Weakened foveal function causing higher myopic progression in children

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Purpose
Myopia is one of the conditions in emmetropization which is a process to regulate the growth of eyeball to compensate the refractive power in order to achieve clear vision. Although previous studies reported that peripheral defocus is the main influencing factor in myopic progression, it is not clear how the fovea contributes in this process. This study is attempted to investigate the foveal electro-retinal function related to myopic progression in one-year period.

Methods
The global flash mfERG with both high (96 %) and low contrast (49 %) protocol is used to measure the foveal activity. The global flash mfERG response contains a direct component (DC) and an induced component (IC) which represents the outer and inner retinal activity respectively. Eighteen children (aged seven to eleven years) with spherical equivalent refractive errors ranged from +0.75D to -1.00D at their first visit were recruited. All subjects have best-corrected visual acuity of logMAR 0.00 or better, normal colour vision and good ocular health. All subjects received two eye examinations with 12 months apart, including cycloplegic refraction, axial length and the global flash mfERG measurements.

Results
These 18 subjects showed averaged -0.45 D myopia progression in one-year period. Nine children with less than -0.45 D myopic progression were regarded as relative slow progression group while 9 children with equal or more than -0.45 D myopic progression were regarded as relative fast progression group. With 49 % contrast global flash mfERG measured at the first visit, the fast myopic progression group showed significant lower central IC amplitude comparing to slow progression group ($p=0.005$), which indicated those with fast myopic progression was associated with initial subclinical weaker central inner retinal activity. The DC amplitudes under both high and low contrast conditions and IC amplitude under high contrast condition had no significant difference between slow and fast myopic progression groups.

Conclusions
Children with subclinical weaker foveal inner retinal function showed relative fast myopic progression. The fovea is likely to involve in the regulation of eye growth and may play an important role in emmetropization.

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