Pemeriksaan Hemostasis Sekunder

Departemen Patologi Klinik dan Kedokteran
Laboratorium FKKMK UGM/RSUP Dr. Sardjito
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Dr.dr. Usi Sukorini, Sp.PK (K), M.Kes

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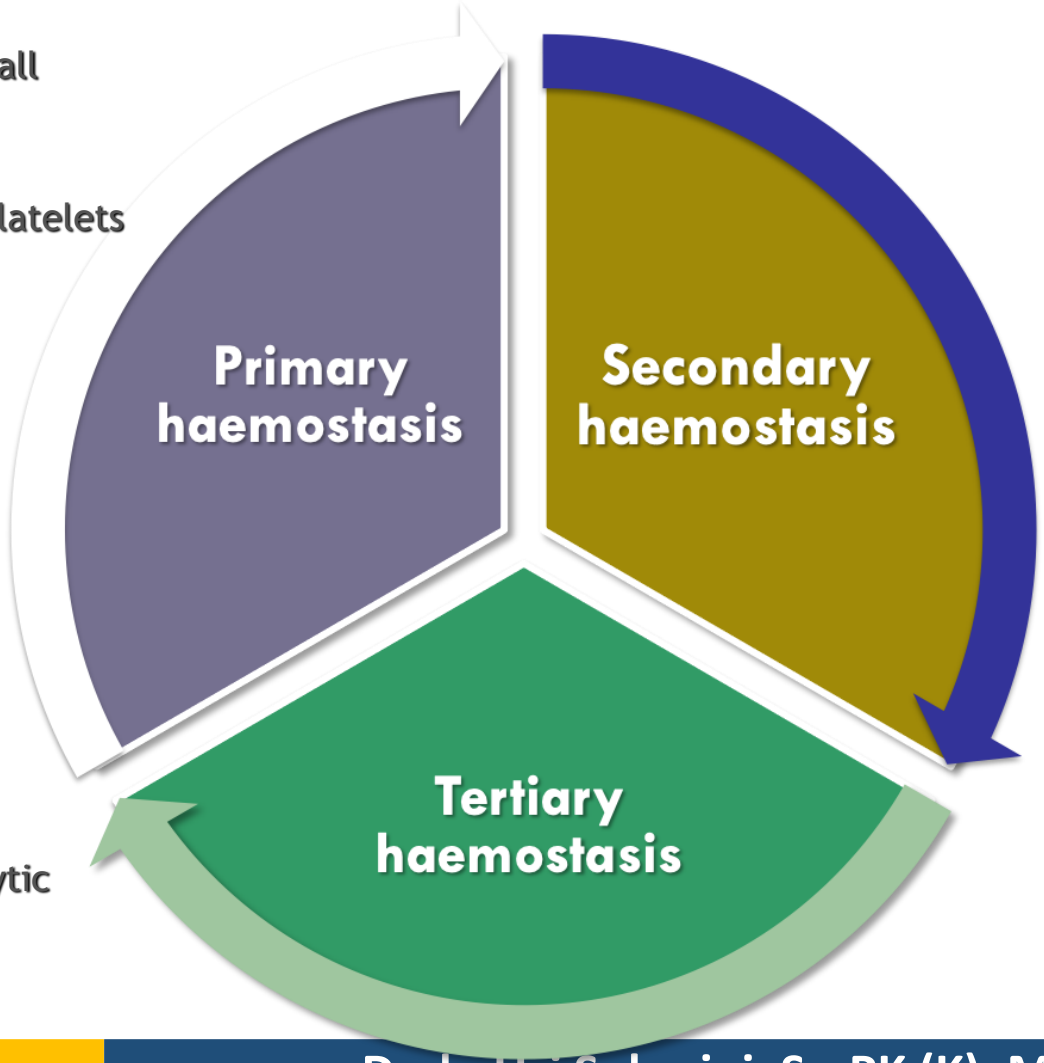
Laboratory test for secondary haemostasis

- Prothrombin Time (PT)
- Activated Partial Thromboplastin Time (APTT)
- Thrombin Time (TT)

