Practical Animals Physiology

(Bleeding Time)

3rd Class

Lec. 5

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Bleeding Disorders

Hemostasis

When a blood vessel is injured , a number of physiological mechanisms are activated that promote hemostasis or the cessation of bleeding

(hemo = blood ; stasis = standing).

1- Vasoconstriction: This is to cause contraction of blood vessel and it is immediate response.

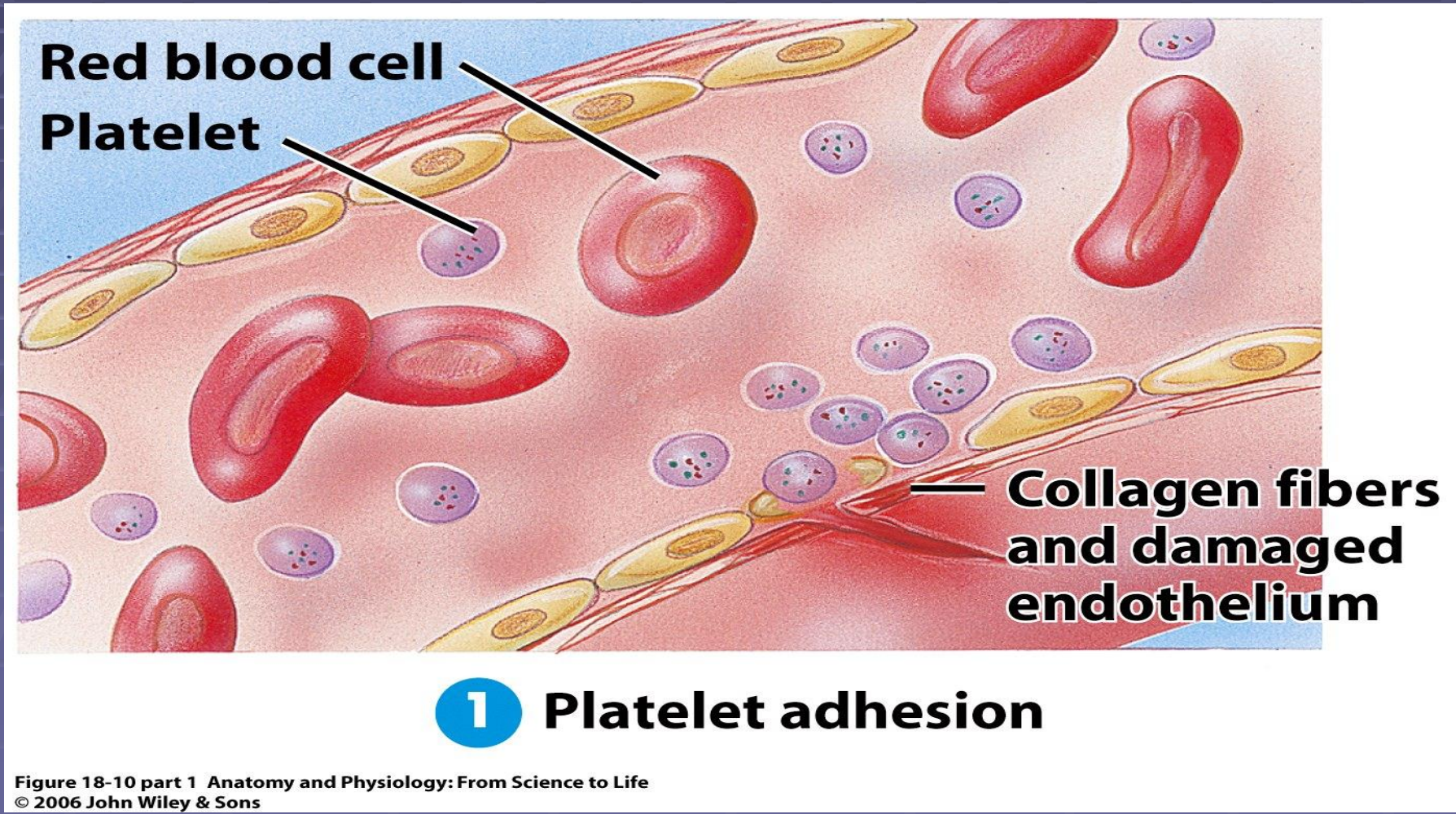


Figure 18-10 part 1 Anatomy and Physiology: From Science to Life

2- Platelet adhesion to the injured blood vessel and aggregation to each other.

