

Changes in Correlations of Regional Visual Cortical Thickness with Optic Radiation Tract in Anisometric Amblyopia

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Purpose:

The purpose of this study was to find whether the changes of the visual cortex associate with integrity changes in the ORs fibers in amblyopia.

Methods

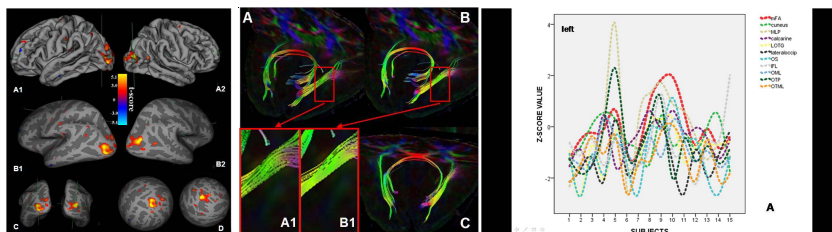
Both structural MRI and DTI data were collected from 15 anisometric amblyopia patients and 15 age and gender matched normal controls. The fractional anisotropy (FA) value was used to evaluate the ORs white matter integrity, and FreeSurfer software was employed to find the significant changes of the cortical thickness accurately between the two groups. Moreover, the relationships between the cortical thickness and the FA values in the ORs were studied to determine whether the cortical thickness changes associate with the integrity changes of ORs white matter in amblyopia.

Results

Our study results indicated that the FA value and voxel numbers reduced significantly in ORs of amblyopia relative to the controls; the cortical thickness decreased in the following subregions: lingual cortex, lateral occipito-temporal gyrus, cuneus, occipital lobe, inferior parietal lobe, temporal lobe; and there was a cortical thickness increase in the calcarine gyrus relative to the controls. A reduction of FA value correlated with the decreased cortical thickness only in the following subregions: lateral occipito-temporalgyrus,occipital-middle-and-Lunatus,occipital-superior,occipito-temporal-medial-and-Lingual, calcarine cortex, med-Lingualr. These results provide key information on the complex damage of internal brain network in anisometric amblyopia.

Discussion

The main findings of this study are as follows. First, the FA value and voxel number of ORs in amblyopia group were reduced significantly relative to the controls. The number of ORs were not significantly different between two groups. Secondly, there were significant cortical thickness reductions in bilateral occipital, lingual gyrus, calcarine, cuneus, lunatus in amblyopia group relative to the control group. Thirdly, in amblyopia group, the mean Z-score of FA value and Z-score of cortical thickness in different subregion of each subject change in the same trend (Fig.3). There were significant correlations between Z score of mean FA and Z-score of cortical thickness in LOTG, OML, OS, OTML, calcarine, and MLP.



The Differences of fractional anisotropy and voxel and the numbers of the Optic Radiation between the amblyope group and the control group, including ipsilateral ORs and contralateral ORs in amblyopes

	FA values of ORs	Voxel value of ORs	The number of ORs
Amblyopia group	0.468 ±0.0431	3019.05 ±217.61	826.23 ±19.92
Control group	0.521 ±0.0599	3179.15 ±127.59	840.70 ±14.97
T value	2.041	1.848	2.484
P value	0.015*	0.021*	0.051
IORs:A	0.478 ±0.0318	3071.09 ±214.69	817.87 ±21.28
CORs:A	0.462 ±0.0537	2988.62 ±293.62	837.13 ±18.79
T value	1.314	1.604	2.191
p value	0.831	0.759	0.747