

# Short-term Effects of Atropine 0.01% on the Structure and Vasculature of the Choroid and Retina in Myopic Chinese Children

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**Table S1. Eligibility criteria for the study**

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Children aged 6 to 14 years

Refractive error of spherical equivalent between -0.50 D to -6.00 D\*

Astigmatism of -2.50 D or less†

Best-corrected visual acuity of logMAR 0.1 or better in both eyes

No history of other ocular diseases (i.e. amblyopia, strabismus, cataract, glaucoma, and congenital retinal diseases)

No history of systemic disorders which might affect the ocular circulation

No allergy to atropine, tropicamide and cyclopentolate

No current or previous use of atropine or pirenzepine, contact lenses or other forms of treatment that might affect myopia progression

Willing to comply with the allocated treatment and follow-up schedule

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logMAR = logarithm of the minimum angle of resolution.

\*Refraction was measured with cycloplegic retinoscopy. Refractive error of spherical equivalent was defined as spherical refraction plus half the cylinder refraction.

**Table S2. Baseline characteristics of the enrolled subjects by Gender.**

	Female Mean (SD) N=20	Male Mean (SD) N=20	ALL Mean (SD) N=40	<i>P</i> Value
Age (yr)	10.30 (1.63)	9.50 (1.79)	9.90 (1.74)	0.147
SE (D)	-2.09 (1.55)	-2.65 (1.73)	-2.37 (1.65)	0.285
AL (mm)	24.16 (0.73)	24.97 (1.08)	24.57 (1.00)	0.008*
BCVA (logMAR)	0.00 (0.01)	0.01 (0.03)	0.01 (0.02)	0.515
K1 (D)	42.93 (1.37)	42.15 (1.33)	42.54 (1.39)	0.091
K2 (D)	44.21 (1.45)	43.44 (1.64)	43.83 (1.58)	0.127
Km (D)	43.57 (1.38)	42.15 (1.33)	43.19 (1.46)	0.053
$\Delta$ K (D)	-1.28 (0.57)	-1.29 (0.58)	-1.29 (0.56)	0.598
ACD	3.72 (0.19)	3.83 (0.16)	3.78 (0.18)	0.051
LT (mm)	3.38 (0.13)	3.41 (0.15)	3.40 (0.14)	0.541
CCT ( $\mu$ m)	531.40 (34.79)	552.15 (30.00)	541.78 (33.74)	0.050
ChT ( $\mu$ m))	233.41 (30.56)	248.06 (51.54)	240.74 (42.47)	0.283
CCF (mm <sup>2</sup> )	2.19 (0.09)	2.16 (0.13)	2.18 (0.11)	0.504
RT-Whole ( $\mu$ m)	281.50 (8.82)	279.90 (11.03)	280.70 (9.89)	0.615
RT-Fovea ( $\mu$ m)	237.45 (15.26)	245.45 (15.23)	241.45 (15.59)	0.105
RT-ParaF ( $\mu$ m)	314.70 (11.78)	316.75 (11.70)	315.73 (11.64)	0.674
RT-ParaF-S ( $\mu$ m)	319.50 (11.43)	320.85 (12.50)	320.18 (11.84)	0.723
RT-ParaF-I ( $\mu$ m)	314.95 (12.79)	316.10 (11.38)	315.53 (11.96)	0.914
RT-ParaF-N ( $\mu$ m)	318.15 (12.75)	321.85 (12.24)	320.00 (12.48)	0.430
RT-ParaF-T ( $\mu$ m)	306.30 (11.54)	307.80 (12.30)	307.05 (11.80)	0.693
RT-PeriFovea ( $\mu$ m)	280.70 (9.40)	277.15 (12.06)	278.93 (11.04)	0.315
RT-PeriF-S ( $\mu$ m)	284.10 (8.81)	280.30 (12.01)	282.20 (10.57)	0.261
RT-PeriF-I ( $\mu$ m)	270.35 (11.31)	267.25 (12.63)	268.80 (11.94)	0.419
RT-PeriF-N ( $\mu$ m)	300.95 (12.55)	296.20 (13.29)	298.58 (12.98)	0.252
RT-PeriF-T ( $\mu$ m)	267.00 (9.71)	264.65 (13.06)	265.83 (11.42)	0.522
sRVD-Whole (%)	47.96 (2.12)	47.96 (2.43)	47.96 (2.25)	1.000
sRVD-Fovea (%)	18.17 (5.71)	22.18 (7.31)	20.18 (6.79)	0.061
sRVD-ParaF (%)	50.34 (3.20)	48.63 (4.61)	49.48 (4.01)	0.182
sRVD-ParaF-S (%)	50.89 (4.74)	49.93 (4.08)	50.41 (4.39)	0.343
sRVD-ParaF-I (%)	49.78 (4.25)	47.15 (4.87)	48.47 (4.70)	0.076
sRVD-ParaF-N (%)	50.15 (3.69)	47.43 (6.14)	48.79 (5.19)	0.099
sRVD-ParaF-T (%)	50.49 (3.26)	49.99 (5.48)	50.24 (4.46)	0.516
sRVD-PeriF (%)	48.29 (2.22)	48.66 (2.32)	48.47 (4.70)	0.614
sRVD-PeriF-S (%)	48.29 (2.75)	48.31 (2.63)	48.30 (2.66)	0.977
sRVD-PeriF-I (%)	48.32 (2.34)	49.29 (2.78)	48.80 (2.58)	0.240
sRVD-PeriF-N (%)	52.97 (2.36)	53.31 (2.48)	53.14 (2.40)	0.664
sRVD-PeriF-T (%)	43.63 (3.27)	43.72 (2.69)	43.67 (2.96)	0.925
dRVD-Whole (%)	46.55 (4.99)	43.79 (4.02)	45.17 (4.69)	0.061
dRVD-Fovea (%)	34.33 (7.13)	38.21 (6.92)	36.27 (7.21)	0.089

