Application of OCT Tear Meniscus Imaging and New Strip Meniscometry to the Diagnosis of Dry Eye Disease
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Introduction
Testing for dry eye disease
Evaluations of Tear Meniscus (TM) is useful in the diagnosis of dry eye disease (DED), since TM contains 75% to 90% of the aqueous tear volume, which is positively correlated with the lacrimal secretory rate.1
Strip Meniscometry (SM)2 and Anterior Segment Optical Coherence Tomography (AS-OCT) are novel methods to evaluate TM in the diagnosis of DED.

Purpose
We investigate the applicability of TM imaging by AS-OCT and SM testing using a modified SM (SMTube®) in the diagnosis of DED. The efficacy of SMTube® is also assessed in comparison with the original SM.

Methods
Subjects

<table>
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<tr>
<th>Group</th>
<th>Gender</th>
<th>Age Range</th>
<th>Mean Age</th>
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</thead>
<tbody>
<tr>
<td>DM</td>
<td>Men</td>
<td>23</td>
<td>51</td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>18</td>
<td>22</td>
</tr>
<tr>
<td>Normal Controls</td>
<td>Men</td>
<td>25</td>
<td>51</td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>23</td>
<td>22</td>
</tr>
</tbody>
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Subjects with dry eye symptoms, presence of a vital staining score of >3 points, and decreased tear break up time or tear osmolarity were diagnosed as having definite dry eye disease according to the 2006 Japanese Dry Eye Research Society Diagnostic Criteria.4

Analysis

1. Subjects with dry eye symptoms, presence of a vital staining score of >3 points, and decreased tear break up time or tear osmolarity were diagnosed as having definite dry eye disease according to the 2006 Japanese Dry Eye Research Society Diagnostic Criteria.4

Ded parameters

1. Symptoms
   - Decreased lacrimal flow and reduced tearing (Corneal Osmolarity, blink rate, Schirmer test)
2. Lacrimal function
   - Cholinergic receptors
   - Tear Film Break up Time (TFBUT)
3. Anterior segment examination
   - Tear meniscus height

Comparison of apter properties of Original SM and modified SM (SMTube®)

SMTube® is a simple and noninvasive tool for measuring TM volume.

SMTube®

[Comparison of efficacy in original SM and SMTube®]

Results

[Comparison of DED parameters between the DE subjects and controls]

| Parameter        | Original SM | SMTube® | TMA | Correlation
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<tbody>
<tr>
<td>Ocular surface x</td>
<td>0.90</td>
<td>0.91</td>
<td>2.10</td>
<td>3.00</td>
</tr>
<tr>
<td>TMA</td>
<td>0.80</td>
<td>0.81</td>
<td>2.10</td>
<td>3.00</td>
</tr>
</tbody>
</table>

[Analysis of correlation among SMTube® and TMA and TMH]

ROC analysis for cut-off values, sensitivities and specificities of SMTube® and TMH and TMA

[Questionnaire of subjects’ sensation about SMTube® and Schirmer test]

Discussion

When we compared the SMTube® with the original SM, SMTube® has...
- better absorption properties
- higher values of diagnostic sensitivity & specificity
- greater patient tolerance

Correlations with other lacrimal function examinations

When we compared CASIA AS-OCT with Visante® AS-OCT1, TMA and TMH detected by CASIA AS-OCT has...
- good correlations with SMTube®, especially when combined together

Conclusion

AS-OCT measurement and SMTube® testing are useful in the evaluation of TM for the diagnosis of DED. SMTube® showed better efficacy than the original SM.

References:

Acknowledgement
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Commercial relationships
Megumi Shinzawa[E], Keiichi Miyasaki[E], Tetsuju Sekiryu[F]; Echo Electricity Co., Ltd., Tokyo, Japan (URL: www.echo-mf.jp)