Haemostasis mechanism

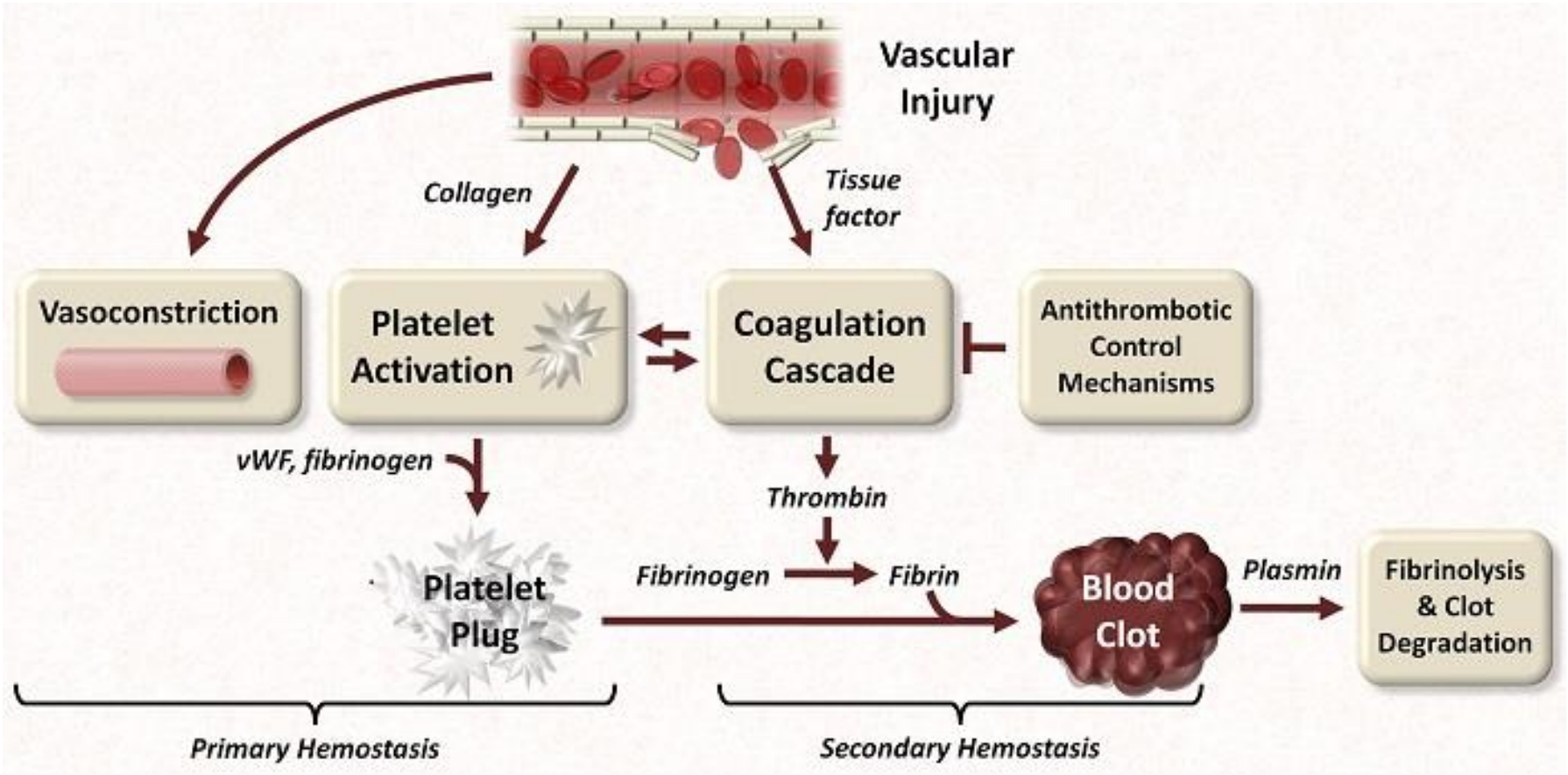
- descuamation & small injuries
  blood vessels
- vascular intima & platelets
- Rapid, short -lived response



- large injuries and other tissues
- platelets & coagulation system
- delayed, long-term response