dRVD-ParaF (%)	54.37 (4.38)	52.04 (3.61)	54.10 (4.38)	0.075
dRVD-ParaF-S (%)	53.18 (5.69)	50.33 (5.68)	51.75 (5.79)	0.122
dRVD-ParaF-I (%)	50.75 (5.91)	48.99 (5.08)	49.87 (5.51)	0.319
dRVD-ParaF-N (%)	56.80 (3.63)	54.42 (4.40)	55.61 (4.16)	0.071
dRVD-ParaF-T (%)	56.71 (4.00)	54.45 (2.07)	55.58 (3.34)	0.033*
dRVD-PeriF (%)	46.95 (5.40)	43.81 (4.34)	45.38 (5.09)	0.050
dRVD-PeriF-S (%)	45.89 (6.77)	41.65 (5.01)	43.77 (6.26)	0.030*
dRVD-PeriF-I (%)	44.97 (6.25)	42.62 (5.43)	43.79 (5.90)	0.212
dRVD-PeriF-N (%)	46.40 (5.91)	40.09 (4.87)	44.24 (5.78)	0.016*
dRVD-PeriF-T (%)	50.52 (4.92)	48.92 (3.73)	49.72 (4.39)	0.254
FAZ (mm <sup>2</sup> )	0.30 (0.10)	0.25 (0.10)	0.27 (0.10)	0.172

SE: spherical equivalent, AL: axial length, ChT: choroidal thickness, RT-: retinal thickness of different region, sRVD-: vessel density of the superficial retinal layer, dRVD-: vessel density of the deep retinal layer, FAZ: foveal avascular zone. Each retinal parameter was calculated over the foveal (Fovea), parafoveal (ParaF) and perifoveal (PeriF), in superior (S), nasal (N), inferior (I), temporal (T) quadrants. Whole means the overall average of retinal thickness or vessel density within central 6 x 6 mm macular area.

\* Between-group significant differences at  $P < 0.05$ .

