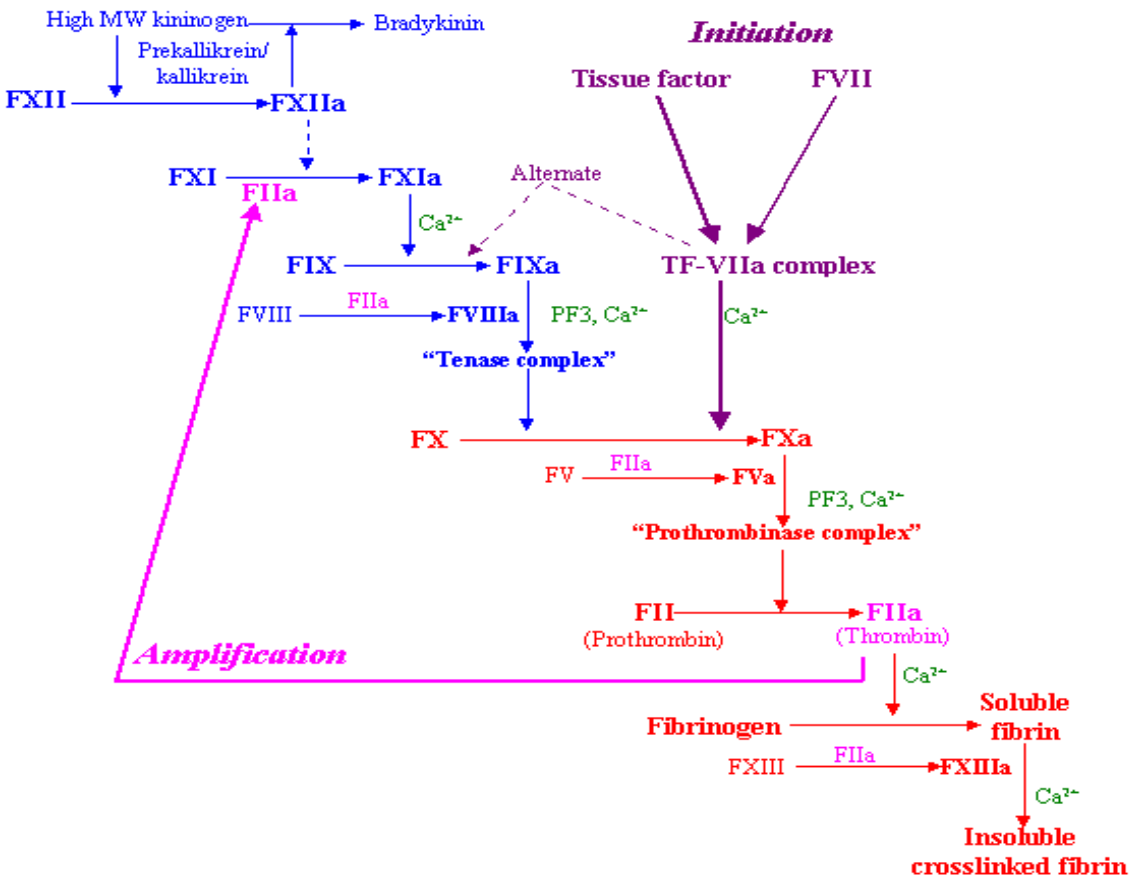
Prothrombin time test (PT)

Prothrombin time is the time required for the plasma to clot after an excess of thromboplastin and an optimal concentration of calcium have been added.

Although the PT was originally described as a specific, *one-stage assay* of prothrombin (FII), it is sensitive to a quantitative or qualitative abnormalities of any of the factors involved in the extrinsic and common pathways of the coagulation system (Factors II, V, VII, X, and Fibrinogen).

The PT used to determine the clotting tendency of blood, in the measure of warfarin dosage, liver damage, and vitamin K status.

