

The Effect of Free Amino Acids on Fibrin Formation

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Fibrinogen, a plasma protein, is a main component of blood clot formation. In the event of an injury, blood loss is hindered through a process that forms a thrombus by conversion of fibrinogen to fibrin induced by activation of the enzyme thrombin. The fibrin network structure depends on the concentration of thrombin, as expected, but is also highly influenced by its environment during formation. In particular, we find that fibrin formation is altered in the presence of zwitterions. Zwitterions are dipolar molecules, typically highly polarizable, exhibiting both a positive and a negative charge depending on the pH of the solution. Amino acids are highly abundant zwitterions in biological materials. In this study we measured by visible/UV-spectroscopy the effects of various types of amino acids on the rate of fibrin network formation. We show that the electrical charge and type of amino acid, such as lysine, glycine and arginine, inhibits or promotes formation of fibrin networks. Such an ability to decrease or increase the rate of coagulation can be valuable in the treatment of patients suffering from hemostatic and thrombotic disorders.

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