Modeling of peptides based on heterocycle substituted non-protein amino acid, synthesis and *in vitro* study of their impact on collagenase activity

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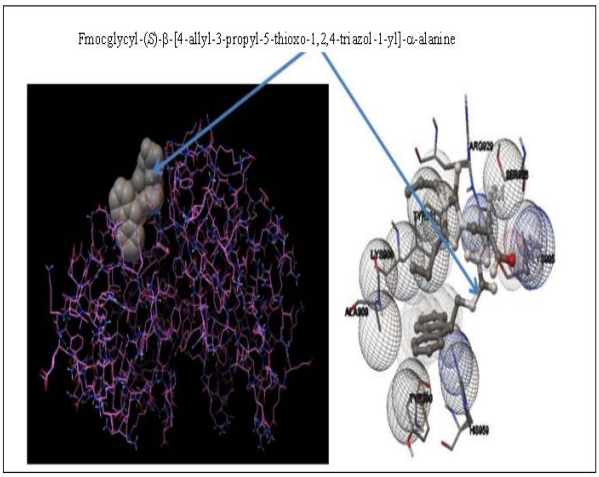
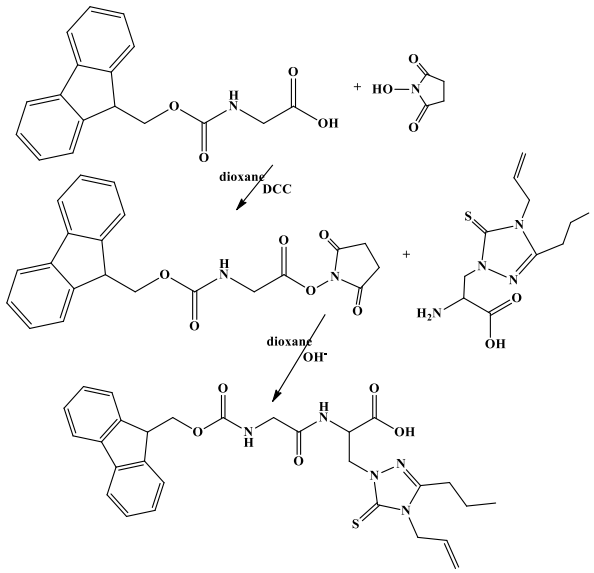
More than 15 new peptides have been constructed on the basis of (*S*)-β-[4-allyl-3-propyl-5-thioxo-1,2,4-triazol-1-yl]-α-alanine non-protein amino acid by ChemOffice software. The study of their possible interaction with collagenase enzyme was implemented by molecular docking program – AutoDockVina software. Analyzing the obtained results, 9-fluorenylmethoxycarbonylglycyl-(*S*)-β-[4-allyl-3-propyl-5-thioxo-1,2,4-triazol-1-yl]-α-alanine dipeptide was identified by maximum values of Gibbs free energy (*ΔG*) and minimum values of inhibition constant (K_I) of ligand-macromolecular interaction (Fig. 1). The synthesis of the mentioned dipeptide was implemented by the method of activated esters (Scheme 1) [1].

Scheme 1





ΔG -8.1; K_I- 1.16

Fig. 1.

The impact of synthesized peptide on collagenase enzyme activity was studied *in vitro* using various peptide concentrations, and the data were presented in the Table. Besides, IC50 of peptide having an impact was determined, which was 0.982 μmol/l.

Concentration, μmol/l	Inhibition %
0.6708	43.82
1.3417	58.33
2.6834	81.72

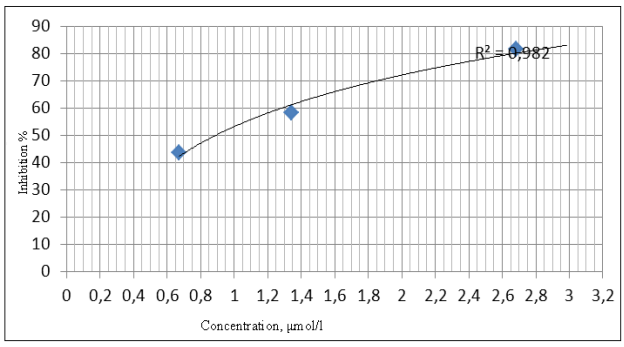


Fig. 2. **Graphical curve of IC50 value**

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Reference: 1. Дангян Ю., Саргсян Т., Сагиян А. и др. // Хим. журн. Армении, 2010, т. 63, № 1, с. 95-100.