# *Abstract E-book*

## Tata Memorial Hospital

Hematopathology Laboratory

Organizes

# *Sixth CME for Medical Laboratory Technologists*

**23rd & 24th December 2016**

# Foreword

Dear All,

We wish to thank you all to the 6th Annual CME for Medical Laboratory Technologists held by the Hematopathology Laboratory of Tata Memorial Hospital, Mumbai.

Aim of this CME was to update the Medical Laboratory Technologists on current diagnostic and management issues. Our previous five CMEs were resoundingly successful with participation by delegates from all over India.

This year once again we had an excellent academic program with Renowned faculties.

This year also we had received 26 abstracts for poster presentations.

We would like to thank you all for your participation and made this conference a very successful.

Team Hematopathology Laboratory
Tata Memorial Hospital,
Parel, Mumbai.

# Faculty

Mr. Manik Tiwari

Dr. Kunal Sehgal

Dr. Archana Vazifdar

Mr. Sampat Godage

Dr. Kiran Ghodke

Dr. Sujay Prasad

Dr. Ganesh Kumar

Mr. Shashikant Mahadik

Dr. Nikhil Rabade

Mrs. Manisha More

Mr. Kalpesh Golvankar

Dr .P.G.Subramanian

Mrs. Rashida Ansari

Dr. Vandana Tiwari

Dr. Priti Desai

Dr. Asma Bibi

Dr. Aruna Poojary

Dr. Prashant Mule

Dr. Gita Nataraj

Dr. Vivek Bhat

Ms. Deepti Karkhanis

## Panel Discussion

Dr. Vandana Tiwari

Dr. Aruna Poojary

Dr. P. G. Subramanian

Mrs. Chitra Hingnekar

## Poster Judges

Dr. Nikhil Rabade

Dr. Asma Bibi

Dr. Vandana Tiwari

Dr. Aruna Poojary

## Poster Winners

**23rd & 24th December 2016**

- Saravanan Murugandhan
- P.Manigandhan
- Tejashree Morajkar
- Ashwini Pandey

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# INDEX

# Poster No - 1

Abstract Title:
Use of fresh blood samples for internal quality control in under resourced hematology laboratories

Presenting author: Ashish Kumar

Co-authors & Affiliations:
RiteshGoswami, MarkasMasih, 1Naveen Kakkar, M.Joseph John
Department of Hematology, Christian Medical College and Hospital, Ludhiana, Punjab

Introduction:
Although the use of automated hematology analyzers has increased steadily, quality control of results does not get the desired attention due to high costs of commercial control material and lack of easy availability. Use of fresh patient samples can be used for select parameters for quality control.

Material & Methods:
This study was done in the Clinical Hematology unit of a tertiary care hospital. Blood samples were drawn in EDTA containers from ten healthy volunteers. Samples were run on Mindary, BC 3000 plus, a three-part automated hematology analyzer. Sample was run within 30 minutes of drawing the sample and at 8.00 AM thereafter for 10 consecutive days. During this time, the blood samples were stored at 2-80C. All routine hematological parameters were recorded. The coefficient of variation (CV) for all hematological parameters was recorded.

Results:
Over the 10-day period, red blood cell (RBC) related parameters remained stable. Hemoglobin, RBC count, MCV, MCH and MCHC showed a coefficient of variation (CV) of less than 2%. The CV for white blood cell, platelet count and MPV was 8.5%, 4.3% and 5.9% respectively. WBC, Platelet count and MPV count showed a significant rise after a variable period of 72-120 hours.

Conclusions:
Fresh blood samples can be used as alternative control material to assess the precision of some hematological parameters in resource poor laboratories in which no commercial control material is being used. Hemoglobin, RBC count, hematocrit and red cell indices showed acceptable stability over a week along with a shorter stability for WBC and platelets.

Keywords: Automated hematology analyzers, fresh blood, quality control, RBC

# Poster No – 2

Abstract Title:
Spectrum of hemoglobin disorders in a tertiary care hospital in North India

Authors & Affiliations: Dalbir Masih

Co - Authors & Affiliations:
Gagandeep Singh, Ranjeet Singh Mashon, Naveen Kakkar
Department of Hematology, Christian Medical College and Hospital, Ludhiana, Punjab

Introduction:
Hemoglobin disorders constitute the commonest genetic defect in the world. Many parts of India have a higher gene frequency of these disorders. Many benign hemoglobin variants may also be detected during screening which need genetic counseling. This study presents the spectrum of hemoglobin disorders in a tertiary care hospital.

Material & Methods:
This study was conducted over a period of two years in a tertiary care hospital. Patient samples were included from the antenatal clinic and other units. Compete blood count was done on LH750 Beckman Coulter analyzer. For hemoglobin quantification, samples were run on Biorad D10 Hemoglobin Testing System. Individual hemoglobin peaks and retention time was noted along with abnormal peaks if any to diagnose specific hemoglobin disorders.

Results:
A total of 3086 patient samples were studied. Of these, 376 (12%) were detected to have hemoglobin disorders. Heterozygosity was detected in 301 (9.8%) cases, homozygosity/compound heterozygosity in 29 cases (0.8%) cases, while 46 (1.5%) patients had borderline HbA2 levels (3.5-4.0%). Beta thalassemia trait was the commonest hemoglobin disorder seen in 235 (7.6%) cases. Structural beta chain variants; HbD-Punjab Trait, sickle cell trait, HbE trait andHbD Iran trait were seen in 0.9%, 0.3%, 0.2% and 0.1% cases respectively. HbQ India was seen in 14 (0.5%) patients. Beta thalassemia major was detected in 0.6% cases. Beta Thalassemia co-inherited with structural variants HbE, Hb Q India, HbD Punjab and HbS was also seen in few patients.

Conclusion:
A wide spectrum of hemoglobin disorders was observed our study. The knowledge of this diversity will be helpful in control of hemoglobin disorders.

Keywords: Hemoglobin, Thalassemia, structural variant, HPLC

# Poster No – 3

Abstract title:
The role of volume, conductivity and Scatter (VCS) parameters, WBC flagging and scatter plot pattern in the diagnosis of acute and chronic leukemia

Presenting Author: Gagandeep Singh

Co-Authors & Affiliations:
Ranjeet Singh Mashon, Naveen Kakkar
Department of Hematology ,Christian Medical College and Hospital, Ludhiana, Punjab

Introduction:
Along with the routine parameters, newer automated hematology analyzers also employ advanced technology for accurate WBC differential count. The volume, conductivity and scatter (VCS) technology used in Beckman Coulter instruments along with WBC flagging and scatter plot pattern have been used to characterize various leukemia's.

