

## Purpose

- Despite the fact that the tear film is more stable than saliva,<sup>1</sup> the potential for the tear film to be used as a source of diagnostic information has received limited attention.<sup>2-4</sup>
- This study aimed to assess the concentration of cytokines in the tear film and saliva and to determine whether a correlation between the cytokine levels in the two physiological fluids exists.

## Methods

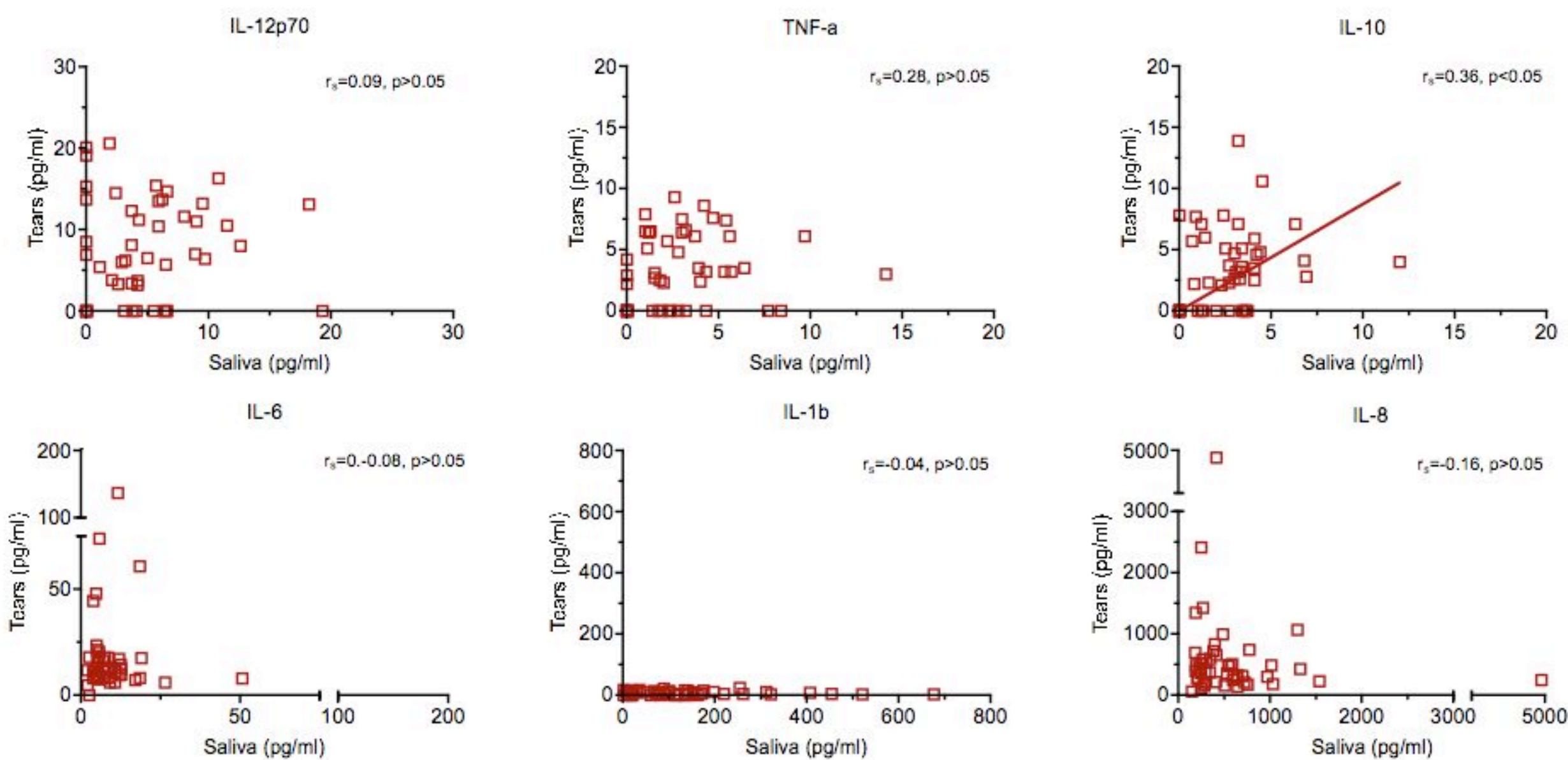
- Reflex tears and saliva collected from N=48 subjects within a 1 hour period in the morning.
  - Tears collected from the inferior meniscus using glass microcapillary tubes.
  - Saliva collected by drooling into a plastic tube.
- Subjects with ocular or systemic disease and/or using topical or systemic medications excluded.
- Cytokines measured by flow cytometry using a Cytometric Bead Array (Becton Dickinson)
  - Human inflammation panel: IL-12p70, TNF- $\alpha$ , IL-10, IL-6, IL-1 $\beta$  and IL-8
  - Duplicate testing of each sample
- Statistical analysis: Wilcoxon Matched Pairs Signed Rank test to compare tear and saliva measures. Spearman's rank correlation coefficient ( $r_s$ ) between fluids calculated.  $p < 0.05$  considered to be statistically significant.

## Results

- Tears and saliva were collected from N=26 females and N=22 males of average age  $30 \pm 9$  years.
- IL-12p70, IL-6 and IL-8 were present in both the tears and saliva (Table 1).
  - IL-12p70 and IL-6 were significantly higher in tears compared to saliva ( $p < 0.05$ , Table 1).
  - IL-8 levels did not vary significantly between the two fluids ( $p > 0.05$ , Table 1)
- IL-1 $\beta$  was below the detection limit in tears but was significantly higher in saliva ( $p < 0.05$ , Table 1).
- TNF- $\alpha$  and IL-10 were below the detection limit in both tears and saliva (Table 1).
- When cytokines were detected in the tears, the levels did not correlate significantly with the concentrations observed in the saliva ( $p > 0.05$ , Figure 1).

**Table 1: Concentration of cytokines (median, interquartile range (IQR)) measured in the saliva and tears.**

Cytokine	Detection limit (pg/ml)	Concentration (pg/ml)		p-value
		Saliva	Tears	
IL-12p70	1.9	median	4.2	0.02
		IQR	1.5 - 6.6	
TNF- $\alpha$	3.7	median	2.4	0.33
		IQR	1.1 - 4.3	
IL-10	3.3	median	2.7	0.43
		IQR	1.0 - 3.6	
IL-6	2.5	median	6.8	<0.001
		IQR	5.0 - 6.8	
IL-1 $\beta$	7.2	median	107.3	<0.0001
		IQR	43.2 - 170.2	
IL-8	3.6	median	411.9	0.46
		IQR	254.8 - 642.8	



**Figure 1: Spearman's rank correlations between saliva and tear cytokines.**

IL-10 was the only cytokine showing a significant correlation between the saliva and tears; however, median concentrations were below the detection limit in both fluids.

## Conclusions

- Whilst IL-12p70, IL-6 and IL-8 were reliably detected in the tears, their concentrations were not correlated with levels observed in the saliva or serum (data not shown as all cytokines were below the detection limit in serum).
- Differences in cytokine levels between the tears and saliva suggest that the tears can be used as a source of diagnostic information; however, are more likely to provide localized rather than systemic information regarding inflammation.

## References

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