

Assessment of Cytokine Levels in the Tears of Contact Lens Wearers and Non-Contact Lens Wearers



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Purpose

- Contact lens (CL) wear may be associated with ocular surface inflammation,¹ which may contribute to dry eye symptoms.
- To date, assessment of cytokine levels in the tears of CL and non-contact lens (NCL) wearers has been limited.
- The aim of this study was to determine and compare the concentration of cytokines in the tears of CL wearers and NCL wearers.

Methods

- N=18 soft CL wearers and N=31 NCL wearers enrolled.
- Reflex tears collected from the inferior meniscus using glass microcapillary tubes.
 - Stimulating tears has limited effect on cytokine concentrations²
 - Collection conducted in the morning to avoid diurnal fluctuations³
- Subjects with ocular or systemic disease and/or using topical or systemic medications excluded.
- Cytokines measured by flow cytometry using a Cytometric Bead Array (Becton Dickinson)
 - Human inflammation panel: IL-12p70, TNF- α , IL-10, IL-6, IL-1 β and IL-8
 - Duplicate testing of each sample (20 μ l per test)
- Statistical analysis: Mann-Whitney U test to compare CL and NCL groups. $p < 0.05$ considered to be statistically significant.

Results

- Subject demographics are presented in Table 1.
- IL-12p70, IL-6, and IL-8 present in both CL & NCL tears samples but did not vary significantly between the two groups ($p > 0.05$, Table 2 & Figure 1).
- TNF- α was significantly higher in CL tears compared to NCL tears ($p = 0.04$, Table 2 & Figure 1).
- IL-10 and IL-1 β were below the detection limit in both groups of subjects (Table 2 & Figure 1).

Table 1: Subjects under study.

	CL	NCL	p-value
N	18	31	
Age (years)	30 \pm 9	34 \pm 11	0.22
Gender	11F:7M	16F:15M	0.52
Wearing experience (years)	8.5 \pm 5.4		
Wearing modality:			
Daily wear	14		
Extended wear	2		
Continuous wear	2		
Wearing time at visit (hours)	3.5 \pm 2.4		

Table 2: Concentration of cytokines (median, interquartile range (IQR)) measured in the tears of contact lens (CL) and non-contact lens (NCL) wearers. TNF- α was significantly higher in CL tears compared to NCL tears.

Cytokine	Detection limit (pg/ml)	Concentration (pg/ml)		p-value
		CL	NCL	
IL-12p70	1.9	median 10.9 IQR 1.7 - 14.6	median 6.2 IQR 0 - 12.3	0.27
TNF- α	3.7	median 4.2 IQR 2.5 - 7.0	median 2.4 IQR 0 - 4.8	0.04
IL-10	3.3	median 3.3 IQR 1.1 - 5.5	median 2.6 IQR 0 - 5.7	0.56
IL-6	2.5	median 11.5 IQR 8.2 - 22.4	median 12.8 IQR 8.0 - 17.6	0.78
IL-1 β	7.2	median 4.8 IQR 3.0 - 12.3	median 5.7 IQR 0 - 11.7	0.85
IL-8	3.6	median 335.5 IQR 211.8 - 559.6	median 427.0 IQR 245.3 - 656.0	0.55