- Control or regulatory mechanism
- involves fibrinolytic system

Major component of haemostasis



Prothrombin Time (PT)

Purpose:

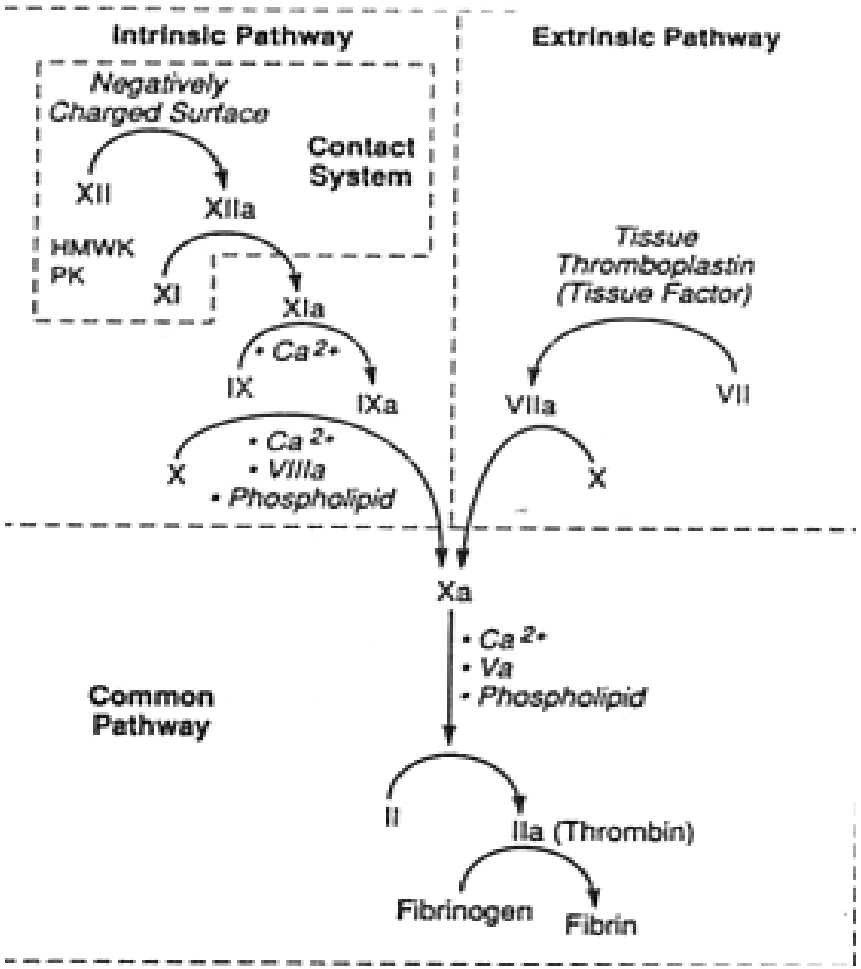
- The PT assay is used to screen for inherited and acquired abnormalities in the extrinsic (factor VII) and common (factors V, X, protrombin and fibrinogen) pathways
- The PT is also used to monitor the effect of oral anticoagulant therapy

Principle:

- Clotting is initiated by a commercial tissue factor reagent, called thromboplastin, and calcium are mixed and the clotting time determined.

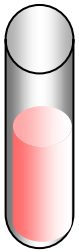
PT

In vivo



In vitro

1



+ anticoagulant (Na sitrat)

↓

Whole blood — binding Ca

↓

Consist of all coagulation factors except calsium

2

+

added tissue factor, Ca

↓

clotting

↓

Detected as PT

Prothrombin Time (PT)

- Normal range (depend on reagent used)
  - 10-12 seconds
  - 12-14 seconds
- When patients are receiving oral anticoagulants, the ratio of the patient's PT to that of the normal control is useful in monitoring this therapy

Prothrombin Time (PT)

Interpretation:

- The common causes of prolonged PT are:
  - The administration of oral anticoagulant drugs (vit K antagonist/Warfarin)
  - Liver disease
  - Vitamin K deficiency
  - Disseminated intravascular coagulation
  - Deficiency of extrinsic coagulation factors
  - Inhibitor to F. VII