Material & Methods:
This study was carried out in a tertiary care hospital in North India over a one a half year period. Eighty three patients with acute and chronic leukemia's, and related hematological malignancies were included. Samples were run on LH750 automated hematology analyzer (Beckman Coulter).WBC flagging, scatter plot pattern and VCS data were studied.

Results:
The study included 83 patients with acute leukemia, chronic leukemia and related hematological malignancies. Of these, there were 30 patients with acute leukemia and 40 with chronic leukemia. There was no significant difference ($p>0.05$) for Neutrophils and lymphocytes VCS parameters between acute lymphoblastic Leukemia (ALL) and chronic lymphocytic leukemia (CLL). VCS data for acute myeloid leukemia (AML) and ALL also did not show a significant difference except for Neutrophils scatter ($p=0.0152$).VCS data for AML, ALL and CLL showed a significant difference ($p<0.05$) when compared to the control group. Patients with ALL consistently showed the lymphoblast flag while patients with CLL showed variant lymphocyte and/or lymphoblast flag (13/23). Consistent flagging pattern was also seen in patients with CML. WBC scatter plot for ALL, CLL and CML showed a consistent pattern while scatter plots for AML showed no well-defined pattern.

Conclusions:
Automated VCS, flagging and scatter plot pattern can assist in characterization of various leukemia's as an adjunct to morphological assessment.

Keywords: Automated, AML, ALL, CLL, CML, Leukemia, VCS

# Poster No – 4

Abstract Title:

Flow cytometric immunophenotyping is a highly accurate and far superior method for the evaluation of body fluid involvement by hematolymphoid neoplasms

Presenting author: Manisha R. More

Co-authors & Affiliations:

PG Subramanian, Nikhil Patkar, Gaurav Chatterjee, Y Badrinath, Ashok Kumar, Sitaram Ghogale, NileshDeshpande, SumeetGujral, PrashantTembhare*

Hematopathology Laboratory, Tata Memorial Center, Mumbai

Introduction:Evaluation of body fluid involvement is very important part in diagnosis, staging and management of the hematolymphoid neoplasms (HLN). Traditionally, it is performed by microscopic analysis of cytomorphology. However, cytomorphology is not only subjective but also highly challenging in the paucicellular samples like CSF or vitreous fluid (VF) leading to misdiagnosis. Flow cytometric immunophenotyping (FCI) is a powerful tool used in the diagnosis, classification and monitoring of HLN involving peripheral blood and bone marrow aspirates. In the present study, we investigated the value of FCI in the evaluation of body fluid involvement by HLN.

Methods: We studied 174 body fluid samples from the 164 patients of HLN. Diagnosis and classification of HLN were performed as WHO criteria. Cytomorphology was performed on the smears prepared through cytospin and stained with Wright' stain. FCI was performed using 8-10 color antibody panel on Navios software and data was analyzed using Kaluza-software1.3V.

Results: We studied 174 body fluid samples including ascetic fluid (13.8%), CSF (42.5%), VF (1.7%). Pericardial fluid (4.6%), Pleural fluid (35.6%), synovial fluid (1.1%), and Splenic aspirate in 0.6% from 164 patients of HLN ( NHL 14.0, ALCL-1.8%, AML-1.2%, BALL-15.2%, Burkitt's lymphoma-3.7%, BNH-NOS-1.2%, CLL-1.8%, CML-1.2%, DLBCL-17.1%, FCL-5.5%, MCL-3.0%, NK/T-NHL-0.6%, PCNSL-6.1%, granulocytic sarcoma-0.6%, PMBCL-1.8%, MM-1.8%, SLL-0.6%, Tcell LBL-6.7%, TALL-15.2%, and PTCL-0.6%). Of 174 samples, 30% were involved and 44% were negative by both cytomorphology and FCI. However, 17% samples were involved by FCI but were false-negative by cytomorphology and 9% were diagnosed as suspicious of involvement but were negative by FCI (false positive). In 1% samples, FCI was negative but cytomorphology was positive. Thus, sensitivity and specificity of cytomorphology was 64.3% and 82.2% when correlated with FCI.

Conclusion: Flow cytometric immunophenotyping is a highly accurate and far superior method for the evaluation of body fluid involvement by hematolymphoid neoplasms and hence, FCI should be the method of choice.

# Poster No – 5

Abstract Title: Robust Statistical Analysis in CMC EQAS

Presenting author: Saravanan Murugandhan

Co-authors & Affiliations:
Geethanjali Arulappan , Victoria Job
Department of Clinical Biochemistry, Christian Medical College, Vellore.

Introduction:
External Quality Assurance (EQA) in Clinical laboratory presents unique challenges for data analysis to assign the target value. EQA participant's results provide unimodal and approximately symmetric data set but also contain a small portion of outliers that are unexpectedly distant from the majority. Such outlying results can be highly variable and make conventional statistical techniques like the Arithmetic Mean and Standard Deviation, unreliable.

Methods:
Robust – means Strong. No data is excluded. This statistics exhibit good performance for data drawn from a wide range of probability distributions .This estimates the mean and standard deviation after the extreme values are corrected or replaced using statistical estimators. It is used only for deriving the target value. The individual values of the participants remain the same for final evaluation and interpretation like VIS, SDI and Bias.

Advantages of Robust Statistical Analysis:

1. The median is a robust measure of central tendency, while the arithmetic mean is not.
2. Since median has a breakdown point at 50 %, a single large observation has no influence on robust median, but it affects the arithmetic mean.
3. Detection and handling of outliers without any prior information and also prevents from masking each other and escapes detection.
4. Small SD and CV due to trimming of outliers by robust estimators.

