

Contact Lens Induced Papillary Conjunctivitis is Associated with Increased Albumin Deposits on Extended Wear Hydrogel Lenses

Maxine E Tan, Gulhan Demirci, Damon Pearce, Isabelle Jalbert, Padmaja Sankaridurg, Mark DP Willcox.
Cooperative Research Centre for Eye Research and Technology, University of New South Wales, Sydney, Australia.

Introduction

CLPC appears to be an immunological/mechanical response to contact lenses and their deposits (Figure 1), resulting in a hypersensitivity reaction.¹ Enlarged papillae on the tarsal conjunctiva, redness, itching, increased mucus and decreased contact lens tolerance are typical symptoms.² Contact lens papillary conjunctivitis (CLPC) is the major reason for discontinuation of contact lens wear. However its mechanism of action is still unclear. Figure 2 shows the conjunctiva of a subject without CLPC. Figures 3 and 4 show the conjunctiva of 2 subjects with CLPC.



Figure 1: Deposits on a contact lens

Purpose

To determine the levels of human serum albumin, secretory IgA (sIgA) and lactoferrin on extended wear contact lenses from subjects with and without CLPC.

Methods

Subjects

Contact lenses were collected from subjects enrolled in extended wear studies conducted at CCLRU and stored in sterile PBS at 4°C.

ELISAs

ELISAs for albumin, sIgA and lactoferrin were performed directly on the lenses.

- Nitrocellulose discs spiked with known concentrations of each protein were used as standards.
- Non-specific binding was calculated from unworn lenses.
- Standards and lenses were blocked with either 0.2% Tween-20/PBS (PBST) or 3% BSA/PBST.
- Standards and lenses were incubated with either α -human HSA, α -human sIgA or α -human lactoferrin peroxidase conjugated antibodies at 1/1000 in PBST.
- ABTS peroxidase substrate was added for 10 mins with gentle agitation and the absorbance read at 405nm, from a 200 μ l aliquot.
- Standard curves were determined and the lens absorbance values converted into absolute amounts of each protein.

Data Analysis

- The non-parametric Mann-Whitney test was used.

Results

- Albumin surface deposits were significantly higher on contact lenses from subjects with CLPC ($p < 0.0001$, Figure 5).
- Lenses from six of the CLPC subjects were analysed prior to the event. There was no difference in the amount of HSA on these lenses compared to the CLPC lenses.
- Lactoferrin amounts were not significantly different between the CLPC and non-CLPC groups (Figure 6).
- The amount of sIgA was not significantly different between the CLPC and non-CLPC groups (Figure 7).

