Experiment:

-Automation blood count

-Red and White blood count and differential count (Manual blood count)

Introduction:

A **complete blood count** (**CBC**) is a test that gives information about the cells in a patient's blood.

Important

➢ To understand this test, it is important to know that the blood generally consists of two major parts; plasma and cellular elements (cellular elements generally divided into three types: white blood cells (leukocytes), red blood cells (erythrocytes), and platelets (thrombocytes). And the white blood cells have many diffrential ; monophil , nutrophil ,eosinophil , basophil , lymphocyte

➢test measures the quantity of all the different types of cells in the blood. It also provides some valuable information on other parameters related to each type of blood cell.(such as mean cell volume (MCV), mean cellular haemoglobin (MCH) and mean cellular haemoglobin concentration (MCHC).

➢In addition to counting, measuring and analyzing blood cells it also measure the amount of hemoglobin in the blood and within each red blood cell. This information can be very helpful to a physician who, for example, is trying to identify the cause of a patient's anemia. If the red cells are smaller or larger than normal, or if there is a lot of variation in the size of the red cells,

CBC can applied by two way:

1- automation blood count

2-manual blood count

(1) automation blood count:

automating analyzer (instrument has many different components to analyze different elements in the blood.

Blood counting machines aspirate a very small amount of the specimen through narrow tubing. Sensors count the number of cells passing through the tubing, and can identify the type of cell; this is flow cytometry.

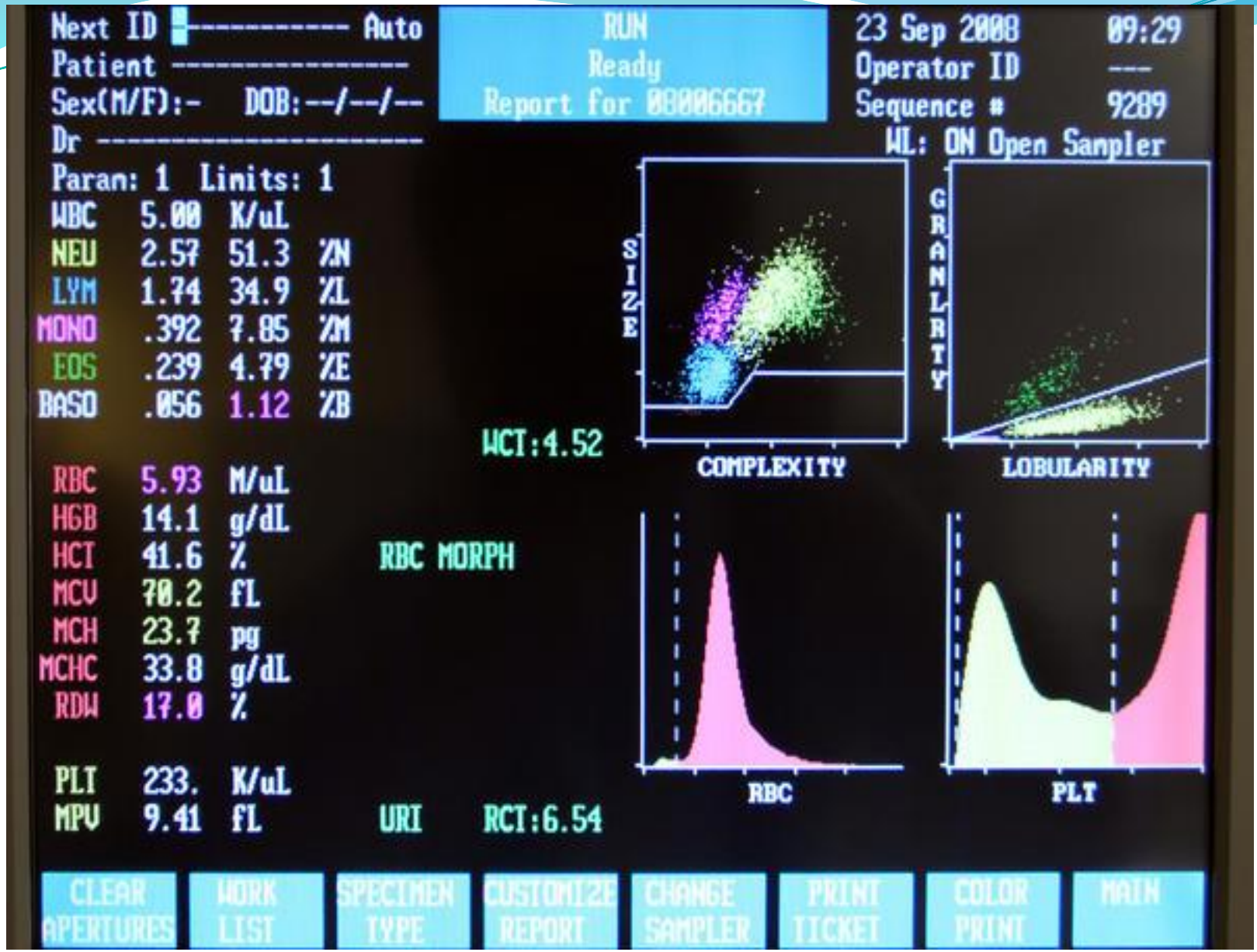
Automating analyzer:

