SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES

OSSUDU AGARAM VILLAGE; KUDAPAKKAM POST,PONDICHERRY - 605003

Circular

11.10.19

Sub: Organizing Value-added Course: Automation in hematology

With reference to the above mentioned subject, it is to bring to your notice that **SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES Bharath Institute of Higher Education and Research**, is organizing"Automation in hematology _"**from November 2019**. The course content is enclosed below."

The application must reach the institution along with all the necessary documents as mentioned. The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before 30.10.2019. Applications received after the mentioned date shall not be entertained under any circumstances.

Dean

Encl: Copy of Course content

Dr. G. JAYALAKSHMI, BSC.,MBBS.,DTCD.,M.D.,
DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Ageram Kudapakkam, Post,
Villanur Commune Puducherry-605 502.

Course Proposal

Course Title: Automation in hematology

Course Objective:

1. To define the automation and shall be able to discuss the principle and procedure to be followed in analyzer.
2. Should know about the parts and principle of Analyzer
3. Should be able to run analyzer and should also know about the trouble shooting

Course Outcome: Should know about the tissue processing in detail
Course Audience: IInd year MBBS
Course Coordinator: Dr.Pammy sinha
Course Faculties with Qualification and Designation:
1. Dr.V.Saravanakumari, Assistant Professor
2. Dr.Pammy sinha, Professor
Course Curriculum/Topics with schedule :

SlNo	Date	Topic	Time	Hours	Faculty
1.	2.11.2019	Automated techniques of blood counting	1.30-4 pm	2.5 hrs	**Dr.Pammy sinha**
2.	9.11.2019	Automated instruments	1.30-4 pm	2.5 hrs	**Dr.V.Saravanakumari,**
3.	16.11.2019	PRINCIPLE	1.30-4 pm	2.5 hrs	**Dr.V.Saravanakumari,**
4.	23.11.2019	Coulter principle-electrical impedance	1.30-4 pm	2.5 hrs	**Dr.Pammy sinha**
5.	30.11.2019	Histograms of Coulter S Plus IV	1.30-4 pm	2.5 hrs	**Dr.V.Saravanakumari,**
6.	7.12.2019	OPTICAL METHOD , Reliability of electronic counters	1.30-4 pm	2.5 hrs	**Dr.Pammy sinha**
7.	14.12.2019	Hemoglobin concentration RBC COUNTING	1.30-4 pm	2.5 hrs	**Dr.V.Saravanakumari,**
8.	21.12.2019	Red cell distribution	1.30-4 pm	2.5 hrs	**Dr.V.Saravanakumari,**

		histograms			
		Practical Class			**Dr.V.Saravanakumari,**
9.	28.12.2019	Reticulocyte count	1.30-4 pm	2.5 hrs	**Dr.Pammy sinha**
10.	4.01.2020	PCV, Red cell indices MCV ,Redcell distribution width (RDW)	1.30-4 pm	2.5 hrs	**Dr.V.Saravanakumari,**
11.	11.01.2020	Platelet count,	1.30-4 pm	2.5 hrs	**Dr.V.Saravanakumari,**
12	18.01.2020	Assessment and giving feedback	1.30-4 pm	2.5 hrs	**Dr.V.Saravanakumari,**
		Total		30 hrs	

REFERENCE BOOKS:

1.Automation in Hematology Dennis W. Ross ,George Brecher ,Marcel Bessis

2.Automated Hematology Analyzers: State of the Art, An Issue of Clinics in Laboratory Medicine, E-Book (The Clinics: Internal Medicine) by CarloBrugnara (Author)

VALUE ADDED COURSE

1. Name of the programme & Code

Automation in hematology & PA012

2. Duration & Period

30 hrs Nov2019-Jan 2020

3. Information Brochure and Course Content of Value Added Courses

Enclosed as Annexure- I

4. List of students enrolled

Enclosed as Annexure- II

5. Assessment procedures:

Short notes questions- *Enclosed as Annexure- III*

6. Certificate model

Enclosed as Annexure- IV

7. No. of times offered during the same year:

1 time Nov2019-Jan 2020

8. Year of discontinuation: 2021

9. Summary report of each program year-wise

Value Added Course- Nov2019-Jan 2020					
Sl. No	**Course Code**	**Course Name**	**Resource Persons**	**Target Students**	**Strength & Year**
1	PA012	Automation in hematology	Dr. V.Saravanakumari	IInd MBBS	Nov2019-Jan 2020

