

Sympathetic control of brain cooling in reindeer

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Abstract: The cold venous blood returning from the nose of the heat stressed reindeer (*Rangifer tarandus tarandus*) may be distributed both through the angular oculi veins for selective cooling of the brain, and through the facial veins for general body cooling. *In vitro* experiments indicate that the adrenergic receptors of the angular oculi veins are exclusively of the β -adrenergic type, while the facial veins contain mainly β -adrenergic receptors. We suggest that the antagonistic neuroeffector organization of these veins play a major role in the control of brain cooling. Thus, simultaneous sympathetic stimulation will result in constriction of the angular oculi veins and release of a pre-existing stretch-induced tone in the facial veins. In this situation the cold venous blood is directed via the facial veins and used for general body cooling. Reduction of sympathetic activity, on the other hand, will result in dilatation of the angular oculi veins and constriction of the facial veins, due to development of myogenic tone in the latter vessels. In this situation the cold venous blood is distributed via the angular oculi veins and used for selective cooling of the brain.

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