

Utility of smartphone application in assessing Dry Eye Disease

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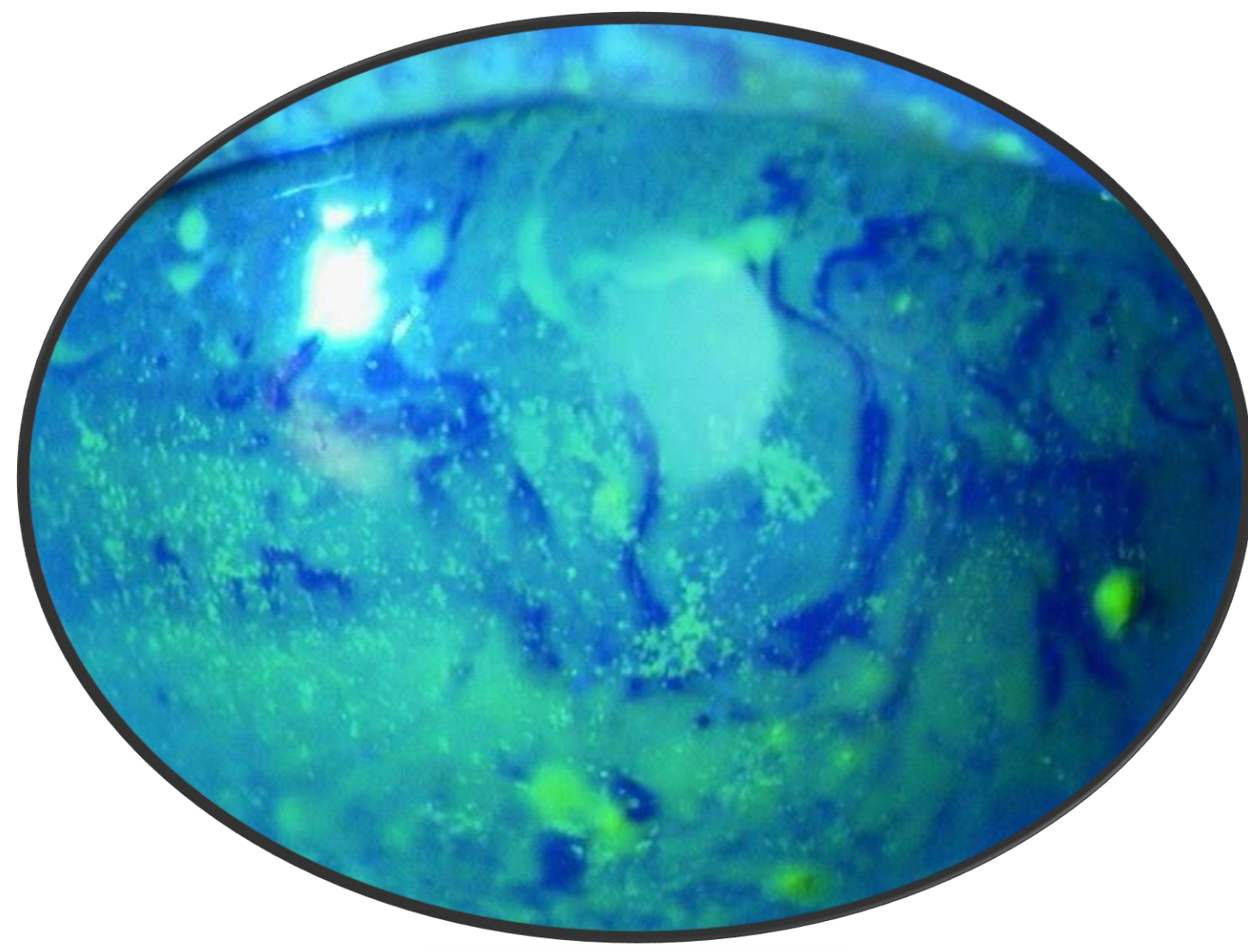
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Akira Murakami: [F] SEED Co., Ltd, Santen Pharmaceutical Co., Ltd. [P] 2012, No. 4855782 .

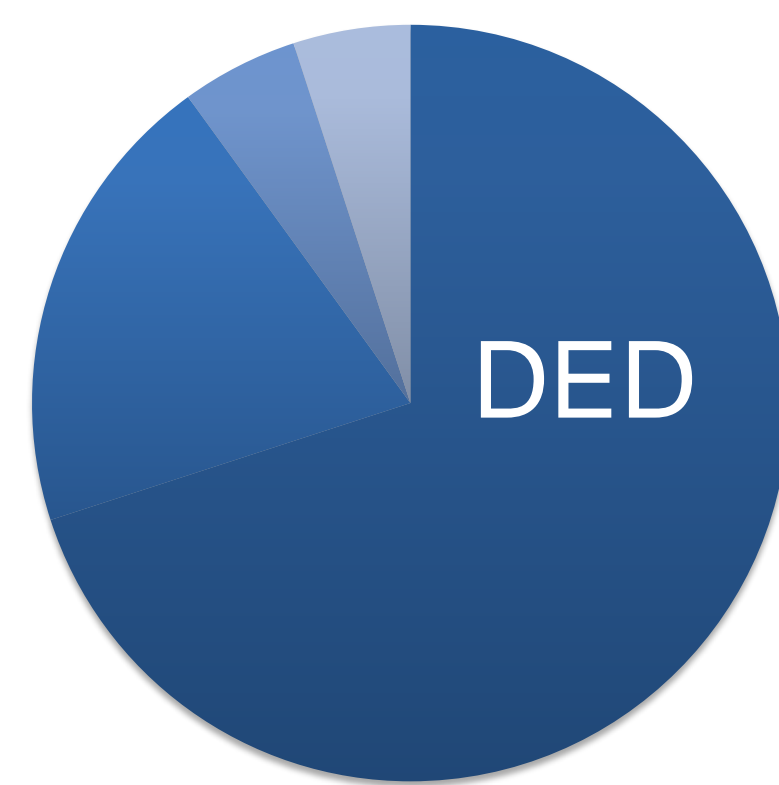
Why Dry Eye Disease?