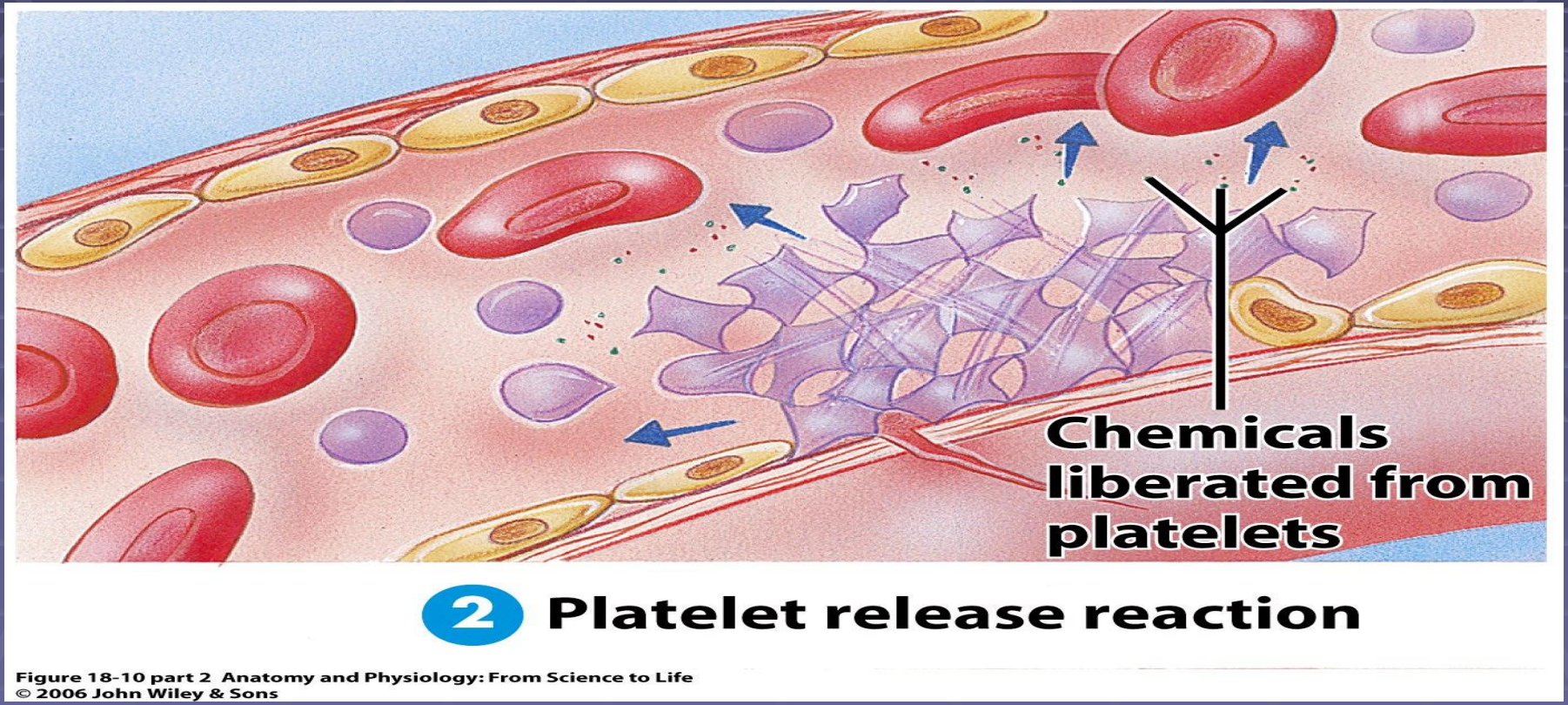


Figure 18-10 part 2 Anatomy and Physiology: From Science to Life

3- The activation of blood coagulation through both intrinsic and extrinsic pathways.

