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A Protocol for Producing Quality Control Materials for Hematology Testing Using Porcine and Goose Blood V.2

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We use this protocol and it's working

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Abstract

Commercial hematology internal quality control (IQC) materials are often costly, imported, and have limited shelf life, which poses a significant challenge for laboratories in low- and middle-income countries (LMICs). This protocol presents a low-cost, locally adaptable method for preparing IQC materials targeting white blood cell (WBC) parameters. Using porcine and goose blood sourced from legal commercial slaughterhouses, the samples are chemically fixed through a two-step stabilization process to preserve cellular morphology and WBC stability over 60 days. The method has been optimized for the Abbott Cell-Dyn Emerald 22 analyzer and validated across other platforms, including Sysmex and Horiba systems, making it applicable in diverse laboratory settings.

Materials

Blood samples:

- Goose blood collected from healthy geese (>5 months old), obtained post-mortem from licensed slaughterhouses.
- Porcine blood obtained from commercial sources, collected immediately after slaughter.

Anticoagulant: CPDA-1 (Citrate Phosphate Dextrose Adenine)

Buffers and reagents:

- Phosphate-buffered saline (PBS)
- 25% glutaraldehyde solution
- Neomycin sulfate (0.44 g/L in stabilizing solution)
- 0.85% sodium chloride (NaCl)
- Acetic acid (to reach 0.1% final concentration)

Equipment:

- 50 mL sterile centrifuge tubes
- Refrigerated centrifuge
- Magnetic stirrer
- Water bath (set to 40°C)
- Glass containers
- Pipettes and standard lab consumables

Experiment 1: Goose erythrocyte-derived simulated leukocytes

1 Collect goose blood into sterile 50 mL tubes containing CPDA-1 anticoagulant.

2 Centrifuge at 2000 rpm for 15 minutes to separate plasma.

3 Wash the erythrocyte pellet 2–3 times with PBS until clean.

4 Prepare stabilizing solution: 25% glutaraldehyde with 0.44 g/L neomycin sulfate.

5 Resuspend washed erythrocytes in the stabilizing solution and stir gently on a magnetic stirrer for 1 hour.

6 Wash fixed erythrocytes 2–3 times with distilled water until the supernatant becomes clear.

7 Suspend the final product in 0.85% sodium chloride and store at 2–8°C until use.

Experiment 2: Porcine leukocyte-derived simulated leukocytes

8 Mix porcine blood with hemolysis solution at a 1:9 (v/v) ratio.

9 Add acetic acid to achieve a final concentration of 0.1%.

10 Incubate the mixture at 40°C for 10 minutes.

11 Centrifuge at 3000 rpm for 5 minutes and discard the supernatant.

12 Wash the sediment with PBS, repeat centrifugation until the solution becomes clear (removal of erythrocyte debris).

13 Suspend ~5 mL of sediment in 20 mL PBS.

14 Add fixation solution at a 1:4 (v/v) ratio.

15 Transfer to a glass container and shake gently at room temperature overnight.

16 After incubation, divide into 50 mL centrifuge tubes and centrifuge again at 3000 rpm for 5 minutes. Wash the pellet 2–3 times with PBS and suspend in 30 mL PBS for preservation. Store at 2–8°C.

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