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Determination and comparison of urinary iodine levels in patients with age-related macular degeneration and healthy volunteers

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Abstract. To investigate the urine iodine level of patients with dry- and wet-type age-related macular degeneration (ARMD) and to compare with those of normal healthy volunteers. ARMD is a leading cause of severe vision loss in developed countries and the pathogenesis has not yet been fully clarified. The ciliary body of the eye and lacrimal gland concentrate iodine, and their antioxidative capacities are increased by iodine because of its antioxidant properties. Urine samples were received from 23 normal healthy volunteers (group I), 23 patients with wet-type (group II) and, 23 patients with dry-type ARMD (group III). Urinary iodine concentration was determined spectrophotometrically using the Sandell-Kolthoff reaction. The iodine levels were significantly lower in group II (4.04 ± 1.12 µg/dL) and in group III (9.73 ± 1.85 µg/dL) compared to group I (the control group: 17.21 ± 1.65 µg/dL) ($p < 0.001$). The iodine levels of group II were lower than those of group III ($p < 0.001$). Tight junctions between retina pigment epithelial cells promoted by iodine assist in the prevention of fluid passage between the neural retina and the retinal pigment epithelium. Low iodine levels in patients with ARMD may be a possible indication of the degeneration of these tight junctions. Therefore, iodine deficiency could be a risk factor for neovascular ARMD. Urinary iodine excretion is used as the most convenient, rapid, and low-cost laboratory marker to determine iodine deficiency, and it may be used to follow up ARMD. Iodine supplementation might be useful to prevent the development of macular edema associated with ARMD.

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Introduction

Age-related macular degeneration (ARMD) as a multifactorial disease is one of the leading causes of blindness worldwide [1]. Neovascular/exudative/wet-type ARMD constitutes 10 – 15% of all ARMD cases, but is responsible for 88% of severe ARMD-associated visual loss. Non-neovascular/ atrophic/dry-type is the most common, and this slowly progressive type of ARMD is detected in 85 – 90% of cases. It also accounts for 10 – 12% of the severe vision loss caused by ARMD [2]. Dry-type ARMD may be characterized by the presence of small-or medium-sized drusen and geographic atrophy. In wet-type ARMD, there may be choroidal neovascularization and non-drusenoid retinal pigment epithelial detachment [3, 4].

ARMD is generally seen at an advanced age. The etiopathogenesis of ARMD has not been fully clarified as yet although it has been long-known and extensively investigated. Many risk factors are recognized as contributing to its etiology [5, 6]. The ocular and systemic factors include advanced age, choroidal neovascularisation, macular pigmentary change, hyperopia, hypertension, smoking, and sunlight exposure [7]. Genetic factors also have an effect on the development of ARMD [8].

Recent studies have focused on the effect of oxidative stress on ARMD [9, 10]. Oxidative stress is defined as an excessive amount of reactive oxygen species (ROS) and has an important role in the development/progression of different diseases such as age-related disorders, cardiovascular diseases, and neurological diseases [11, 12]. There is an optimum balance between the activity of antioxidant defense system and the generation of ROS. With aging, pro-oxidant/antioxidant imbalance and oxidative damage are increased, and this situation plays a possible role in the ARMD pathogenesis. The retina