1-1-2012

Membrane lipids in human lenses and age

J R. Hughes
University of Wollongong, jnealon@uow.edu.au

J M. Deeley
University of Wollongong, jmd67@uow.edu.au

J -A Seng
University of Wollongong, jas995@uowmail.edu.au

S R. Ellis
University of Wollongong, sre359@uowmail.edu.au

Stephen J. Blanksby
University of Wollongong, blanksby@uow.edu.au

See next page for additional authors

Membrane lipids in human lenses and age

Abstract

Abstract of paper that presented at the XX Biennial Meeting of the International society for Eye Research, 21-25 July, Berlin.

Keywords

age, lenses, human, lipids, membrane, CMMB

Disciplines

Medicine and Health Sciences | Social and Behavioral Sciences

Publication Details

Hughes, J. R., Deeley, J. M., Seng, J. -A., Ellis, S. R., Blanksby, S. J., Leisch, F., Truscott, R. J. W. & Mitchell, T. W. (2012). Membrane lipids in human lenses and age. ISER 2012: XX Biennial Meeting of the International society for Eye Research - Abstracts (p. O461). Switzerland: ISER.

Authors

J R. Hughes, J M. Deeley, J -A Seng, S R. Ellis, Stephen J. Blanksby, F Leisch, Roger J. W Truscott, and T W. Mitchell

O461

MEMBRANE LIPIDS IN HUMAN LENSES AND AGE

J.R. Hughes[1], J.M. Deeley[2], J.-A. Seng[2], S.R. Ellis[2], S.J. Blanksby[2], F. Leisch[3], R.J.W. Truscott[4], T.W. Mitchell[5]

[1]Graduate School of Medicine, [2]School of Chemistry, University of Wollongong, Wollongong, NSW, Australia, [3]Institute of Applied Statistics and Computing, University of Natural Resources and Life Sciences, Vienna, Austria, [4]Save Sight Institute, University of Sydney, Sydney, [5]School of Health Sciences, University of Wollongong, Wollongong, NSW, Australia

It is well established that macroscopic alterations occurring to the human lens with age, such as an increase in stiffness, correlate with microscopic alterations observed to lens proteins. There has been limited investigation thus far on changes to the lens membrane lipidome with age. Previous studies pooled lenses or did not use quantitative techniques for analysis. For an age-related comparison, it is essential to use individual lenses and examine the nucleus only; the lens present at birth.

The aim of this study was to examine lipid alterations that occur with age in the human lens nucleus.

Sixty human lenses aged between 12 and 82 were separated into nucleus and cortex by coring the centre using a 4.5 mm trephine, and approximately 1 mm was removed from the ends of the cylinders. Human lens lipids were then extracted by standard methods and analysed by complementary mass spectrometric techniques. Glycerophospholipids that are abundant in young lenses decrease dramatically to a negligible concentration with age. Concurrently, dihydroceramides and ceramides that are undetectable at age 20 increase over 1000-fold by age 60. We hypothesised that the increases in ceramide concentration were due to decreases in biosynthetically related molecules dihydrosphingomyelin and sphingomyelin; however the concentration of these lipids remained unchanged with age. Preliminary work has focussed on elucidating the identity of other biosynthetically related molecules that may have caused the increase in ceramides with age. New sphingolipid molecules were identified for the first time in the human lens.

Dramatic alterations that occur to lens lipids in the human nucleus with age may have significant effects on lens protein function throughout one's lifespan. These membrane alterations correlate to the onset of presbyopia. Further work is required to elucidate the mechanisms of lipid alterations with age.

Supported by NHMRC grant #464866; RJWT is a NHMRC fellow.

COI/Financial disclosure: Nothing to disclose