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237 | The absence of the potassium channel KCNQ4 affects the visual function

Sensory and Motor Systems

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Voltage-gated KCNQ potassium channel subunits are responsible for the M-current that regulates neuronal excitability. We found expression of KCNQ4 in the retinal pigmented epithelium (RPE) and in the ciliary body (CB) of mouse eyes, suggesting that it could participate in visual processing and aqueous humor formation. Using Kcnq4 knockout (KO) and wild-type (WT) mice we studied the role of KCNQ4 in vision. First, we analyzed Kcnq gene expression by qPCR. We found that in KO mice, the expression of Kcnq3 and -5 in the RPE/retina did not change. On the other hand, in CB the expression of Kcnq3 increased 2.5-fold while the expression of Kcnq5 decreased 30%. Then, we tested light perception by testing the innate aversion of rodents to it. We did not find any differences between the KO and WT in the test performance. To analyze the function of the neuronal visual pathway, we recorded electroretinogram (ERG) in both genotypes. We observed no differences in a- and b-wave peaks and latency times between WT and KO in young animals, whereas in 50 weeks-old mice we observed a reduction trend in b-wave peak in KO while a-wave showed no differences. We also measured intraocular pressure (IOP) in young animals to evaluate CB function. We found a slight increase in the IOP in KO mice (13.6±1.0 to 15.8±1.1 mm Hg). In conclusion, the presence of the KCNQ4 subunit is necessary for the proper expression of the other Kcnq subunits and it would contribute to CB and retinal function.

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