10. Course Feed Back

Enclosed as Annexure- V

RESOURCE PERSON

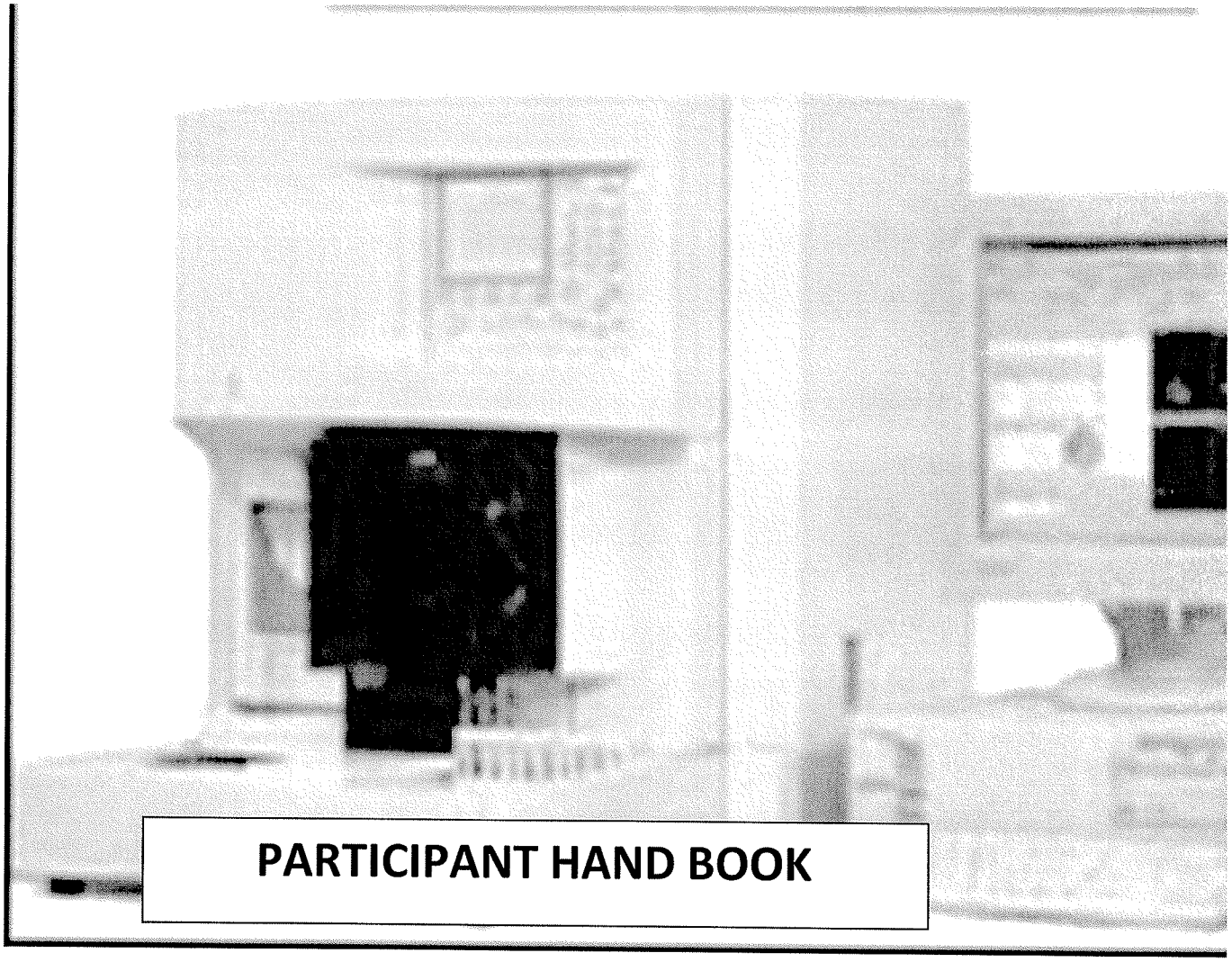
DR.V.SARAVANAKUMARI

COORDINATOR

Dr. Pammy Sinha

PROFESSOR & HEAD, DEPT. OF PATHOLOGY
SRI LAKSHMI NARAYAN INSTITUTE OF
MEDICAL SCIENCES,
PUDUCHERRY - 605 502.