**Table S3. Baseline characteristics of the enrolled subjects by age.**

	6-8	9-11	12-14	<i>P</i>
	Mean (SD), N=8	Mean (SD), N=24	Mean (SD), N=8	Value
Female, n (%)	3 (37.5)	12 (50.0)	5 (62.5)	0.32
SE (D)	-2.06 (1.82)	-2.33 (1.53)	-2.80 (1.93)	0.67
AL (mm)	24.49 (1.05)	24.54 (1.02)	24.72 (0.99)	0.40
BCVA (logMAR)	0.03 (0.05)	0.00 (0.01)	0.00 (0.00)	0.09
K1 (D)	42.31 (1.17)	42.55 (1.40)	42.73 (1.67)	0.84
K2 (D)	43.36 (1.11)	43.76 (1.61)	44.50 (1.81)	0.34
$\Delta$ K (D)	-1.05 (0.45)	-1.21 (0.47)	-1.76 (0.71)	0.06
ACD (mm)	3.79 (0.12)	3.77 (0.21)	3.77 (0.16)	0.98
LT (mm)	3.38 (0.09)	3.43 (0.14)	3.32 (0.13)	0.12
CCT ( $\mu$ m)	534.50 (26.30)	543.96 (34.12)	542.50 (41.83)	0.80
ChT ( $\mu$ m)	253.22 (48.40)	243.33 (41.70)	220.47 (36.40)	0.28
CCF (mm <sup>2</sup> )	2.19 (0.11)	2.16 (0.12)	2.20 (0.10)	0.67
RT-Whole ( $\mu$ m)	279.00 (11.36)	280.79 (8.97)	282.13 (12.09)	0.83
RT-Fovea ( $\mu$ m)	240.75 (11.23)	240.67 (16.98)	244.50 (16.33)	0.83
RT-ParaF ( $\mu$ m)	310.13 (16.15)	316.63 (10.42)	318.63 (9.41)	0.30
RT-ParaF-S ( $\mu$ m)	314.25 (15.04)	321.17 (11.00)	323.13 (10.19)	0.27
RT-ParaF-I ( $\mu$ m)	311.50 (17.18)	316.00 (10.51)	318.13 (10.58)	0.53
RT-ParaF-N ( $\mu$ m)	313.38 (17.55)	321.38 (11.08)	322.50 (9.61)	0.24
RT-ParaF-T ( $\mu$ m)	300.88 (15.62)	307.79 (10.83)	311.00 (9.10)	0.21
RT-PeriFovea ( $\mu$ m)	277.88 (11.15)	278.79 (10.42)	280.38 (13.94)	0.90
RT-PeriF-S ( $\mu$ m)	281.38 (9.52)	282.04 (9.36)	283.50 (15.53)	0.92
RT-PeriF-I ( $\mu$ m)	269.13 (12.52)	267.96 (11.61)	271.00 (13.64)	0.83
RT-PeriF-N ( $\mu$ m)	296.75 (13.83)	299.13 (12.51)	298.75 (15.11)	0.91
RT-PeriF-T ( $\mu$ m)	264.13 (10.18)	265.67 (11.17)	268.00 (14.30)	0.80
sRVD-Whole (%)	47.10 (1.54)	48.55 (2.05)	47.01 (3.00)	0.12
sRVD-Fovea (%)	20.95 (7.41)	20.43 (7.12)	18.64 (5.61)	0.77