Conclusion:
Robust statistical method gives error-free assigned value and minimizes the SD and CV of the data set

Key Words : External Quality Assurance (EQA)

# Poster No – 6

Abstract Title:
A Novel Step in Fixing the Turnaround Time of Surgical Pathology Reports: A Part of Quality Management System

Presenting Author: Dr. Anandraj Vaithy

Authors & Affiliations: Dr. Shanmugasamy, Dr. Dhananjay Kotasthane
Mahatma Gandhi medical college& research institute, Pondicherry

Introduction: Lab investigations are essential in patient and quality management system. The essential aspect of quality which goes often overlooked is turnaround time (TAT), a key performance indicator of laboratory. Most laboratories put undue stress on only reliability, but nowadays the clinician is more inclined towards getting the result done in a shorter time. Analyzing outliers in TAT in a lab gives insight of causes delay and the areas need improvement. Laboratories in developing countries are yet to use TAT and analyze them for laboratory improvement

Methods/strategy: Analysis was conducted for a period of three months on Histopathology specimens. Our first observation was to trace the flow process. Laboratory improvement strategy was developed by designing a time log sheet attached to all histopathology request forms at the time of receiving specimens. All the data including special stains, IHCC and all sub process in the flow path were documented.

Observations: Our observation and root cause analysis revealed that the processes of slide allocation and delivery to pathologists, report editing by transcriptionists, and report verification by pathologists are the sub processes where most delays occur and set to be a target area for our improvement. With an evasive fact that several academic institutions with postgraduate courses often tend to yield delayed TAT in histopathology, Time interval taken by postgraduate students screening proved to be insignificant

Conclusions: One important lesson we learnt is that small and simple change can lead to huge improvements and not necessarily complex changes. By this study of mapping out the workflow process using time log sheet, had led to process and systems improvement by Focusing and fixing sub processes which showed that 94% of all histopathology cases being reported within the standard TAT

Keywords: Quality assurance, Time Log sheet, Turnaround Time (TAT)

# Poster No – 7

Abstract Title: Lyophilization Enabling a Viable, Economic, Indigenous EQA Programme

Presenting Author: P.Manigandhan

Authors & Affiliations:
Geethanjali F.S, Victoria Job
Department of Clinical Biochemistry, CMC, Vellore.

Introduction: The Clinical Biochemistry department a pioneer in indigenous EQAS programme from 1978 has been able to improve the scheme & serve nearly 5000 laboratories in the country due to the technology of Lyophilization. This helped us to produce a stable product and thus made it convenient to handle such large numbers. The participating labs perform better with the lyophilized material. At present there are six different programs namely, Chemistry I and II, Thyroid hormones and Cortisol, HbA1c, Reproductive hormones, Markers for Downs's screening and Urine chemistry.

Material and Methods: Human plasma is converted to serum and spiked with the chemicals, enzymes and hormones. The concentrations of analytes cover the entire range of normal and pathological level of the various analytes.
The samples are lyophilized (freeze dried), where the sample is frozen to -40°C and then under vacuum the drying is initiated. The frozen water molecules sublime to water vapor, without causing denaturation of the sample. Lyophilization is a long and slow process that goes for 40 hours for a total capacity of 30 L. Homogeneity, stability and the moisture content of the lyophilized samples are tested as per the ISO guidelines (ISO 13528:2015). The shelf-life of the lyophilized material is much longer (almost 2 years) and it can be transported at ambient temperature. The participants reconstitute the sample, analyse and report online.
CMC EQAS is accredited by NABL for ISO/IEC 17043:2012 standards after the Lyophilization has been introduced since meeting it's criteria was attainable.

Conclusion: The lyophilized samples are more robust, more stable and easy to handle. Hence enzymes, hormones and other proteins could be added in the EQAS program which was not possible with the liquid material.

Keywords: EQAS, / IEC 17043:2012, Lyophilization, HbA1c, Shelf-life

# Poster No – 8

Abstract Title: Quality Indicators in Hematology Laboratory.

Presenting Author: Trupti V. Mestry

Authors & Affiliations:
Pratik Poladia R Mohite, U.Gavhane, B. Pillai, M.Tiwari, S.Pal, A.Karmore, U.Gosavi, S.Vaykar, A.Kumari, P Dalvi, S Kamble. V.Bhatt, C Naresh, P Chavan.
ACTREC, Tata Memorial Centre, Kharghar, Navi Mumbai.

Introduction & Background:
Quality indicators (QI) are measurable, objective, quantitative measures of key system performance. They can indicate the quality of the key, strategic and support processes. It is important that quality indicators address all three key processes in the laboratory: pre-analytical, analytical and post analytical. Besides self-evaluation, quality indicators can also be used for benchmarking. It helps to capture information about quality indicators in the hematology laboratory and to evaluate laboratory quality performance over time as a strategy for continuous quality improvement effort

Material and Methods: A retrospective analysis of the following quality indicators for the period of March 2015-March 2016 was carried out: a) Sample Rejection, b) Equipment Breakdown, c) Critical Alerts reporting, d) Turn-around-Time (TAT), e) External Quality Assurance Scheme (EQAS) f) Internal Quality Assurance Scheme (IQAS).

Results: A total of 41222 hematology samples were received. 33 samples were rejected based on criteria clotted, mismatch, unlabeled etc. Equipment breakdown occurred 27times, 99.9% critical alerts were informed telephonically; in addition system generated short message service (SMS) was sent to patients. 2% reports were beyond the given TAT. Out of 14 CBC EQAS challenges comprising 112 tests 10 were outliers and of 16 Coagulation EQAS challenges comprising 32 tests 2 were outliers. Necessary corrective actions were taken. Internal quality control was performed routinely; results were within the laboratory defined ranges.

Conclusions:
Use of quality indicators to assess and monitor the quality system of the clinical laboratory services is extremely valuable tool in keeping the total testing process under control in a systematic and transparent way.

# Poster No – 9

Abstract Title: Analysis of Laboratory Sample Rejections in the Pre-Analytical Stage at an Oncology Center

Presenting Author: Divya Kawle

Authors & Affiliations:

Ashwadeep Karmore, P.Chavan, V.bhat, P.Poladia, U.Gavhane, M.Tiwari, S.Pal,Babu Pillai, U. Gosavi, R.Mohite . ACTREC, Tata Memorial Centre, Kharghar, Navi Mumbai.

Introduction: Clinical laboratories play a crucial role in the diagnosis and management of patients. These are some of the key indicators of errors that can help identify potential improvements in patient safety during pre-analytical phase in clinical laboratories. Clot was found to be the major cause of rejection of samples, followed by requisition sent without specimen, improperly labeled samples ,haemolysed samples, samples received without requisition, samples collected in expired vacutainers, insufficient sample volume, patients clinical history was not provided, improperly collected samples and soiled requisition forms. Errors in clinical laboratories have a great impact on safety and care of patients. The pre-analytical phase is responsible for about 70% of errors.