Automation in haematology



PARTICIPANT HAND BOOK

COURSE DETAILS

Particulars	Description
Course Title	Automation in haematology
Course Code	PA012
Objective	1. Automated techniques of blood counting 2. Automated instruments 3. PRINCIPLE 4. Coulter principle-electrical impedance 5. Histograms of Coulter S Plus IV 6. OPTICAL METHOD 7. Reliability of electronic counters 8. Hemoglobin concentration 9. RBC COUNTING 10. Red cell distribution histograms 11. Reticulocyte count 12. PCV and red cell indices 13. MCV, Red cell distribution width (RDW) 14. Platelet count 15. Automated differential count
Further learning opportunities	Learn automation in hematology
Key Competencies	On successful completion of the course the students will have skill in handling & understanding automated instruments
Target Student	II MBBS Students
Duration	30hrs Every Nov2019-Jan2020
Theory Session	20hrs
Practical Session	10hrs

Assessment Procedure	Short notes

Automated techniques of blood counting

- **Semi-automated instruments**

Require some steps, as dilution of blood samples

Often measure only a small number of variables

- **Fully automated instruments**

Require only that an appropriate blood sample is presented to the instrument.

They can measure 8-20 variables including some new parameters which do not have any equivalent in manual methods.

Automated instruments

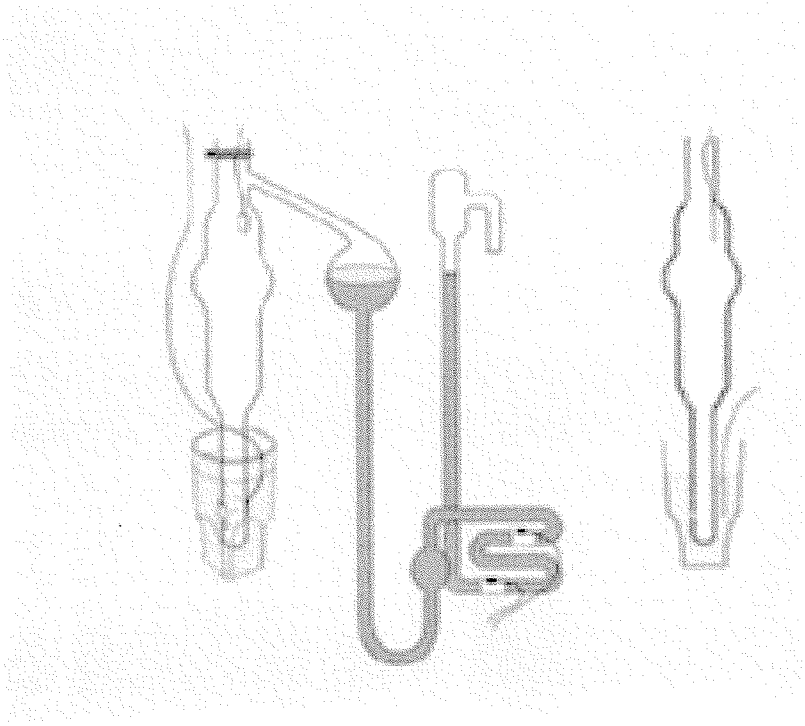
- **They have a high level of precision for cell counting and cell sizing greatly superior to that of the manual tech.**
- **The results are generally accurate.**
- **Aberrant results consequent on unusual characteristics of blood are "flagged" for subsequent review.**
- **In general automated differential counters are favourable to the manual in 2 conditions**
  - **Exam of normal blood samples**
  - **Flagging of abnormal samples**

PRINCIPLE:

