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| Area | Laboratory-Hematology |
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# Hemaprep Slide Preparation



Document Type: Procedure

# I. PURPOSE AND OBJECTIVE:

The HEMAPREP® is a mechanical device designed to emulate the standard method of preparing peripheral blood films by the wedge technique.

During the cycle of operation, glass spreader blades are brought mechanically into contact with the drop of blood; the instrument pauses to allow the blood to wet the spreaders, and then the spreaders pull the blood gently along the slide at a predetermined angle and preselected speed. The speed control, which is achieved by an air-operated piston, dispenses the blood in the standard wedge configuration.

# II. CLINICAL SIGNIFICANCE:

Because the smearing action is automatically controlled, it is able to achieve reproducible smears with ample “working area,” good distribution and minimization of trauma. The length and thickness of the smear are related to the hematocrit, the quantity of blood used and the speed of the spreader blade. However, a valuable characteristic of the smears is that the monolayer of long and short smears is generally similar. This is because it dispenses at a constant rate.

# III. SPECIMEN COLLECTION AND HANDLING:

A. The unit accepts both fresh and EDTA anticoagulated blood.
    1. The slides should be prepared immediately, if fresh blood is used.
    2. The slides should be prepared within four hours, if EDTA anti-coagulated blood is used.

B. Specimens must be well mixed before dispensing the blood.

C. If a DIFF-SAFE is used for dispensing the blood:

    1. Invert and position DIFF-SAFE over target. Gently press tube downwards until a drop forms at the tip of the DIFF-SAFE. Relax pressure when the drop touches the target.

D. Wooden sticks or a disposable pipette can also be utilized to dispense blood onto the slide.

# IV. EQUIPMENT:

A. HEMAPREP mechanical device

# V. SUPPLIES:

A. Spreader slides

B. DIFF-SAFE Blood Dispenser

C. Wooden sticks or disposable pipettes

# VI. MAINTENANCE:



HEMAPREP is made of rugged materials and should provide trouble-free operation. It does not require periodic adjustments or lubrication. However, it does require cleaning the spreader after every smear, spreader replacement as needed, smear calibration as needed, and PAUSE calibration as needed.

A. Clean the spreader blades after every smear

    1. Rotate the spreader assembly backward to the resting position.
    2. Wipe the spreader blades with a tissue dampened with water.
    3. Make sure spreader blades are dry before using.
    4. If blood is spilled into the mechanism, clean the parts with a swab and mild soap solution. Do not rinse the parts under running water.

B. Spreader replacement

    The precision spreaders are manufactured of high-strength glass and are designed for long-term operation. With normal use they will last for several months. The spreaders may get nicked from hitting chips of glass or other obstructions on the slide; a nick on the edge of the spreader may cause a streak in the smear. If this condition persists after the spreader has been cleaned, the spreader should be replaced.

    1. To replace the spreader blade, hold the spreader assembly and pry off the spreader blade by hand.
        a. Remove the protective paper and apply the new spreader blade.
        b. The spreader blade is then positioned squarely in the slot provided in the spreader holder and then stuck firmly in place.
    2. It is recommended to replace the spreader blades after approximately 2000 slides have been prepared or whenever the quality of smears is negatively affected.

C. Smear Calibration

The smear control knob is located on the top of the unit. The smear control knob adjusts the rate at which air escapes from the piston.

1. To adjust this knob, it is necessary to move the spreader arm away slightly before turning the knob in any direction. The adjustment of the smear control knob should be a maximum of a quarter turn clockwise or counter clockwise from the median position.
    a. Turning the knob clockwise produces a slower rate of smearing, which produces smears that are generally thinner and longer.
    b. A counter clockwise adjustment produces faster speeds, which cause thicker and shorter smears.
    c. Once the smear control knob is adjusted to produce the desired thickness of smear, it is generally not necessary to make any further adjustments except for specimens having extremely high or low hematocrits.

D. Pause Control Calibration

The PAUSE CONTROL determines the amount of time that the spreader blades stay in contact with the blood drop. The PAUSE CONTROL knob is located on the underside of the instrument and is factory set. With normal use, it should not need to be adjusted by the operator.

1. To check the duration of the PAUSE CONTROL setting, completely depress the front lever and immediately release it. The lever will slowly rise but the spreaders will be still exactly one second and then begin their movement. Measure only the amount of time that the spreaders are still.
2. To increase the duration of the pause, turn the knob clockwise.
3. To decrease the duration of the pause, turn the knob counterclockwise.



# VII. SAFETY PRECAUTIONS:

A. All standard safety precautions should be followed.

B. When handling slides or when replacing spreaders, care should be taken to handle glass carefully, avoiding cuts

# VIII. PROCEDURE:

A. Place the glass slides in the slide holder locations with the frosted end up and toward the front of the device.

B. Place 5 to 6 µL of blood on the slides at the target locations, indicated by a black dot on the tray, which can be seen through the slide. The drop should be placed directly above this mark and should be approximately the same diameter as the mark.

