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Lab Tests: Why Are They Needed and What Do They Mean?

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Your Life Your Health

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Have you heard about the man whose dog was sick? The owner took his dog to the Veterinarian, who said, "I'm sorry, sir, but your dog is dead!" The man protested, "That can't be, I love this dog, he's my companion, I demand more evaluation!" So, the Vet brought out a Siamese cat who walked around the dog, sniffed and walked away. The Vet said, "Sir, the cat thinks your dog's dead, too." The man remonstrated, "I don't care what a cat says, they hate dogs." The Vet then brought out a Labrador Retriever. The Retriever walked around the man's dog, sniffed and walked away. The Vet said, "He thinks your dog's dead, too."

The owner sadly said, "That's terrible, but I'll have to accept it. How much do I owe you?" The Vet said, "\$747.00" The man said, "To tell me my dog is dead?" The Vet said, "Oh, no, that's only \$35, but the Lab test and the CAT scan are more!"

The humor of this story points out that very often, health care is expensive and sometimes it can be very confusing. Lab tests, CAT scans, MRIs, IVPs, Biopsies -- what do they all mean? Before we discuss some of the most common lab tests, there are two things which must always be kept in mind when evaluating test results:

1. **Validity** -- Are the results of the tests accurate? Are they real? The last thing you want is a decision being made about your health with invalid, inaccurate or unreal results. Because most of us have no way of knowing whether or not the actual numbers of our tests are "real," we have to depend upon government agencies to accredit laboratories which do the tests which we trust.

The Texas Department of Health inspects and accredits labs operating in Texas. Through CLIA (Clinical Laboratory Improvement Amendment) which was passed by Congress in 1988, the Federal government established quality standards for all laboratory testing to ensure the accuracy of patient test results regardless of where the test is performed. The final CLIA regulations, published in 1992, are based on the complexity of the test method, thus, the more complicated the test, the more stringent the requirements. Three categories of tests have been established: waived complexity, moderate complexity and high complexity. Southeast Texas Medical Associates operates a CLIA certified, moderately-complex reference laboratory as part of SETMA's Clinic services.

CLIA also specifies quality standards for "proficiency testing." Routinely, CLIA certified laboratories are required to undergo proficiency examinations. Test material with known values are sent to the laboratory. The tests are performed in the laboratory. The results are sent back to the proficiency testing agency, which determines if the results are accurate or not.

Therefore, if your healthcare provider uses a laboratory, you want to know three things:

- a. Is it licensed by the Texas Department of Health and what was the score given by the State Department of Health at its most recent review.
- b. Is it CLIA certified?
- c. How does it perform on its proficiency testing?

SETMA's laboratory routinely receives perfect scores on all three levels of credentials. That is why SETMA's reference laboratory services are being utilized by a number of offices and facilities in Southeast Texas.

2. Relevance -- Are the tests available in a timely fashion? If a test is done today and the results are not available for months, the results may be valid -- they may be accurate -- but they are very likely irrelevant to your healthcare. For instance, we don't do viral cultures very often, not because we can't get valid results, but because most often, except in rare circumstances, the patient is well before the results come back and we would not change the treatment with knowing the results. Different tests have different times of relevance. A thyroid test done three months ago, except in the rarest of cases, is still relevant. However, a hemoglobin, may be irrelevant 24 hours later, under the right circumstances.

This is why Southeast Texas Medical Associates has integrated its systems to where the patient's laboratory results are reported electronically to the patient's medical record and health care provider. This way every test can be reviewed every day and the tests results can effectively be used in treating a patient's illness. And, those laboratory test results are available whether you are in the doctor's office, in the hospital or on the telephone with your healthcare provider on the weekend.

So, assuming that your laboratory results are valid, because, like at SETMA, they are performed in a certified lab, and assuming that your laboratory results are relevant, because, like at SETMA, they are available in a timely fashion, what does it mean when your doctor or nurse practitioner performs a CBC, a UA, a CMP, a LFT, a PT, a LIPID Profile, an Occult Blood or other test?

The two most commonly performed tests in a primary-care clinic are probably the CBC and the UA. The Complete Blood Count (CBC) gives your healthcare provider a great deal of information about you. From the CBC, you can tell the following:

1. **Hemoglobin (Hgb)** -- This is the protein in the red blood cell which carries oxygen to the body. When the hemoglobin, often abbreviated as "Hgb," is low, a patient will feel weak, tired and will fatigue easily because oxygen is necessary for the body to produce the energy required to walk, breath, live and work. There are a number of causes of low Hgb, which is called "anemia." Inadequate iron will cause anemia, as will inadequate Vitamin B12 and Folic Acid. There are toxic conditions which block the ability of the body to make Hgb and there are genetic reasons why a person cannot make Hgb. Chronic kidney disease, advanced age and many malignancies result in a person not being able to make hemoglobin. Acute or chronic blood loss through ulcers, bowel inflammation or other causes of small or large bowel bleeding can cause low hemoglobin and anemia. Once your healthcare provider has determined that you are anemic, the cause will be sought.

