Temperature control role of the choroid may affect choroidal thickness after dynamic exercise

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Dear Sir,

We read the current article, "choroidal thickness (CT) changes after dynamic exercise as measured by spectral-domain optical coherence tomography," with interest.[1] In this well-organized study, authors have investigated CT to be increased when measured 5 min after exercise and normalized at measurement after 15 min. Results are being discussed very well. Besides, we want to make some contributions that may widen discussion area on these findings.

As authors addressed in introduction, choroid is believed to have a role in temperature regulation.[2] Choroid has highest blood flow in the body. Its blood flow is 10 times higher than blood flow through gray matter of brain.[3] However, this high blood flow does not correspond to metabolic requirements. High blood flow of the choroid is believed to protect retina from heat stress.[4] Body temperature rises during exercise. Elevated temperature may harm sensitive retinal cells such as photoreceptors and retina pigment epithelium. Although body temperature is being controlled by hypothalamus during exercise, increase in choroidal blood flow may contribute to this process to protect retina. Retina may need an extra heat lowering mechanism during exercise because of its sensitive structure and heat storing potential of the vitreous. As a result, increase in choroidal blood flow and thereby CT is an expected result. We believe that, finding in this study should also be discussed according to retinal cooling. On the other hand, in a study, CT have found not to be changed by exercise.[5] Average age of patients in this study is 60.6 (±10.4 years) while 27 ± 4.08 in the current study. Age may affect changes in CT.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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Authors' response

Dear Sir,

We appreciate the interest in and comments of the author concerning our article.[1] As we addressed in our study, choroid has a very large vascular network and choroidal circulation has one of the highest rates of blood flow in humans.[1] However, an important physiological role for the high choroidal blood flow is to help temperature regulation of the retina.[2,3] Increased body temperature during exercise may lead to vasodilation and increase in choroidal blood flow.[4] On the other hand, the previous study showed that decreased retinal temperature led to a significant decrease in choroidal blood flow.[5] Our findings confirm the outcomes of that study. We found that choroidal thickness (CT) values increased significantly at 5 min following dynamic exercise and returned to baseline values at 15 min following the exercise. Core body temperature rises during exercise and returns to baseline values following the exercise.[6] In conclusion, high choroidal blood flow protects photoreceptors, retina pigment epithelium, and vitreous from heat stress.[7] It must be remembered that the measurements of CT with enhanced depth imaging optical coherence tomography (EDI-OCT) technology provide only an indirect index of the consequence of blood flow regulation in a vascular bed, yet cannot measure blood flow, volume, or velocity there. We, therefore, suggest that the EDI-OCT may be used to evaluate the issue of blood flow regulation. Furthermore, it has been reported that the body temperature of older persons is lower than that of younger people

and that their tolerance of thermal changes is more limited.[8] So that, studies are required to evaluation the changes in CT during egzersize in older and young peoples.

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Comment on: Acute visual loss with ophthalmoplegia after spinal surgery - Acid Base imbalance induced glaucoma in pediatric patients

Dear Sir,

We read with interest the article titled "Acute visual loss with ophthalmoplegia after spinal surgery: Report of a case and review of literature" by Mukherjee and Alam.[1] Authors have mentioned about ischemic damage to optic nerves due to raised intraocular pressure (IOP) as a possible mechanism for loss of vision in the immediate postoperative period following prolonged surgery. We appreciate the authors' effort and the research work. We would like to highlight a few points regarding glaucomas due to acid base imbalance. Factors which increase IOP are hypoxia, metabolic alkalosis and respiratory acidosis, and increased central venous pressure (coughing, straining, increased intrathoracic pressure, trendelenburg positions, and valsalva maneuver).[2] Pharmacological or metabolic process that increases choroidal blood volume will increase IOP. Mechanically ventilated patients with chronic lung disease (posthypercapnia syndrome) develop metabolic alkalosis. Respiratory acidosis is caused by depressed central respiratory drive and acute paralysis of the respiratory muscle. Assisted ventilation is required in children undergoing treatment for respiratory acidosis.[3] The prevalence[4] of pupillary block glaucoma increases with age. However, it can occur at any age, including rare cases in childhood.[5] Atropine and adrenaline are common drugs used in general anesthesia, which may precipitate acute angle closure glaucoma in predisposed patients.[4]

To conclude, IOP monitoring should be performed in children undergoing intensive care treatment following either head injury or major head and neck surgery. Torchlight, fluorescein strip, topical anesthetic eye drops, direct ophthalmoscope, measuring tape, plastic rule (exophthalmometer), and tonometer (Schiotz or Tonopen) should be available in pediatric Intensive Care Unit.

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