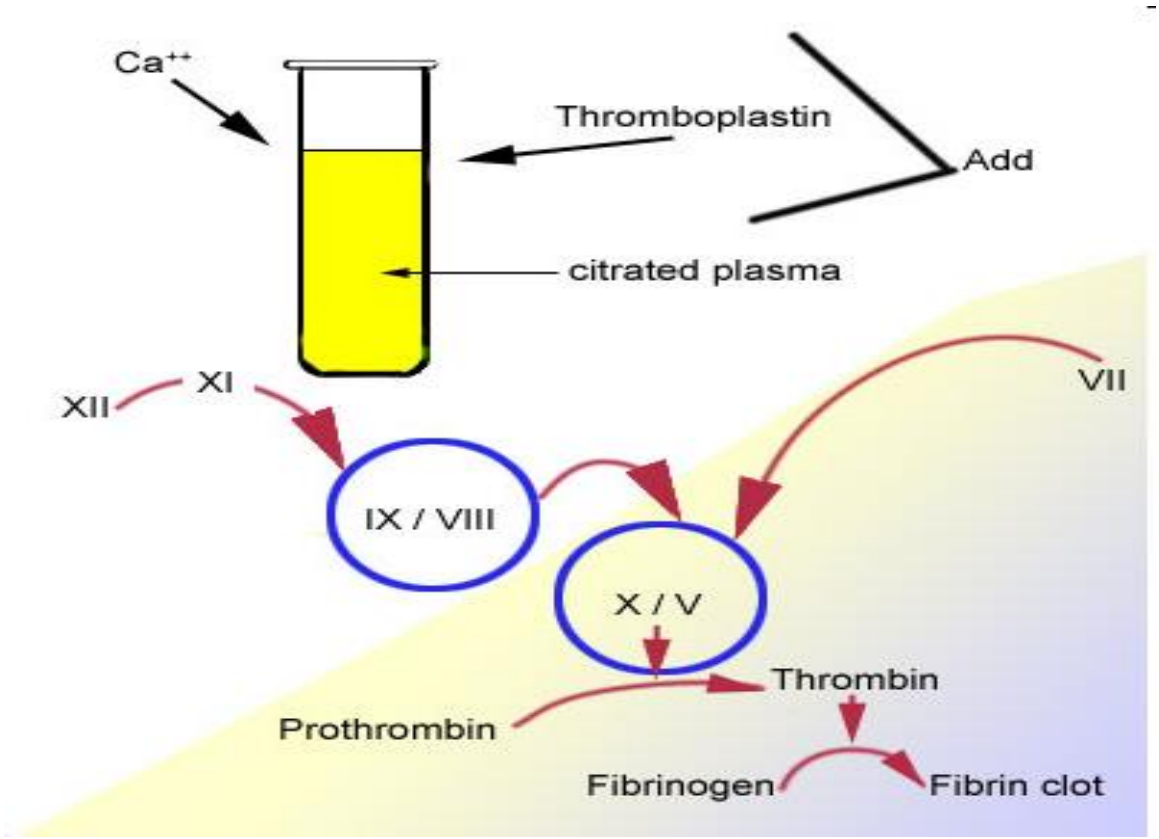
Occasionally, the test may be used to screen patients for any previously undetected bleeding problems prior to surgical procedures.



Principle:

When reagent thromboplastin--to which calcium has been added--is mixed with plasma (derived from sodium citrated whole blood), the time (in seconds) it takes for the formation of a clot is reported as the Prothrombin time (PT).

Calcium is necessary for the correct orientation and binding of a number of complexes including **:** tissue factor-VIIa, IXa-VIIIa, and Va-Xa.



SPECIMEN:

Citrated plasma: 1 part of sodium citrate solution (0.11 mol/ L) to 9 part of venous blood, avoiding the formation of foam.

Control: normal plasma (Commercial, Pooled Plasma).

EQUIPMENTS:

- 100 µL micropipettes (0.10 mL)

- Stop Watch.
- Reagent
- Test tubes
- Water bath (37ºC)

Procedure:

1. Bring all reagents, controls and sample to room temperature 15 minutes prior to testing.

2. Pre-warm PT reagent at 37°C for 5 minutes.

3. Pipette 100µl of PT reagent to each tube.

4. Add 50 µl of sample, controls to the tubes prepared in step 3, start stop watch , mix in a water bath (37°C) for 8 seconds , then record the time required for clot formation .

RESULTS:

Prothrombin Time Ratio (PTR) = Clot time of the test plasma / Clot time of the control plasma

Reference ranges:

- PT: 11.0 – 13.0 seconds.
- Normal control sample: (11-16 seconds)
- PTR: 1.0±0.15

When is it ordered?

- Used to monitor oral anticoagulant therapy (Warfarin / Coumadin).
- When a patient who is not taking anti-coagulant drugs has signs or symptoms of a bleeding disorder
- When a patient is to undergo an invasive medical procedure, such as surgery, to ensure normal clotting ability.

An elevated Prothrombin time may indicate the presence of

1. Vitamin K deficiency
2. DIC
3. Liver disease
4. Presence of FSP's
5. A deficiency in one or more of the Concerning factors: Factor I (Fibrinogen), Factor II (Prothrombin), Factor V (Proaccelerin, Labile Factor), Factor VII (Proconvertin, Stable Factor, Factor X (Stuart-Prower Factor, Factor XIII (Fibrin Stabilizing Factor)

In addition, inhibitors can cause prolonged PT's

Interpretation of Result:

- A Normal Plasma is used to evaluate routine result.
- Patients with lupus anticoagulants are not be requested for PT as they have antiphospholipid

Interfering Factors:

- Diet: ingestion of excessive green, leafy vegetables will increase the absorption of vit-K, which promotes blood clots.
- Alcoholism, Prolonged PT levels
- Diarrhea and vomiting decrease PT because of dehydration.
- Quality of Vein puncture.
- Medication : Antibiotics , Aspirin, Cimethidine….
- Prolonged Storage of plasma at 4^{o} C.