
EDITORIAL**Anti-Thrombin and its Biological Significance**

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For correspondence to Email: drumeransari256@gmail.com**What is Antithrombin?**

Anti-thrombin (AT) is a small molecular weight glycoprotein molecule, synthesized by liver, and circulates in the plasma at a concentration approximately 150 mg/ml¹.

AT belongs to a family of serine proteases, and most potent inhibitor of coagulation, and has vital role in maintaining haemostatic balance.

It is also termed as '*Heparin Cofactor*', and is considered essential for effective heparin therapy. Under normal conditions, its biological half-life is 1.5–2.5 days; But in conditions of acquired deficiency, and in the presence of heparin, the half-life of AT is much shorter, even being reduced to few hours.

What is the biological significance?

By inhibiting the coagulation proteases, AT prevents uncontrolled coagulation in patients with disseminated intravascular coagulation (DIC) and other related thrombotic and hypercoagulable disorders

Mechanism of action:

The anticoagulant activity of AT is primarily due to inhibition of Thrombin, activated factor X (Xa) and, also other activated clotting factors (IXa, XIa, XIIa)². The rate of formation of the thrombin-antithrombin complex is very greatly increased by Heparan sulphate, present on the surface of endothelial cells

Activity of AT & plasma levels:

The activity of AT is increased considerably by heparin, which is an anticoagulant drug and enhances the binding of AT to factor IIa (prothrombin) and factor Xa

Hereditary deficiency of AT causes a high risk for venous thromboembolism³. Deficiency of AT is, therefore, associated with a high risk of thrombo-embolic disorders such as myocardial infarction (MI), Transient ischemic attack (TIA) & cerebral stroke.

AT can be used to exclude or diagnose hereditary deficiency in patients with a tendency towards thrombo-embolism, in pre-operative stages.

Anti-thrombin levels are elevated by RIVAROXABAN (Commercially available as XCEPT 5mg, 10 mg, 20mg tablets). Whereas, plasma levels of AT are reduced during heparin therapy, liver cirrhosis, nephritic syndrome, sepsis with DIC, burns, CABG (Coronary artery bypass graft), large hematomas and metastatic tumors.

Normal plasma range of AT: 75-125%

Low plasma level: less than 75%

High plasma level: more than 125%

A single low result does not confirm deficiency. A repeat test after 4-6 weeks is suggested for confirmation

REFERENCES

1. Hathaway WE, Goodnight SH., Jr . *Malattie dell'Emostasi e Trombosi*. Milan, Italy: McGraw-Hill Companies Italia; 2004.
2. Finley, Alan; Greenberg, Charles. 2013 "Review article: heparin sensitivity and resistance: management during cardiopulmonary bypass". *Anesthesia and Analgesia*. 116 (6): 1210-1222
3. Elizabeth M. Van Cott, Christelle Orlando, Gary W. Moore, Peter C. Cooper, Piet Meijer, and Richard Marlar. *Journal of Thrombosis and Haemostasis. Recommendations for clinical laboratory testing for antithrombin deficiency*; 18 (1); 2020; 17-22