DEWS	**DRY EYE: DIAGNOSTIC TEST TEMPLATE**	
RAPPORTEUR	Mark B. Abelson and George W. Ousler III	5th Nov 2004
TEST	Tear Film Break-Up (TFBUT) also called: BUT (Break-up Time) and FBUT (Fluorescein Break-Up Time)	
TO DIAGNOSE	Tear Film Stability	
VERSION of TEST	Version I	
DESCRIPTION	The tear film break-up time is defined as the interval between the last complete blink and the first appearance of a dry spot, or disruption in the tear film.	Lemp 1970 Lemp 1995
CONDUCT of TEST	[V1] 1. Instill 1 to 5 micro-liters of non-preserved, 2% sodium fluorescein onto the bulbar conjunctiva without inducing reflex tearing by using a micro-pipette or D.E.T. strip; 2. The patient is instructed to blink naturally, without squeezing, several times to distribute the fluorescein 3. Within 10 - 30 seconds of the fluorescein instillation, the patient is asked to stare straight ahead without blinking, until told otherwise; 4. Set slit-lamp magnification at 10X, keep the background illumination intensity constant (cobalt blue light) and use a Wratten #12 yellow filter to enhance observation of the tear film over the entire cornea; 5. Use stopwatch to record time between last complete blink and first appearance of growing micelle; 6. Once TFBUT is observed, instruct patient to blink freely.	Abelson et. al 2002
CONDUCT of TEST	[V2] 2.5 µl 1.0% fluorescein	Vitale et al. 1994
Video	*A slit-lamp, on-line video camera may be used to capture TFBUT. Video capture with an on-screen timer allows for precise measurement of the time between the last complete blink and the appearance of the first, growing micelle. This also allows masking for clinical trials purposes	Welch et al. 2003
Web video	Awaited	
Materials:	• Non-preserved, 2% sodium fluorescein; • Micro-pipette; • Or D.E.T. strip. • Slit-lamp • Timer	
Variations of technique	Historically, the technique for evaluating TFBUT has lacked consistency. Large and varying amounts of sodium fluorescein (up to 50 µl) were used, times were determined by counting aloud and using less sophisticated instrument-ation. Such techniques yield varying results.	
Standardization	Time of day [√] Temperature [√] Humidity [√] Air speed [√] Illumination [√] • Patient instruction; • Slit-lamp magnification; • Barrier filter.	
Diagnostic value	This version (micro-quantities of fluorescein):	Lemp 1995 Abelson et al.

	TFBUT ≤ 5 seconds = dry eye; TFBUT > 5 seconds = normal. Other version (larger quantities of fluorescein): TFBUT ≤10 seconds = dry eye; TFBUT > 10 seconds = normal.	2002
Repeatability	Intra-observer agreement. [ ] Inter-observer agreement. [ ]	
Sensitivity	**(true positives)** [72.2] 184/255 patients cut off < 10 sec	Vitale et al. 1994 European Criteria See 'Combined' template
Specificity	**(100 – false positives)** [61.6] 69/112 controls	
Other Stats		
Test problems	Instillation of fluorescein must be done carefully so that reflex tearing is not induced. Alterations in tear volume may artificially lengthen TFBUT. Proper patient instruction is critical. If patients are not told to blink freely after TFBUT occurs, reflex tearing may occur and skew subsequent measurements. Large, uncontrolled volumes of fluorescein may also artificially lengthen TFBUT.	
Test solutions	Implement techniques listed in conduct of test section.	
FORWARD		
Glossary	TFBUT = Tear film break-up time: BUT = Break-Up Time) and FBUT = Fluorescein Break-Up Time.	

References

Abelson M, Ousler G, Nally L. Alternate reference values for tear film break-up time in normal and dry eye populations. Adv Exp Med Biol 2002;506 (Part B):1121-1125.

Lemp MA, Dohlman CH, Holly FJ. Corneal desiccation despite normal tear volume. *Ann Ophthalmol* 1970; 284: 258-261.

Lemp MA. Report of National Eye Institute/Industry Workshop on clinical trials in dry eyes. *CLAO J* 1995;21:221-232.

Marquardt R, Stodtmeiser R, Christ T. Modification of tear film break-up time test for increased reliability, in Holly FJ, ed. *The Preocular Tear Film in Health, Disease and Contact Lens Wear.* Lubbock, Texas: Dry Eye Institute, 1986:57-63.

Vitali C, Moutsopoulos HM, et al. The European Community Study Group on diagnostic criteria for Sjogren's syndrome. Sensitivity and specificity of tests for ocular and oral involvement in Sjogren's syndrome. *Ann Rheum Dis* 1994: **53**(10): 637-47.

Welch D, Ousler G, An approach to a more standardized method of evaluating tear film break-up time. IOVS 2003; 2485/B324.