

Sun Exposure and Visual Field Damage among Children on the Adriatic Island Rab – Possible Initial Risk Factor in Development of Age-Related Macular Degeneration

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ABSTRACT

The Adriatic Island Rab, situated in the northern part of the Croatian sea, is more strongly exposed to sunlight (especially from May to October) than the other parts of Croatia and most of the European countries. As consequences of higher solar radiation, significant percentage of Pseudoexfoliation of lens capsula occurs in 15% and fundus picture of AMD (Age-Related Macular Degeneration) in 18% of agriculturalists and fishermen (45–70 years old). We previously presented the first clinical study showing that in AMD the peripheral visual field is also damaged. In this clinical study we examined 68 children (8–15 years old), including following procedures: vision correction, slit lamp examination, visual field in technic of isopters and profile quantitative perimetry (meridian retinal thresholds examination) using Kowa automated perimeter. In 15% of examinees we found strictly foveal »degeneration«, and changes of visual fields: higher meridian thresholds and typical changes with invagination of isopters. It is very interesting that these children with damaged visual field and fundus picture do not protect their eyes from the sunlight during summertime. We suggest the possibility of the influence of higher sun radiation as one of the risk factors in the earlier development of future AMD.

Key words: age-related macular degeneration, children, sun exposure, visual field damage

Introduction

In our previous study of Age-Related Macular Degeneration (AMD), on the island Rab, we concluded that there is a correlation between higher solar radiation and AMD, in as high as 18% of agriculturalists and fishermen, while in urban population it exists only in 2.5%¹.

It is well known that UV radiation with very high energy can produce damage in retinal structures, lead to deleterious biochemical reactions and production of dimers photoproducts and damage nucleic acids with consequently formed abnormal DNA^{2,3}.

Following the above mentioned clinical results showing the possible influence of solar radiation on the development of AMD, we suggested the possibility of the earlier damage of the neuroretina as a consequence of higher and prolonged solar radiation. For this reason, we ap-

plied the same examination to the children on the island Rab as we did in the previous study 5 years ago^{1,4}.

Patients and Methods

The study population included 68 children between 8 and 15 years of age. All of the children were examined using following procedures: vision examination, slit lamp examination, optical media and anterior chamber examination, fundus picture, visual field analyses – isopteric, profile quantitative perimetry (meridian retinal thresholds examination) and OCT – Optical Coherence Tomography, as well as detailed anamnesis on prolonged sun exposure.

Results and Discussion

The analysis of our findings revealed significant damage in visual field, isopteric and profile perimetry in 9 cases (15%). On isopteric perimetric findings (Figure 1), there are characteristic invaginations present in peripheral and inner isopters, as consequences of the influence of higher and prolonged solar radiation on the retina. Figure 2 presents an evident curve B depression and lower photopic retinal sensibility. In the above mentioned group of 9 children we also found significant changes in fundus picture (Figure 3), but strictly in fovea, namely dysssgrupatio pigmenti and initial point »degeneration«. The complete interpretation of OCT findings will follow, because of its very delicate and serious nature. We must accentuate that all children in the group with damages in visual fields and fundus picture are more exposed to sunlight that the other children and without any protection of the eyes.

In the analysis of our two studies on the island Rab, the older group in the earlier study and children in this study, we can conclude that the prolonged sun exposure

of the eyes can lead to the damage of neuroretina even in children.

Conclusion

Consequently to these findings, we can conclude that the prolonged sun exposure of the eyes can be one of the very important early risk factors for future development of AMD. Therefore, the necessity of children being adequately protected from sun radiation, especially during the summertime and with sun glasses with correct legal declaration, is of the utmost importance. In order to prevent future vision loss in who are now the children, the Ministry of Health of the Republic of Croatia must consider this the national public health problem, and in collaboration with the pharmaceutical industry offer special medical supplementation of vitamin A and its precursors, as well as antioxidants to children. In the future studies, we will examine and compare the results obtained on the island Rab with the ones from the mountain region of Gorski Kotar.

