

Physiological features of fluid exchange processes in the animal's eyeMasian Janek³, Liudmila V Stepanova¹, Georgy M Sychev² and Olga V Svetlova³¹Siberian Federal University, Russia²Khakassia State University after N F Katanova, Russia³North-Western State Medical University after I I Mechnikov, Russia

One of the main problems of modern ophthalmology is the development of a unified concept of the exchange of aqueous humor in the eye. It is generally accepted that aqueous humor circulates mainly in the anterior segment of the eye. However, the involvement of the posterior part in the exchange of aqueous humor eyes is not represented. The purpose of the study is to identify of the mechanisms of water exchange processes in the lens and vitreous chamber of the rabbit's eye. Fluid transport processes in the lens were studied *in vitro* by the change in mass when immersed in the washing environments of the lenses, with the addition of an inhibitor of the active transport system Na⁺,K⁺-ATPase and without it. The direction of movement of aqueous humor was studied *in vivo* by the displacement of the fluorescein using biomicroscopy and stopped diffusion. The removal of aqueous humor from the vitreous chamber was investigated by changing the concentration of the fluorescein in blood plasma taken from the vascular eye veins and the lateral ear veins, with increased or decreased pressure in the vascular system. It is established that water exchange processes represent the physiological mechanism of breathing in the lens at the moments of accommodation near-in the distance. At a sight in the distance pressure in the flattened lens is minimal, therefore fresh aqueous humor enters the lens through its anterior capsule. The active ion transport system Na⁺,K⁺-ATPase, which is localized in the epithelium of the anterior capsule, promotes the osmotic transport of fresh aqueous humor and its further unidirectional diffusion from the anterior capsule to the posterior. Intensive receipt of aqueous humor maximally increases the inside the lens pressure to 6 mmHg and translates the lens into a accommodation phase near. The lens is maximally rounded and the greatest inside the lens pressure, which promotes the diffusion of spent aqueous humor through the posterior capsule. The movement of aqueous humor in the vitreous chamber takes place in the direction of the retina along the gradient of the oncotic pressure. Excretion of aqueous humor from the eye's posterior part occurs through the eye's vortical veins into the total bloodstream. In this way, the first time is presented the theory of the water exchange process at the moments of accommodation near-in the distance, which was confirmed in experiments in the eyes of rabbits *in vivo* and *in vitro*. The presented physiological process makes it possible to understand the functioning of the eye in norm and in pathology.

Recent Publications

1. Koschitc I N, Svetlova O V and Gorban' A I Functioning of the executive mechanisms of accommodation and the development of the Helmholtz accommodation theory. Normal physiology of the eye. SPb.: Publishing House of SZGMU them. I. I. Mechnikov.
2. Stepanova L V, Sychev G M and Svetlova O V (2014) Features of water exchange processes in rabbit lenses. Eye 6(100):29-33.

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