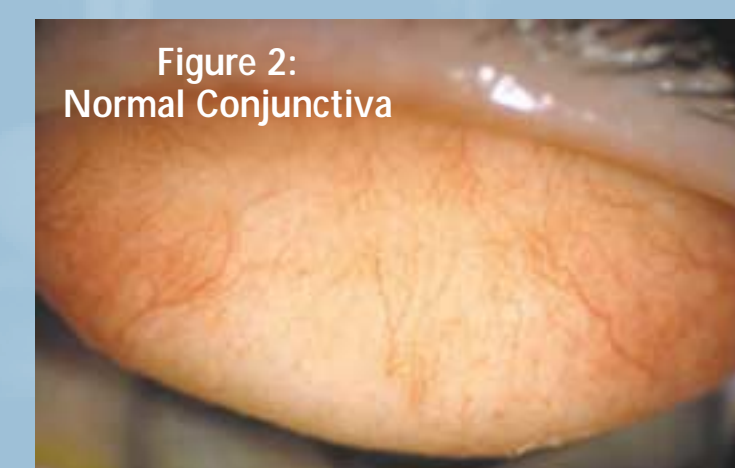


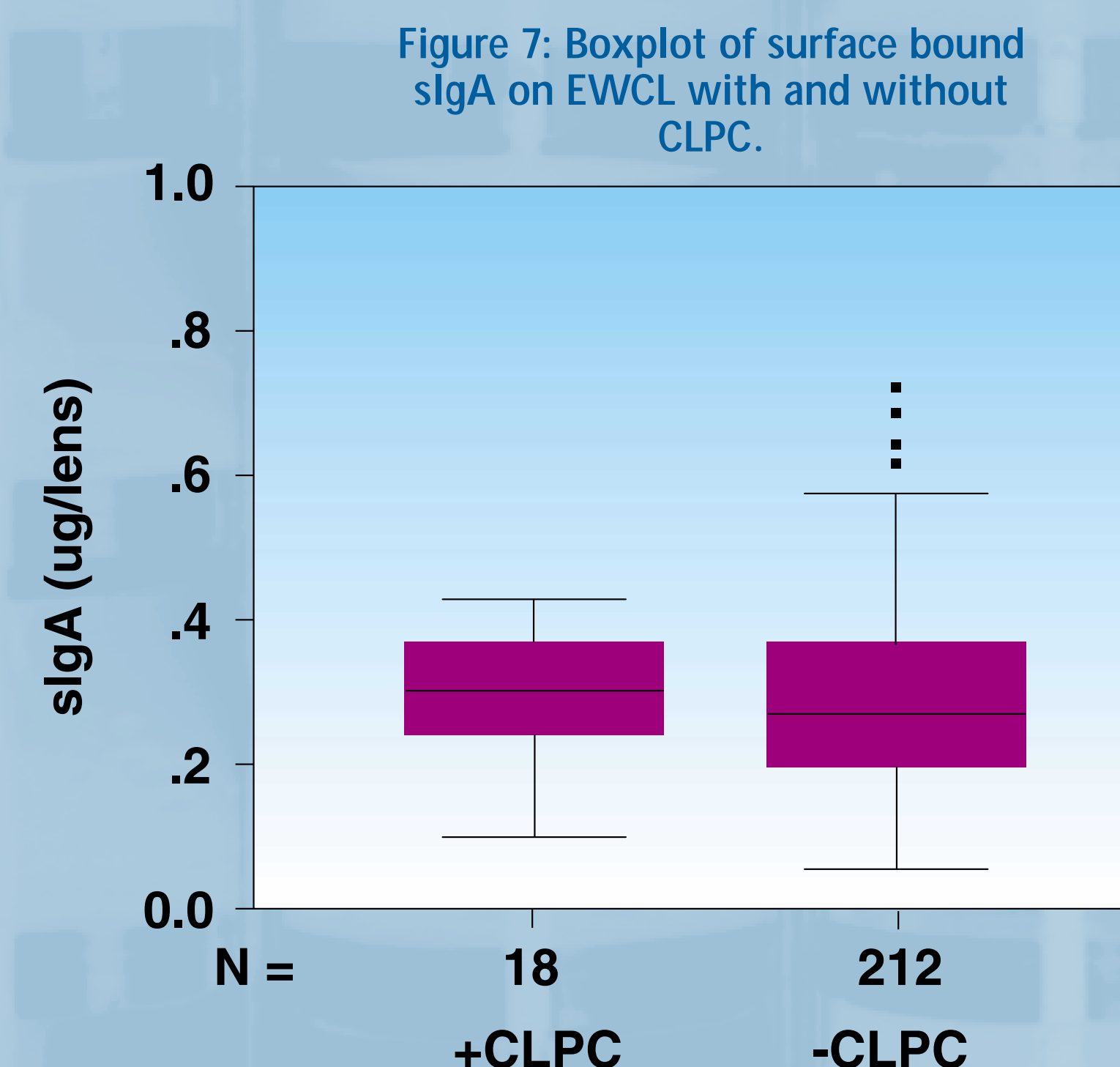