Cell Dyn® (Abbott)

Coulter® LH 780 and other (Beckman Coulter)

ADVIA® 2120 and other(Siemens Diagnostics)

X-Class Hematology Systems (Sysmex**)**


Next ID ---------- Auto
Patient ----------
Sex(M/F):- DOB:--/--/--
Dr ----------
RUN
Ready
Report for 00006667
23 Sep 2008 09:29
Operator ID ---
Sequence # 9289
WL: ON Open Sampler
Paran: 1 Linits: 1
WBC 5.00 K/uL
NEU 2.57 51.3 %N
LYM 1.74 34.9 %L
MONO .392 7.85 %M
EOS .239 4.79 %E
BASO .056 1.12 %B
WCT:4.52
SIZE
COMPLEXITY
GRANLRTY
LOBULARITY
RBC 5.93 M/uL
HGB 14.1 g/dL
HCT 41.6 %
MCV 70.2 fL
MCH 23.7 pg
MCHC 33.8 g/dL
RDW 17.0 %
RBC MORPH
RBC
PLT
PLT 233. K/uL
MPV 9.41 fL
URI
RCT:6.54
CLEAR APERTURES
WORK LIST
SPECIMEN TYPE
CUSTOMIZE REPORT
CHANGE SAMPLER
PRINT TICKET
COLOR PRINT
MAIN

LOST RIVERS MEDICAL CENTER LABORATORY

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Patient:	**MALKIEWICZ, JUDITH A**			**Acc #:**	**55276**	
Patient #:	120850JM	Birth:	12/8/1950	Fasting:	UNKNOWN	
Doctor:	NON-STAFF	Age:	61 years	Collection Date:	2/22/2012 09:20	DZ
Home Phone:	(208)588-3977	Gender:	Female	Received in Lab:	2/22/2012 09:20	DZ
				Destination	OP	
				DR	SHULL/MYINT	

Test Name	Result	Units	Flag	Reference Range
CBC W/ 5 PART DIFF. (X6)				*Run by: TB on 2/22/2012 09:33*
WBC	2.1	K/uL		4.0 - 11.2
RBC	4.15	M/uL		4.00 - 5.60
HGB	13.5	gm/dL		12.0 - 16.0
HCT	39.5	%VOL		35.0 - 50.0
MCV	95	fl		82 - 98
PLATELETS	172	K/uL		140 - 440
MCH	32.6	pg		26.0 - 36.0
MCHC	34.3	g/dL		27.0 - 36.0
RDW	13.2	%		9.0 - 18.0
MPV	7.3	fl		6.0 - 12.0
NEU%	55.2	%		45.0 - 65.0
LYMPH%	30.9	%		20.0 - 50.0
MONO%	9.0	%		0.0 - 11.0
EOS%	4.0	%		0.0 - 7.0
BASO%	0.9	%		0.0 - 3.0
NEUT#	1.17	K/uL		2.00 - 8.00
LYMPH#	0.65	K/uL		1.80 - 4.80
MONO#	0.19	K/uL		0.10 - 1.10
EOS#	0.08	K/dl		0.00 - 0.80
BASO#	0.02	K/dl		0.00 - 0.30

(2) Manual blood count (red and white blood count and differential count):

Blood cell counts By ***appropriately diluted blood samples*** and a ***ruled counting chamber (hemocytometesr).***

***Why the blood should diluted?**

As there are far too many cells if it is not diluted.

