



HAL
open science

Relevance of 24S-hydroxycholesterol as a biomarker of optic neuropathies

Lionel Brétilon, Lucy Martine, Bruno Pasquis, Cynthia Fourgeux, Coralie Schnebelen, Niyazi Acar, Ingemar Bjorkhem, Alain Bron, Catherine Creuzot Garcher

► To cite this version:

Lionel Brétilon, Lucy Martine, Bruno Pasquis, Cynthia Fourgeux, Coralie Schnebelen, et al.. Relevance of 24S-hydroxycholesterol as a biomarker of optic neuropathies. Association for Research in Vision and Ophthalmology annual congress, May 2009, Fort Lauderdale, Florida, United States. 1 p. hal-01137001v1

HAL Id: hal-01137001

<https://hal.science/hal-01137001v1>

Submitted on 30 Mar 2015 (v1), last revised 17 Feb 2016 (v2)

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Relevance of 24S-Hydroxycholesterol as a Biomarker of Optic Neuropathies

L. Bretillon¹, L. Martine¹, B. Pasquis¹, C. Fourgeux¹, C. Schnebelen¹, N. Acar¹, I. Björkhem², A. M. Bron^{1,3} and C. P. Creuzot-Garcher^{1,3}

¹INRA, University of Burgundy, Eye & Nutrition Research Group, Dijon, France

²Department of Laboratory Medicine, Karolinska Institutet, Stockholm, Sweden

³University Hospital, Department of Ophthalmology, Dijon, France

Commercial Relationships: L. Bretillon, None; L. Martine, None; B. Pasquis, None; C. Fourgeux, None; C. Schnebelen, None; N. Acar, None; I. Björkhem, None; A.M. Bron, None; C.P. Creuzot-Garcher, None.

Support: PHRC inter-régional Dijon-Nancy

Abstract

Purpose: 24S-Hydroxycholesterol is formed by enzymatic oxidation of cholesterol via cholesterol-24S-hydroxylase (CYP46A1) activity in neurons, including retinal ganglion cells and neurons from the inner retina. We investigated whether neurodegeneration could be associated with the release of 24S-hydroxycholesterol in acute neuropathies, and therefore 24S-hydroxycholesterol could be considered as a biomarker of retinal cell degeneration in the course of optic neuropathies.

Methods: Retinal neurodegeneration was induced in rats by severe elevation of intra-ocular pressure. For that purpose, rats were submitted to 532nm-laser photocoagulation of the episcleral veins, limbus and trabecular meshwork. Intra-ocular pressure was monitored in a time course study at 1, 3, 7, 14, 21, 30 and 60 days post laser injury using Tonolab®. Rat retinal and plasma 24S-hydroxycholesterol levels were quantified by gas-chromatography mass spectrometry using deuterated internal standard at the same time points. Plasma levels of 24S-hydroxycholesterol were similarly monitored in patients suffering from anterior ischemic optic neuropathy.

Results: Intra-ocular pressure was significantly raised by a factor of five in the laser treated-eyes of the rats compared to fellow eyes, during the first two weeks after photocoagulation, and returned to baseline afterwards. The levels of 24S-hydroxycholesterol were lowered in the first three days in the retina injured by laser, compared to fellow eye. Meanwhile, plasma levels of 24S-hydroxycholesterol were raised by a factor of three. Patients suffering from anterior ischemic optic neuropathy showed increased plasma levels of 24S-hydroxycholesterol, compared to age-matched normal subjects (H=6.86, P=0.009 by Kruskal-Wallis test).

Conclusions: Increased plasma levels of 24S-hydroxycholesterol were associated with acute phases of optic neuropathies, suggesting its relevance as a biomarker of retinal neurodegeneration.

Keywords: retinal degenerations: cell biology • inner retina dysfunction: biochemistry and cell biology • ischemia