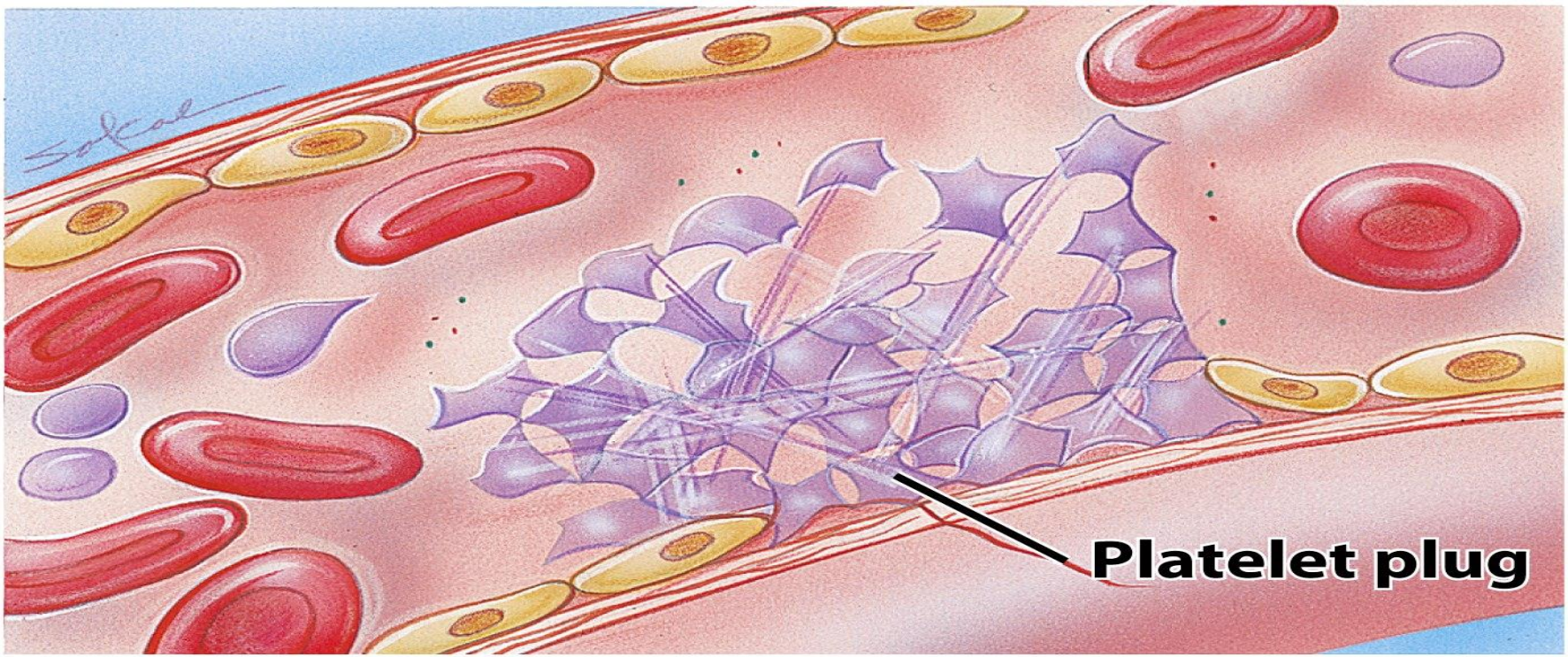
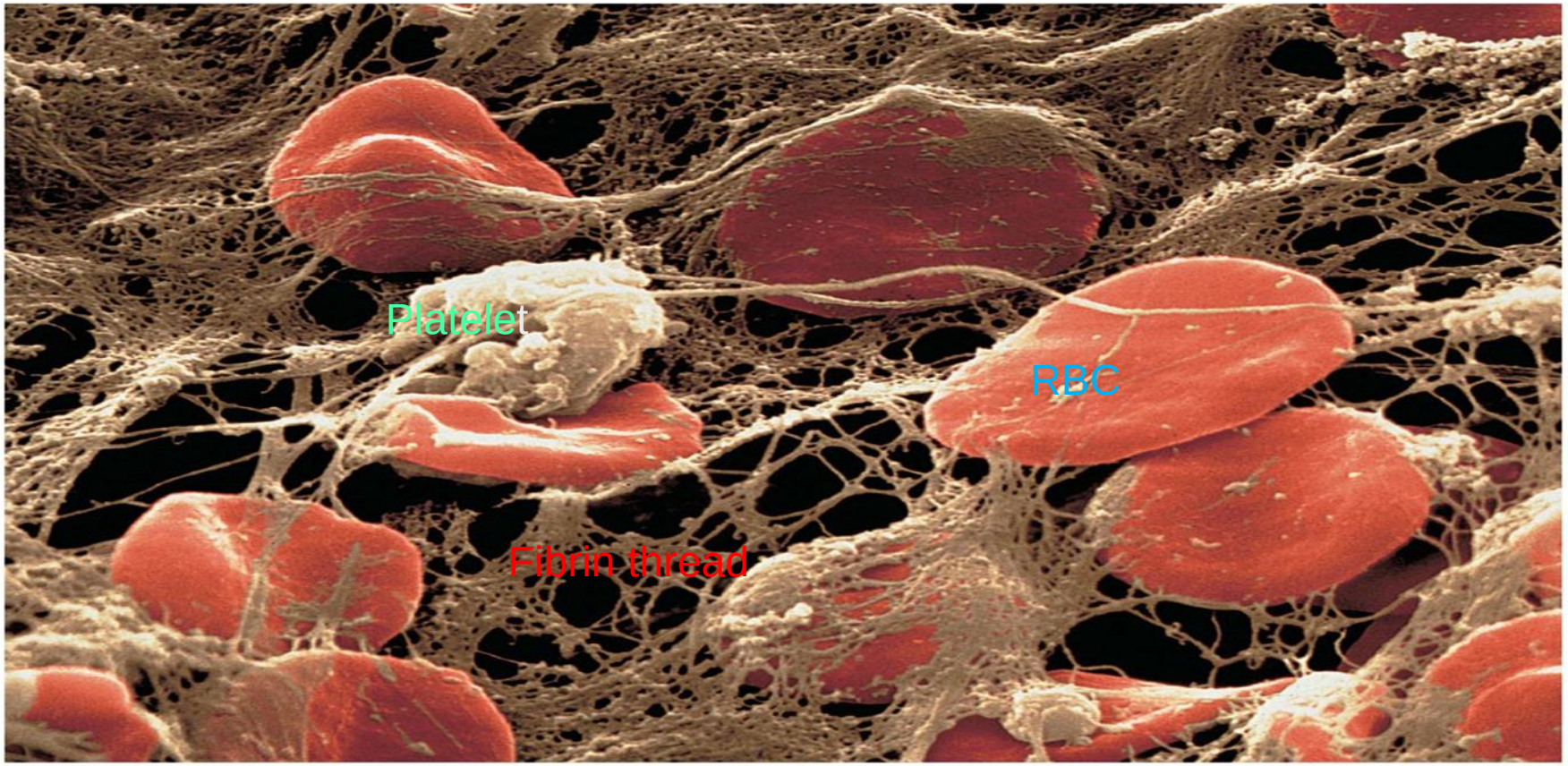