Material and Methods: Quality indicators in clinical laboratory provide a useful tool for continuous improvement of laboratory services. In this study, we aimed to evaluate the sample rejection ratios according to the types of pre-analytical errors.

A retrospective analysis of the following quality indicators for the period of March 2015-March 2016 was carried out: a) Sample Rejection, b) Equipment Breakdown, c) Critical Alerts reporting, d) Turn-around-Time (TAT), e) External Quality Assurance Scheme (EQAS) f) Internal Quality Assurance Scheme (IQAS).

Results: Out of 135409 samples received during January-2015-August 2016,111 samples (0.08 %) were rejected. The most common reasons for rejection in were clotted blood specimen samples(48.64 %),followed by requisition sent without specimen(15.31%),improperly labeled samples (12.61%) ,haemolysed samples(10.81%), samples received without requisition(5.40%), samples collected in expired vacutainers, insufficient sample volume& patients clinical history was not provided (1.80% each), improperly collected samples & soiled requisition forms(0.9% each).

Conclusion: This study has shown that the most frequent causes of pre-analytical errors are clotted sample, requisition sent without specimen, improperly labeled samples, haemolysed samples and samples received without requisition.

# Poster No – 10

Abstract Title:
Implementation and Evaluation of Quality Indicators in biochemistry laboratory.

Presenting Author: Ramhari Kadam

Co-authors and Affiliations:
Dr Meghana K Padwal,Mrs Shruti Gadre,
Central Clinical Laboratory, Bharati Hospital and Research Centre, Pune.

Introduction:
Laboratory testing and services have an important role in provision of health care. Quality indicators (QIs) are fundamental tools enabling users to quantify the quality of laboratory services.

Material and Methods:
To quantify performance in the pre and post analytical phases of testing in Clinical Biochemistry Laboratory, using quality indicators. We have analyzed the laboratory data from January to October 2016. The quality indicators are selected in such a way that they cover the critical activities of pre and post-analytical phases of laboratory testing. We have implemented three quality indicators for this study as follows:

1) Non Adherence to sample collection and transport protocol
2) Number of Reporting Errors
3) Non adherence to safety precautions by employees. Analysis is done at the end of every month.

Results:
We have received total 72,688 samples in biochemistry laboratory during the period of January to October 2016.We observed Non Adherence to sample collection and transport protocol was 0.22%, non adherence to safety precautions was 0.07%, Reporting errors were 0.10%.

Conclusions:
Assessing the quality of laboratory services using quality indicators requires a systematic, transparent and consistent approach for collecting and analyzing the data.

Keywords: Preanalytical phase, Post analytical phase, quality indicators

# Poster No – 11

Abstract Title:

To Monitor Quality Control Mechanism Developed in Microbiology Laboratories in Pune

Presenting Author: Ms. Neelam Redekar

Co-authors and Affiliations:

Ms. Uttara Tatke, Ms. Mayura Maitri, Mr.Akash Kharatkar, Ms.Kajal Dagade, Ms.Gayatree Patil, Ms. Maitreyi Sawant.

Symbiosis Institute of Health Sciences, Symbiosis International University, Pune.

Introduction:

Quality must be measured if it has to be managed. Quality indicators (QI) help the health laboratory to define and measure progress. The measurement of quality indicators leads to early detection of system failure which includes all aspects of service – pre-analytic, analytic and post-analytic – so that remedial actions can be taken promptly. Good Clinical Laboratory Practices (GCLP) deal with the organization, process and conditions under which laboratory studies are planned, performed, supervised, documented and reported.

Materials and Methods:

A prospective study was carried out where microbiology laboratories underwent an inspection to check the Quality Control Mechanism.

Results:

Microbiology laboratories accredited with NABL and running multiple panel tests were more particular in following the protocol, while basic, non- accredited laboratories were ignorant in adhering Quality Control protocol.

Conclusion:

So as per the results of survey conducted, microbiology laboratories with multiple tests panel showed more level of awareness in following the protocol while those with basic tests hardly followed the protocol. However, having given an informative lecture about Quality Control, the laboratory professionals showed positive inclination towards embracing the required protocols, thereby benefitting the implemented intervention based initiative.

Keywords:

Quality control, microbiology, laboratories.

# Poster No – 12

Abstract Title:

Lipoblastoma-a rare paediatric tumour- A Report of 2 Cases

Presenting Author: Shikha Dubey

Co-authors and Affiliations:

Suman Lata verma ,Vivek Gupta , Vishwa Prakash Tiwari

Introduction:

The aim of study is to perform a detailed investigation of clinical, gross and microscopic characteristics of Lipoblastoma.

Materials and Methods:

- In 1st case we report a 1 and ½ year male child with this rare tumour. We Received tumour in multiple bits aggregating 10x5x3cms ,E/s-capsulated.

- In 2nd case we report a 1 and ½ year female child. We Received tumour measuring 13*6*6cm.

Results &:

- Lipoblastomas - rare benign mesenchymal tumors of embryonal fat-Comprise of adipocytes and lipoblasts
- Lipoblastomas have to be differentiated from liposarcoma.

Conclusion :

Complete resection achieves optimal results but recurrence is possible and close follow up is mandatory

Keywords: Lipoblastoma & tumour

# Poster No – 13

Abstract Title:

The morphological and biochemical changes in squamous cells of oral cavity of people with long term exposure to Tamol: An experience from Assam with reference to high incidence of cancer.

Presenting Author: Lhakit Lepcha

Co-authors and Affiliations:

Manash Pratim ,Sarma Manash ,Pratim Kashyap, B.G Unni.

Department of Pathology, Biotechnology, Statistics, Research Cell, Assam down town University, Panikhaiti, Guwahati-781026, Assam, India.

Introduction: In North-East India, and Assam in particular, variety of Areca nuts are widely consumed (local name: Tamol). Previous studies have confirmed that the raw betel nut are more damaging to the oral cavity then the dried one and confirmed that chewing Tamol in various combination and forms are major risk factors for developing oral carcinoma and adds to the increasing incidence of cancer from this region. The current study aims to measure the cellular proliferative activity due to “Tamol” chewing to enable early prediction of carcinogenesis process.

Materials and Methods: Oral Scrap samples (tamol chewers without tobacco) were collected from the age group of 18 years and above from the different village in Assam for Biochemical and other histopathological studies. A total of 80 individual were screened and demographic data were collected in a predesigned questioner. The study was approved by the ethics committee of BBCI, Assam.

