THE EFFECT OF FORM DEPRIVATION ON THE FORMATION OF AXIAL MYOPIA MODEL OF GUINEA PIGS

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Background: Myopia is a common refractive error, referring to a refractive state in which the parallel light passes through the refractive system of the eye under the condition of adjustment and relaxation, and the focus falls in front of the retina. Axial myopia is mainly manifested as eye axis lengthening with cornea and lens curvature in the normal range. It is commonly seen in pathological myopia and most simple myopia. The eyeball structure and emmetropization mechanism of guinea pigs are similar to those of humans, serving as an ideal animal model of myopia.

Purpose: To observe the effects of wearing diffuse reflectors outside the eyes on the eye diopter and axial growth of guinea pigs, and to provide a reliable animal model for the R&D of new drugs for the prevention and treatment of myopia in youth.

Method: Established a model by putting diffuse reflector on the single eye (left eye) of 12 two-week-old guinea pigs. The day of model creation was recorded as D1. The diopter and axial length of the animals' eyes were measured before modeling, on D7, D14, D21, D28, D35 and D42. Retinoscopy optometry was used to test eye refractive power, and ophthalmic A-ultrasound technology was used to determine the axial length of the eye.

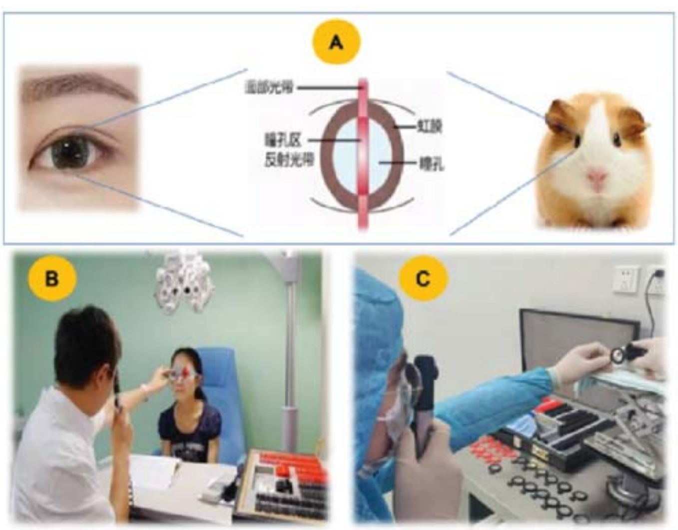

Figure 1 Schematic diagram of eye diopter inspection practice

A Schematic diagram of the reflected light band in the pupil area of the retinoscope

B Human eye diopter inspection site

C Guinea pig eye diopter inspection site

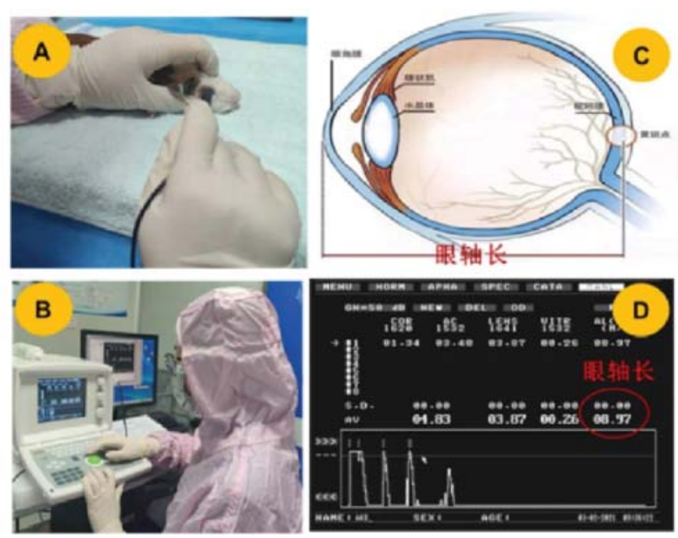

Figure 2 Schematic diagram of guinea pig eye axial length inspection

A guinea pig ophthalmology Aultrasound examination

B Ophthalmology A/B ultrasonic diagnostic apparatus in use

C Pattern diagram of eye axis length

D Screenshot of ophthalmology A-ultrasound test results

Result: Before modeling, the refractive power of the unmodeled eye (right eye) and the modeled eye (left eye) were 5.05 ± 1.57 and 4.77 ± 1.47, respectively, and the axial length were 8.3 ± 0.12mm and 8.21 ± 0.37mm, respectively. There was no significant difference in the refractive power and axial length between the left and right eyes ($p>0.05$). After modeling, the refractive power of the unmodeled eye fluctuates between 4.91 ± 1.50D and 5.18 ± 1.82D. The axial length of the eye gradually increased from 8.45 ± 0.15mm (D7) to 9.14 ± 0.06mm (D42). On D7, the refractive power of the modeled eye decreased to 1.59 ± 2.18 D. Reversal (−0.32 ± 2.12 D) occurred on D14. The maximum reversal vale (−0.32 ± 2.12 D) was reached on D28, and then fluctuated between −2.59 ± 2.50 D and −2.70 ± 2.14 D. Eye Axis length of the modeled eye gradually increased from 8.51 ± 0.13 mm (D7) to 9.27 ± 0.04mm (D42).

Compared with unmodeled eyes in the same period, the refractive power of the modeled eyes significantly decreased or reversed on D7, D14, D21, D28, D35, D42 ($p<0.05$), indicating success in myopia modeling.

Conclusion: In the model of axial myopia induced by diffuse reflectors in guinea pigs, the refractive power of the eyes changed after 1 week of form deprivation, and the axis of the eyes increased. Relative myopia was successfully induced after 5 weeks of form deprivation.