

Orentreich
Foundation for the
Advancement of
Science, Inc.

VitalLongevity™

Logo: Life's blood flows through the hourglass; the stopcock represents the alteration of aging and disease as biomedical research progresses.

December 2004

MAPPING THE PRESENT

Our last newsletter, "Mapping the Future", discussed the promise of multi-biomarker testing. In this newsletter we discuss blood tests available today and the interpretation of their results. Although diseases are more easily treated when detected early, many persons do not take advantage of the multitude of blood screening tests; therefore, many diseases go undiagnosed. Sometimes the first symptom can be the last; 15% of all first heart attacks are fatal. The complete blood count (CBC), the lipid profile, and blood glucose level have the greatest potential to detect underlying diseases.

THE COMPLETE BLOOD COUNT

An estimated 5% of women and 2% of men in the US have iron deficiency anemia. From less than one teaspoon of blood, automated instrumentation can generate a 13-point CBC to screen for anemia and other conditions. Included are the white blood cell count (WBC) and subclasses of white cells (neutrophils, lymphocytes, monocytes, and others). The red blood cell count (RBC) indicates the number of oxygen-carrying red blood cells per unit of blood and is related to hemoglobin and hematocrit values. Hemoglobin is the molecule in a red cell that carries oxygen. Hematocrit is the percentage of RBCs in a blood sample. Platelets, while not exactly blood cells, are an important part of the clotting mechanism.

White cells recognize invaders—bacteria, viruses, parasites, and foreign protein—from accidental exposures (a slip of the bread knife) to induced (the foreign tissue of an organ transplant). First to respond are the white cells called neutrophils; elevated levels indicate infection, low levels indicate bone marrow depression or increased emotional stress. Anemia (indicated by low RBC) can be caused by diets deficient in iron, folate, vitamin B₆ or B₁₂; these deficiencies can readily be treated. It is especially

important to correct anemia in those over 65, a group predisposed to anemia. A study in the *New England Journal of Medicine* (October 25, 2001) reported that mortality rates are higher in anemic heart attack victims compared to those without anemia. Anemia can also be a sign of cancer or serious internal bleeding. Platelet count can be decreased in hemolytic anemia, leukemia, or during chemotherapy.

THE LIPID PROFILE

For the past 50 years cardiovascular disease has been the leading cause of death in the US. Although rates have declined somewhat in recent years, there are more than 900,000 deaths annually. Elevated levels of cholesterol and other lipids are some of the best-known risk factors. The National Cholesterol Education Program currently recommends that all adults over 20 years old get a complete lipid profile [total cholesterol, low-density lipoprotein (LDL), high-density lipoprotein (HDL), and triglyceride] every 5 years.

Serum lipid levels are measured after a 9- to 12-hour fast and classified on a desirability scale, for example, from optimal (LDL < 100 mg/dL) to high risk (LDL 190 mg/dL). While all of the lipoproteins are used to predict heart disease risk, LDL is the most important. LDL determines the level of treatment in combination with other risk factors such as established heart disease, high blood pressure, and family history. More information on interpreting a lipid profile and calculating your 10-year risk of developing heart disease can be found at <www.nhlbi.nih.gov/guidelines/cholesterol/index.htm>.

OTHER MARKERS

While most people are aware that diabetes results in a high blood glucose, few realize that it also increases the risk of heart disease, which accounts for 80% of all deaths among diabetics. Glucose levels often creep up so slowly that most persons are unaware that they have diabetes. Diabetes not only increases heart disease risk, but also risk of kidney disease and blindness. A fasting glucose

| THE ABC LABORATORY | | 123 MAIN STREET, NY, NY 10001 | | |
|---|----------------------|-------------------------------|-------------|--------------------------|
| ===== | | | | |
| DATE: 10/2/04 | | | | ID#: 12345 |
| NAME: DOE, JOHN | AGE: 65 | | | DOB: 02/39 |
| SEX: M | HT: 5'11" | WT: 170 lbs | B/P: 106/70 | PULSE: 60 |
| RX: NONE | BLOOD DRAWN: 10/1/04 | | HOUR: 0937 | |
| TEST NAME | COMPLETE BLOOD COUNT | HI/LO | REF. RANGE | UNIT |
| WHITE BLOOD CELL COUNT | 4.2 | | 4.0-11.0 | 10 ³ cells/μL |
| NEUTROPHILS | 53 | | 50-80 | % |
| LYMPHOCYTES | 45 | | 20-45 | % |
| MONOCYTES | 1 | | 0-12 | % |
| EOSINOPHILS | 1 | | 0-6 | % |
| BASOPHILS | 0 | | 0-2 | % |
| RED BLOOD CELL COUNT ¹ | 4.3 | LO | 4.5-6.0 | 10 ⁶ cells/μL |
| HEMOGLOBIN ¹ | 13.5 | LO | 14.0-18.0 | g/dL |
| HEMATOCRIT ¹ | 40.1 | | 40.0-54.0 | % |
| MEAN CELL VOLUME | 94 | | 80-100 | fL |
| MEAN CELL HEMOGLOBIN | 31.5 | | 27.0-34.0 | pg |
| MEAN CELL HGB CONCENTRATION | 33.7 | | 31.0-37.0 | % |
| PLATELET COUNT | 176 | | 140-400 | 10 ³ cells/μL |
| ¹ REFERENCE RANGE CORRECTED FOR GENDER | | | | |
| ===== | | | | |
| TEL 800-555-0800 | | DIRECTOR: R.J. SMITH, MD | | |

level is normal at < 110 mg/dL, impaired at 110 – 125 mg/dL, and diabetic over 125 mg/dL.