2. **White Blood Cell Count (WBC)** -- The white blood cells, the leucocytes, are the part of the blood which "fight" infection in the body. It is important to know that we DO NOT treat white blood counts. We treat the cause of elevated or decreased WBCs. Often a viral infection will cause the WBC to be low; while a bacterial infection will cause it to be high. The level of the WBC can indirectly indicate the severity of an infection but sometimes a person can be very, very sick with a normal WBC because they are unable to "mount" an effective response to an infection. And, a very high WBC does not necessarily mean that you have leukemia, cancer of the blood.

3. **Cell Morphology** -- in addition to how many red blood cells (RBC) and white blood cells are present, the CBC tells your provider their shape, their size and their stage of development. Large RBCs may mean one kind of anemia, while small RBCs means another kind. There are different kinds of WBCs and the percentages of one kind or another can give insight into what is causing your illness. For instance, among the WBCs are a cell type called "monocytes." When a young person has Mononucleosis, a highly contagious, viral illness, the "monocytes" -- see the root "mono-" in the word "mononucleosis" -- will be increased and they will have a slightly abnormal "shape," which makes them "atypical monocytes." Here the cell "morphology" can be an important part of the diagnostic process.

4. **Platelets** -- Another type of "particle" evaluated in the CBC is the platelets. The platelet is very important in your ability to stop bleeding when you are injured. One of the most fascinating aspects of medicine is the "clotting" ability of the blood. It is complicated but it is elegant. The platelets naturally tend to "adhere" or stick together. When you are cut, the platelets stick to the wound and to each other. Then a protein called "fibrin" sticks to the platelets and causes the beginning of a clot. There are other proteins in the blood which contribute to the formation of a blood clot. These are evaluated with other blood tests, but one of the first treatments of abnormal clotting situations -- situations where the blood clots when and where you don't want it to -- for instance in a vessel in your heart, which can cause a heart attack --- is to make the platelets "less sticky." This is what aspirin and several other medicines do.

There is much more which can be learned from a CBC, but this introduction will help you understand some of the reasons why your healthcare provider would want to know what your CBC is. Also, there are certain medications which can affect various elements of the CBC and if you are taking one of those medications, your healthcare provider will periodically obtain a CBC for preventive maintenance. In addition, a CBC should be part of an annual physical, a well-woman or well-man check-up and is particularly important in children.

The Urinalysis (UA) can tell your health care provider a number of things:

1. **Color and appearance** -- These simple observations can give a clinician excellent information. For instance, if the urine is clear and colorless, it is very likely to be normal, although additional evaluation needs to be done. If the lab notes that the urine is clear and colorless but then states that there are 100 WBCs per high powered field, one of those is wrong. This is one of the excellent checks and balances in laboratory evaluation by a clinician; some things cannot coexist.

2. Just as in the blood the number of **WBCs** and **RBCs** are measured, so they are in the urine test. There should be no WBCs in the urine although 1 or 2 does not represent the presence of illness. There should be no RBCs in urine but once again, 1 or 2 may not be significant. If you have a bladder infection or pyelonephritis (a more serious infection of the kidney), the WBCs will be elevated in the urine. The presence of a large number of RBCs in the urine is indicative of a number of possibilities. When the UA reveals this, your healthcare provider will determine if you have a "contaminated specimen" because of blood from another source, a severe infection which causes bleeding from the bladder wall, an inflammation in the kidney, a growth or some other cause.

3. **Protein** -- The most common illness which causes abnormal protein in the urine is diabetes. The presence or absence of protein in the urine of a diabetic is an important part of managing diabetes and should be done at least once a year on every diabetic. There are other causes of protein in the urine, all more or less serious. There are a few relatively benign conditions which cause protein in the urine but it is important to know whether there is protein there or not. Once it is determined that a person had protein in their urine, a 24-hour urine collection to quantify the amount of protein can be helpful in managing their illness. In addition, there are special kinds of protein which show up in the urine, which can help diagnose specific illness. One of those is Bence-Jones Protein which is found in patients with Multiple Myeloma.

4. **Glucose** -- Normally, a person should not have "sugar" in the urine. If a person has large quantities, it is suggestive that they have diabetes. The reason diabetes, whether new or known, have "polyuria" -- increased urination -- is because of the sugar in the urine. With large mounts of sugar being "spilled" in the urine, a certain amount of water must come with it causing the volume of urine to be increased. This can cause a person to become dehydrated, which results in excessive thirst -- polydipsia -- another common complaint in new diabetes and/or a person with poorly treated diabetes.

5. Specific Gravity -- This measures the buoyancy of the urine, or how concentrated it is. If the Specific Gravity is very high, it suggests that the patient may be dehydrated, while if it is very low, the patient may be drinking too much water, which can result in "water intoxication," or can be the result of a condition called Diabetes Insipidus.

There are other evaluations done on urine such as pH, bilirubin, ketones and nitrite, but these give you an idea that this simple test can give your healthcare provider a wealth of information. Next week, we'll continue with our review of some of the most common laboratory tests done in a medical clinic. It will help you evaluate the care you are getting to understand some of these. Remember, it is your life and it is your health.