Blood Coagulation related ELISA Kits

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Blood coagulation is a physiological process in which the blood forms an insoluble fibrin clot when the body is injured or blood vessels are damaged, aiming to stop bleeding and promote wound healing. The coagulation process is a complex cascade of biological reactions involving the interaction of multiple coagulation factors. When the blood vessels are damaged, platelets adhere to the injury site and release thromboxane, triggering vasoconstriction and platelet aggregation, forming a primary thrombus. At the same time, damaged tissue releases tissue factor, activating prothrombin and initiating the transformation of thrombin-fibrinogen into fibrin, forming a fibrin network that strengthens platelet aggregation, ultimately resulting in a blood clot. On the other hand, abnormal coagulation function can also lead to bleeding or thrombotic diseases. To prevent abnormal coagulation and thrombus formation, the body has sophisticated anticoagulation mechanisms involving anticoagulant proteins, fibrinolytic enzymes, and platelet inhibitors, which work together to maintain normal blood flow.

The entire coagulation process is precise and balanced in physiology, ensuring the rapid initiation of hemostasis when necessary while avoiding unnecessary thrombus formation, thus maintaining the healthy operation of the blood system.

CUSABIO is committed to providing researchers with high-precision and high-sensitivity ELISA kits related to the regulation of coagulation function, satisfying a variety of test samples, including thrombin, fibrinogen, plasma prothrombin activator, protein C and plasminogen, etc., helping you to deeply understand the coagulation process and its role in health and disease, providing accurate and reliable data support for your scientific research, and helping you to facilitate breakthrough progress in the field of coagulation and vascular diseases.

1. Coagulation Factor

Coagulation factors are proteins directly involved in the process of blood clotting. The World Health Organization has assigned numbers to these factors based on their discovery order, such as factor I, II, III, and so on. These factors interact with each other to form a complex cascade reaction network called the coagulation cascade. When a coagulation factor is activated, it is indicated by adding the letter "a" after its corresponding Roman numeral (e.g., factor VII becomes factor VIIa when activated). The table below provides the names and functional descriptions of coagulation factors [1]. It should be noted that factor XIII, which was discovered later, has been shown to have no decisive impact on clotting function, and factor VI had its name withdrawn as it was found to be an activated form of factor V.

Coaqulation Factor Number	Coaqulation Factor Name	Function
I	Fibrinogen	Clot formation
II	Prothrombin	Activation of I, V, VII, VIII, XI, XIII, protein C, platelets
III	TF	Co-factor of VIIa
IV	Calcium	Facilitates coagulation factor binding to phospholipids
V	Proacclerin, labile factor	Co-factor of X-prothrombinase complex
VI	Unassigned	
VII	Stable factor, proconvertin	Activates factors IX, X
VIII	Antihaemophilic factor A	Co-factor of IX-tenase complex

Coaqulation Factor Number	Coaqulation Factor Name	Function
IX	Antihaemophilic factor B or Christmas factor	Activates X: Forms tenase complex with factor VIII
X	Stuart-Prower factor	Prothrombinase complex with factor V: Activates factor II
XI	Plasma thromboplastin antecedent	Activates factor IX
XII	Hageman factor	Activates factor XI, VII and prekallikrein
XIII	Fibrin-stabilising factor	Crosslinks fibrin
XIV	Prekallikrein(F Fletcher)	Serine protease zymogen
XV	HMWK- (F Fitzgerald)	Co-factor
XVI	vWf	Binds to VIII, mediates platelet adhesion
XVII	Antithrombin III	Inhibits IIa, Xa, and other proteases
XVIII	Heparin cofactor II	Inhibits IIa
XIX	Protein C	Inactivates Va and VIIIa
XX	Protein S	Co-factor for activated protein C

HMWK- High molecular weight kininogen; vWf-Von Willebrand factor; TF-Tissue factor

2. Coagulation Pathway

Coagulation process involves the regulation of many coagulation factors. Coagulation factor refers to protein, which is directly involved in blood coagulation process. The World Health Organization numbers it as coagulation factor I-XIII according to the order of its discovery. They interact with each other to form a complex prothrombin activation cascade reaction network.

Coagulation mainly includes two ways: Intrinsic pathway and extrinsic pathway.

● Intrinsic pathway

Mainly occurs when the inner wall of blood vessel is damaged, platelets in blood and substances released from blood vessel wall come into contact with substances in blood, thus starting the coagulation process. Specifically, the activation of the intrinsic coagulation pathway includes the following steps:

(1) Contact activation: When blood vessels are damaged, blood coagulation factors contact with damaged vascular endothelial cells and tissue factor (TF), and then are activated.

(2) Activation of coagulation factors: A series of coagulation factors, including coagulation factor XII, coagulation factor XI, coagulation factor IX, etc., are activated in turn and interact with each other, finally transforming coagulation factor X into activated thrombin Iia.

(3) Thrombin formation: Activated thrombin promotes the transformation of fibrinogen into fibrin, forming a thrombus network.

● Extrinsic pathway

Coagulation pathway initiated by the release of tissue factor from injured tissue. The main feature of exogenous coagulation pathway is that its starting speed is faster than that of internal coagulation pathway, and it is usually used to quickly start the coagulation process to stop bleeding. The steps of exogenous coagulation pathway are as follows:

(1) Tissue factor release: The damaged tissue releases tissue factor.

