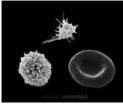



CBC INTERPRETATION

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Complete Blood Count (CBC)



- One of the most common lab tests that is ordered
- Provides an overview of the general health of the patient
- Like all labs, must be interpreted within the context of the patient, his history, and presenting signs and symptoms
- Like all labs, the TREND must be observed (the most powerful way of interpreting Labs!!)



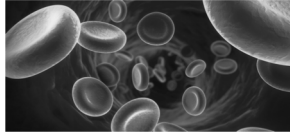
WBC } Hgb
 } HCT
 } PLT

RBC

Red Blood Cells

Erythrocytes

Red Blood Corpuscles



RBC

- Normal ranges
 - Female = $4.2 - 5.14 \times 10^6$ /microliter
 - Male = $4.7 - 6.1 \times 10^6$ /microliter
- Usually corresponds with Hgb and Hct values
- Anemia is the condition of low RBC
 - May be acute or chronic

RBC

Decreased	Increased
Blood loss	Dehydration
RBC destruction	Pulmonary diseases
Nutritional deficiency	Congenital heart disease
Leukemia, multiple	Smoking
myeloma, other bone	Kidney tumor
marrow disorders or	Polycythemia vera
damage	Genetic causes
Chronic kidney disease/failure	
Chronic inflammatory	
disease or condition	

RBC

- Nursing Considerations:
 - Assess the patient
 - Trend results
 - Notify MD if trending downward
 - Correlate with Hgb & Hct
 - Identify & treat root of problem

Hemoglobin (Hgb)

- Heme + globin
- Reflects O2-carrying capacity
- Normal ranges
 - Male = 14 - 18 mg/dl
 - Female = 12 - 16 mg/dl
- Clinical uses:
 - Detect blood loss
 - Detect/monitor anemia
 - Monitor in other possible issues

Hgb

Decreased	Increased
Anemia	COPD
Cancer	CHF
Fluid retention or overload	Dehydration
Hemorrhage	Polycythemia
Kidney disease	Blood doping
	High altitude

Hgb

- Nursing Considerations: Think Blood Loss / Anemia
 - Assess the patient
 - Identify early signs of blood loss
 - Assess for signs of tissue hypoxia
 - Correct underlying problem
 - Blood transfusions possible (PRBC)

Hematocrit (Hct)

Packed Cell Volume (PCV)
 "Crit"

- Percent of RBC's in a volume of blood
 - Usually 100 mL
- Normal range
 - Adult males: 42-54%
 - Adult females: 38-46%

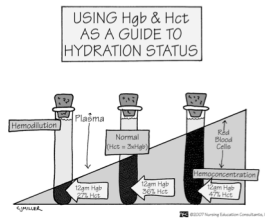
Hct

Decreased	Increased
Bleeding	Cor pulmonale
Destruction of RBC's	Smoking
Decreased production of RBC's	High altitude
Nutrition	Dehydration
Fluid overload	Polycythemia

Hct

- Nursing Considerations:
 - Assess the patient
 - Trend results
 - Notify MD if trending downward
 - Identify & treat root of blood loss
 - Iron transfusion
 - Blood transfusions possible (PRBC)
 - Epoetin injections

“Hemodilution” vs “Hemoconcentration”



Challenge Quiz!

- A **Hemogram** is.....

?

Hemoglobin and Hematocrit

Challenge Quiz!

- Another way to refer to a Hemogram is.....

?

“H & H”

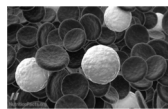
RBC Indices

- “The VS of the RBC”
- MCV = mean corpuscular volume / average size of RBC
- MCH = mean corpuscular Hgb /amount of Hgb per RBC
- MCHC = mean corpuscular Hgb concentration / concentration of Hgb in RBC
- RDW = red cell distribution width / variation of RBC size

WBC

White Blood Cells
Leukocytes

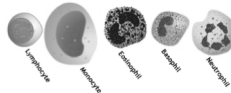
- Immune function
- Detection of blood cancers, autoimmune disease, immune deficiencies
- Monitor patients receiving chemo, radiation therapies
- Total WBC = 4.5 to 11.0
- Differential: 5 types of WBC



WBC

Decreased	Increased
HIV	Smoking
Autoimmune disorders	Infections
Bone marrow disorders	Tumors in bone marrow
Lymphoma	Leukemia
Liver/spleen disease	Inflammatory conditions
Medications	Allergies, asthma
	Stress

Normal Ranges



Type of WBC	Normal % of total WBC count
<u>neutrophil</u>	55 to 73 percent
<u>lymphocyte</u>	20 to 40 percent
<u>eosinophil</u>	1 to 4 percent
<u>monocyte</u>	2 to 8 percent
<u>basophil</u>	0.5 to 1 percent

The Lesser Known Players....

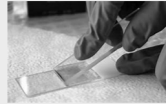
- Basophils - inflammation, allergy response
- Eosinophils - allergy response, asthma, parasitic infection, Coccidiomycosis
- Monocytes - fights infection and against foreign substance invasion, TB
 - *Macrophages are derived from Monocytes and perform phagocytosis to clean up*

The Usual Villains....

- Lymphocytes - viral infections, TB
 - *Main WBC's of the lymph system*
- Neutrophils - bacterial infections
 - "Absolutes"
- And then, there's the nasty...

Shift to the Left

- Immature Neutrophils 0-5%
 - *Bands*
 - *Immature Granulocytes (IG)*
- Why do they call it a Shift to the Left?



Old Technology



Older Technology

One step further....

Bands	Basophils	Eosinophils	Monocytes	Lymphocytes	Neutrophils

And here's how it looked....

Bands	Basophils	Eosinophils	Lymphocytes	Monocytes	Neutrophils

Left Shift

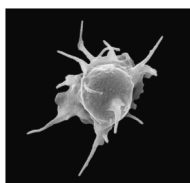
- Many causes
- "Big" 4 causes are generally:
 - Infection
 - Steroids
 - Cancer (Leukemia, Lymphoma)
 - Catastrophic event (MI, PE, surgery, stress)

WBC

- Nursing considerations
 - Trend results
 - Notify MD if trending up
 - Assess differential if ordered, and trend results
 - Assess for shift to the left
 - Monitor for infection
 - Culture potential site(s)
 - Monitor culture & sensitivity results
 - Notify MD if organism is not sensitive to ordered antibiotics
 - Admin prescribed antibiotics, effects of treatment

PLATELETS Thrombocytes

- Clotting function
- Normal range 150,000-400,000
- MPV = size of platelets
- Thrombocytopenia / HIT



PLATELETS

Decreased	Increased
ITP	Cancer
Viral infections	Anemia
Medications	Inflammatory conditions
Leukemia, lymphoma, other	Infectious diseases
CA c mets to bone	Oral contraceptives
Sepsis	s/p splenectomy
Autoimmune disorders	Polycythemia Vera
Chemo, radiation	Other bone marrow disorders
Chronic alcohol use	

Platelets

- Nursing considerations
 - Assess for bleeding
 - If very low, may transfuse pooled platelets
 - Teach bleeding precautions
 - If high, assess for/prevent VTE
 - Check for HIT before heparin / lovenox
 - Magic number is usually 100,000
 - Monitor the TREND!

FINAL Challenge Quiz!

- When interpreting labs, what is the MOST important action a nurse should take?

?

TREND!!!

THE END!