- **1.ELECTRICAL IMPEDANCE**
- **2.LIGHT SCATTERING**
- **3.CENTRIFUGATION AND QUANTITATIVE BUFFY COAT ANALYSIS**

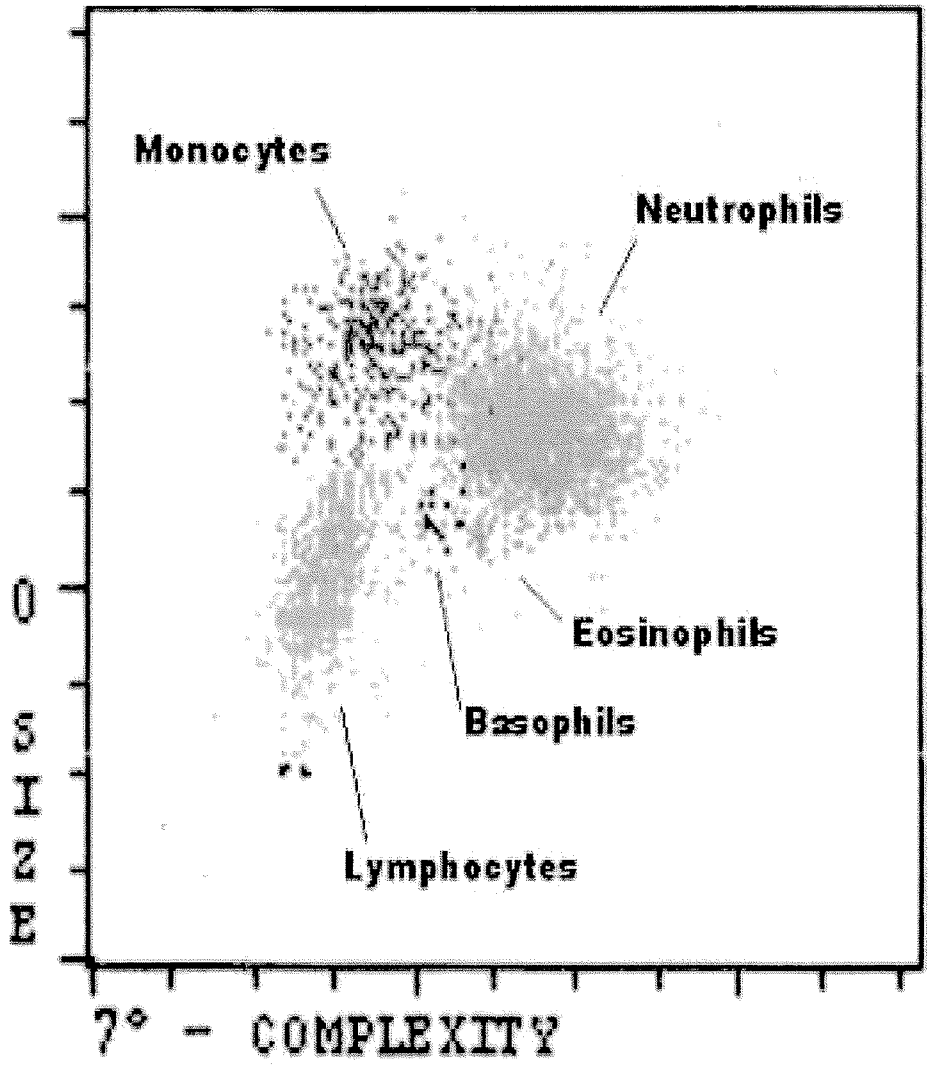
Coulter principle-electrical impedance

- **. A stream of cells in suspension passes through a small aperture across which an electrical current is applied. Each cell that passes alters the electrical impedance and can thus be counted and sized.**