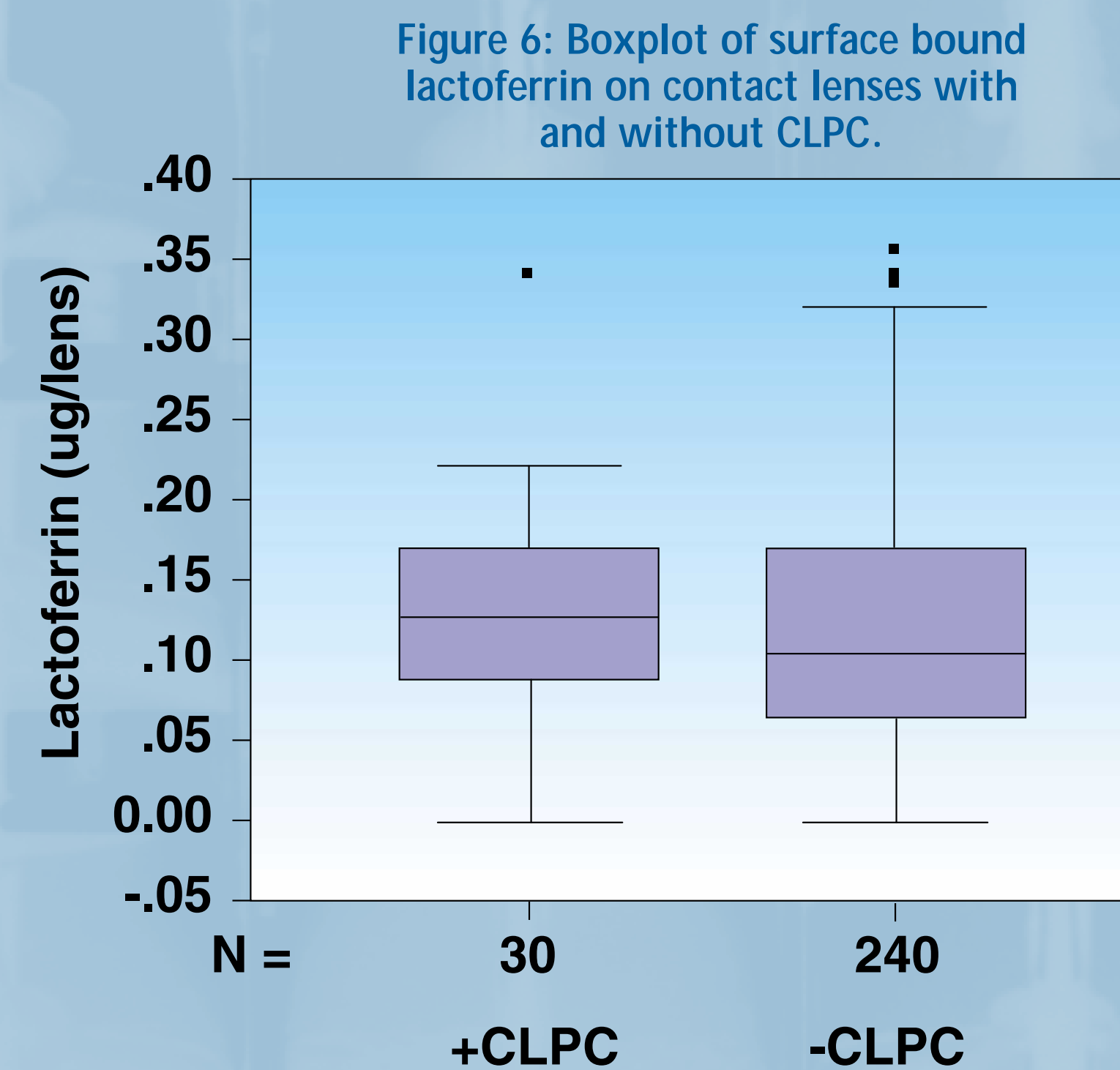
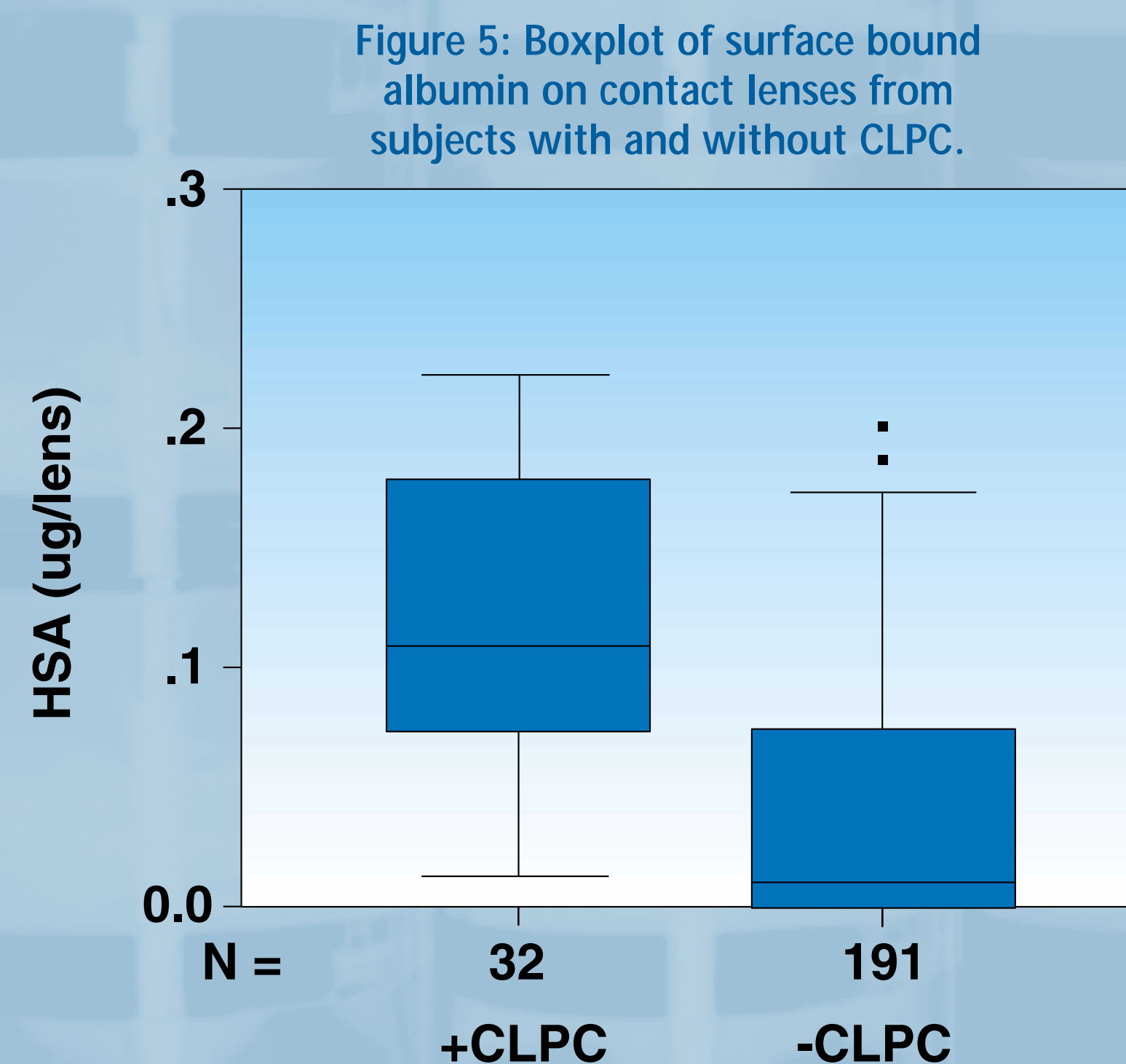
Figure 2: Normal Conjunctiva



