Automated Hematology

SPECIMEN HANDLING

Venous specimens for CBCs are collected in EDTA (lavender-top) tubes and should be checked for clots prior to testing. Not only can a clot distort cell distribution and cause unreliable results, but it may also damage or clog your instrument.

If you find a clot, you must reject the specimen and document this in the corrective action log. To help prevent clots, be sure to gently invert the blood tube end-to-end 10 times immediately after it is filled. It is also very important to repeat this process again before running the specimen or setting up a test to be sure it is well-mixed. In hematology, anything other than a well-mixed specimen is sure to cause unreliable results.

Specimens for centrifugal hematology instruments are often collected by finger stick. As with any other finger stick collection, it is important to thoroughly cleanse the finger, wipe away excess alcohol, wipe away the first drop of blood, and collect the specimen without "milking" the finger or allowing air to enter the capillary tube.

These criteria are also important for specimens which are "pre-diluted." Also, with pre-diluted specimens be sure to thoroughly mix the specimen with diluent fluid immediately upon collection to avoid clotting.

INSTRUMENT MAINTENANCE

You need to establish a schedule for the monitoring and upkeep of the instrument you use. You can accomplish this by using a maintenance log that should contain data from function checks, i.e., background counts, electronic self-tests, etc.

The log should also chart the frequency of performance for all necessary preventive maintenance procedures. Preventive maintenance must be performed according to manufacturer's instructions and recorded. When recording, be sure to include the date and initials of the person who performed the procedure.

You need to perform calibration, recalibration, or calibration verification at least every six months. These procedures, which involve running calibration material in the same manner as patient samples are run, are performed to ensure that your results will be accurate throughout the range that patient results are reported. This should also be done whenever quality control results show any shifts or trends, and when other corrective action does not solve the problem.

Sometimes calibration will drift on instrumentation between regularly-scheduled calibrations. If using a new control or doing routine troubleshooting steps recommended by your manufacturer does not solve the problem, you will need to recalibrate. Recalibration will often correct the QC problem, but if it does not work, it is time to request a service call on the instrument.

Record in your maintenance log the date, initials of the laboratory worker, and action taken. Maintain this log and any instrument logs for at least two years.

AUTOMATED DIFFERENTIALS

If your instrument does automated differentials, and you report out these results, your laboratory must have a written policy which indicates when a manual differential is required to verify the results of an automated differential. The policy should state where the test is to be performed, i.e., "in-house" or at a hospital or reference lab. The following is a sample policy statement:

"Whenever the instrument reports out lymphocytes as > x percent, or granulocytes as > x percent, or monocytes as > x percent, the laboratory worker must prepare a smear for blood cell differential for confirmation of the count."

It is the responsibility of the laboratory director to determine what the actual value would be for each type of cell and to decide if the smear will be read "in-house" or sent out for reading.

CONTROLS

When performing automated hematology, you must run at least two levels of controls each day of testing. If you have three levels of controls--such as a normal, a high, and a low--you can alternate from one day to the next.

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For example, run the normal and high one day; run the normal and low the next. Be sure to run the normal each day, but alternate the high and low. It is acceptable to run a commercial control each day along with one "patient control," rather than two commercial controls.

A "patient control" is a specimen of known value which was run the previous day. In other words, you would run as a control today a specimen from a patient who was tested yesterday.

Be sure, of course, that the specimen was properly stored (refrigerated) overnight, and is allowed to reach room temperature and is thoroughly mixed before running it the second day.

Each day of testing, plot all your controls on a Levy-Jennings chart or similar graph. If a control is "out of limits," repeat the control. Be sure to plot both the original and repeat control results on your chart. It is acceptable for a control to be "out of range" once every 20 times it is run, although it still must be repeated.

If a control result falls out of range more than once every 20 times, corrective action must be taken. First, allow a fresh bottle of control to reach room temperature. Being sure you have mixed it well, run the new control.

If the control is still out of range, refer to your operator's manual for appropriate corrective action. If all steps fail, recalibrate. Be sure to log and initial corrective action in your maintenance log.

The results of any patient tests that were run with even one out-of-limits control are unreliable and must be repeated. You must never report out patient results until all control results are within acceptable limits.

DILUENT

Because most automated instruments count particles, contaminated diluent fluid can produce falsely-elevated results. Diluent fluid should be processed as a specimen whenever a new batch is opened.

Be sure the person who processes the diluent records it in the hematology QC log along with the date and their initials. Consult your operator's manual for full instructions on running diluent.