# CHLORIDE ACTIVITY IN THE CILIARY BODY OF THE SHARK, SQUALUS ACANTHIAS

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In most vertebrates, aqueous humor formation is due to an active transport process in the epithelium of the ciliary body. Anatomical, biochemical and physiological similarities between the ciliary body of mammals and elasmobranchs suggest that the shark may be the prototype for higher organisms and seems to be suited as model for studies of basic transport mechanisms.

Eyes were removed from freshly-killed adult sharks (spiny dogfish, Squalus acanthias). The ciliary body of the shark is an easily identifiable band of 4 mm width. Quartered sections of the eye including the ciliary body and adjacent parts of the iris and neuronal retina and pigment epithelium were secured with micropins on Sylgard discs and superfused with shark Ringer solution. Single barreled conventional microelectrodes (tip resistance 30-80 Mohm) were employed to measure the transmembranal potential difference (PD) across the cell membranes. Chloride-sensitive microelectrodes (input resistance $5 \times 10^{10}$ to $3 \times 10^{11}$ ohm, response time 1-3 seconds) were prepared following the method described earlier (Wiederholt and Zadunaisky, Current Eye Res. 3:673-675, 1984). Intracellular potentials, were measured when the microelectrodes were advanced from the aqueous side of the preparation into the most superficial (non-Pigmented) cell layer of the ciliary body.

In 13 stable recordings (9 tissue preparations) a mean PD of $-53.2 \pm 1.5$ mV was obtained. The range was - 40 to - 62 mV. In a total of 15 stable impalements in 10 tissues mean chloride activity of 74.2 + 3.3 mMol (range 54 to 98 mMol) was obtained. For the calculation of the individual chloride activity the mean intracellular PD of the total experimental group was used.

This is the first report on intracellular membrane PD and chloride activity in a ciliary body preparations. The observed intracellular chloride activity seems to be rather high in comparison with mammalian or amphibian epithelia. However, one has to keep in mind that the chloride activity in plasma of sharks is quite high. Furthermore, an intracellular chloride activity of 45 mMol has been measure in the rectal gland of sharks (Greger, Schlatter, Wang and Forrest, Bull. Mt. Desert Isl. Biol. Lab. 23: 8-9, 1983). From the data presented it can be derived that intracellular chloride activity in the ciliary body of the shark is well above the equilibrium concentration of 25 mMol and thus chloride transport must consist of an active process across the cell membrane. Where this transport step is located can only be speculated at present. From the localization of tight junctions in the non-pigmented layer (Raviola and Raviola, Invest. Ophthalmol. 17:958-981, 1978). It is tempting to speculate that the chloride transfer takes place across a cell membrane of this layer. Finally, it has to be tested if such a transmembranal chloride transport is involved in a transepithelial electrolyte transport.