C-reactive protein (C-RP) is another test for heart disease that is gaining popularity. Chronically elevated levels of C-RP (over 3 mg/L) can signal the development of unstable atherosclerotic plaques, the type most likely to be involved in a heart attack. However, high C-RP levels are not specific to heart disease and can be elevated during any inflammatory condition.

TAKING CONTROL

The first step in taking charge of your own blood screening procedures is to obtain copies of past test results as well as current ones. Keep them in one place and periodically review them; consult your physician if you have questions.

There are several things to keep in mind when reviewing your test results. As in the sample on the front, lab reports all have certain key components. Of particular interest is whether any of your results are “flagged” as abnormal. Clinical laboratory results cannot be interpreted without comparing them to the reference range of values for healthy individuals.

No single number is “the right one”, and “normal” depends upon your sex and age. For example, referring to our sample lab report, the RBC of 4.3×10^6 cells/ μ L is flagged as low for the adult man (reference range: $4.5 - 6.0 \times 10^6$ cells/ μ L), but it would be fine for a woman (reference range: $4.0 - 5.5 \times 10^6$ cells/ μ L).

Reference ranges for tests such as the CBC, the lipid profile, and blood glucose levels are very similar from lab to lab, but reference ranges may vary for newer tests such as the sensitive C-RP. What and when you ate, medications you take, and even when you last exercised can also affect results. For instance, a glucose level of 130 mg/dL would be considered diabetic if measured after fasting but perfectly normal after a large meal. It is also normal to see transitory elevations of WBCs and HDL levels after vigorous exercise.

CAVEATS

Fortunately, lab errors are rare, especially after the passage of the Clinical Laboratory Improvement Act of 1988, which requires a variety of quality control checks. No screening test, however, is perfect. Any abnormal result should be repeated and confirmed by other tests. Also, be wary of a false sense of security, e.g., cholesterol levels are normal in two-thirds of coronary events! It might be more important to determine what is normal for you rather than whether you fall within the reference range.

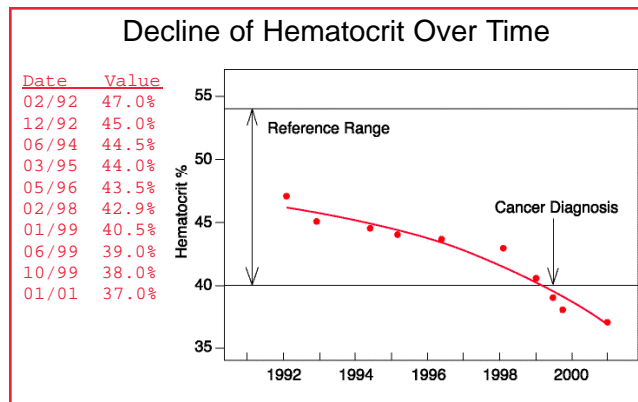
In addition, it is not enough to simply know whether a lab result is “normal” or “abnormal”. For example, a continuing trend of lower and lower hematocrit levels (see graph) should prompt investigation. In this example, the cause of the decline was explored, revealing onset of an *H. pylori*-related stomach cancer. The early diagnosis and prompt treatment—before other symptoms occurred—led to a complete cure. If the condition had been discovered later, the outcome easily could have been less successful.

A basic principle of preventive medicine is to screen for diseases before overt symptoms occur. In addition to the ones that we have discussed, liver profiles, thyroid function tests,

and many others have the potential to detect treatable conditions. Become more active in improving your health by being aware of the wide variety of reliable blood tests available. Realize also that test results are intended to supplement, rather than replace, a physician's clinical judgment. Then you can fully utilize the wealth of information available from the laboratory.

The next issue of VitaLongevity will be devoted to practical ways of getting some of the health benefits of calorie restriction without starving yourself.

The OFAS VitaLongevity newsletters are designed to alert you to those strategies that are valid, those that are no longer valid, and new suggestions for making your life as long and healthy as possible.



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The Orentreich Foundation for the Advancement of Science, Inc., was founded in 1961. OFAS is a non-profit institution dedicated to biomedical research to prevent, halt, or reverse those disorders that decrease the quality or length of life. It is duly registered with the US Internal Revenue Service as an Operating Private Foundation under Section 4942(j)(3).

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