

ESR Haemoglobin Bleeding Time and Clotting Time

Experiment 7 - Practical Notes

Name: _____ Roll no.: _____ Date: _____

1. Erythrocyte Sedimentation Rate

Aim

To observe a Westergren-type ESR demonstration and report sedimentation with method, time and units.

Principle

ESR describes red-cell settling under standardised conditions and is commonly expressed in mm at one hour. Increased plasma proteins can promote red-cell aggregation, but anaemia, cell shape and other factors also affect sedimentation. ESR is a non-specific finding and does not identify one disease by itself.

Requirements

- Westergren-type system and its instructions, vertical stand and timer.
- Instructor-provided anticoagulated material or a simulated reading.
- Temperature and observation record.

Procedure

1. Confirm method

Record the tube or instrument type, required anticoagulant and any prescribed dilution. Use the method-specific preparation rather than assuming one dilution for every system.

2. Observe filling

The instructor fills to the stated mark without bubbles or clot. Note that a correct initial level is required.

3. Set vertically

Place the tube upright in a stable stand, protected from vibration and unsuitable temperature conditions. Start timing as prescribed.

4. Read

At the stated endpoint, usually one hour for the classical method, read the clear-plasma column above the red cells in millimetres.

5. Interpret

Report method and interval and compare with the supplied laboratory range. Discuss non-specificity and confounding factors.

Observations and Record

Item	Required record	Observation
Method / temperature	System and room condition	_____
Start / reading time	___ / ___	_____
Sedimentation	Clear-plasma column	___ mm at 1 h

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Worked Example

The numbers below are illustrative; enter your own observations in the record.

- Illustrative classical reading: clear-plasma column 18 mm after one hour. Report ESR = 18 mm at 1 h under the stated method.
- Do not divide a 30-minute observation into a guessed one-hour result: sedimentation is not assumed to be a simple linear process.

Result

ESR by ____ method = ____ mm at ____ h. The measurement conditions and interpretive limitations are recorded.

Precautions

- Keep the tube vertical and the timing consistent.
- Clots, bubbles, vibration or an incorrect fill level can invalidate the reading.
- Do not use ESR alone to diagnose infection, autoimmune disease or malignancy.

Viva Questions and Answers

1. What is read in the classical test?

The height of clear plasma above the settled red cells at the stated time.

2. Why can tube tilt matter?

It changes the sedimentation conditions and can distort the measurement.

3. Why is ESR non-specific?

Many inflammatory and non-inflammatory factors can change it.

2. Haemoglobin Estimation and Interpretation

Aim

To observe a prescribed haemoglobin estimation method, calculate a teaching result and interpret it with the supplied laboratory interval.

Principle

Haemoglobin concentration describes the oxygen-carrying pigment in a volume of blood. Modern analysers may use validated non-cyanide photometric methods. A visual acid-haematin teaching method, where used, has different limitations. The named method, calibration and control status must accompany the result.

Requirements

- Instructor-selected analyser or photometer and its specified reagent system.
- Appropriate control, calibrator and supplied specimen or demonstration material.
- Method instructions and observation sheet.

Procedure

1. Identify the method

Record the instrument or teaching method and the reporting unit. Do not combine reagents or procedures from different methods.

2. Check readiness

Observe the instrument blank or zero, calibrator and control checks as prescribed.

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3. Observe preparation

The instructor prepares and measures the supplied material using the method-specific quantities and reaction time.

4. Read the result

Record the reported Hb or blank-corrected absorbance. Apply the calibration calculation only if it is the validated calculation for that method.

5. Interpret

Compare with the supplied age- and context-appropriate interval. Consider CBC indices and clinical assessment; a low Hb finding does not itself establish the cause.

Observations and Record

Item	Value / description	Record
Method and unit	Instrument / g/dL or g/L	_____
Calibrator / control	Assigned concentration / accepted result	_____
Specimen result	Reported Hb or absorbance	_____

Worked Example

The numbers below are illustrative; enter your own observations in the record.

