy, precision, and overall efficiency of laboratories in detecting routine hematological, biochemical, metabolic and microbiological tests. Use of techniques of nuclear magnetic resonance (NMR) and mass spectrometry (MS) has further accelerated potentiated the laboratory process of delineating metabolic profiles, developing newer biomarkers and in prediction of risk factors. Inventions and developments in next generation sequencing, different microfluidic and nanotechnology based microflow systems, bar coding of nucleotide sequences and integrating all databases with AI regulated data generators have provided us much more sophisticated, robust, accurate and fast methods for assaying different disease outcomes in the context of their cellular and molecular mechanisms that include their chromosomal abnormalities, epigenetic variabilities, changes in their phosphorylation process or protein expressions, point mutations, deletions or addition in the target genes and above all a complete assay of the abnormal genes, RNAs and proteins of a single circulating tumour cell in blood.

No doubt, laboratory medicine is being revolutionized throughout the world including in our country also. However, this underscores the need and importance of strengthening the basic pillars of a modern sophisticated laboratory system by nurturing and developing the concepts of fundamental biochemical, pathological and microbiological techniques in the learners and creating interests in them about these subjects from the very beginning. Afterall, a long life can be fulfilled with all enjoyments and responsibilities only when it is bestowed with a good and robust health.

Professor Anindya Dasgupta,

Editor in Chief.