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INFLUENCE OF TAXIFOLIN ON COLLAGEN FIBRILS FORMATION AND THERMAL STABILITY

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Flavonoids are the natural substances belonging to polyphenols. They influence positively on human's health and are used in medicine. We daily assimilate dozens if not hundreds of milligram of flavonoids with food. They protect our body from stressors owing to their antioxidant activity, ability to form complexes with heavy metals and to influence the cell signal system. But metabolism products of some flavonoids show toxic, mutagenic and carcinogen activity in the human's body like in case of quercetin – flavonoid, which is mostly studied and widely used. Taxifolin is less toxic what is probably caused by the lack of double bond in 2,3 carbon position. This research work is devoted to the study of Taxifolin (**Flavocon**®, Bioflavon Ltd, Russia) interaction with collagen and its influence on collagen fibrils formation and stability. Collagen molecules form fibrils spontaneously in phosphate buffer. There was observed a considerable difference in the preparation collagen appearance in neutral medium at 0,1% Taxifolin as compared with the control. After 24 hours passed the control preparation was clearer than the preparation with Taxifolin. Large collagen bandings slightly visually discerned formed at Taxifolin presence. The dynamics of fibrils formation was registered for the change of light scattering. The increase of light scattering at Taxifolin presence was more remarkable and began earlier that in the control. The increase of Taxifolin concentration led to the increase of light scattering. Taxifolin accelerates collagen fibrils formation. Collagen fibrils formation was also observed within the method of electron microscopy. Structural features characteristic to fibrils preserved well at Taxifolin presence, i.e. Taxifolin does not damage fibrils structure. At high concentrations of Taxifolin the periodicity was more prominent. It is seen from the thermogram of collagen preparations received from the differential scanning calorimetry that albumen melts at $41,3\pm 0,3^{\circ}\text{C}$ in acid medium and at $50\pm 2^{\circ}\text{C}$ in neutral medium. In acid medium molecules of collagen are in monomeric form and have lower fusion temperature whereas at getting into the neutral medium this albumen is able to spontaneously form fibrils which have higher fusion temperature.

Fusion curves of our preparations have only one maximum, consequently, all protein was in monomeric form in acid medium and all protein was involved in process of fibrils forming in neutral medium. Fusion temperature of collagen monomeric form in acid medium is not changed in presence of Taxifolin (concentration $10^{-5} - 10^{-1}\%$), at that time collagen fibrils formation in neutral medium become more thermostable. As a result of protein incubation by 37°C the reduction collagen thermostability was observed by low

Taxifolin concentrations and by its absence. The differences by Taxifolin concentration $10^{-4}\%$ were disappeared. Essential growth of fibril thermostability by 37°C was observed by higher concentrations. The obtained results testified that stabilizing effect of Taxifolin was appeared especially in neutral medium by Taxifolin concentration more than $10^{-4}\%$, in conditions which are favoured to collagen fibrils formation at the time separate molecules of collagen in acid medium are not sensible to Taxifolin.

Taxifolin which refer to molecules of polyphenols have large number of hydroxyl groups and at that time they are soluble in water bad because of presence hydrophobic aromatic rings. We suppose that combination comparatively high hydrophobia and ability to form hydrogen bonds allow to these molecules to intrude to definite to fibril collagen area and make for stabilization of their structures. It is known that flavonoids have ability to form intermolecular cross-links stabilized protein. It is offered collagen gels which are stabilized by flavonoids to use for healing over wounds, creation of biocompatible materials, cosmetics agents and microcontainers for delivery of medicine.