Results:

Morphological variations in the oral epithelial cell are observed in 80-90% of the cases, which are significantly associated with the duration of Tamol chewing in a year. There variables were positively correlated with grading of epithelial dysplasia. Grade of epithelial dysplasia were found to have significant positive correlation with duration of Tamol consumption in a year (r=0.267, p=0.036). Variation in uric acid was observed.

| | Group of the Respondent | Mean values |
|---|---|---|
| Uric Acid | Control (n=20) | 4.78100 |
| | Tamol Chewers | 2.59217 |

Conclusion: Tamol chewing represents great burden and enormous health problem in the North East India especially Assam. Early stage of cancer cells can be revealed by oral exfoliative cytology and other biochemical variations which may be a sensitive tool for early detection. Also this is of great importance as it is a non-invasive detection technique and larger prospective study with greater sample size will be required to establish the index.

Keywords: Tamol, exfoliative cytology, Assam, Cancer

# Poster No – 14

Abstract Title:

Comparison between HPLC and Capillary Electrophoresis in the Measurement of HbA1C Values

Presenting Author: L. Thondaiman

Co-authors and Affiliations:

S. Janani Iswarya, Victoria Job

Department of Clinical Biochemistry, Christian Medical College, Vellore.

Introduction:

Diabetes management needs efficient and reliable measurement techniques. One of these is the measurement of glycated Hb( HbA1C). There are many methods available to measure HbA1C such as borate-affinity chromatography, cation exchange Chromatography, immunoinhibition turbidimetric assay and capillary electrophoresis etc. Since these techniques measure the HbA1C via different methods, there may be variations between the values. Therefore, there are concerns in the selection of HbA1C methods that different measurement methods used for HbA1C in the same laboratory should give comparable values.

Materials and Methods:

The aim of this study is to compare the performances of HPLC and capillary Electrophoresis in the measurement of HbA1C.

50 whole blood specimens were randomly selected for this study. Methods taken for comparison includes Ion-Exchange High performance liquid chromatography (HPLC)- (Biorad variant II Turbo Hemoglobin A1C testing system) and capillary electrophoresis (capillary 2.flex piercing HbA1C analyzer SEBIA, CEDEX-France)

Results:

The HbA1C values of the samples run by both methods were taken for comparison. There was a significant correlation between the two methods and the results are satisfactory.

Conclusion: HbA1C measurement should have adequate repeatability and accuracy since it is used in the long term follow up in diabetes management. Any method that is commercially available should at least give the same or indeterminate performance compared to currently available methods. In this study, we found that HbA1C values obtained from both HPLC and capillary Electrophoresis are well correlated and acceptable for clinical setting.

Keywords: HbA1C, Electrophoresis, SEBIA, CEDEX, HPLC, immunoinhibition turbidimetric assay

# Poster No – 15

Abstract Title:

Low GI Indian vegetarian diet for dietary management of type 2 diabetes.

Presenting Author: Ashwini Pande

Introduction:

This paper presents the modified Indian foods suitable for consumption of Type 2 diabetes. The objective of this paper is to assess the evidence relating the glycemic response of foods to a role in health maintenance and management of diabetes. This study reports the glycemic as well as insulinemic response of three types of Indian vegetarian snacks and mixed meals (MMs).

Materials and Methods:

Each of the three snacks and mixed meals was given at weekly intervals to both normal and type 2 diabetic subjects on the same day to reduce variations in food preparations plasma glucose & insulin level at Fasting, Postprandial-1hr and 2hr in ten normal healthy volunteers were analyzed after oral administration of 50 gm pure glucose and later at weekly intervals with each of the test Snack. Area under curve was calculated and compared for pure glucose and each test snack to determine the Glycemic Index.

Results:

The GI of test snacks ranged from 29% to 42%. The sprouted lentil s had the lowest GI (29.94%) and AUC (381.9) as compared to other two test snacks. , Similarly three types of MM consisted of five to six food items with a low glycemic index (GI) ranging from 36% to 46.12%, glycemic load ranging from 15.58 to 23.8 g and energy value (calculated) from each test meal ranging from 403 to 502 kcal.

Conclusion:

All the three meals were found to have a good postprandial glycemic control in type 2 diabetic subjects who ranged from 132.8 to148.4 mg%, and hence appropriate for routine consumption by diabetic subjects. Sustained intake of such low GI test snacks and MMs by diabetic can result in good glycemic control

Keywords: GI, Type 2 diabetes, Low GI Food, diabetes management

# Poster No – 16

Abstract Title:

Comparison of Serum Lithium measurements by AAS, ISE AND COBAS Automated Colorimetric Assay

Presenting Author: Ashok Kumar

Co-authors and Affiliations:

Victoria Job, Arun Jose Nellickal,

Department of Clinical Biochemistry, Christian Medical College, Vellore

Introduction:

Lithium is widely used as a drug in treatment of manic depressive diseases ,its drug formulation is as lithium carbonate which is freely absorbed from gastrointestinal tract, whose peak plasma concentration is between two and four hours. It is cleared mainly by renal route as it is minimally protein bound. Toxicity of Lithium depends on its plasma concentration, therefore the drug levels are monitored to ensure patient compliance and to prevent toxicity.

Materials and Methods:

To compare three methods measuring Lithium using different techniques.

Consecutive 59 samples received in the lab for lithium measurement was selected for the study .Blood collected was allowed to clot and serum separated and lithium was analyzed immediately using Ion selective electrode on Roche 9180 analyzer .and calorimetrically in Roche 502 analyzer using manufactures' kit and also in atomic absorption spectrophotometer. The results were analyzed using SPSS software.

Results:

The mean levels of lithium in AAS, ISE and COBAS are respectively.

Bland Altman plot of AAS vs Cobas Lithium was of good agreement between methods with R2=0.975,whereas AAS vs ISE had poor agreement when values were less than <1.0 mmol/L with R2 =0.947intercept, 0.085, and ISE v Cobas also had poor agreement bellow <1.0 mmol/l with R2 0.951 and intercept 0.0007

Conclusion:

Lithium measurement by AAS and colorimetric Cobas assay has definitely emerged as superior over ISE.

