Comparing and optimizing cholesterol extraction from hydrogel and silicone hydrogel contact lens materials
Miriam Heynen, Diana Trieu, Holly Lorentz, Lyndon Jones
Centre for Contact Lens Research, School of Optometry and Vision Science, University of Waterloo, Canada

Introduction
- Contact lens (CL) drop-out due to discomfort and dry-eye symptoms continues, despite development of new materials.¹
- CLs are known to interact with the tear film, by sorbing proteins and lipids in a material-dependent manner and having an impact on bulk and surface properties.² These changes may have a direct or indirect effect on comfort.
- Groups that study lipid deposits on lenses use a variety of techniques to measure cholesterol, a common lipid involved in lens spoilation.³,⁴
- Differences in reported amounts may be due to factors such as the participant population, environmental factors and lens care regimen.
- Another potential factor is the method used for extracting cholesterol, which markedly differs between published manuscripts. To date, a systematic study to compare these methods has not been undertaken.

Purpose
- To compare the ability of 6 published extraction methods to extract cholesterol from silicone and conventional hydrogel contact lenses.
- To optimize the most efficient method for laboratory use.

Methods

Lenses:
- Conventional hydrogels (CH) - omifalcon A, etafilcon A, vicon A
- Silicone hydrogels (SH) - comfilcon A, lotrafilcon B, galyfilcon A, senofilcon A and balafilcon A.

Methods A and B were similar to A (p>0.05) except for:
- Method B was similar to A (p>0.05) except for lotrafilcon B (p=0.038).
- Method C removed the least amount of cholesterol (p<0.0002).

Comparison of published extraction methods
- Methods A-F were based on different extraction methods, each with its advantages and disadvantages.
- Method A was the most efficient method for extracting cholesterol.

Comparison of methods:
- Method A was optimized for volume, time, and level of agitation.
- Method B was altered to use sonication (p<0.023).
- Method C was altered to use sonication (p=0.03).
- Modifications to method A did not change cholesterol extraction in the remaining lenses.

Analysis
- Data were analyzed using Statistics 10. A repeated measures analysis of variance (RM-ANOVA) was used to determine significant differences between any two different extraction methods within a lens type. A post-hoc Tukey HSD test was performed wherever applicable.

Results
- The most convenient and cost effective procedure for extracting cholesterol from a variety of CH and SH is Method I: two extractions with 2 ml of 2 cholesterol: 1 methanol, shaken vigorously at 37°C

References
- ⁴ Mazerov, E.P. et al. Protein deposition on silicone hydrogel lenses, part 1: quantification of soluble Acid, soluble Acid refracto water, and cholesterol Eye Contact Lens, 2016; 2016(2): p. 30-38

© 2014 CCLR - Centre for Contact Lens Research, University of Waterloo. All rights reserved. All data and images were collected, compiled and are exclusively owned by the CCLR. Unauthorized utilization, editing, or reproduction or distribution of this poster or any part thereof is strictly prohibited.