Therapeutic effects of Fenofibrate on lens-induced myopia chicken model

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**Purposes:** Retinal Apolipoprotein A1 (ApoA1), the major component of high density lipoprotein, is found to be up-regulated in lens-induced hyperopia (LIH) and down-regulated in lens-induced myopia (LIM) model. The growth of axial length was reduced in LIM through the up-regulation of ApoA1. Fenofibrate, a peroxisome proliferator-activated receptor α (PPARα) agonist is the first line therapy to regulate lipid metabolism by increasing the synthesis of ApoA1. The current study investigated the efficacy of fenofibrate on eye growth LIM chicken model.

**Methods:** At day 4 of age, male chicken was divided into different groups after gender determination by PCR method. In the LIM group, negative powered lenses (-10D) were worn by the right eye and the left eye was kept untreated as control. In the treatment groups, 20uM, 100uM, 200uM fenofibrate (10ul) were injected into the bottom of the vitreous chamber of the right eye, and vehicle solutions were injected into the left eyes as control on day 5. Then, negative powered lenses (-10D) were worn on both eye immediately. An extra group of chicken without lens induced treatment
received 200uM fenofibrate intravitreal injection at the right eyes. A high-frequency A-scan ultrasound system was used to measure the ocular parameters of all the chicken before the treatment and on day 8. Chicken with growth abnormality or vitreous hemorrhage were ruled out. The changes of ocular parameters among different treated eyes were statistically analyzed by t-test.

Results: On day 8, LIM chicks (n=15) received fenofibrate (200uM) intravitreal injection had shorter axial length than those (n=13) just worn negative powered lenses by 32.7% ($P=5.15078E-07$). There was a dose-dependent relationship between the concentration of fenofibrate and treatment changes in axial length. Fenofibrate had no effect on the growth of normal eye. There was no different between fenofibrate treated eye and simple LIM eye at the choroid recovery changes after the negative lenses were taken off.

Conclusions: Fenofibrate is protective against LIM development. The results demonstrate therapeutic effects of fenofibrate on myopia and give clue to the role of PPARα-dependent mechanism in the development of myopia.