C. Press down front lever with a firm but gentle stroke. By depressing the lever in front of the instrument, the spreaders are brought forward to make contact with the blood. The lever should be depressed firmly but gently. Do not use force.

D. When the lever is in the down position, the tech should remove their hand. At this time the lever will begin to slowly rise under control of a timing mechanism. The timing mechanism is designed to permit the blood to fully spread laterally. At the end of the timing control, the spreaders begin their travel the length of the slide. During this travel, the blood is dispensed. The feathered edge of the smear should end 5 to 15 mm from the end of the slide. The rate of travel of the spreaders is determined by the smear control setting.

E. Remove the slides.

# IX. TROUBLESHOOTING:

Refer to the table below for the possible smear problems, causes, and solutions.

**Erratic smears on rough edge. Streaks in smears. Appearance of a dip in the center of the feathered edge.**

| Cause | Solution |
|---|---|
| Blood trapped in the front of the spreader blade. | Do not hold the lever down too long. Release it as soon as it reaches its bottom position.<br><br>Avoid depressing the lever too rapidly.<br><br>Avoid placing the blood drop off the black target area.<br><br>The PAUSE CONTROL may require readjusting. |
| Dirty spreader blades. | Clean the blades. |
| Nicked spreader blade. | Replace the nicked blade. |
| Bubbles in the blood drop. | Avoid dispersing the blood drop in such a way that bubbles will be produced. If they are produced, attempt to “pop” them with the edge of a wooden stick. |
| Dirty Slides | Do not use slides that appear to be particularly dirty or greasy. |
| Dried blood drop | Depress the lever immediately after the blood drop has been applied to the slide. |

**Run off or excessively long smears.**

| Cause | Solution |
|---|---|
| Blood drop too large | Apply a smaller blood drop. |
| SMEAR CONTROL knob set too thin or blood has a very low hematocrit | Turn the SMEAR CONTROL knob counterclockwise in one eighth-of-a turn increments until a satisfactory setting is obtained. |

**Excessively short smears.**

| Cause | Solution |
|---|---|
| Blood drop too small | Apply a larger blood drop. |
| SMEAR CONTROL knob set too thick or blood has a high hematocrit | Turn the SMEAR CONTROL knob clockwise in one eighth-of-a turn increments until a satisfactory setting is obtained. |

**Smear is too short and/or feathered edge is bullet-shaped.**

| Cause | Solution |
|---|---|
| Blood drop too small | Apply a slightly larger blood drop. |
| Blood is too thick | Use two drops of blood. Place a drop on either side of the target area. |

**Entire smear is in the shape of a bullet.**

| Cause | Solution |
|---|---|
| Spreader blades are not pausing in the blood drop long enough | The PAUSE CONTROL is set too short. Adjust the pause.<br>Fully depress lever to its bottom position. |



**Lopsided smears**

| Cause | Solution |
|---|---|
| Blood drop not placed in center area contacted by spreader blade | Place blood drop on target of area. |
| Spreader blade not positioned squarely in its slot. | Make sure that the spreader blade is centered in its slot. Reposition spreader blade. |

**Incomplete pickup of blood drop.**

| Cause | Solution |
|---|---|
| Spreader blade not making contact with blood drop; drop being placed behind the target area. | Be certain to place the drop directly on the target. If insufficient blood is still picked up, place the blood drop slightly forward of the target area (toward the spreader). |

**Stand-up" blood drop (a drop which, when dispensed, doesn't spread out and "wet" the slide).**

| Cause | Solution |
|---|---|
| Dirty slide | Discard slide. |
| Blood dispenser is being held at an angle which is too vertical | Hold dispenser at about 45° angle when the blood drop is dispensed. The amount of blood, which is delivered, can be controlled by the angle at which the dispenser is held |

# X. REFERENCES:


1. CellaVision Hemaprep Instructions for Use. Cellavision Document PM-10019-01. Revised: 2022-06-08


## Approval Signatures

| Step Description | Approver | Date |
|---|---|---|
| Medical Director | Muhammad Arshad: Chief, Pathology | 8/27/2024 |
| Policy and Forms Steering Committee Approval (if needed) | Kristin Murphy: Medical Technologist Lead | 8/27/2024 |
| | Christopher Ferguson: Dir, Lab Services | 8/26/2024 |
| | Ashley Beesley: Mgr, Laboratory | 8/26/2024 |
| | Kristen DiCicco: Mgr, Laboratory | 8/14/2024 |
| | Katherine Persinger: Mgr, Laboratory | 8/14/2024 |
| | Kristin Murphy: Medical Technologist Lead | 8/14/2024 |

## Applicability

Taylor, Trenton, Wayne