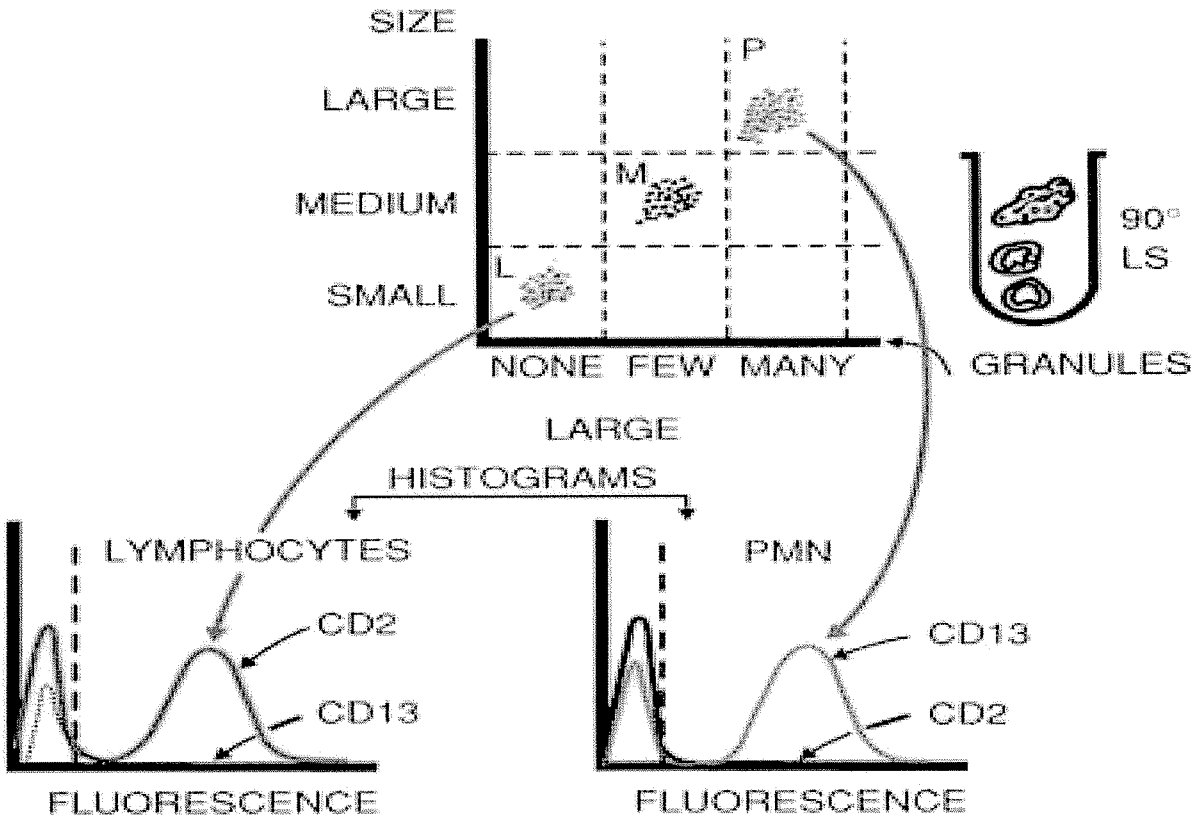


Histograms of Coulter S Plus IV

Scatterplot obtained from laser light scatter analysis of white blood cells. y-axis represents data obtained by light scatter at 0° (measure of cell size), while x-axis represents laser light scatter at 7° (cell internal complexity). Each "dot" represents data from a single cell



- **Lymphocytes (L) (small and nongranular) occupy the lower left area of the screen; polymorphonuclear leukocytes (P) (large with many granules), the upper right.**
- **The monocytes (M) are detected in an intermediate position.**
- **Identification of these populations is achieved with monoclonal antibodies specific for markers present .**



4-1 MULTIPARAMETER ANALYSIS

Reliability of electronic counters:

- **They are precise but care should be taken so that they are also accurate.**
- **Some problems which could be faced:**

Two cells passing through the orifice at the same time, counted as one cell.

RBC agglutination(clump of cells)

Counting bubbles or other particles as cells.

Hemoglobin concentration

Hb is measured automatically by a modification of the manual (cyanide) method.

To reduce toxicity of Cyanide some systems replace it by a non-toxic material Na- lauryl sulphate.

RBC COUNTING

- **The RBCs are counted automatically by two methods**
  - **Aperture impedance: where cells are counted as they pass in a stream through an aperture.**
  - **Or by light scattering technology**

Red cell distribution histograms

- In these histograms, RBC volume (x-axis) is plotted vs. the cell count (number of events counted (y-axis).
- The mean corpuscular volume (MCV) is the median value of the histogram distribution.
- The red cell distribution width (RDW) is the coefficient of variation of the curve.

Microcytic red cells (a) fall to the left portion of the curve, while macrocytic red cells fall to the right (c). The histogram in the center is from a normocytic, normochromic specimen with an MCV of 88 fL.

Reticulocyte count

- **An automated retic count can be performed using the fact that various fluoro-chromes combine with the RNA of the reticulocytes. Fluorescent cells can then be enumerated using a flowcytometer.**
- **An automated retic counter also permits the assessment of retic maturity since the more immature reticulocytes have more RNA→fluoresce more strongly than the mature retics found normally in PB.**

PCV and red cell indices

- **Pulse height analysis allows either the PCV or the MCV to be determined.**
- **MCV=PCV/RBC count**
- **MCH= Hb/RBC count**
- **MCHC= Hb/PCV**

MCH & MCHC are derived parameters

MCV

The MCV is the median value of the histogram distribution obtained when red blood cell size is plotted against the number of cells ("red cell histogram")

- **The MCV, measured in femtoliters (fL, or 10^{-15} L), is the most important of the red cell indices.**

Red cell distribution width (RDW)

- **Automated instruments produce volume distribution histograms which allow the presence of more than one population of cells to be appreciated.**
- **Most instrument produce a quantitative measurement of variation in cell volume, an equivalent of the microscopic assessment of the degree of anisocytosis. - known as the RDW.**
- **A quantitative measure of variation in red blood cell size (anisocytosis),**
- **RDW- elevated in iron deficiency anemia, myelodysplastic syndromes, macrocytic anemia secondary to vitamin B12 or folate deficiency, and some malignancies**
- **RDW is usually normal or only mildly elevated in the microcytic anemia of thalassemia**