INR

- Control of oral anticoagulant
- Variation in reagent of PT
- Standardization of thromboplastin: ISI (International Sensitivity Index)

- $INR = \left(\frac{\text{Patient's PT}}{\text{mean PT of normal plasma}} \right)^{ISI}$

Therapy range : 2 – 3 (low intensity); 2.5 – 3.5 (high intensity)

Activated Partial Thromboplastin Time (APTT)

Purpose:

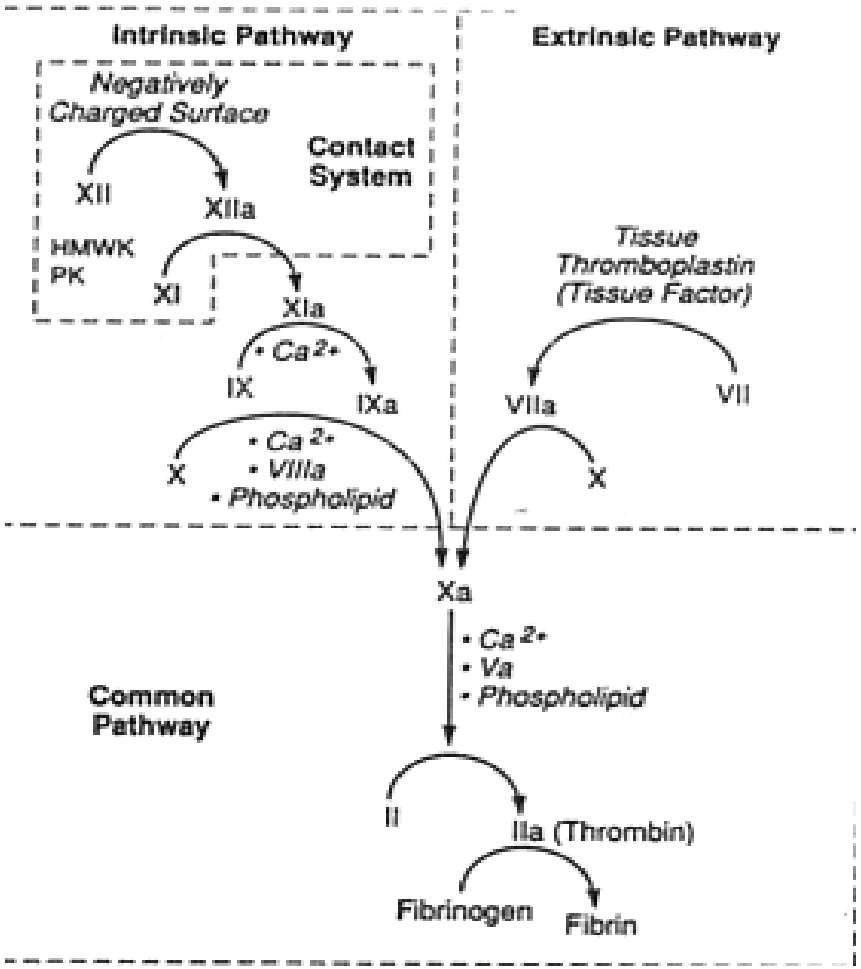
- The APTT assay is used to detect inherited and acquired coagulation factor deficiency and quality of the intrinsic pathway, to screen for lupus anticoagulant and to monitor heparin therapy

Principle:

- The APTT is an assay of the intrinsic and common pathway. A platelet substitute (crude phospholipid), and a surface-activating agent such as micronized silica (to activate factor XII) are added to plasma. This achieves optimal contact activation
- Calcium is then added and the clotting time is recorded
- The APTT assay measures all factors except factors VII and XIII

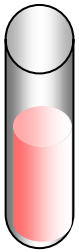
APPT

In vivo



In vitro

1



+ anticoagulant (Na sitrat)

Whole blood → binding Ca

↓

Consist of all coagulation factors except calcium & platelets

2

+

added tissue factor, Ca

↓

clotting

↓

Detected as APPT

Activated Partial Thromboplastin Time (APTT)

