

老人性白内障水晶体の着色現象の解明と着色化阻外物質の検索

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1990 Fiscal Year Final Research Report Summary

Research for Brown Pigmentation of Brunescant Cataractous Lenses and For

Research Project

Project/Area Number

01570153

Research Category

Grant-in-Aid for General Scientific Research (C)

Allocation Type

Single-year Grants

Research Field

Pathological medical chemistry

Research Institution

Department of Biochemistry, Kanazawa University School of Medicine

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Brunescant cataracts / Lenses / Pigmentation / Pigmentation—inhibiting substances

Research Abstract

We analyzed the brown pigments of brunescant lenses obtained from patients with cataracts by using optical methods such as integrating sphere till last year, and deduced that the brown pigments might be xanthommatin or its analogues which were produced by the oxidative dimerization of 3-hydroxykynurenine. As for the mechanism of the formation of brown pigments in brunescant cataractous lenses, we considered that the tryptophan residues of lens proteins were, first of all, converted to 3-hydroxykynurenine residues in the proteins by means of UV irradiation of sun, and then free 3-hydroxykynurenine was added to this 3-hydroxykynurenine residues in the proteins, resulting in the formation in the proteins. Thus, we investigated whether 3-hydroxykynurenine and its analogues such as 3-hydroxyanthranilic acid and o-aminophenol were additively bound to 3-hydroxykynurenine residues of the lens proteins under irradiation of UV. The experiments were performed at 25°C for 48 hours. As a result, these

compounds strongly bound to lens proteins, and the color of the lens proteins changed from pale yellow to brown or orange-colored. It was very difficult to isolate these pigmented compounds from the lens proteins. The absorption spectra of these pigmented proteins showed typical ones with peaks at visible and at near-violet regions. These results show that 3-hydroxykynurenine and its analogues bound to 3-hydroxykynurenine residues of the lens proteins by means of UV irradiation. These results also support our previous views that 3-hydroxykynurenine combine with 3-hydroxykynurenine residues of the lens proteins to form xanthommatin.

Furthermore, we investigated the pigmentation—inhibiting compounds which may inhibit the brown pigmentation, utilizing the findings that pale yellow lens proteins are pigmented strongly with o-aminophenol under the irradiation of UV for 48 hours. Especially we examined the effects of antioxidants such as ascorbic acid and reduced glutathione. However, these compounds showed little effects on inhibiting the pigmentation of lens proteins. We are now continuing to find the pigmentation—inhibiting substances using such experimental systems.▲ Less

Research Products (4 results)

All Other

All Publications (4 results)

[Publications] Akio Tomoda, Yoshimasa Yoneyama, Teruhide Yamaguchi, Etsuko Shirao, Kazuo Kawasaki: "Mechanism of coloration of human lenses induced by near-ultraviolet-photo-oxidized 3-hydroxykynurenine" *Ophthalmic Research*. 22. 152-159 (1990) ▼

[Publications] 友田 二夫、山口 照英、白尾 悦子、河崎 一夫: "積分球を用いた老人性白内障水晶体の着色物質の吸収スペクトルの測定について" *あたらしい眼科*. 6. 1577-1583 (1989) ▼

[Publications] Akiko Tomoda, Yoshimasa Yoneyama, Teruhide Yamaguchi Etsuko Shirao, Kazuo Kawasaki: "Mechanism of coloration of human lenses induced by near-ultraviolet-photo-oxidized 3-hydroxykynurenine" *Ophthalmic Research*. 22. 152-159 (1990) ▼

[Publications] Akio Tomoda, Teruhide Yamaguchi, Etsuko Shirao Kazuo Kawasaki: "Measurement of absorption spectra of pigments of lenses of senile cataracts using integrating sphere" *Eye*. 6. 1577-1583 (1989) ▼

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