



Letter to the Editor

Blood metals, age related macular degeneration and contrast sensitivity impairment*To the Editor*

Damar Güngör et al. [1] conducted a case control study to evaluate blood lead (Pb) and cadmium (Cd) levels in age related macular degeneration (AMD). In this study, blood Pb and Cd levels were higher in all subjects and in non-smokers compared to controls. However, there were no significant differences in the mean values of blood Pb and Cd levels between cases and controls, and no statistical difference was observed even when smoking status was considered. I have some queries on their study with particular reference to clinical symptoms, sex difference, and metabolic syndrome.

First, Roh et al. [2] evaluated clinical factors associated with vision-related quality of life (VRQoL) in patients with bilateral advanced AMD with a mean age of 83.2 years. They used multiple regression analysis with fixed item parameters and concluded that high contrast visual acuity and contrast sensitivity were significantly associated with the VRQoL and scores on the Visual Function Scale and the socioemotional functioning scale. Similar to this study, Paulsen et al. [3] conducted a prospective study to evaluate risk factors for contrast sensitivity impairment, including blood Pb and Cd levels. Adjusted hazard ratios (HRs) (95% confidence interval [CI]) of blood Cd level in the highest quintile, older age, larger waist circumference, 1–3 carotid plaque sites, and 4–6 carotid plaque sites for contrast sensitivity impairment were 1.35 (1.02–1.78), 1.36 (1.25–1.47), 1.06 (1.01–1.11), 1.43 (1.07–1.92) and 2.75 (1.26–6.05), respectively. In comparison, adjusted HRs (95% CIs) of male sex and any alcohol consumption for contrast sensitivity impairment were 0.77 (0.60–0.98) and 0.61 (0.43–0.88), respectively. They concluded that Cd exposure, and not Pb exposure, was a significant predictor of contrast sensitivity impairment. Further studies are needed to verify the effects of metals on contrast sensitivity impairment in patients with AMD.

Second, there is a need to consider sex difference in the occurrence of AMD. In western countries, the prevalence of AMD is higher in females than in males. In Cd non-polluted inhabitants, low level of Cd exposure is derived from tobacco and foods grown in soil, and for chronic Cd exposure, the kidney is the critical organ. Regarding sex difference, Cd exposure may cause tubular damage in the kidneys through oxidative stress, and females may be more susceptible than males to Cd exposure [4]. Risk of contrast sensitivity impairment in females could partly be explained by the effect of sex difference on susceptibility to Cd exposure. I understand that sex-specific differences could be difficult to test in their Turkish population due to the limited

number of study subjects.

Third, as the authors pointed out, whole blood Cd is a better indicator of recent Cd exposure than urinary Cd [5], and urinary Cd can be used as a substitute for dietary Cd intake, gathered from food information, for the estimation of long-term Cd exposure [6]. Risk assessment of contrast sensitivity impairment due to Cd exposure should additionally be conducted by using urine specimens.

Finally, there is a significant contribution of metabolic syndrome to subsequent AMD [7]. Association of increased waist circumference and carotid plaque formation with contrast sensitivity impairment, which was reported by Paulsen et al. [3], could also be closely related to AMD.

Disclosure statement

The author has indicated no financial support.

Conflicts of interest

There is no conflict of interest in this study.

References

- [1] E. Damar Güngör, F. Yülek, U. Serkant, Y. Toklu, A. Hocaoglu, Ş. Şimsek, Blood lead and cadmium in age related macular degeneration in a Turkish urban population, *J. Trace Elem. Med. Biol.* 48 (2018) 16–19.
- [2] M. Roh, A. Selivanova, H.J. Shin, J.W. Miller, M.L. Jackson, Visual acuity and contrast sensitivity are two important factors affecting vision-related quality of life in advanced age-related macular degeneration, *PLoS One* 13 (2018) e0196481.
- [3] A.J. Paulsen, C.R. Schubert, L.J. Johnson, et al., Association of cadmium and lead exposure with the incidence of contrast sensitivity impairment among middle-aged adults, *JAMA Ophthalmol.* 136 (2018) 1342–1350.
- [4] M. Huang, S.J. Choi, D.W. Kim, et al., Evaluation of factors associated with cadmium exposure and kidney function in the general population, *Environ. Toxicol.* 28 (2013) 563–570.
- [5] S.V. Adams, P.A. Newcomb, Cadmium blood and urine concentrations as measures of exposure: NHANES 1999–2010, *J. Expo. Sci. Environ. Epidemiol.* 24 (2014) 163–170.
- [6] S.V. Adams, P.A. Newcomb, Urinary cadmium as a marker of exposure in epidemiological studies, *Environ. Health Perspect.* 121 (2013) A296.
- [7] H. Ghaem Maralani, B.C. Tai, T.Y. Wong, et al., Metabolic syndrome and risk of age-related macular degeneration, *Retina* 35 (2015) 459–466.

Tomoyuki Kawada

Department of Hygiene and Public Health, Nippon Medical School, 1-1-5 Sendagi, Bunkyo-Ku, Tokyo 113-8602, Japan
E-mail address: kawada@nms.ac.jp