Keywords: Lithium measurement AAS

# Poster No – 17

Abstract Title: Osmometry a Clinical Tool

Presenting Author: B. Vijayalakshmi

Co-authors and Affiliations:

Victoria Job, Arun Jose Nellickal,

Department of Clinical Biochemistry, Christian Medical College, Vellore

Introduction:

Osmometry is a technique used to measure the total concentration of solutes in solution. The osmolar concentration can be expressed as osmolality or osmolarity while the measurement of osmolality is considered to be more precise. Determination of plasma and urine osmolality can be useful in the assessment of electrolyte and fluid disorders. It is based on the measurement of any one of the colligative properties such as osmotic pressure, vapour pressure, boiling point and the most commonly used colligative property for the measurement of osmolality is the freezing point. This instrument where the number of solute particles changeup the freezing point is mathematically converted to osmolality is called an osmometer.

Materials and Methods:

To study the pattern of urine osmolality in Diabetes Insipidus.

Serum and urine samples from patients were collected at approximate hourly intervals. The sodium concentration in the serum samples was measured by an automated ISE (Ion selective electrode). The osmolality was estimated by cyroscopic osmometer OSMOMAT 030 (Gonotec). The patients included were those who underwent a fluid deprivation test for either differented diagnosis of polyurea.

Results:

The results of osmolality during the course of the test clearly differentiates the type of diabetes Insipidus and also from other causes of polyuria and polydipsia.

Conclusion:

Osmometer is an essential instrument in tertiary a care centre for managing fluid disorders related and electrolyte imbalance and in conditions such as Anti diuretic hormone deficiency.

Keywords: Osmolality, diabetes Insipidus, electrolyte imbalance, Polyuria and Polydipsia

# Poster No – 18

Abstract Title:

Performance Evaluation of Dry Chemistry Analyzer vs. Wet Chemistry Analyzer

Presenting Author: Ketan Patel

Co-authors and Affiliations:

Dr .Pankaj Bardia, Dr. N. N. Jha, Dr. R. Rajesh
Reliance Industries Limited

Introduction:

The purpose of the study is to evaluation performance by method comparison between Wet & Dry chemistry. For the same, we selected Cobas Integra 400 plus analyzer as a wet chemistry & Fujifilm Nx500i analyzer as a dry chemistry.

Materials and Methods:

We selected most common & frequently used analytes for this study. We selected samples with different concentration from routine laboratory test flow & analysed on wet & dry chemistry analyzers. Linear regression analysis & Bland-Altman plot were applied for method-comparison data analysis.

Results:

Using linear regression analysis, 15 analytes were evaluated for method comparison with correlation coefficient (r) : Creatinine – 0.9989 ,Total bilirubin – 0.9987, Direct bilirubin – 0.9942, BUN – 0.9986, Uric acid – 0.9928, Total Cholesterol – 0.9947, HDL cholesterol – 0.9915, Triglyceride – 0.9925, AST – 0.9968, ALT – 0.9978, Alkaline Phosphatase - 0.9935, GGT - 0.9973, Glucose – 0.9977, Total protein – 0.9759, Calcium – 0.9764, Albumin - 0.9203. Bland-Altman plot revealed that results of parameters by both methods are in agreement against defined limits.

Conclusion:

As per using linear regression analysis and Bland-Altman plot, results from Wet & Dry chemistry are comparable for most of the analytes when analysed on Cobas Integra 400 plus as a wet chemistry analyzer and Fujifilm Nx500i as a dry-chemistry analyzer.

Keywords:
Linear regression analysis, Bland-Altman plot, Correlation coefficient, Performance evaluation, Method comparison.

# Poster No – 19

Abstract Title: Retrospective Analysis of HyponaTremia And Syndrome of Inappropriate Anti-Diuretic Harmone Secretion (SIADH) in Bone Marrow Transplant

Presenting Author: Shraddha Kamble

Co-authors and Affiliations:
U Gavhane,B.G.S.Pillai, M Tiwari, S Pal, U Gosavi, R Mohite, A.Karmore, S.Vaykar, A.Kumari, P.Dalvi, D.Kawle, V Bhat, P Chavan , S. Mokashi, P Poladia. TMC - ACTREC, Kharghar

Introduction: One of the common complications observed in oncology patients is electrolyte imbalance. Hyponatremia is common abnormality in hospitalized patients and is associated with increased morbidity and mortality. In patients of Bone Marrow Transplant (BMT), Syndrome of Inappropriate Anti-Diuretic Hormone secretion (SIADH) has been reported in the literature between 7-13%. We undertook this study to evaluate the incidence of hyponatremia and SIADH in our patient's post-BMT.

Materials and Methods:

We analysed359(M:252,F:107,paediatric:69,adult:290,allogenic:160,autologous:199) cases of peripheral blood BMT conducted between a period of June2012-May2016 retrospectively. Serum electrolyte levels were assessed during stay in BMT unit and subsequently twice-thrice a week during their follow-up outpatient department visits. Hyponatremia was defined as serum sodium level <136 mmol/l. In Hyponatremics further serum and urine osmolality were assessed.

Results : Incidence of hyponatremia was found to be 5.84%(21/359).Total number of patients with SIADH was 7/359(1.95%). Incidence of Hyponatremia was 5.95% in men, 5.6% in women(p=0.8986);8.75% in allogenic,3.52% in autologous transplant (p=0.0610);6.21% in adult and 4.34% in paediatric groups(p= 0.7765)respectively. Serum sodium levels were<=130 mmol/l, in all Hyponatremics. Incidence of SIADH in allogenic and autologous BMT patients was 3.75% and 0.50 %(p=0.0479) respectively. Out of all 290 adult and 69 paediatric cases, SIADH was observed in 6.2%and1.45% respectively (p=1.0).Incidence of SIADH was 2.38% in men and 0.94% in women(p=0.6790). More than 70% of SIADH cases occurred within 100 days post transplant.

Conclusion : Compared to other published studies incidence of hyponatremia and SIADH post BMT was observed to be lower in our patients. SIADH was more commonly seen in allogenic transplant patients than autologous transplant setting.

Keywords: SIADH, hyponatremia, Bone Marrow Transplant

# Poster No – 20

Abstract Title: Limitations of Using only Hemoglobin Levels for Screening Blood Donors.

Presenting Author: Mrunal Ganage

Co-authors and Affiliations:
Preeti Chavan, Vivek Bhat, Minal Poojary, Shashank Ojha, Sanjay Pal, Babu Pillai
Composite Lab ,ACTREC, Kharghar

Introduction: Blood and aphaeresis donors are screened for fitness based on their haemoglobin value. However, donors with acceptable haemoglobin levels may have low mean corpuscular volume(MCV) with high total Red Blood Cell(RBC) Count. The cause for these low levels of MCV may be iron-deficiency-anaemia(IDA)or haemoglobinopathy. Aim of this study was to assess the low MCV values, total RBC count and its correlation with haemoglobin levels in blood, aphaeresis donors found fit- for-donation.