Figure 18-10 part 3 Anatomy and Physiology: From Science to Life

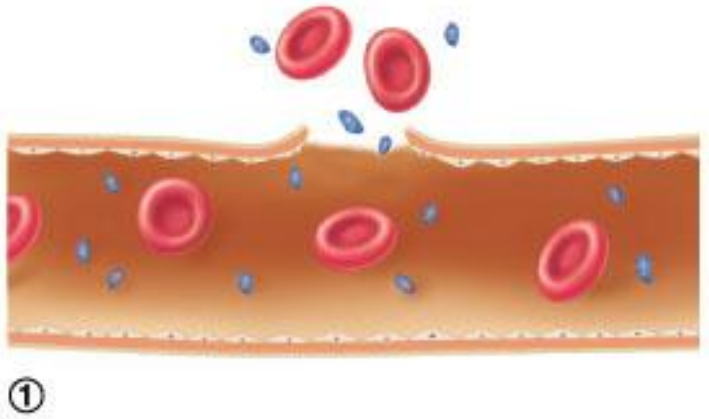
i) Prothrombin $\xrightarrow{\text{(prothrombinase)}}$ Thrombin

Fibrinogen $\xrightarrow{\text{(thrombin)}}$ fibrin

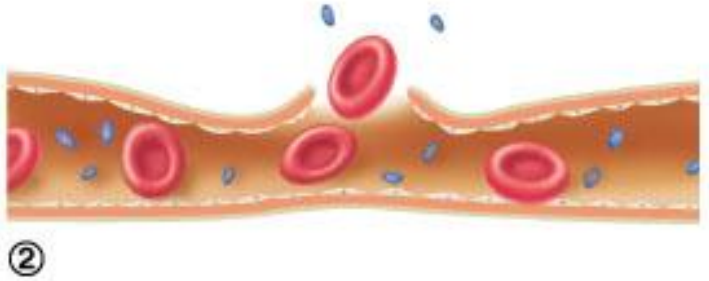


Hemostasis:

