Manual Hematology

Requirements for good laboratory practice and COLA Laboratory Accreditation programs are underlined.

SPECIMENS

Venous specimens for hematology testing should be collected in a tube containing the appropriate anti-coagulant. For most tests, this is an EDTA (lavender-top) tube. Mix the sample well before testing and check it for clots. A clotted sample is unacceptable and must be redrawn because a clot will distort the distribution of cells and platelets causing inaccurate results. Clotting in an anti-coagulated tube is usually caused by either a difficult "slow draw" when obtaining the specimen or inadequate mixing of blood with anti-coagulant. For optimum anti-coagulant performance, gently invert the blood tube end-to-end 10 times immediately after it is filled.

Most clotting in capillary specimens can be prevented by obtaining a generous, free flow of blood, so the specimen can be collected quickly before clotting occurs. Capillary specimens drawn into diluent should be visually checked for clots and mixed well before testing.

Follow proper collection, storage, and handling conditions. This information should be listed in the Procedure Manual for each test. For example, if a sample has been in the refrigerator, allow it to reach room temperature and mix it carefully prior to testing.

WHITE CELL COUNTS

- Hemacytometers should be clean and free of scratches. Check empty hemacytometers under the microscope prior to each filling.
- Use a special hemacytometer coverslip.
- It is easiest to use prepackaged dilution systems for diluting the samples.
- Mix samples well just before loading the hemacytometer.
- Dilute a sample in duplicate and count each dilution. Fill each side of the hemacytometer with one dilution. The two counts must be within your laboratory's acceptable tolerance range of duplicate counts. For most counts, the results from the two sides of the chamber should agree within 10 to 20 percent. If they are not in good agreement, clean the hemacytometer, refill it, and perform another count.
- Whenever a new batch of prepackaged diluent reservoirs is opened, a count should be performed on the diluent fluid itself. Check to be sure it is free of contamination or particles that could cause a falsely-elevated count. Record this on the container of reservoirs along with the date and initials of the person who checked the batch.
- A control must be counted in duplicate at least every eight hours of testing. Treat the control just as you would a patient specimen. Count the control and record results before any patient specimens are counted and reported. Your laboratory supplier can help you obtain appropriate controls.

PLATELET COUNTS

- Hemacytometers should be clean and free of scratches.
- Use a special hemacytometer coverslip.
- Use prepackaged dilution systems for diluting the samples.
- Mix the sample well just before loading the hemacytometer.
- Dilute a sample in duplicate and count each dilution. Fill each side of the hemacytometer with one dilution. The two counts must be within your laboratory's acceptable tolerance range of duplicate counts. For most counts, the results from the two sides of the chamber should agree within 10 to 20 percent. If they are not in good agreement, clean the hemacytometer, refill it, and perform another count.
- Whenever a new batch of prepackaged diluent reservoirs is opened, a count should be performed on the diluent fluid itself. Check to be sure it is free of contamination or particles that could cause a falsely-elevated count. Record this on the container of reservoirs along with the date and initials of the person who checked the batch.

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- A control must be counted in duplicate at least every eight hours of testing. This should be done before any patient specimens are counted and reported. Be sure to record control results.

- A peripheral blood smear should be made for all platelet counts and examined for a platelet estimate. This is used as a check of the count. If there is a marked difference, the count should be rediluted and counted. Make the platelet estimate according to the following formula: Count the platelets per oil power field and multiply by 20,000. Check the feather edge of the slide for clumping if the estimate is low. Clumps may be a common problem if the smear is made from a finger stick.

MICROHEMATOCRIT

- Run all specimens in duplicate.

- Fill capillary tubes at least 3/4s full.

- The maximum packing time of the microhematocrit centrifuge should be measured once a month. To perform a maximum packing test, take a control or patient sample and perform a microhematocrit as you usually would. Record the value you obtained. Take the **same** capillary tube, place it back into the microhematocrit centrifuge and spin it for an additional minute. Recheck the value; it should remain the same. If it does not, continue to spin the specimen for one minute intervals until the value no longer changes. The total amount of time the specimen has been spun minus one minute is the length of time which you should use to spin all of your microhematocrits.

ERYTHROCYTE SEDIMENTATION RATE

Vibration, running a test outside of a temperature range of 20 to 25 degrees Celsius (room temp.), and lack of levelness are factors which can alter the speed with which red cells fall.

- Check that the rack is level before performing the test.

- Place the rack on a surface that is free of vibration.

- Set up the sed rate within two hours if the EDTA tube is kept at room temperature and within 12 hours if the sample is refrigerated.

- Mix the sample well and be sure it is at room temperature before performing the test.

PERIPHERAL BLOOD CELL DIFFERENTIAL

- The training of the staff performing the test is the most crucial quality control measure.

- Smears should be stained properly, with no precipitate, and have good cell distribution. Record at least once a week that the smears are adequately stained.

- At least 100 white blood cells should be counted.

- Include an evaluation of red cell morphology in the blood smear report.

- Make a platelet estimate from the smear and include it in the blood smear report. To do this, go to an area of uniform red cell distribution. Count the number of platelets per oil power field and multiply this number by 20,000.

- Performance of a differential without identification of any abnormal white cells (the smear is sent to a hospital or reference lab for identification of abnormal cells) is classified as a moderate complexity test by federal regulations.

- Performance of a differential with identification of any abnormal white cells, i.e., anything younger than a band, is classified as a high complexity test by federal regulations.

- If a laboratory worker does not meet the personnel requirements for high complexity testing, the smear must be sent out for identification of any abnormal cells.

RETICULOCYTE COUNT

- Base the count on 1,000 counted red cells or use a Miller Disc.

- Perform the count in duplicate. The results should agree within 10 percent.