sRVD -ParaF (%)	46.81 (5.72)	50.52 (3.00)	49.04 (3.91)	0.19
sRVD -ParaF-S (%)	48.39 (36.17)	51.33 (3.24)	49.65 (5.33)	0.35
sRVD -ParaF-I (%)	44.94 (4.85)	50.08 (4.35)	47.14 (3.51)	0.01*
sRVD -ParaF-N (%)	46.93 (7.25)	49.25 (4.36)	49.28 (5.47)	0.78
sRVD -ParaF-T (%)	47.03 (6.85)	51.40 (2.88)	49.98 (4.47)	0.16
sRVD -PeriF (%)	47.80 (1.36)	49.00 (2.06)	47.56 (3.16)	0.19
sRVD -PeriF-S (%)	47.28 (2.06)	48.88 (2.34)	47.58 (3.77)	0.24
sRVD -PeriF-I (%)	48.69 (2.17)	49.28 (2.49)	47.49 (3.05)	0.24
sRVD -PeriF-N (%)	52.23 (1.88)	53.64 (2.27)	52.54 (3.04)	0.26
sRVD -PeriF-T (%)	43.10 (2.14)	44.20 (2.89)	42.66 (3.77)	0.28
dRVD-Whole (%)	46.20 (3.99)	45.57 (5.00)	42.94 (4.15)	0.31
dRVD-Fovea (%)	37.70 (4.70)	36.35 (8.48)	34.58 (5.05)	0.70
dRVD-ParaF (%)	55.44 (3.31)	52.90 (4.21)	51.88 (4.24)	0.20
dRVD-ParaF-S (%)	53.41 (6.40)	51.96 (5.73)	49.46 (5.37)	0.39
dRVD-ParaF-I (%)	52.54 (3.56)	49.58 (5.84)	48.06 (5.71)	0.25
dRVD-ParaF-N (%)	56.81 (3.54)	55.30 (3.20)	55.15 (3.73)	0.51
dRVD-ParaF-T (%)	58.95 (4.17)	54.73 (3.80)	54.89 (3.97)	0.04*
dRVD-PeriF (%)	46.15 (4.15)	45.93 (5.44)	42.95 (4.63)	0.33
dRVD-PeriF-S (%)	43.29 (4.70)	44.70 (6.92)	41.46 (5.43)	0.45
dRVD-PeriF-I (%)	44.35 (5.16)	44.66 (6.19)	40.61 (5.17)	0.24
dRVD-PeriF-N (%)	46.26 (6.19)	44.32 (5.57)	41.99 (5.93)	0.34
dRVD-PeriF-T (%)	50.66 (3.12)	50.08 (4.74)	47.71 (4.17)	0.34
FAZ (mm <sup>2</sup> )	0.24 (0.07)	0.29 (0.12)	0.27 (0.10)	0.57

SE: spherical equivalent, AL: axial length, ChT: choroidal thickness, RT-: retinal thickness of different region, sRVD-: vessel density of the superficial retinal layer, dRVD-: vessel density of the deep retinal layer, FAZ: foveal avascular zone. Each retinal parameter was calculated over the foveal (Fovea), parafoveal (ParaF) and perifoveal (PeriF), in superior (S), nasal (N), inferior (I), temporal (T) quadrants. Whole means the overall average of retinal thickness or vessel density within central 6 x 6 mm macular area.

\* Between-group significant differences at  $P < 0.05$ .

**Table S4. Baseline characteristics of the enrolled subjects by refraction.**

	Low Myopia Mean (SD), N=28	Moderate Myopia Mean (SD), N=12	<i>P</i> Value
Age (yr)	10.00 (1.72)	9.67 (1.83)	0.59
Female, n (%)	15 (53.6)	5 (41.7)	0.49
AL (mm)	24.19 (0.65)	25.43 (1.14)	0.003*
BCVA (logMAR)	0.00 (0.01)	0.02 (0.04)	0.51
K1 (D)	42.61 (1.23)	42.38 (1.76)	0.51
K2 (D)	43.83 (1.36)	43.81 (2.06)	0.92
$\Delta$ K (D)	-1.23 (0.34)	-1.42 (0.90)	0.48
ACD (mm)	3.77 (0.18)	3.79 (0.17)	0.91
LT (mm)	3.40 (0.13)	3.39 (0.16)	0.84
CCT ( $\mu$ m)	540.43 (38.57)	544.92 (19.21)	0.63
ChT ( $\mu$ m)	234.71 (40.75)	227.71 (57.19)	0.80
CCF (mm <sup>2</sup> )	2.18 (0.12)	2.18 (0.09)	0.97
RT-Whole ( $\mu$ m)	281.36 (9.83)	279.17 (10.29)	0.53
RT-Fovea ( $\mu$ m)	239.36 (15.87)	246.33 (14.36)	0.20
RT-ParaF ( $\mu$ m)	315.29 (12.54)	316.75 (9.60)	0.72
RT-ParaF-S ( $\mu$ m)	306.86 (12.58)	307.50 (10.23)	0.88
RT-ParaF-I ( $\mu$ m)	320.11 (12.56)	320.33 (10.47)	0.96
RT-ParaF-N ( $\mu$ m)	319.11 (13.87)	322.08 (8.53)	0.37
RT-ParaF-T ( $\mu$ m)	314.82 (12.66)	317.17 (10.48)	0.58
RT-PeriFovea ( $\mu$ m)	279.57 (10.74)	277.42 (12.06)	0.58
RT-PeriF-S ( $\mu$ m)	267.36 (10.82)	262.25 (12.45)	0.20
RT-PeriF-I ( $\mu$ m)	283.29 (10.20)	279.67 (11.43)	0.33
RT-PeriF-N ( $\mu$ m)	298.18 (12.85)	299.50 (13.82)	0.77
RT-PeriF-T ( $\mu$ m)	269.43 (11.95)	267.33 (12.30)	0.62
sRVD-Whole (%)	48.08 (2.17)	47.66 (2.50)	0.59
sRVD-Fovea (%)	19.69 (6.58)	21.32 (7.41)	0.49