- One-point linear teaching example: standard Hb = 15.0 g/dL; standard absorbance = 0.50; test absorbance = 0.40, all blank-corrected.
- $Hb = (0.40 \div 0.50) \times 15.0 = 12.0 \text{ g/dL} = 120 \text{ g/L}$.
- This formula requires a valid linear method and matched conditions; use the instrument's calibration when the method is not a simple one-point comparison.

Result

Method: _____. Haemoglobin = ____ g/dL or ____ g/L. The result was considered with the supplied interval and other relevant information.

Precautions

- Use only the specified reagent system; do not prepare hazardous historical reagents for this exercise.
- Turbidity, clots or poor specimen identification can invalidate a result.
- Do not infer iron deficiency from Hb alone or advise treatment from the classroom result.

Viva Questions and Answers

1. What does Hb concentration measure?

The mass concentration of haemoglobin in blood.

2. How are g/dL and g/L related?

Multiply g/dL by 10 to obtain g/L.

3. Why is a visual teaching method limited?

Colour matching and observer judgement can reduce precision compared with validated instrument measurement.

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3. Bleeding Time and Clotting Time

Aim

To distinguish primary haemostasis from clot formation and calculate intervals using a supervised demonstration or simulation.

Principle

Bleeding time is the interval until bleeding stops under a specified test method and is influenced by platelet and small-vessel function. Whole-blood clotting time records a method-specific clot endpoint and relates more to coagulation. These historical teaching tests are not interchangeable with modern platelet studies, PT or aPTT; bleeding time is rarely used clinically today.

Requirements

- Instructor-selected video, simulated timing record or approved demonstration.
- Timer, endpoint descriptions and observation sheet.
- Any invasive demonstration is conducted only by authorised trained staff under institutional procedures.

Procedure

1. Identify the method

Record whether the demonstration concerns bleeding time or clotting time. Note the named method, time-zero definition and endpoint.

2. Observe bleeding endpoint

In a simulation or authorised demonstration, record the start and the first endpoint meeting the stated method. Do not carry out cuts or punctures on classmates.

3. Observe clot endpoint

Record when the stated clot criterion is reached and the conditions shown, including temperature where relevant.

4. Calculate intervals

Subtract the starting timestamp from each endpoint. Write both minutes and seconds; a decimal minute is not the same as a minute:second notation.

5. Discuss limitations

Compare the recorded interval with the method-specific laboratory interval. Discuss observer dependence and why modern investigations may be preferred.

Observations and Record

Test	Start / endpoint	Elapsed interval
Bleeding-time simulation	___ / ___	___ min ___ s
Clotting-time simulation	___ / ___	___ min ___ s
Method / conditions	_____	_____

Worked Example

The numbers below are illustrative; enter your own observations in the record.

- Illustrative bleeding record: start 09:02:00; endpoint 09:05:30. Interval = 3 min 30 s = 3.5 min.

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- Illustrative clotting record: start 09:10:00; endpoint 09:14:45. Interval = 4 min 45 s = 4.75 min.
- These times demonstrate arithmetic and are not patient findings or universal normal limits.

Result

Bleeding-time simulation: ____ min ____ s. Clotting-time simulation: ____ min ____ s. Method-specific limitations were identified.

Precautions

- Use the approved simulation rather than student self-puncture or improvised cuts.
- Do not stop medicines or infer a bleeding disorder from a classroom timing result.
- Test conditions and endpoint definitions must be recorded; different methods cannot be compared by one universal cutoff.

Viva Questions and Answers

1. Which process is especially relevant to bleeding time?

Primary haemostasis involving platelets and small vessels.

2. Are clotting time and aPTT the same?

No; they have different procedures and endpoints.

3. Why is bleeding time uncommon today?

It is difficult to perform reproducibly and more suitable investigations are available.

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