Platelet count

- **Platelets can be counted in whole blood using the same tech-of electrical or electro-optical detection as are employed for RBCs.**
- **Other parameters include**
  - **MPV**
  - **PDW**
  - **Plateletcrit= MPV x platelet count.**
- **mean platelet volume (MPV), based on a platelet distribution histogram.**
- **The MPV is increased in patients with peripheral platelet destructive processes, - young, large platelets are rapidly released from the bone marrow.**
- **The MPV is decreased in thrombocytopenia due to marrow suppression.**

Total WBC count

- **The total WBC count is determined in whole blood in which red cells have been lysed.**
- **Fully automated multichannel instruments perform WBC counting by either**
  - **Impedance**
  - **Or light scattering**
  - **Or both.**

Automated differential count

- Automated differential counters which are available now generally use flow cytometry incorporated into a full blood counter rather than being standard alone differential counters
- Automated counters provide a three-part or five- to seven-part differential count.
- 3-part differential
- Granulocytes or large cells
- Lymphocytes or small cells
- Monocytes(mononuclear cells) or (middle cells)
- 5-part classify cells to
- Neutrophils
- Eosinophils
- Basophils
- Lymphocytes
- Monocytes
- A sixth category designated "large unstained cells" include cells larger than normal and lack the peroxidase activity this include
    - Atypical lymphocytes
    - Various other abnormal cells.
- Other counters identifies 7 categories including
    - Large immature cells(composed of blasts and immature granulocytes)
    - Atypical lymphocytes(including blast cells).
- Analysis may be dependant on:
    - Volume of the cell
    - Other physical characteristics of the cells
    - Sometimes the activity of cellular enzymes such as peroxidase.
- technologies used
    - Light scattering and absorbance
    - Impedance measurement
- Automated differential counters employing flow cytometry classify far more cells than is possible with a manual differential count.

- **Lymphocytes (L) (small and nongranular) occupy the lower left area of the screen; polymorphonuclear leukocytes (P) (large with many granules), the upper right.**
- **The monocytes (M) are detected in an intermediate position.**

Identification of these populations is achieved with monoclonal antibodies specific for markers present

VALUE ADDED COURSE

Automation in haematology, PA012

List of Students Enrolled November 2019-January 2020

2nd Year MBBS Student			Signature
Sl. No	**Name of the Student**	**Roll No**	
1	FAUSTINA BAJWIN .S	U18MB291	
2	G SRI SAI NITISH	U18MB292	
3	GAUR DARSHANA PURUSHOTTAM GAUR	U18MB293	
4	GHATKAR SAYALL KRISHNA	U18MB294	
5	GOKUL M S	U18MB295	
6	GOPIKA .P	U18MB296	
7	HARI BALA SIDDHARTH T.R	U18MB297	
8	HARSHINI R C	U18MB298	
9	HIBA MOIDEEN .K	U18MB299	
10	INDHU S	U18MB300	
11	INDU V	U18MB301	
12	INDUKURI SAI AKANKSHA	U18MB302	
13	IPSITA SETHY	U18MB303	
14	JAGADEESAN S.R	U18MB304	
15	JAHNAVI REDDY .M	U18MB305	
16	JAISHREE .S	U18MB306	
17	JANANI V	U18MB307	
18	JASMEET NIRANJAN	U18MB308	
19	JAYALAKSHMI S	U18MB309	
20	JAYAREDDYGARI SAI RUCHITHA	U18MB310	

RESOURCE PERSON

DR. V. SARAVANAKUMARI

DEPARTMENT OF PATHOLOGY
Sri Lakshmi Narayana Institute Of Medical Sciences
PONDICHERRY 605 502.

COORDINATOR

D. Pammy Sinha

PROFESSOR & HEAD, DEPT. OF PATHOLOGY
SRI LAKSHMI NARAYAN INSTITUTE OF
MEDICAL SCIENCES,
PUDUCHERRY - 605 502.

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Automation in haematology PA012

Course Code: PA12

I. ANSWER ANY 6 QUESTIONS

1. PRINCIPLE of Automated instruments
2. Red cell distribution histograms
3. Reticulocyte count
4. PCV and red cell indices
5. MCV,Red cell distribution width (RDW)
6. Platelet count
7. Automated differential count

Name : Indu

Automation in Haematology

21/30

3. Reticulocyte count:

A reticulocyte count is a test used to measure the level of reticulocytes in the blood. It's also known as a retic count, corrected reticulocyte count or reticulocyte index.