sRVD -ParaF (%)	49.78 (4.05)	48.80 (4.01)	0.48
sRVD -ParaF-S (%)	50.70 (4.38)	49.17 (4.64)	0.22
sRVD -ParaF-I (%)	50.29 (4.74)	50.68 (3.60)	0.94
sRVD -ParaF-N (%)	49.09 (5.25)	48.08 (5.20)	0.49
sRVD -ParaF-T (%)	48.96 (4.28)	47.3 (5.59)	0.31
sRVD -PeriF (%)	48.50 (2.17)	48.40 (2.52)	0.90
sRVD -PeriF-S (%)	43.88 (2.94)	43.18 (3.06)	0.50
sRVD -PeriF-I (%)	48.23 (2.60)	48.46 (2.90)	0.81
sRVD -PeriF-N (%)	52.97 (2.32)	53.53 (2.63)	0.50
sRVD -PeriF-T (%)	48.94 (2.34)	48.47 (3.16)	0.60
dRVD-Whole (%)	45.32 (4.81)	44.81 (4.60)	0.76
dRVD-Fovea (%)	35.46 (7.11)	38.16 (7.39)	0.28
dRVD-ParaF (%)	53.36 (4.34)	52.83 (3.77)	0.72
dRVD-ParaF-S (%)	55.44 (3.66)	55.90 (2.56)	0.69
dRVD-ParaF-I (%)	52.20 (6.01)	50.70 (5.36)	0.46
dRVD-ParaF-N (%)	55.63 (4.01)	55.56 (4.68)	0.96
dRVD-ParaF-T (%)	50.18 (5.96)	49.14 (4.45)	0.59
dRVD-PeriF (%)	45.60 (5.18)	44.87 (5.06)	0.68
dRVD-PeriF-S (%)	50.05 (4.50)	48.96 (4.18)	0.48
dRVD-PeriF-I (%)	43.62 (6.40)	44.12 (6.18)	0.82
dRVD-PeriF-N (%)	44.61 (5.72)	43.39 (6.08)	0.72
dRVD-PeriF-T (%)	44.12 (6.22)	43.02 (5.23)	0.59
FAZ (mm <sup>2</sup> )	0.28 (0.10)	0.27 (0.11)	0.84

SE: spherical equivalent, AL: axial length, ChT: choroidal thickness, RT-: retinal thickness of different region, sRVD-: vessel density of the superficial retinal layer, dRVD-: vessel density of the deep retinal layer, FAZ: foveal avascular zone. Each retinal parameter was calculated over the foveal (Fovea), parafoveal (ParaF) and perifoveal (PeriF), in superior (S), nasal (N), inferior (I), temporal (T) quadrants. Whole means the overall average of retinal thickness or vessel density within central 6 x 6 mm macular area.

\* Between-group significant differences at  $P < 0.05$ .

