

## A RAPID BEDSIDE TEST FOR MEASURING SEDIMENTATION RATE

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**I**F DROPS of blood obtained by pricking the finger tips of different individuals be placed on inverted glass slides, the slides righted, and the drops allowed to clot and dry spontaneously, the films, when examined macroscopically by holding them to the light, will show an interesting phenomenon.

Some films will give the appearance of a uniform, coarse meshwork. In others, the detail will be fine and there will be a concentration of red cells in the center. In all, four main types may be distinguished (Figs. 1, 2, 3, and 4).

The character of the film depends on several interacting factors:

1. Degree to which the red cells settle (sedimentation rate) before clotting occurs.
2. Coagulation time.
3. Degree of agglutination of the red cells (rouleaux formation).
4. Rate of drying of the film.

Under ordinary conditions, the rapidity of drying is unimportant.

The rate at which the red cells settle is directly proportional to the degree of their rouleaux formation.<sup>1</sup> Thus, a slow rate will produce a film fine in detail and uniform in the distribution of the cells (Fig. 1); whereas, with a rapid rate, the rouleaux will be large and the general appearance of the film that of a coarse meshwork (Fig. 4).

If the coagulation time be rapid compared to the sedimentation rate of the cells (rapid coagulation time, or slow sedimentation rate) there will be a tendency for the cells to be drawn to the center of the film. In actual practice, variations from the normal with respect to coagulation time are found in the direction of slower, not faster, rates. Thus, the picture described is seen with slow sedimentation rates (Fig. 1).

A very slow coagulation time will merely cause a more uniform distribution of the cells.

In short, then, the character of the film may be said to depend directly on the sedimentation rate of the blood.

A study of a large series of these films, comparing the readings with the actual sedimentation rate determined by a modification of the Linzenmeyer<sup>2</sup> technic\* gave values summarized in Table 1.

TABLE 1

UNSPREAD BLOOD FILM	AVERAGE SEDIMENTATION RATES*
+	One and a half hours
++	45 † minutes
+++	25 † minutes
++++	18 minutes

The criteria for reading the films are as follows:

1. Fineness or coarseness of general detail.
2. Character of meshwork, if present.
3. Presence or absence of central agglutination.
4. Presence or absence of peripheral ring (Figs. 3C and 4B).

With this in mind, the four groups may be described as follows:

+ Normal; very fine detail; no meshwork; gradual transition from periphery to dark central agglutinated mass (Fig. 1).

++ Moderately rapid; the detail is somewhat coarse but uniform throughout. Meshwork not noticeable particularly; there may be the beginning of a central agglutinated mass (Fig. 2).

\*Modified Linzenmeyer Technic. A 5 mm. bore tube calibrated to 0, 12, and 18 mm. is used. Add 0.2 cc. of 2.5 per cent sodium citrate to the tube. Withdraw blood from venipuncture and add the blood to the citrate in the tube until the 1 cm. mark is reached. Invert the tube three times to mix blood and citrate. Let the tube stand and note the time it takes for the red cells to settle to the 18 mm. mark.

†Only about 3 1/2 per cent of the sedimentation rate readings according to this technic fell within the range of 30 to 40 minutes.

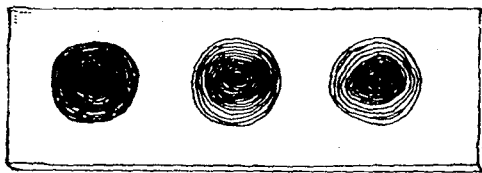


FIG. 1. The film shows very fine detail, no meshwork and with a gradual transition to the concentrated mass of red cells in the center.\*

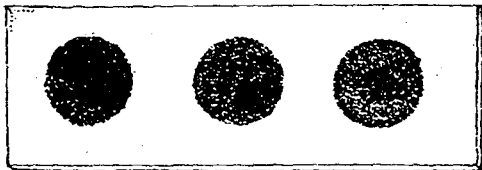


FIG. 2. The detail is coarse and uniform; meshwork not particularly noticeable.\*

+++ Rapid; coarse detail; the meshwork fine but easily observed; no central agglutinated mass (Fig. 3).

++++ Very rapid; very coarse detail; definite meshwork; no central agglutinated mass (Fig. 4).

Variations within each group will, of course, be found, but with a little practice in comparing the results with values from the quantitative test a surprising accuracy of prediction, correct within a few minutes, can be obtained.

#### Technic

1. Clean the finger tip with alcohol and dry with a sterile gauze.
2. Prick finger tip with needle. (I use a No. 19 gage Wassermann needle to insure a fairly large drop.)
3. Gently express a small drop of blood (about 3 mm. in diameter).
4. Touch it with the flat surface of a clean glass slide to produce a drop on the slide (about 5 mm. in diameter). I employ the practice of getting several drops of slightly different sizes on the slide, expressing more blood from the puncture wound without wiping away the residual blood after each drop is taken. The

\* For the sake of clearness the blood films were drawn proportionately larger than the glass slides.

reason for doing this is that if the blood on the finger as first expressed be small and globular in character, the first film produced will be thickly rimmed (Figs. 3C and 4B), which distorts the picture somewhat; whereas successive films will show a uniform distribution.

