

**Partial prothrombin time**

Also known as: Partial Thromboplastin Time (PTT); Kaolin Cephalin Clotting Time (KCCT).

Is a performance indicator measuring the efficacy of both the "intrinsic" (the contact activation pathway) and the common coagulation pathways.

APTT is the most widely used method for monitoring intravenous heparin anticoagulant therapy (Heparin acts to accelerate Antithrombin which inhibits the actions of thrombin).

The PTT evaluates the coagulation factors XII, XI, IX, VIII, X, V, II (prothrombin), and I (fibrinogen) as well as prekallikrein (PK) and high molecular weight kininogen (HK).

It measures deficiencies mainly in factors VIII, IX, XI, and XII, but can detect deficiencies of all factors except III and VII.

The PTT can also detect Nonspecific inhibitors, such as lupus anticoagulant and anticardiolipin antibodies, which associated with clotting episodes and with recurrent miscarriages, especially those that occur in the second or third trimester.

**Principle**

Patient platelet poor plasma (PPP) is incubated at 37°C then phospholipid (cephalin) and a contact activator (e.g. Kaolin) are added followed by the calcium (all pre-warmed to 37°C). Addition of calcium initiates clotting and timing begins for a fibrin clot to form.

Kaolin is used as a surface activator. It binds directly to FXII resulting in its activation to XIIa. XIIa cleaves FXI to XIa but in the absence of calcium, activation of the subsequent factors does not occur.

Cephalin is a phospholipid substitute that replaces platelet phospholipid in the test (remember the test uses platelet poor plasma and so requires a source of phospholipid for coagulation to occur.)

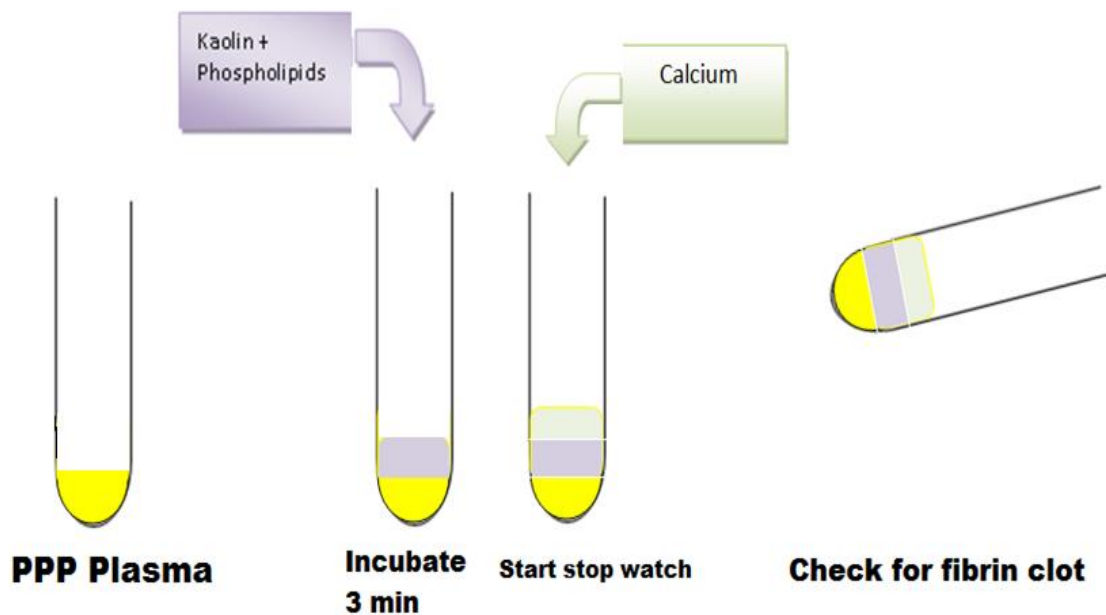
Reagent	Explanation
Platelet poor plasma [PPP]	See pre-analytical variables
Surface activator	Kaolin, Micronized silica, Celite, Ellagic acid
Phospholipid	e.g. Cephalin - to replace platelet phospholipid
Calcium	Calcium is required in molar excess for coagulation to occur. Calcium is removed (by chelation) when blood is collected into sodium citrate and recalcification is necessary to allow coagulation to occur.

### When is it ordered?

- Unexplained bleeding or bruising(The PTT may be ordered along with other tests such as a PT)
- A thromboembolism like DIC or Liver Disease.
- Recurrent miscarriages or a thrombotic episode , the PTT may be ordered as part of an evaluation for lupus anticoagulant or anticardiolipin antibodies.
- A person is on intravenous (IV) or injection heparin therapy (Monitoring Therapy).
- When someone is switched from heparin therapy to longer-term warfarin (COUMADIN) therapy, the two are overlapped and both the PTT and PT are monitored until the person has stabilized.
- Pre-surgical evaluation for bleeding tendencies

**Procedure:**

1. Pre- warm a sufficient quantity of calcium chloride reagent to 37°C for at least 10 min.
2. Pipet 100 µL of Sample into a labeled test tube, incubate 1-2 min.
3. Into each test tube, add 100 µL of partial thromboplastin reagent.
4. Incubate the mixture at 37°C for a minimum of three minutes. (optimum activation of contact factors)
5. Forcefully add in 100 µL of calcium chloride into mixture and start the stop watch immediately.
6. Mix the tube once, immediately after adding the calcium reagent. Allow the tube to remain in the water bath, approximately 20 seconds, mixing occasionally.
7. After 20 seconds, remove the tube from the water bath/heat block. Wipe off the outside of the tube. Gently tilt the tube back and forth until a visible clot forms. Stop the stop watch immediately and record the time in seconds.
8. Carry out 1 significant figure passed the decimal point. For example, if your result is 30.31, report as 30.3 seconds.
9. The result must be run in duplicate.
10. Repeat the steps using Normal Control.



### Reference Range

- ▶ Reference Range: 27-35 seconds.
- ▶ Critical Value: > 70 seconds

### Sources of Error

1. **Associated with specimen (Preanalytical)**
  - a. Inappropriate ratio of anticoagulant to blood
  - b. Clotted, hemolyzed or lipemic samples
  - c. Lack of PPP
  - d. Delay in testing or processing
  - e. Inappropriate storage
2. **Associated with Reagent (Analytical)**
  - a. Incorrect preparation of reagents.
  - b. Use of reagents beyond expiration date.

c. Contaminated reagent.

**3. Associated with procedure (Analytical)**

a. Incorrect temperature

b. Incorrect incubation times

c. Incorrect volumes of sample, reagents or both