**Table S5. Correlation between the change of choroidal and retinal structural and vascular parameters in control eyes over 3 months\*.**

	ChT	RT- Whole	RT- Fovea	RT- ParaF	RT- PeriF	sVRD -	sRVD -	sRVD -	sRVD -	dVRD -	dRVD -	dRVD -	dRVD -	SE	AL
						Whole	Fovea	ParaF	PeriF	Whole	Fovea	ParaF	PeriF		
ChT	1.000														
RT- Whole	0.227 0.365	1.000													
RT- Fovea	0.275 0.269	<b>0.592</b> <b>0.010</b>	1.000												
RT- ParaF	0.176 0.485	<b>0.829</b> <b>&lt;0.001</b>	<b>0.728</b> <b>0.001</b>	1.000											
RT- PeriF	0.024 0.924	<b>0.903</b> <b>&lt;0.001</b>	<b>0.491</b> <b>0.039</b>	<b>0.686</b> <b>0.002</b>	1.000										
sVD- Whole	0.106 0.675	0.440 0.067	0.241 0.336	0.345 0.161	0.414 0.088	1.000									
sVD- Fovea	0.051 0.842	0.362 0.140	0.275 0.270	0.410 0.091	0.417 0.085	<b>0.632</b> <b>0.005</b>	1.000								
sVD- ParaF	0.078 0.757	0.419 0.083	0.330 0.182	<b>0.493</b> <b>0.038</b>	0.434 0.072	<b>0.886</b> <b>&lt;0.001</b>	<b>0.742</b> <b>&lt;0.001</b>	1.000							
sVD- PeriF	0.088 0.729	0.391 0.109	0.229 0.360	0.272 0.275	0.356 0.147	<b>0.977</b> <b>&lt;0.001</b>	<b>0.561</b> <b>0.016</b>	<b>0.797</b> <b>&lt;0.001</b>	1.000						
dVD- Whole	0.293 0.238	0.072 0.777	-0.207 0.410	-0.145 0.565	0.112 0.657	0.136 0.590	-0.109 0.667	-0.144 0.569	0.249 0.319	1.0 00					
dVD- Fovea	-0.096 0.705	0.273 0.273	0.127 0.615	0.272 0.276	0.433 0.073	0.400 0.100	<b>0.727</b> <b>0.001</b>	0.468 0.050	0.377 0.123	0.387 0.112	1.000				
dVD- ParaF	0.408 0.093	0.045 0.860	-0.163 0.518	-0.230 0.359	0.061 0.811	0.033 0.897	-0.285 0.252	-0.231 0.356	0.129 0.610	<b>0.914</b> <b>&lt;0.001</b>	0.213 0.396	1.000			
dVD- PeriF	0.315 0.203	0.071 0.780	-0.204 0.418	-0.118 0.642	0.097 0.702	0.204 0.416	-0.062 0.807	-0.072 0.778	0.320 0.195	<b>0.990</b> <b>&lt;0.001</b>	0.384 0.116	<b>0.875</b> <b>&lt;0.001</b>	1.000		
SE	0.358 0.145	0.387 0.113	-0.039 0.877	0.376 0.124	0.317 0.200	0.170 0.499	-0.068 0.789	0.150 0.551	0.173 0.492	0.397 0.103	0.171 0.498	0.321 0.193	0.423 0.080	1.000	
AL	-0.342 0.164	<b>-0.530</b> <b>0.024</b>	-0.105 0.679	-0.343 0.163	-0.439 0.068	-0.290 0.243	-0.047 0.854	-0.204 0.418	-0.320 0.195	<b>-0.514</b> <b>0.029</b>	-0.244 0.329	<b>-0.516</b> <b>0.028</b>	<b>-0.520</b> <b>0.027</b>	<b>-0.716</b> <b>0.001</b>	1.000

SE: spherical equivalent, AL: axial length, ChT: choroidal thickness, RT-: retinal thickness of different region, sRVD-: vessel density of the superficial retinal layer, dRVD-: vessel density of the deep retinal layer, FAZ: foveal avascular zone. Each retinal parameter was calculated over the foveal (Fovea), parafoveal (ParaF) and perifoveal (PeriF), in superior (S), nasal (N), inferior (I), temporal (T) quadrants. Whole means the overall average of retinal thickness or vessel density within central 6 x 6 mm macular area.

\*The upper row value of each cell represents correlation coefficient (r) and the lower row value represents statistical difference (P value). Bold values represent a significant difference ( $P < 0.05$ ).