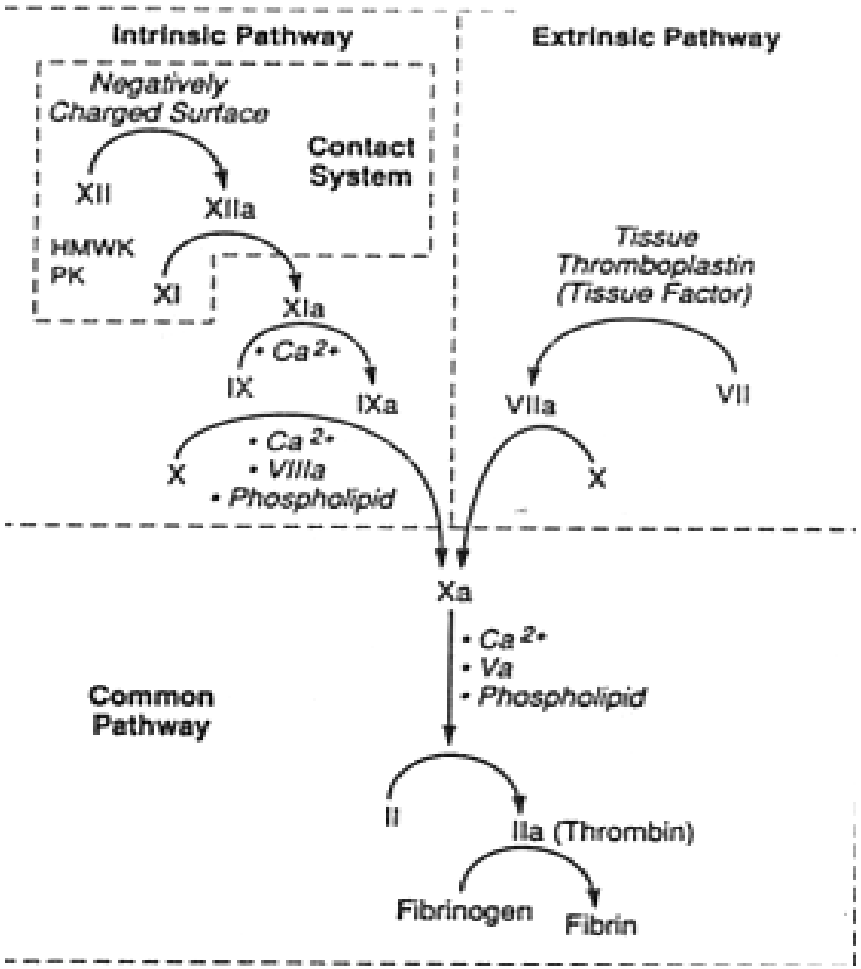
- **Normal range: depending on the reagent used**
  - **25-45 seconds**
  - **23-35 seconds**
- **The common causes of prolonged APTT are:**
  - **Disseminated intravascular coagulation**
  - **Liver disease**
  - **Massive transfusion with stored blood**
  - **Administration of heparin or contamination with heparin**
  - **A circulating anticoagulant**
  - **Deficiency of a coagulant factor other than factor VII**
  - **Inhibitor to intrinsic factors (e.g. antibody to f. VIII in hemophiliac)**

Thrombin Time (TT)

- **Purpose:**
  - The TT is used to screen for abnormality in the conversion of fibrinogen to fibrin
- **Principle:**
  - Thrombin is added to plasma and the clotting time measured
  - The TT is affected by the concentration & reaction of fibrinogen and the presence of inhibitory substances including fibrinogen/fibrin degradation products (FDP) and heparin
- **Interpretation:** normal 15-19 seconds
  - The common causes of prolonged thrombin time are:
    - Hypofibrinogenemia
    - Increased of FDP
    - Presence of heparin
    - Dysfibrinogenemia

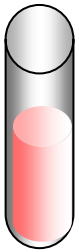
TT

In vivo



In vitro

1



+ anticoagulant (Na sitrat)

Whole blood

+

2 Thrombin

↓

clotting

↓

Detected as TT

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Thank You ☺