Laboratory testing: A patient's view

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All of them



None of them



Kind of a short list to come all this way



Klf diagnosis - then results concerning

* Platelet descriptors
 * Platelet count, Platelet aggregation, bone marrow evaluation of megakaryocytes
 * Genetic markers
 * Jak2, CALR, MPL, etc.
 * Allele burden



Klf diagnosis - then results concerning

***** Red cell descriptors ***** RBC-HGB-HCT-MCV-RDW ***** Genetic markers
• JAK 2 and others
• Allele burden



Klf diagnosis - then results concerning

CBC
RBC significant changes in size and shape
WBC change in total and cell line distribution
PLT changes in total, size, and shape
Genetic markers
JAK2 and others

Allele burden

If monitoring -* Reference range from your facility ◆ Easy to find on your report These are what one expects of 95% of the population who are healthy. Values can bounce around as much as they want without any significance You need to conclude what your stable range is Reference might be 80-100 but you are mosty between 95 ~ 105.



If monitoring -* Critical values Usually not published on your report so get them from your physician • Usually mean that something of significance is happening BUT • Even these need to looked at in the light of what "YOUR" range has been $\%\ensuremath{\text{Ex.WBC}}$ is usually around 3.0 and today it is 2.0



Test	Refernce Range	Critical Range	YOUR RANGE	Date#1	Date#3
WBC	4-11 x109/L	↓2.00 118.00	10.2	11. <i>9</i>	4.2

Assumptions of Testing

Accuracy How close is the result to the absolutely correct value?

Precision

When performing the same test multiple times on the same sample, what is the range of results?

How important are these?

Accuracy

If you start with 100 mg of glucose in 100ml of water, does your test get you a value of 100 mg?

If it doesn't, is a 98 or a 101 good enough?

Most tests are 95 – 98% accurate

Accuracy

But this type of testing only works if you can completely dissolve the exact weight of a compound in water (standard) because you can then run a standard and determine if the instrument is performing correctly.

Hematology has only one standard, hemoglobin. The rest of the tests (counting) can be influenced by the plasma (not water), mixing, breakage, age, etc.

NPN Slightly less confidence in instrument

Precision

Really a reflection of instrument quality and technique

If you start with 100 mg of glucose in 100ml of water and you use that sample ten different times, what is the range of results?

Probably, a range of results between 95 and 105 looks good.

What about a range of 90 to 110?

Or 80 to 120??

Analytical Precision will vary with

Each instrument

Each method

For example, comparing it to a cholesterol standard, most cholesterol tests are plus or minus 10 mg.

While TSH range is +/-0.1

Precision is harder to understand with hematology because the sample is not uniform.

Cells are distinct entities. In the swirl of a sample, are they perfectly uniformly suspended?

So ranges are greater.



Hematology (always the most important)

Erythrocyte Red Cell Count Hemoglobin Hematocrit MCV MCH MCHC RDW

What are you looking for? Viscosity - red cell count or hematocrit Oxygenation - hemoglobin or hematocrit



Erythrocyte Red Cell Count Hemoglobin Hematocrit MCV MCH MCHC RDW

What are you looking for? Nutritional deficiencies such as iron or B₁₂ or folic acid









Erythrocyte Red Cell Count Hemoglobin Hematocrit MCV MCH MCHC RDW

What are you looking for? Hemolysis from damaged vessels or Hemolysis from autoimmune issues









If you like tables, then

Assuming that the specimen is drawn at approximately the same time of day as the previous results

Don't worry if The RBC varies less than 4% Hemoglobin varies less than 3% Hematocrit varies less than 4% Red cell indices and RDW vary less than 4%





Platelets

Very hard to pin down They are hard to see if you are doing the count manually. They are hard to count if you are using an instrument So Don't worry if the the new result is varies less than 10%.

The number doesn't not say anything about potential for bleeding or clotting



My choices but each of you has to work this out yourself and with your physician

if needed

reticulocyte count and plt aggregation

BUN & creatininekidney functionBilirubinhemolysis, liver functionAkaline Phosphatasebone and liver functionALT (alanine aminotransferase)liver functionElectrolytes (**plasma Potassium)fluid balance