Materials and Methods:

Pre-donation blood samples from 751(M:558;F:193)blood, aphaeresis donors found fit-for-donation were processed for Complete Blood Count(CBC). Serum Ferritin levels of donors with MCV levels below reference range(83-101fL) were analysed. Serum Ferritin levels<reference range(M:21.8-274.6ng/ml;F: 4.63-204ng/ml) were defined as iron deficiency. Mentzer index-MI(MCV/RBC count) was calculated for all samples. MI<13 was considered suggestive of haemoglobinopathy,>13 was suggestive of IDA.

Results : 27/751(M:19;F:8)samples(3.6%) showed MCV<80fl. Of these, 58%(11/19) male donors and 50%(4/8) female donors had MI<13 suggesting haemoglobinopathy. The rest(M: 8; F: 4)had MI>13 suggesting IDA. Three male donors showed low serum ferritin levels, of these two had MI<13 suggesting coexistence of hemoglobinopathy and IDA. RBC count was>reference range in all donors with low MCV. Reference range for total RBC count was M:4.5-5.5X1012/L;F:3.8-4.8X1012/L.

Conclusion : Screening blood,aphaeresis donors for haemoglobin alone is not a reliable method for selecting healthy individuals fit-for-donation. CBC count with emphasis on MCV and RBC count should be done while screening to select donors to help exclude individuals with hemoglobinopathy or IDA, but higher haemoglobin levels due to high RBC count. Detailed study with further investigation for IDA and haemoglobinopathies is desired.

Keywords: IDA, haemoglobinopathies

# Poster No – 21

Abstract Title:

Detection and clinical significance of HPV (Human Papilloma Virus) genotype in diagnosis of HPV infection and screening of cervical cancer.

Presenting Author: Tejashree Morajkar

Co-authors and Affiliations:
Vijay Vadgama, Ashish Lad, Dr. Shamma Shetye
Metropolis Healthcare Ltd, Mumbai

Introduction: HPV infection is the most common sexually transmitted disease and persistent HPV infection plays a major role in cervical cancer. Traditional population based cervical screening programme, based on cytology, have successfully reduced the burden of cervical cancer. HPV strains are classified in two groups i.e. high risk (HR) and low risk (LR) based on their oncogenic property i.e. their ability to transform cells and cause cancer. Various national guidelines like USPSTF, ASCCP and ACOG guidelines recommend HPV co-testing with cytology for women aged 30-65 years every 5 years or only cytology every 3 years.

Materials and Methods:

This study was done to find the distribution of various HPV genotypes among Indian population. To facilitate the detection and molecular typing of HPV in clinical samples, nested-PCR amplification system for L1 region followed by sequencing technique was carried out. Nested-PCR with MY / GP+ primer set was done to detect presence of HPV infection in 7800 clinical samples. All HPV positive samples were further tested for genotype using sequencing technique (Genetic Analyzer 3500Dx) which works on Sanger's principle and genotype was determined using NCBI BLAST tool.

Result & Conclusion:

Total number of patient included in this study was 7800. Out of which 7097 (90.98 %) patients were negative and 703 (9.01 % patients) were found to be positive. All the positive cases were further evaluated for high-low risk based on their genotype. Out of 703 positive patients (475/703) 67.56% were found to be high risk and (228/703) 32.43 % were found to be low risk.

Keywords: HPV (Human Papilloma Virus), PCR, Cervical cancer

# Poster No – 22

Abstract Title:

Diagnostic Performance of Genexpert Assay for Pulmonary & Extrapulmonary Tuberculosis Specimens

Presenting Author: Aabida Khan

Co-authors and Affiliations:
Vijay Vadgama, Ashish lad and Dr. ShammaShetye
Metropolis Healthcare Ltd, Mumbai

Introduction:

Tuberculosis, caused by Mycobacterium tuberculosis (MTB) is a highly-infectious-transmissible disease. Globally, approximately nine million people are infected with Mycobacterium Tuberculosis and develop active disease. India being hyper endemic bears the highest burden of TB cases each year. The rapid, accurate and point of care testing diagnosis of tuberculosis and detection of rifampin (RIF) resistance are essential for early disease management. World Health organization endorsed an automated and fully integrated molecular diagnostic system called GeneXpert MTB/RIF, developed by the Foundation for Innovative New Diagnostics (FIND) that detects Mycobacterium tuberculosis and tests for drug resistance in less than two hours simultaneously. The drug Rifampicin constitutes first-line drug treatment strategy for TB management. Literature studies suggest that Xpert MTB/RIF assay display better sensitivity over pulmonary than Extrapulmonary specimens.

Materials and Methods:

Overall 9525 specimens were studied at the Metropolis Healthcare with the new molecular-based GeneXpert MTB/RIF (Xpert) assay system. In which 65% (6236/9525) patients were found MTB positive and 34% (3289/9525) patients were MTB negative. In MTB positive cases, 9% (926/9525) patients were positive for Rif resistance and 24% (2361/9525) Patients were negative for Rif resistance.

Result & Conclusion: Thus, Gene Xpert MTB/RIF assay is efficient and reliable technique for the rapid diagnosis of MDR TB. Its simplicity, sensitivity, speed and automation, make this technique a very attractive tool for diagnosis of Mycobacterium tuberculosis from samples in MDR cases.

Keywords: Genexpert, Extra pulmonary Tuberculosis

# Poster No – 23

Abstract Title:

A Demographic Study of MDR TB in Mumbai Suburbs and its Socio-economic Implications

Presenting Author: Kishore Desai

Co-authors and Affiliations:

Bangde S, Patil A, Dept of Biotechnology, Birla College, Kalyan, InfeXn laboratories, Thane

Introduction:

India has highest burden of tuberculosis, affecting most young, economically productive age group. High prevalence of MDR- TB has become an obstacle to effective TB control & economic burden in India.

Materials and Methods:

Impact of demographic and socio economic factors on prevalence of MDR-TB in Thane suburban area.

Retrospective cohort study of 100 positive cases of Pulmonary & Extra pulmonary tuberculosis by Liquid culture using BACTEC-MGIT 960. Drug sensitivity was studied for first line drugs to look for MDR cases.

