

Erythrocyte Sedimentation Rate

“The Role of ESR in Current Medicine Practice”

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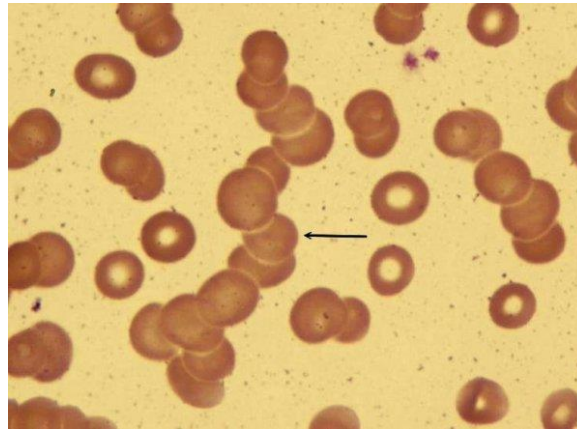


ESR - Standard Practice

- Invented in 1918 by Biernacki (Biernacki Test).
- Standardized by Westergren in 1973:
 - * Venus blood mixed with Trisodium Citrate (anti coagulant) in a 4:1 ratio.
 - * Placed in a 100 mm vial (Westergren) in an upright position.
 - * Result is the number of mm of clear plasma after 1 hour.

ESR - Mechanism

- 1) Aggregation: The Erythrocytes form stacks called “rouleaux”.



- 2) Settling: The formed rouleaux settle to the bottom of the vial, pushing the plasma up.
- 3) Packing – The mass of rouleaux gathers at the bottom of the vial, slowing the rate of further settling.

ESR - Mechanism

* The aggregation phase is the rate determining phase – The aggregation raises the ratio between the rouleaux weight and surface area, accelerating the sedimentation rate.

ESR - Mechanism

Pro-sedimentation Factors:

Positive charge plasma proteins – Fibrinogen, Globulins.

Acute phase reactants – CRP, SAA.

Anti-sedimentation Factors:

Negative charge on the Erythrocyte surface.

Hemoglobin

Albumin

ESR – Standard Values

Male – $\text{Age}/2$.

Female – $(\text{Age}+10)/2$.

* A high ESR of over 100 mm/hour has a predictive value of disease of 90%, in asymptomatic individuals.

ESR – Different Uses

- 1) Determining a pathogenic process in asymptomatic individuals (screening test).
- 2) An aid in Diagnosis of disease.
- 3) Monitoring disease process.

ESR - screening test

- General asymptomatic population – In less than 1% of patients ESR was the only indication of a pathogenic process.
- Disease prone population - High predictive value (93%)
- Indicator of infectious, cardio-vascular, neoplastic and connective tissue pathologies.

ESR – Diagnosis Aid

Infectious diseases:

Endocarditis – 93% sensitivity.

T.B – 80%.

Connective tissue diseases:

Polymyalgia Rheumatica – 99% sensitivity.

Temporal Arteritis – 99%.

Neoplasms:

MM – 92% sensitivity.

High ESR (>100 mm/hour) = High chance of metastasis.

ESR - Monitoring disease process

- Indicator of flaring of disease – In some cases before symptoms.
- Polymyalgia Rheumatica and Temporal Arteritis – Only indicator. Indication for higher steroid dose.

Slow ESR D.D's

- Polycythemia Vera.
- Hypofibrinogenemia.
- Severe Leukocytosis.
- Sickle cell disease (anemia).
- Hereditary spherocytosis.
- Salicylic usage.
- Corticosteroid use.
- Congestive cardiac failure.

ESR - Conclusions

- 1) No value in general population screening.
- 2) Valuable screening tool in populations with high incidence of disease.
- 3) Valuable in diagnosis of some disease, due to high sensitivity.
- 4) Valuable in monitoring some disease.
- 5) An ESR of >100 mm/hour – High indicator of disease.

Thank you!