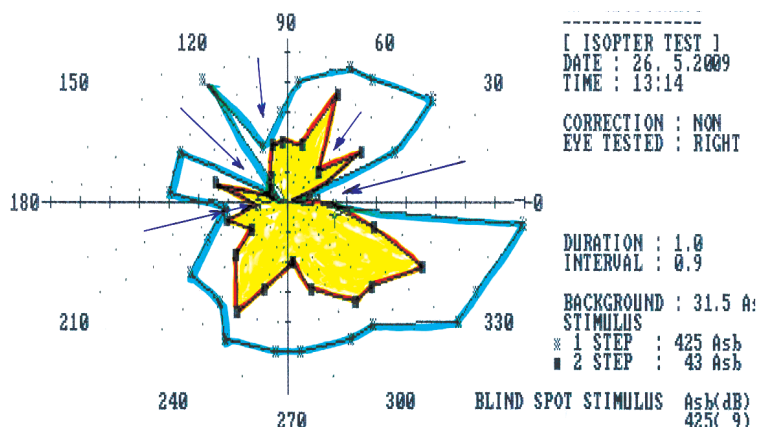


Fig. 1. Isopteric perimetric finding with characteristic invaginations present in peripheral and inner isopters.

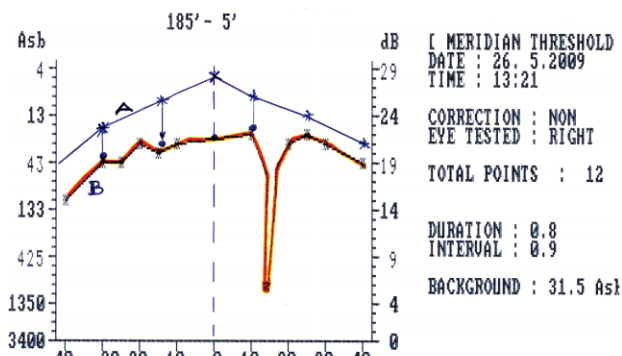


Fig. 2. An evident curve B depression and lower photopic retinal sensibility.

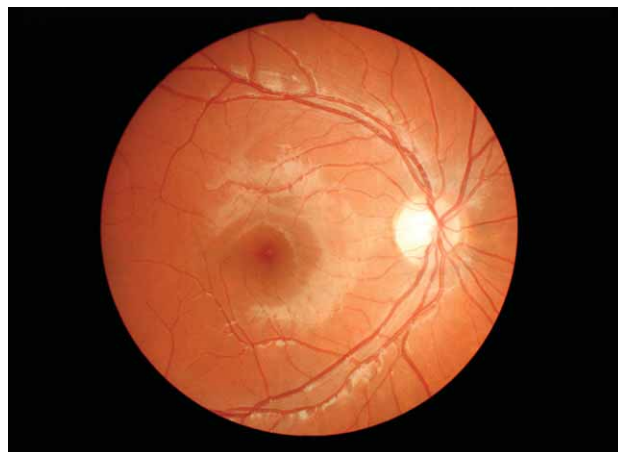


Fig. 3. Significant changes in fundus picture, strictly in fovea, namely dysssgrupatio pigmenti and initial point »degeneration«.

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EKSPONIRANJE SUNCU I PROMJENE U VIDNOM POLJU U DJECE NA OTOKU RABU – MOGUĆI POČETNI FAKTOR RIZIKA ZA BUDUĆI RAZVOJ MAKULARNE DEGENERACIJE

SAŽETAK

Na otoku Rabu, koji je jače izložen sunčevoj svjetlosti od ostalih krajeva Hrvatske i većine zemalja Europe, ispitano je 68 djece, u rasponu od 8 do 15 godina starosti, kako bi se otkrile bilo kakve eventualne promjene kao posljedica pojačanog izlaganja sunčevu svjetlu, posebice tijekom ljeta. U tom smislu učinjene su slijedeće pretrage: slikanje fundusa, vidno polje izopteričko i kvantitativno – meridian thresholds, visus i detaljna anamneza. Ustanovljeno je da u 15% djece koja su bitno više izložena suncu i bez zaštite postoje promjene u vidnom polju, s invaginacijama u periferiji, te povišenjem praga podražaja neuroretine. Fundus slika pokazuje punktififormne promjene disrupcije foveolarnog pigmenta i naznake za točkastu foveolarnu »degeneraciju«. Autori zaključuju da zbog povećane solarne radijacije, u djece čije su oči više izložene suncu i bez zaštite, s velikom vjerojatnošću postoji aktiničko oštećenje neuroretine, kao moguć početni faktor rizika za budući razvoj buduće makularne degeneracije. Autori predlažu da to mora biti nacionalni zdravstveni problem, te da je dužnost Ministarstva Zdravstva Republike Hrvatske pobrinuti se za bolju zaštitu djece od štetnosti sunčeva zračenja, na način da se s farmaceutskim kućama dogovori plan suplementacije doza vitamina A i njegovih prekursora, kao i antioksidansa.