(2) Tissue factor forms a complex with coagulation factor VII: Tissue factor forms a complex with coagulation factor VII in plasma to activate coagulation factor VII.

(3) Activation of coagulation factor: Activated coagulation factor VII further activates coagulation factor X to form active thrombin.

(4) Thrombin formation: Active thrombin promotes the transformation of fibrinogen into fibrin, forming a thrombus network.

Intrinsic coagulation pathway and exogenous coagulation pathway will eventually converge to the same coagulation end point, forming thrombus. The interaction and adjustment of these coagulation pathways ensure that the human body can form thrombus in time when bleeding, prevent excessive bleeding and promote wound healing.

3. Anticoagulation Mechanism

Anticoagulation mechanism can resist the formation of blood clots, maintain normal blood flow and prevent the formation of abnormal thrombus. Mainly includes the following aspects:

(1) Anticoagulant effect of blood vessel wall: cells and platelets release a variety of cytokines, such as NO (nitric oxide) and PGI2 (prostaglandin), which can inhibit platelet adhesion and aggregation, thus preventing thrombosis.

(2) Anticoagulase system: Anticoagulase is a kind of protein which can inhibit thrombin activity, including antithrombin, protein C and protein S, etc. They can inhibit the production of thrombin in the coagulation cascade, thus reducing the risk of thrombosis.

(3) Fibrinolytic enzyme system: Fibrinolytic enzyme system can dissolve thrombus and prevent thrombus from forming and expanding in blood vessels, mainly including plasminogen, plasmin and plasmin inhibitor (such as PAI-1).

(4) Anticoagulant protein in plasma: The plasma also contains some protein, such as antithrombin III and tissue factor pathway inhibitor, which can inhibit the activity of thrombin, regulate the coagulation process and prevent the occurrence of excessive coagulation.

4. The List of CUSABIO's Blood Coagulation related ELISA Kits

Code	Product Name	Sensitivity	Detection Range
CSB-E14235h	Human Thrombin ELISA Kit	1.95 ng/mL	7.8 ng/mL-500 ng/mL
CSB-E13283B	Bovine Fibrinogen,Fb Elisa Kit	1.56 μg/mL	3.125 μg/mL-200 μg/mL
CSB-E13319h	Human Fibrinogen Gamma Chain (FGG)ELISA Kit	31.25 ng/mL	125 ng/mL-8000 ng/mL
CSB-E07913h	Human tissue factor (TF) ELISA kit	0.78 pg/mL	3.12 pg/mL-200 pg/mL
CSB-EL012479HU	Human Kininogen-1(KNG1) ELISA kit	11.75 ng/mL	47 ng/mL-3000 ng/mL
CSB-E16637m	Mouse plasma kallikrein(KLKB1) ELISA Kit	0.78 ng/mL	3.12 ng/mL-200 ng/mL

Code	Product Name	Sensitivity	Detection Range
CSB-E14291h	Human Coagulation Factor XIII A1 Polypeptide (F13A1) ELISA kit	0.156 ng/mL	0.625 ng/mL-40 ng/mL
CSB-E06534p	Pig plasminogen activator inhibitor 1,PAI-1 ELISA Kit	0.078 ng/mL	0.312 ng/mL-20 ng/mL
CSB-E08201r	Rat Fibrinogen,Fbg ELISA Kit	0.156 μg/mL	0.312 μg/mL-20 μg/mL
CSB-E13861h	Human coagulation factor VIII (FVIII) ELISA Kit	3.12 ng/mL	12.5 ng/mL-800 ng/mL
CSB-EL021086MO	Mouse Plasma protease C1 inhibitor(SERPING1) ELISA kit	1.4 ng/mL	5.6 ng/mL-360 ng/mL
CSB-E08778h	Human Thrombin activatable fibrinolysis inhibitor, TAFI ELISA Kit	7.81 ng/mL	31.25 ng/mL-2000 ng/mL
CSB-E07948r	Rat plasminogen activator inhibitor 1,PAI1 ELISA Kit	19.5 pg/ml	78 pg/ml-5000 pg/ml
CSB-E09909h	Human activated protein C,APC ELISA Kit	0.39 pg/mL	1.56 pg/mL-100 pg/mL
CSB-E08443h	Human coagulation factor IX,FIX ELISA Kit		
CSB-E09902h	Human protein C (PC) ELISA kit	0.78 ng/mL	3.12 ng/mL-200 ng/mL
CSB-EL018754RH	Monkey Vitamin K-dependent protein S(PROS1) ELISA kit	3.9 ng/mL	15.6 ng/mL-1000 ng/mL
CSB-EL018754MO	Mouse Vitamin K-dependent protein S(PROS1) ELISA kit	1.56 ng/mL	6.25 ng/mL-400 ng/mL
CSB-E08525Rb	Rabbit von Willebrand Factor,VWF ELISA Kit	0.078 ng/mL	0.312 ng/mL-20 ng/mL
CSB-E14302h	Human coagulation factor V (F V)ELISA Kit	0.78 ng/mL	3.12 ng/mL-200 ng/mL
CSB-E12909h	Human coagulation factor VII,FVII ELISA Kit	0.078 ng/mL	0.312 ng/mL-20 ng/mL
CSB-E08440h	Human coagulation factor X ,F X ELISA Kit	0.156 ng/mL	0.625 ng/mL-40 ng/mL

References

[1] Palta S, Saroa R, Palta A. Overview of the coagulation system. Indian J Anaesth. 2014 Sep;58(5):515-23.