The reticulocyte count can help to learn if your bone marrow is producing enough red blood cells.

4. PCV - Packed cell Volume:

Blood is a mixture of cells and plasma. The PCV is a measurement of the proportion of blood that is made up of cells. The value is expressed as a percentage or fraction of cells in blood.

Red Cell Indices:

Red cell indices are blood tests that provide information about the hemoglobin content and size of red blood cells.

Red cell indices can be calculated if the values of hemoglobin, hematocrit and red blood cell count are known.

6. Platelet count:

Platelets are the smallest of blood cells and can only be seen under a microscope.

AUTOMATION IN HEMATOLOGY

GOKULM.S
Roll no: 5

22/30

① Principle of Automated Instruments

- An essential Principle of SFA is the introduction of air bubbles.
- The air bubbles segment each sample in to discrete packets and act as barrier b/w packets to prevent cross-contamination as they travel down the length of glass tubing
- It is the medical laboratory instrument designed to measure different chemicals and other characteristic

② Red cell distribution histograms

- Red DW is one of numbers or blood cell indices included as part of a complete blood count & describes varies in size of RBC in a sample of Blood.
- A higher RDW means that there is a greater variation in the size of RBC than excepted
- It is a graphic representation of particle size distribution now routinely availble on automated cell analyzer as standard part of automated complete blood count analysis

③ Reticulocyte Count

- To measure level of reticulocytes in your blood.
- It is known as a retic count, corrected reticulocyte or reticulocyte index

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that GOKUL M.S has actively participated in the Value Added Course on Automation in hematology held during Nov2019 – Jan 2020 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr. V.SARAVANAKUMARI
RESOURCE PERSON

DEPARTMENT OF PATHOLOGY
Sri Lakshmi Narayana Institute Of Medical Sciences
PONDICHERRY 605 502

Dr. PAMMY SINHA
COORDINATOR

PROFESSOR & HEAD, DEPT. OF PATHOLOGY
SRI LAKSHMI NARAYAN INSTITUTE OF
MEDICAL SCIENCES,
PUDUCHERRY - 605 502.

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CERTIFICATE OF MERIT

This is to certify that G. SRI SAI NITISH has actively participated in the Value Added Course on **Automation in hematology** held during Nov2019 – Jan 2020 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr. V.SARAVANAKUMARI

RESOURCE PERSON

DEPARTMENT OF PATHOLOGY
Sri Lakshmi Narayana Institute Of Medical Sciences
PONDICHERRY 605 502

Dr. PAMMY SINHA

COORDINATOR

PROFESSOR & HEAD, DEPT. OF PATHOLOGY
SRI LAKSHMI NARAYAN INSTITUTE OF
MEDICAL SCIENCES,
PUDUCHERRY - 605 502.

Student Feedback Form

Course Name: **Automation in hematology**

Subject Code: **PA12**

Name of Student: Jayashree. S Roll No.: U18MB306

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear			✓		
2	Course contents met with your expectations				✓	
3	Lecturer sequence was well planned				✓	
4	Lectures were clear and easy to understand			✓	✓	
5	Teaching aids were effective					✓
6	Instructors encourage interaction and were helpful				✓	
7	The level of the course					✓
8	Overall rating of the course	1	2	3	4	5

** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory*

Suggestions if any:

Nil.

Signature

Date: 18.1

Student Feedback Form

Course Name: **Automation in hematology**

Subject Code: **PA12**

Name of Student: Jayalakshmi Roll No.: UIBMB 309

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear				✓	
2	Course contents met with your expectations					✓
3	Lecturer sequence was well planned				✓	
4	Lectures were clear and easy to understand					✓
5	Teaching aids were effective					✓
6	Instructors encourage interaction and were helpful				✓	
7	The level of the course					✓
8	Overall rating of the course	1	2	3	4	5

** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory*

Suggestions if any:

Nil

Jayalakshmi.
Signature

Date: 18.1.20

Date: 25.01.2020

From

Dr.Pammy sinha
Professor and Head,
Department of pathology
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Through Proper Channel

To

The Dean,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Completion of value-added course: Automation in hematology

Dear Sir,

With reference to the subject mentioned above, the department has conducted the value-added course titled: Automation in hematology in IInd MBBS **Nov2019** - Jan 2020 for 20 students . We solicit your kind action to send certificates for the participants, that is attached with this letter. Also, I am attaching the photographs captured during the conduct of the course.