Figure 3: Moderate CLPC



Figure 4: Severe CLPC



Discussion

- Significant albumin deposits on contact lenses may be the end product of an inflammatory response cascade. Increased conjunctival permeability during CLPC has been suggested.^{3,4,5,6} Deposits⁶ and tear albumin levels⁴ have also been shown to increase during CLPC.
- The lack of difference in albumin deposits found before and during CLPC may indicate that those subjects who continue in contact lens wear and develop CLPC have more albumin in their tears (although our sample size is at present too small to draw firm conclusions).
- Decreased lactoferrin levels in the tears of subjects with CLPC has been reported.⁵ In support of our findings, there is a report of lactoferrin deposits with and without CLPC which showed no difference.⁶
- There was no significant difference in sIgA levels between the groups. This is in agreement with a report of no difference in tear IgA levels during CLPC.⁷ There have been reports of increases in IgM, IgE and IgG in tears from CLPC subjects.^{4,7}

Conclusions

- Extended wear contact lenses from subjects with CLPC have significantly more albumin on their surface.
- Deposits of sIgA and lactoferrin do not appear to be increased during CLPC.

Future Studies

- Prospective studies to determine if increased albumin of the surface of contact lenses precedes clinical signs of CLPC.
- To determine if other protein profiles on the lenses or in the tears of subjects with CLPC are altered.

References

- Larzarou ZK. Clin Eye Vis Care, 1999; 11:33-35
- Allansmith MR, et al. Am J Ophthalmol, 1977; 83:697-708.
- Irkec MT, et al. Ocular Immunol Inflamm, 1998; 7:35-38.
- Barishak Y, et al. Curr Eye Res, 1984; 3:1161-1168.
- Ballow M, et al. Invest Ophthalmol Vis Sci, 1987; 28:543-545.
- Richard NR, et al. CLAO, 1992; 18:143-147.
- Donshik PC, Ballow M. Am J Ophthalmol, 1983; 96:460-466.

Acknowledgements

This work was sponsored by the Australian Federal Government through the Cooperative Research Centres programme. The authors would also like to thank i-media @ CRCERT for their assistance.