DEWS	**DRY EYE: DIAGNOSTIC TEST TEMPLATE**	
RAPPORTEUR	Mark Willcox	Date: 25 Oct 2004 10th Jan 2006
Reviewers	David Sullivan	14 July 2006
TEST	**Tear protein (especially lactoferrin) analysis**	
TO DIAGNOSE	Test used to diagnose – e.g. aqueous tear deficiency (ATD).	REFERENCES
VERSION of TEST	[V 1]	Ohashi et al., 2003
DESCRIPTION	Tears are collected into microcapillary tubes and the concentration of lactoferrin (or other proteins) analysed by enzyme-linked immunosorbent assay.	
CONDUCT of TEST	1. The subjects head is tilted to one side and a microcapillary tube (total volume of liquid that can be held <50ul) gently rested on the lower lid. 2. Tears are drawn into the tube by capillary action from the lower tear prism at the outer corner of the eye. 3. The time taken for tears to reach a specified point (3 - 5 µl) is recorded as flow rate (µl/min). 4. Care should be taken to avoid stimulation of tears during this collection, and therefore it may be necessary for the subject to gain experience in the technique. 5. After collection, tears are usually centrifuged at 1,000 g for 5 min to remove debris, then aliquoted into smaller volumes and can be stored at –80°C until needed 6. Tears and lactoferrin standards are then processed by ELISA according to the instructions of the manufacturer of the kit (e.g. Oxis International Inc. Portland OR. USA)	Glasson 2003
Web Video	Not available	
Materials:	• Glass Microcapillary tubes - total volume <50ul • Lactoferrin test kits from e.g. Oxis International Inc. Portland OR. USA. • Microtitre plate reader – to measure absorbance at specific wavelengths (dependent on kit used)	
Variations of technique	It is also possible to collect tears using sponges or Schirmer strips. It is also possible to design in-house ELISAs Lactoplate is a commercial technique	
Standardization	Time of day [X] Temperature [ ] Humidity [ ] Air speed [ ] Illumination [ ] Other:[Rate of tear collection]	
Diagnostic value	This version : [ ] Other version: [X]	Wang et al., 2005
Repeatability	Intra-observer agreement. [NA] Inter-observer agreement. [NA]	
Sensitivity	**(true positives)** [79.4% when using cut off value of 1.1mg/ml]	Wang et al., 2005
Specificity	**(100 – false positives)** [78.3% when using cut off value of 1.1mg/ml]	Wang et al., 2005
Other Stats	Significant decrease in lactoferrin concentration in Sjögren's,	Ohashi et al., 2003

	non-Sjőgren's and Stevens-Johnson syndrome Correlation of lactoferrin concentration with Schirmer test	
Test problems	Control of tearing is important – reflex tearing may influence results (although some proteins e.g. lactoferrin are regulated proteins which minimises this problem)	
Test solutions		
FORWARD LOOK	Tests that incorporate more than one measure of specific tear proteins may be more appropriate – e.g. lipocalin concentration together with lactoferrin concentration. Or a regulated versus constitutive (e.g. sIgA) protein test. The lactoferrin test is perhaps best used to discriminate between normals and severe dry-eye sufferers (e.g. Sjogrens etc).This test does not appear to be useful for mild dry-eye (as determined by contact lens wear intolerance) and normals	Glasson et al., 2003
Glossary		

References

Glasson MJ, Stapleton F, Keay L, Sweeney D, Willcox MDP. (2003). Differences in clinical parameters and tear film of tolerant and intolerant contact lens wearers. *Invest Ophthalmol Vis Sci* 44: 5116-5124.

Ohashi Y, Ishida R, Kojima T et al. (2003). Abnormal protein profiles in tears with dry eye syndrome. *Am J Ophthalmology* 136: 291-299.

Wang HF, Fukuda M, Shimomura Y. (2005). Diagnosis of dry eye. *Semin Ophthalmol* 20(2):53-62.