

# Difference Between PT and PTT

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## Key Difference – PT vs PTT

Blood coagulation is the process which prevents excessive bleeding after an injury. When a blood vessel is injured, platelets in the blood create a temporary plug at the site of injury to stop bleeding. However, it is not strong enough to stop bleeding. Hence, blood coagulation cascade activates and makes a fibrin mesh to reinforce the platelet plug. Platelets, together with plasma cells and fibrins, make a strong blood clot at the injury site to seal the wound. Hence, excessive bleeding from the wound is stopped. There are different coagulation factors involved in blood clotting. Among them, prothrombin and prothrombin activator (thromboplastin) are extremely important to synthesize thrombin, which is the main enzyme that catalyzes fibrin formation. Blood coagulation process can show abnormalities which can lead to bleeding disorders. Hence, there are several blood tests designed to find out problems in and blood clotting and bleeding. Prothrombin time (PT) test and partial thromboplastin time (PTT) are two blood tests which measure the time taken to form a blood clot. The key difference between PT and PTT tests is that **PT test measures the integrity of the extrinsic system and the factors common to both systems** while **PTT test measures the integrity of the intrinsic system and factors common to both systems**.

## What is PT?

Bleeding disorders prevent the formation of coagulation factors or synthesize incorrect blood coagulation factors. These malformations are caused due to some medications, liver diseases, vitamin K deficiency, etc. When there is a bleeding disorder, it may result in a higher risk of excessive bleeding and accumulation of blood under the skin (hematoma). All these complications are due to abnormal blood clot formation. PT is a type of blood test which measures the time taken for blood clot formation or blood coagulation. PT test is often performed to investigate bleeding problems, or it is performed prior to surgery to check the chances of excessive bleeding.

PT test mainly focuses on measuring the integrity of the extrinsic blood coagulation pathway and the coagulation factors common to both pathways. Prothrombin is an essential plasma protein made by the liver. Vitamin K should be

available to make prothrombin. Prothrombin is converted into thrombin by the prothrombin activator. Thrombin formation is the key factor involved in the clotting process. Prothrombin time measurement is important because it tells whether the five different blood clotting factors (factor I, II, V, VII, and X) are present or not.

PT is measured in seconds. However, it is reported as a number of international normalized ratio (INR). The normal prothrombin time ranges from 11 to 13.5 seconds. In INR number, the range is 0.9 to 1.1. The prothrombin time can be extended due to several reasons such as blood thinning medications, low levels of blood clotting factors, absence of blood clotting factors, and changes in the activity of clotting factors.



Figure 01: PT test

PT test is performed by taking a blood sample from the patient and adding certain chemicals (calcium and thromboplastin) to it. Then the time taken for the fibrin clot formation is measured. If it lies within the normal time, it can be concluded that the patient is free from bleeding disorders.

## What is PTT?

Partial thromboplastin time test is another test which measures the time taken for blood coagulation. It measures the integrity of the intrinsic blood clotting system and coagulation factors of the common pathway. This test is performed together with the PT test to investigate excessive bleeding or clotting disorders. When there is an injury, both intrinsic and extrinsic pathways initiate and sequential activation of coagulation factors occur to form a blood clot. PTT test is used to evaluate the coagulation factors XII, XI, IX, VIII, X, V, II (prothrombin), and I (fibrinogen).

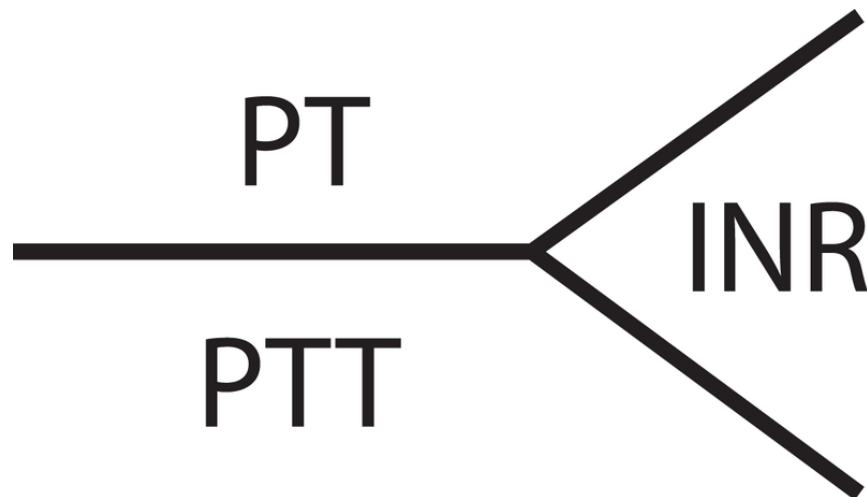


Figure 02: Coagulation Diagram

PTT test is prescribed along with the PT test for several reasons such as unexplained bleeding, easy bruising, formation of blood clot in a vein or artery, chronic liver conditions, etc. The test results of both PTT and PT tests will reveal the real clues about the reasons for blood clotting disorders. Hence, doctors often prescribe both tests together.

## What are the similarities between PT and PTT?

- PT and PTT blood tests are done to measure the time it takes your blood to clot.

## What is the difference between PT and PTT?

PT vs PTT	
PT test measures the integrity of extrinsic pathway and common pathway coagulation factors.	PTT test measures the integrity of intrinsic pathway and common coagulation factors.
Coagulation Factors	
PT test evaluates the coagulation factors VII, X, V, II, and I (fibrinogen).	PTT test evaluates the coagulation factors XII, XI, IX, VIII, X, V, II (prothrombin), and I (fibrinogen).
Monitoring of Blood Thinning Medicines	
PT test monitors warfarin.	PTT test monitors heparin.

## Summary – PT vs PTT

PT and PTT are two blood tests performed to investigate bleeding problems. The PT is a measure of the integrity of the extrinsic and final common pathways of the coagulation cascade. The PTT is a measure of the integrity of the intrinsic and final common pathway of the blood coagulation. PTT test evaluates the coagulation factors XII, XI, IX, VIII, X, V, II (prothrombin), and I (fibrinogen) and PT test evaluate the coagulation factors VII, X, V, II, and I (fibrinogen). Thus, the difference between PT and PTT depends on their exact functions. Results of the both tests together conclude the reasons for excessive bleeding or clotting disorders.

## References:

1. Ross, Heather. "Prothrombin Time Test." Healthline. Healthline Media, 04 May 2017. Web. [Available here](#). 04 July 2017.
2. "Prothrombin time (PT)." MedlinePlus Medical Encyclopedia. N.p., n.d. Web. [Available here](#). 04 July 2017.
3. "PTT." Lab Tests Online: Empower Your Health. Understand Your Tests. A public resource on clinical laboratory testing. N.p., n.d. Web. [Available here](#). 05 July 2017. .

## Image Courtesy:

1. "Airman 1st Class Sabrina Huerta, 779th Medical Group Medical laboratory technician, performs a Prothrombin Time/Partial Thromboplastin Time (PT/PTT) test " by U.S. Air Force photo/Airman 1st Class Erin O'Shea (Public Domain) via [Joint Base Andrews](#)
2. "Coagulation diagram" By Elliott.jd – Own work (CC BY-SA 3.0) via [Commons Wikimedia](#)

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