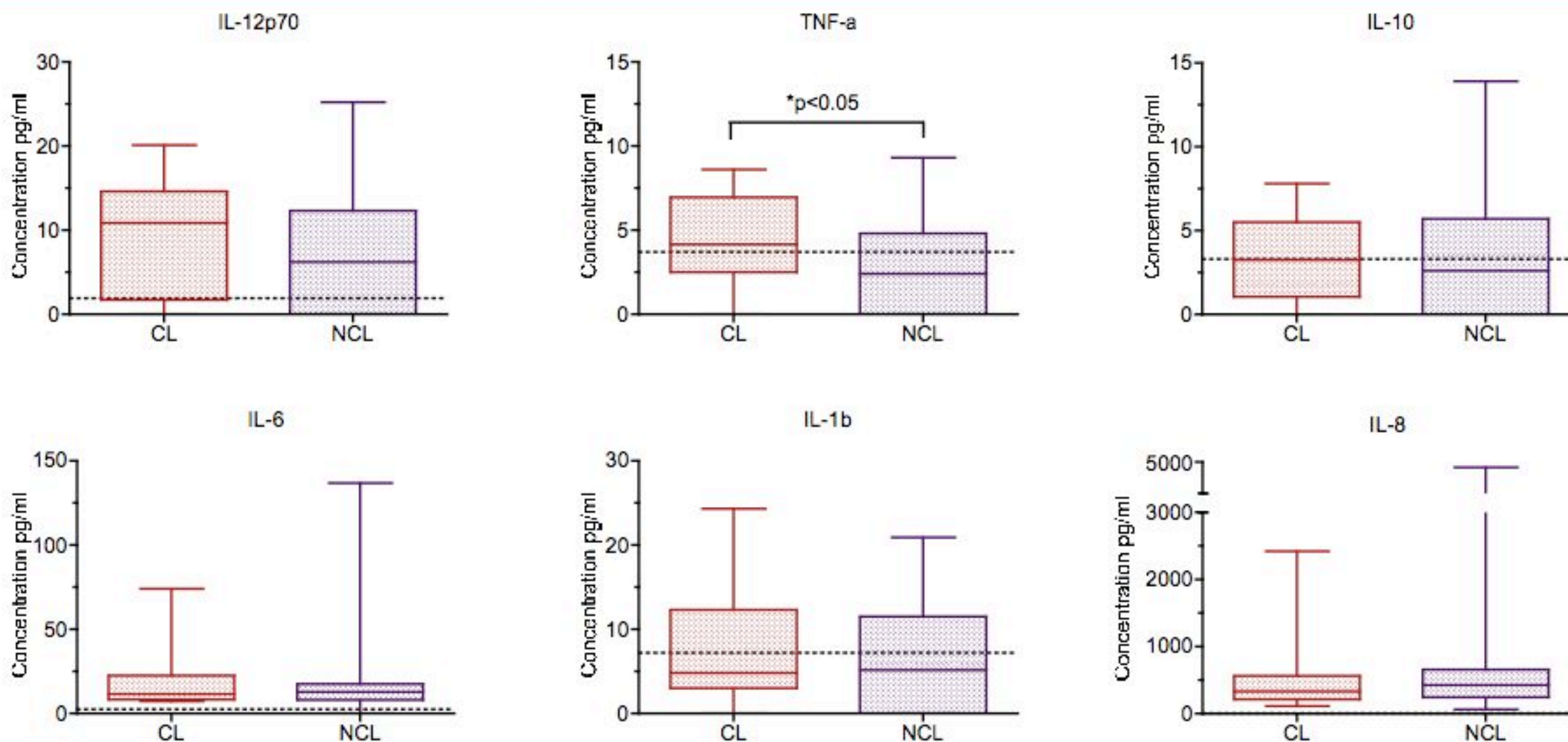


Figure 1: Box plots of the concentrations of cytokines measured in the tears of contact lens (CL) and non-contact (NCL) wearers.

The boxes extend from the 25th to the 75th percentile, and contain a line at the median. The whiskers indicate the minimum and maximum data values. The dotted line on each plot represents the detection limit of the assay.

Conclusions

- A number of cytokines can be reliably detected in the tears of CL and NCL wearers using a Cytometric Bead Array.
- Soft CL wear may stimulate TNF- α production, a cytokine involved in acute and chronic inflammatory responses.
 - Response to contact lens material, care systems, bacterial contaminants?
 - TNF- α and IL-6 have been shown to be elevated in tears of patients with dry eye.⁴
 - Bacterial lipopolysaccharide (LPS) induces the release of pro-inflammatory cytokines such as IL-1, IL-6 and TNF- α .⁵
- Further investigation of the effect of CL type, wearing modality, care system and correlation of cytokine levels with clinical signs and symptoms, will be beneficial for understanding ocular responses to CL wear.

References

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Acknowledgements & Address for Correspondence

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