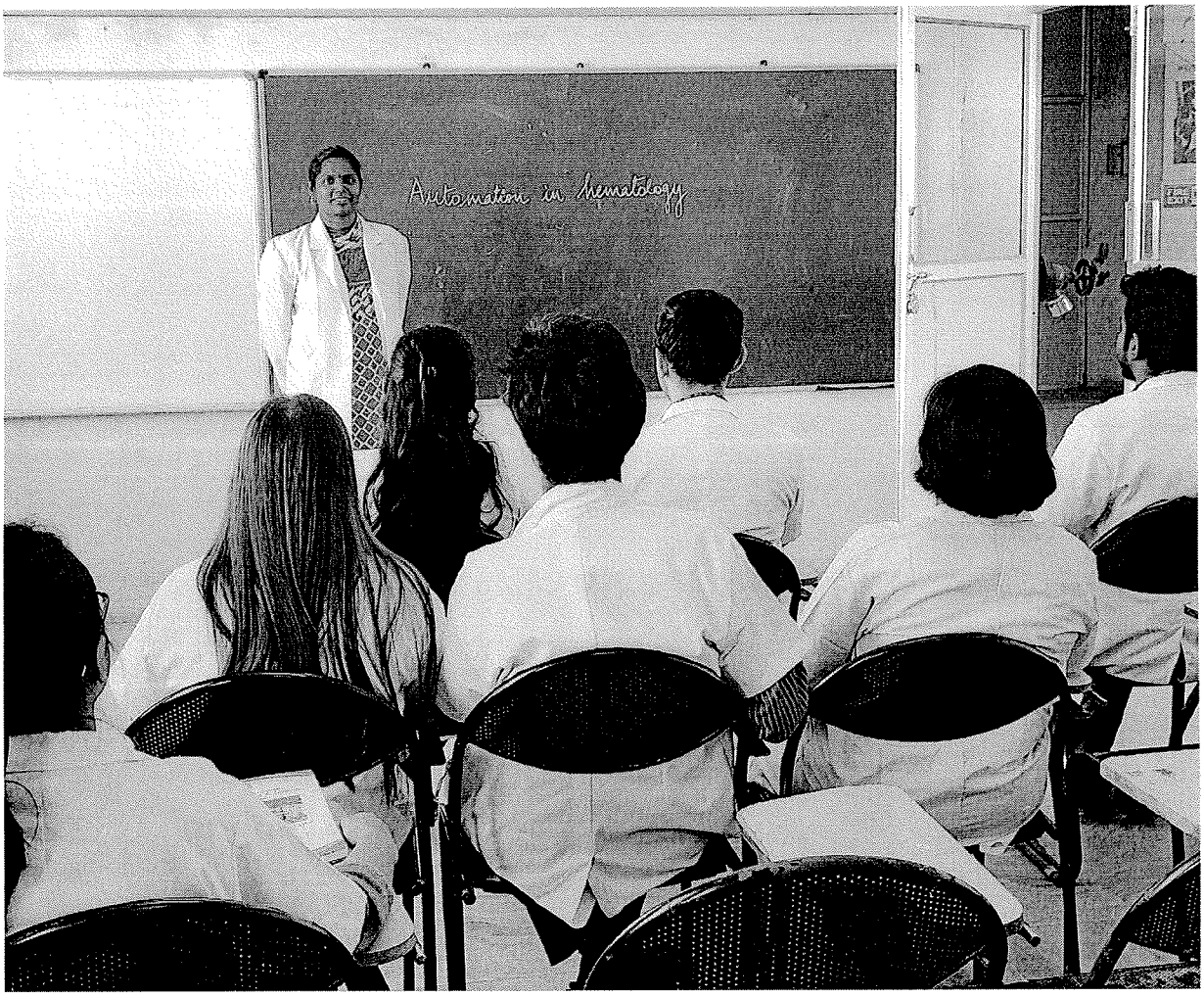
Kind Regards,

Dr. Pammy sinha

PROFESSOR & HEAD, DEPT. OF PATHOLOGY
SRI LAKSHMI NARAYAN INSTITUTE OF
MEDICAL SCIENCES,
PUDUCHERRY - 605 502.

Encl: Certificates

Photographs


Automation in hematology