Objective:

1-to estimate the number of RBC in blood sample

2-to estimate the number of total WBC in blood sample

3-to perform a differential count for a blood sample

(A)Red blood count:

- It is test done to determination the number of RBC in a sample of blood , also it evaluate the size and shape of RBC
- it is range from 4.2 – 5.5 million RBC per cubic milimeter (mm^3)
- It is considered a very important indicator of a patent'health

Low RBC count :

- ✓ Anemia
- ✓ Acute or chronic blood loss
- ✓ Malnutrition
- ✓ Chronic inflamation

Higher than average RBC count:

- ✓ polycythemia
- ✓ Congenital heart disease
- ✓ Renal problem

Normally high (RBC count)

✓People who live at high altitudes

✓Smokers

Principle :

RBC count by use haemocytometer , this instrument is a special microscopic slide .

The processes is involved by counting cells in several squares of the grid and obtain an average number, this number is multiply by a factor that compensates the amount of dilution. The final results expresses the number of RBC /mm^3 of original blood sample.

(B)WBC count :

- total leukocytes count shows the number of WBC in a sample of blood .
- A normal WBC count is between 4,500 and 11,000 cells per cubic millimeter .
- The number of WBC is sometimes used to identify an infection or to monitor the body's response to treatment .

- **Leukopenia:** is a Condition in which the number of leukocytes is abnormally low and which is most commonly due to sever infections and radiation poisoning.

- **Leukocytosis:** ia a condition characterized by an elevated the number of WBC occur as a result of an infection , cancer ,
- It can occur normally after eating larger meal .

Principle:

It is necessary to obtain RBC free preparation of WBC from blood . Suspension of the red blood cell in a very hypotonic solution will lead to the destruction of RBC .

(C) Differential Count:

- It is determines the number of each type of WBC present in the blood
- WBC are lymphocytes (25-33%) , monocytes (2-10%) , neutrophils (54-62%) , basphil (< 1%) , eosinophil (1-6%) . Each type of those cells a differential important role in protecting the body.
- ***Types of WBC:***

(1)Non granular (lymphocyte – plasma cell)

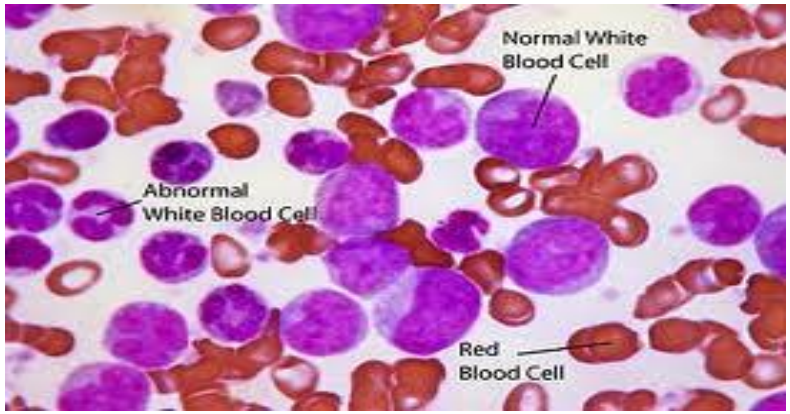
(2)Granular (polymorphonuclear granulocytes – monocytes)

Principle:

Classification of polymorphonuclear granulocytes is based on the size , shape , number and staining characteristics of their granules .

Leishman's stain diffrentiates between WBC because the nucei of lymphocytes stain dark purpule , neutrophils purple , basophils granules dark blue and eosinophils granules orange-red , platelets violet granules and RBC pick.

This stain based on a maxture of methylene blue and eosin.



❖ RBC blood cell count (5 squares)

Found the total RBCs in 80 (5 X 16) small square, and divide it with 80 to find the average in one square, multiply it by 200 to allow for the dilution and then multiply by 4000 to obtain the number per cubic milliliter.

The average of RBC in 5 large square = 84+71+63+93+83/ 5 = 394 cells.

The average of RBC in one square= 394/80 = 4.9 cells.

RBC count= 4.9X 800000= 4 million/mm^3.

Normal range= 4.2-5 million/mm^3 for women

❖ WBC blood cell count (4 squares)

Found the total WBCs in 64 (4 X 16) small square, and divide it with 64 to find the average in one square, multiply it by 20 to allow for the dilution and then multiply by 160 to obtain the number per cubic milliliter.

The average of WBC in 4 large square = 16+21+17+15/ 4 = 69 cells.

The average of WBC in one square= 69/64 = 1.07 cells.

WBC count= 1 X 3200= 3200 Cells/mm^3.

Normal range= 4500-11000 cells /mm^3

Thank you