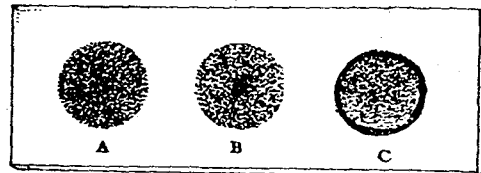


FIG. 3. The meshwork is becoming prominent.\*

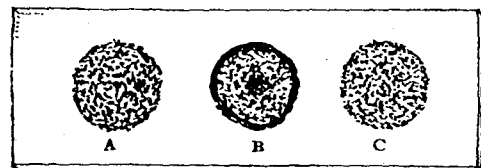


FIG. 4. The film presents the appearance of coarse meshwork.\*

5. Right the slide and let the film clot and dry spontaneously in the horizontal position. (I tried angulating the slide while the films were drying, but the results did not justify the use of this procedure.)

6. Observe macroscopically when dry, by holding the slide to the light; note the type of film. The slide may now be filed for future reference.

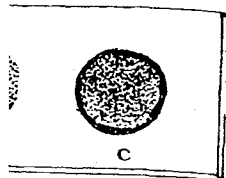
It should take from five to seven minutes for the film to dry. Smaller or larger drops may take longer.

The red blood count of the patient has no influence on the character of the film.

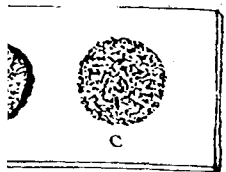
#### Discussion

It is not my intention to imply that the test described above be used to supersede regular methods of sedimentation rate. Its place lies not so much in the hospital or research laboratory where facilities are at hand for complicated procedures, but rather in the office and at

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the bedside where a simple and inexpensive and quick test requiring no special tubes, solutions, no syringes, and no graphs is of distinct value. Not only is my test of diagnostic value, but the fact that the slides can be filed and the results checked week by week in cases such as coronary thrombosis, rheumatoid arthritis, salpingitis, etc., places a good and simple prognostic guide in the hands of the physician.\*

\* Blood films taken and filed by me more than a year ago still retain all their original clearness and characteristics.

Summary

1. Varying characteristics of the unspread blood film have been described.
2. These have been shown to be dependent on sedimentation rate.
3. A technic was described for utilizing this phenomenon as a simple qualitative measure of sedimentation rate.

1100 Grand Concourse

Bibliography

1. Fahreus, R.: Acta med. Scandinav. p. 651 (1921).
2. Linzenmeyer, G.: München. med. Wchnschr. 70: 1243 (1923).

EXPERT WITNESS

Woldman's description of the medical expert on the witness stand is quoted thus in the *American Journal of Medical Jurisprudence*:

"With an erudite profundity,  
And subtle cogitabundity,  
The medical expert testifies in Court:  
Explains with ponderosity  
And keen profound verbosity  
The intricate nature of the plaintiff's tort.

"Discoursing on pathology,  
Anatomy, biology,  
Opines the patient's orbit suffered this:  
Contusions of integuments  
With ecchymose embellishments,  
And bloody extravasation forming pus.

"A state of tumerosity  
Producing lacrimosity,  
Abrasion of the cuticle severe,  
All diagnosed externally,  
Although he feared, internally  
Sclerotic inflammation might appear.

"The jury sits confused, amazed,  
By all this pleonasm dazed,  
Unable to conceive a single word,  
All awed, they think with bated breaths  
The plaintiff died a thousand deaths—  
What agony and pain he had endured.

"But then the counsel for the defense,  
Devoid of garrulous eloquence,  
Asked, 'Isn't it true that all you testified  
Means merely from a punch or two  
The plaintiff's eye was black and blue?'  
'Yes, that's correct,' the doctor meekly sighed."

DIPHTHERIA DANGER SPOTS

At least seventeen communities in upstate New York will have to increase their number of diphtheria immunizations of children under five years of age if they are to feel reasonably secure from an outbreak of this disease, according to the 1938 diphtheria immunization reports from sixty-eight places made public by Dr. Edward S. Godfrey, Jr., State Commissioner of Health.

Health authorities say any community may feel reasonably secure from an outbreak of diphtheria only when 35 per cent or more of children under five years of age have been immunized. Dr. Godfrey said, however, that while this will protect a community, nothing will protect the individual child except actual immunization treatment and he warned against a feeling of false security on the part of parents who may reside in a community with a high percentage of immunization, but whose own children have not been given the protective treatment.

The following communities, as of January 1, 1939, reported immunization percentages below the 35 mark: Elmira, Jamestown, Dunkirk, Gloversville, Rensselaer, Hornell, Oneida, Rockville Centre, Floral Park, Oswego, Watervliet, Fulton, Hempstead, Glen Cove, Lynbrook, Valley Stream, and Freeport.

Johnson City, Middletown, and Peekskill are tied for first place in the report with each place reporting 95 per cent. Second place honors go to Mamaroneck where 86 per cent was reported. Third place honors go to Hudson and Port Jervis each reporting percentages of 77, with Troy running a close fourth at 75 per cent.