

<b>DEWS</b>	<b>DRY EYE: DIAGNOSTIC TEST TEMPLATE</b>	
<b>RAPPORTEUR</b>	Norihiko Yokoi	30 <sup>th</sup> Oct 2004
<b>TEST</b>	<b>Reflective Meniscometry</b>	
<b>TO DIAGNOSE</b>	Dry eye, using an index of tear volume.	Bron 1997; Yokoi et al 1999; Oguz et al. 2000; Yokoi et al. 2000
<b>VERSION of TEST</b>	[V1 ]	
<b>DESCRIPTION</b>	This test measures the radius of curvature of the lower central tear meniscus, which reflects total tear volume at the ocular surface	Bron 1997; Yokoi 1999; Oguz 2000; Yokoi 2000; Ishibashi 2003; Yokoi 2004a, b
<b>CONDUCT of TEST</b>	An illuminated horizontal striped target, with known line width, is projected onto the meniscus and the reflected specular image is magnified via a lens system. It is recorded with a slit-lamp camera (photographic system) or a video (video system). Using the concave mirror formula [ $R=2W(i/t$ ; $W$ =working distance (known value), $i$ =image size (calculated from the width of a pair of stripes (one white and one black) in a printed image, $t$ =target size (known value)], the radius of the tear meniscus at the central lower lid margin is calculated manually, (with a microscope and photographs) or digitally (using image analysis software).	Yokoi et al. 1999; Oguz et al. 2000; Yokoi et al. 2000
<b>Web Video</b>	Not available	
<b>Materials:</b>	<ul style="list-style-type: none"> <li>• Illumination system with horizontal striped target</li> <li>• Lens system for magnification</li> <li>• Receiving system (camera or videocamera)</li> <li>• Rule with microscope or computer and image analysis software</li> </ul>	Yokoi et al. 1999; Oguz et al. 2000; Yokoi et al. 2000
<b>Variations of technique</b>	Radius, cross sectional area, width and height of the tear meniscus can be measured on a captured cross-sectional photograph of the inferior tear meniscus using image analysis software in the computer. Fluorescein must be instilled to delineate the tear film.	Mainstone et al. 1996
<b>Standardization</b>	Time of day [ ] Temperature [ ] Humidity [ ] Air speed [ ] Illumination [ x ] Other:[desirable to perform the test in conditions which do not induce reflex tearing]	
<b>Diagnostic value</b>	<p><b>This version:</b> [1]  <b>Photographic system::</b>  [normal subjects, n=45] <math>R=0.365 \pm 0.153</math> (SD) mm, Yokoi et al 1999</p> <p><b>Video-meniscometer:</b>  Significant difference between normal subjects and dry eyes.  Dry eye patients, n=29: <math>R=0.22 \pm 0.09</math> (SD)mm; Oguz et al 2000;  Dry eye patients, n=32; <math>R=0.250 \pm 0.086</math>(SD)mm, Normal subjects, n=29; <math>R=0.365 \pm 0.153</math> (SD)mm; Yokoi et al 2000</p> <p>Right or left eye of normal subjects, n=14; <math>R=0.30 \pm 0.06</math> (SD)mm; <math>0.33 \pm 0.08</math> (SD), Ishibashi et al. 20003  Dry eye patients, n=38; <math>R=0.17 \pm 0.05</math> (SD)mm,  Normal subjects, n=36; <math>R=0.30 \pm 0.1</math> (SD)mm; Yokoi 2004<sup>a</sup></p> <p>Other version : [2]: Dry eye subjects (n=15):</p>	<p>Yokoi et al 1999</p> <p>Oguz et al 2000,3</p> <p>Yokoi et al 2000</p> <p>Ishibashi et al. 2003</p> <p>Yokoi 2004a.</p>

	R=0.314±0.160 (SD)mm, age matched normal controls (n=15): R=0.545±0.259 (SD)mm	Mainstone et al. 1996
<b>Repeatability</b>	Intra-observer agreement. [NA] Inter-observer agreement. [NA]	
<b>Sensitivity</b>	<b>(true positives)</b> [88.9%, cut-off value for the radius taken to be 0.25mm]	Yokoi 2004a.
<b>Specificity</b>	<b>(100–false positives)</b> [77.8%, cut-off value for the radius taken to be 0.25mm]	Yokoi 2004a.
<b>Other Stats</b>		
<b>Test problems</b>	In Conjunctivochalasis and lid abnormalities, such as entropion or ectropion, make the measurement difficult or impossible	
<b>Test solutions</b>		
<b>FORWARD LOOK</b>	A real-time automatated system is anticipated.	
<b>Glossary</b>		

## References

Bron AJ: The Doyne lecture. (1997). Reflections on the tears. *Eye* 11: 583-602.

Golding TR, Bruce AS, Mainstone JC (1997). Relationship between tear-meniscus parameter and tear-film breakup. *Cornea* 16: 649-661.

Ishibashi T, Yokoi N, Kinoshita S. (2003). Comparison of the effects of topical levobunolol and timolol solution on the human ocular surface. *Cornea* 22: 709-715.

Mainstone JC, Bruce AS, Golding TR. (1996). Tear meniscus measurement in the diagnosis of dry eye. *Curr Eye Res* 15: 653-661.

Oguz H, Yokoi N, Kinoshita S. (2000).The height and radius of the tear meniscus and methods for examining these parameters. *Cornea* 19: 497-500.

Yokoi N, Bron AJ, Tiffany JM, Brown NAP, Hsuan JD, Fowler CW. (1999). Reflective meniscometry: a non-invasive method to measure tear meniscus curvature. *Br J Ophthalmol* 83: 92-97.

Yokoi N, Bron AJ, Tiffany JM, Kinoshita S. (2000a). Reflective meniscometry: A new field of dry eye assessment. *Cornea*, 19: S37-S43.

Yokoi N, Komuro A: (2004a)Non-invasive methods of assessing the tear film. *Exp Eye Res* 78: 399-407.

Yokoi N, Bron AJ, Tiffany JM, Maruyama K, Komuro A, Kinoshita S. (2004b).Relationship between tear volume and tear meniscus curvature. *Arch Ophthalmol* 122: 1265-1269..