Results:

1. Pulmonary tuberculosis : Extra Pulmonary tuberculosis = 63 : 37
2. Tuberculosis Positive :- Male : Female = 51 : 49
3. Among Pulmonary TB, 65% of cases were MDR (Resistant to Rifampicin and Isoniazid)
4. The study reveals alarming situation that 53% population belongs 15-30 year age group that is young and sole bread winner of the family.

Conclusion:

Findings of this study emphasize the importance of analyzing socio demographic profiles with respect to MDR-TB.

- MDR resistant strains are prevalent amongst both Pulmonary as well as Extra-pulmonary infections.
- Prevalence of MDR Tuberculosis is not gender specific hence increased risk of transmission in close contacts (especially young children) .
- MDR TB was found most prevalent among youth (15 – 30 years) as compared to rest of population

Keywords: MDR-TB, Extra-pulmonary, DST, MGIT.

# Poster No – 24

Abstract Title:

Non- Salmonella Blood Stream Pathogens: Metropolis Experience

Presenting Author: Mrs. Asha Talekar

Co-authors and Affiliations:

Dr. Shamma Shetye, Metropolis, Mumbai.

Introduction:

Throughout the world, the number of patients at risk for bloodstream infections (BSIs) continues to rise. BSIs are associated with high rates of morbidity and mortality, and they markedly increase the costs of hospital care. Blood culture (BC) remains the gold standard for diagnosing BSIs. Over the decades, automated Blood culture systems have enhanced the recovery of bloodstream pathogens and decreased the time to detection (TTD) of microbial growth. The time-consuming process of isolate identification with conventional culture-based methods has also been improved, with development of new technology such as matrix-assisted laser desorption ionization–time of flight (MALDI-TOF) mass spectrometry (MS).

Materials and Methods:

Within the year 2016, consecutive samples received for Blood culture were processed in BactecFx blood culture system. Identification and susceptibility was done using Vitek-MS and Vitek-2 respectively.

Results:

Out of 797 positive isolates, 399 (50%) were salmonella and 398 non- salmonella blood stream pathogens which included *E. coli, Klebsiallapneumoniae, Staphylococcus aureus, CONS (Coagulase negative Staphylococci), Candida spp*.

Conclusion: Our experience indicates that the Automated Blood culture systems help in recovery of blood stream pathogens & Vitek MS helps In faster identification. Since the rapid emergence of resistant bacteria is occurring worldwide, clinicians and laboratories need to think beyond the usual bacteria causing blood stream pathogens.

Keywords: Bloodstream infections (BSIs), (MALDI-TOF), non-salmonella

# Poster No – 25

Abstract Title:

Knowledge, Attitude, Practices about Biomedical Waste Management amongst Healthcare Professionals

Presenting Author: Uttara Tatke

Co-authors and Affiliations:

Neelam Redekar , Uttara Tatke, , Mayura Maitri, ,Akash Kharatkar, Kajal Dagade, Gayatree Patil, Maitreyi Sawant, Swarada Lele

Symbiosis Institute of Health Sciences, Symbiosis International University, Pune

Introduction:

Any waste which is generated during the diagnosis, treatment or immunization of human beings or animals or in research activities pertaining thereto or in the production or testing of biological is defined as biomedical waste. There is no effective waste segregation, collection, transportation and disposal system which raises an immediate and urgent need to train and educate all healthcare professionals to adopt an effective waste management practice. Measures need to be taken for to monitor the protocol carried in laboratories.

Materials and Methods:

A comparative survey was carried out in Pune city where healthcare professionals working in pathology laboratories associated with Hospitals and laboratories working independently underwent a structured survey. Participants volunteered in the research study having received their consent form. Confidentiality was strictly maintained.

Results:

95% laboratories associated with hospitals are more aware about the biomedical waste protocol while 69% laboratories working independently have adhered to systematic biomedical waste disposal protocol as expected to be followed.

Conclusion:

So as per the results of survey conducted, as compared to the independent pathology laboratories, the hospital attached pathology laboratories are much more aware about biomedical waste disposal and follow the waste disposal protocol in much efficient manner.

Keywords:

Biomedical waste, pathology, laboratories.

# Poster No – 26

Abstract Title: Two Cases of Bombay Blood Group in ANC Patients

Presenting Author: Arun Talekar

Co-authors and Affiliations:

Jain VU, Gaikwad ND, Nisal AR, Jaykar H, Kelkar AJ, Mani NS Department of Pathology, Bharati Vidypeeth University Medical College, Pune

Introduction:

The Hh blood group contains one antigen, the H antigen, which is found on virtually all RBCs and is the building block for the production of the antigens within the ABO blood group. H antigen deficiency is known as the "Bombay phenotype" (h/h, also known as Oh) and is found in 1 of 10,000 individuals in India and 1 in a million people in Europe. There is no ill effect with being H deficient, but if a blood transfusion is ever needed, people with this blood type can receive blood only from other donors who are also H deficient.

Materials and Methods:

Two ANC patients who came for routine check up in the obstetric OPD were tested for blood groups in addition to the routine testing.

Results :

Both the patients showed O Rh Positive blood group showing absence of agglutination with H antigen and agglutination of O cells with patient's serum in reverse grouping by tube method.

Conclusion:

Detection of Bombay phenotype is important in pregnancy as well as in other situations where a blood transfusion is anticipated as it is a rare phenotype and can cause transfusion reaction if proper identification is not done.

Keywords:

Bombay phenotype, H antigen, ANC patient

# Department Activity

## Training Programs In Hematopathology Laboratory

### 1. Advanced Training Course in Hematopathology

It is a six month training program with a monthly stipend.

Course starts every January and July.

Accommodation will be provided.

### 2. Advanced Training Course in Flow cytometry

It is a six month training program with a monthly stipend.

Course starts every January and July.

Accommodation will be provided.

### 3. Advance training course molecular hematology

It is a six month training program with a monthly stipend.

Course starts every January and July.

Accommodation will be provided.

### 4. Clinical Cytometry Course

It is a 5 days course held once in a year in the month of August.

No fees are charged for this course.

accommodation will be provided at a nominal rate.

### 5. CME For Medical Technologists

Two days program held every year in the month of December.

### 6. Basic Hematopathology Course for doctors

Two days program held every year in the month of June - July.

**Details are available on TMH website-** www.tmc.gov.in

**Contact Number-** 022-24177000 **Extension -** 4362/4367/4371.

# Meeting Coordinators

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