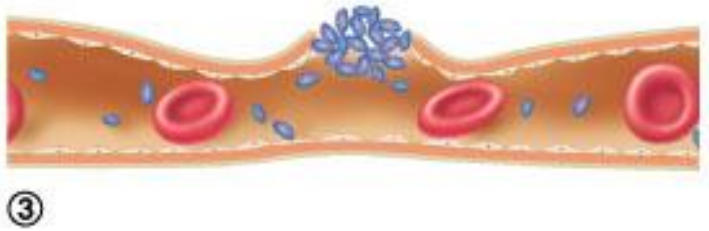
1. Vessel injury



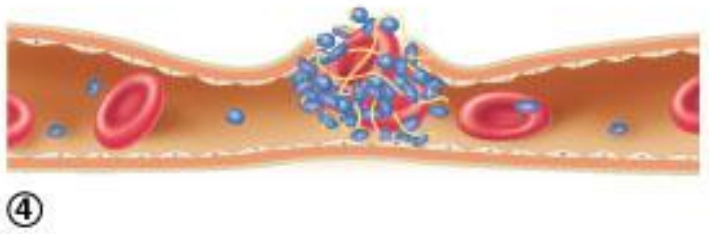
2. Vascular spasm



3. Platelet plug formation



4. Coagulation



A patient with bleeding tendency requires the following investigation.

1- Hess capillary resistance test.

2- Platelet count.

3- Bleeding time.

4- Whole blood coagulation time.

5- More sophisticated methods.

e.g. The measurement of prothrombin time . Partial thromboplastin time. Factor VIII and other clotting factor activities.

Capillary resistance test (Hess test): -

Principle: - Consists of inflating a sphygmomanometer cuff placed around the arm and inspecting the petechiae appearance.

Procedure:

1-With a grease pencil mark a circle 6cm in antecubital fossa.

2-Apply the cuff of sphygmomanometer 1-2 inchs above the circle.

3-Raise the pressure to 60 mm Hg and maintain the pressure for 5 minutes.

5-Release the cuff and after few minutes count the fresh petechiae withen the circle.

Clinical application:

1-In healthy people 0-8 petechiae are produced by this technique.

2-A positive test is observed when the capillaries are weaken by a disease and in cases of thrombocytopenia.

3-The test may be positive even thought the bleeding time is normal in this cause the capillaries fail to withstand to an increase in pressure.

2) Bleeding time

This is the time taken to arrest the bleeding from capillary wound, it gives an indication about the capillary reactivity and platelet number and function there are two methods for measuring bleeding time:

1- Dukes method

2- Ivys method

1. Dukes method

Procedure:

1- Clean the lobe of ear or the finger by spirit.

2- With a lancet make a puncture about 2-4 mm depth.

3- By a clean filter paper remove the blood from wounded site every 30 second.

4- Count the spots of blood when bleeding stops and find the bleeding time. While clotting do not press on the punctured site. Normal range is 2-5 minutes.

2/ **Ivys method**

Procedure:

1- Apply the cuff of sphygmomanometer to the arm.

2- Increase the pressure to 50-60 Hg.

3-Puncture the arm below the anticubetal fossa area in the same manner of Dukes method. (Avoid the area of large vessels).

4- Note the time.

Normal range is 2-6 minutes.

Clinical application of bleeding time:

1- Bleeding time is not a reliable test because

a- It depends on the site and depth of puncture.

b- Depend on the weather (cold or warm) due to capillary constriction in the skin and shorted of bleeding time in cold and reverse is happening in hot weather

2- Bleeding time is increased in thrombocytopenia and normal in hemophilia.

3) Clotting time:

This is the time taken for blood to clot outside the vascular system. There are two methods for measuring clotting time:

1- Capillary tube method

2- Test tube method

1. Capillary tube method

Procedure:

1- Clean the finger with spirit.

2- With lancet make a puncture obtain large drop.

3-Note the time.

4-Fill a non heparinized capillary tube.

5- After 2 minutes start breaking small pieces of capillary tube every 30 second.

6- Note the time when fibrin thread is seen between two broken ends.

Clotting time =2+no.pieces/2 Normal Value is 2-6 minutes.

2. Test tube method:

Procedure:

1- Venous blood is withdrawn in to a dry syringe.

2- 1 ml delivered in to 4 unsiliconized tubes of 10 mm bore.

3- A stopwatch is started as soon as the blood enters the syringe.

4- Tide the tube every minutes through an angle greater than 90 without spilling the blood.

5- The time is taken as the average of clotting time in all 4 tubes.

6- The temperature must be controlled.

Normal ranges is 4-9 minutes at 37ºC. This is about twice faster in room temperature 20ºC.

Clinical application:

1- Clotting time is normal in puerperal.

2- Clotting time is prolonged in hemophilia.