Dry Eye Disease (DED)



Epidemiology

Most Common



Increasing



Multi Risk Factor Disease

Aging



VDT



Stress



Purpose

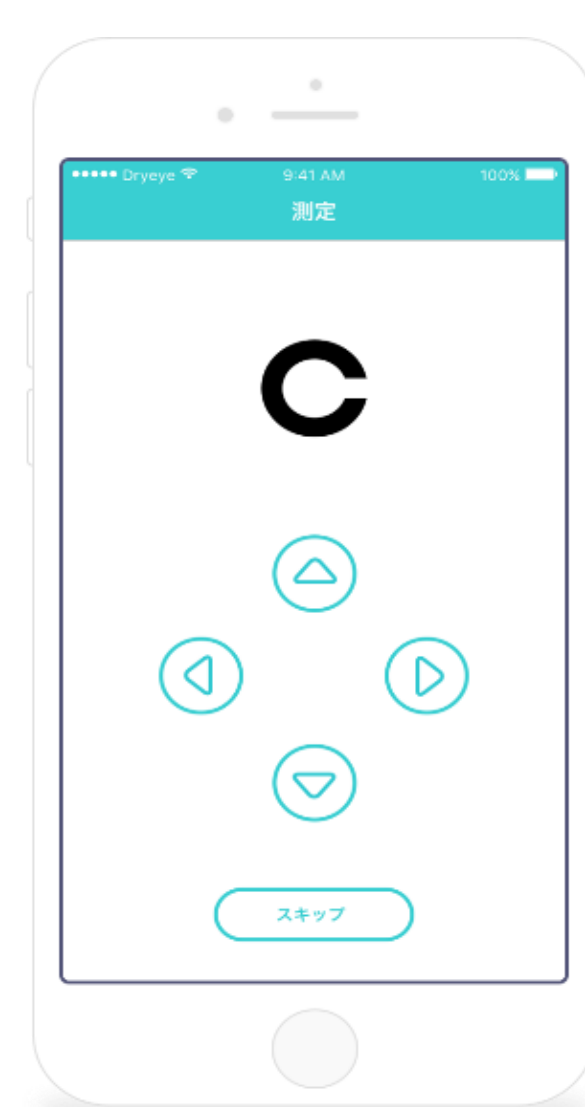


DryEyeRhythm

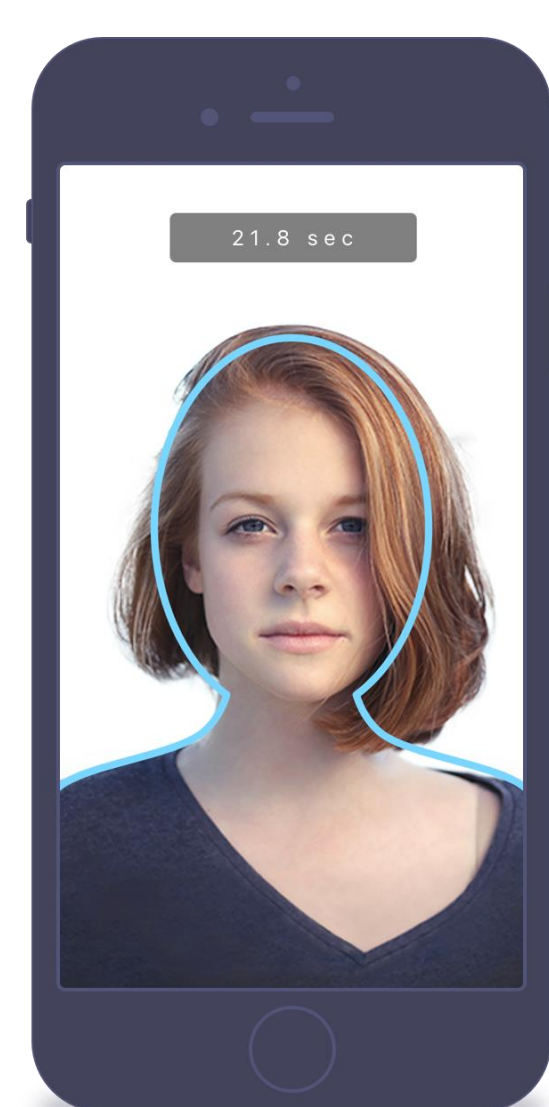
Here, we developed a new smartphone application “DryEyeRhythm” for assessing DED using ResearchKit, which equipped with Ocular Surface Disease Index (OSDI) questionnaire and blinking monitor. The purpose of this study was to develop a new app that can be used for assessment of DED and to compare its function to the clinical examination.

Material & Methods

OSDI



Blink Monitor



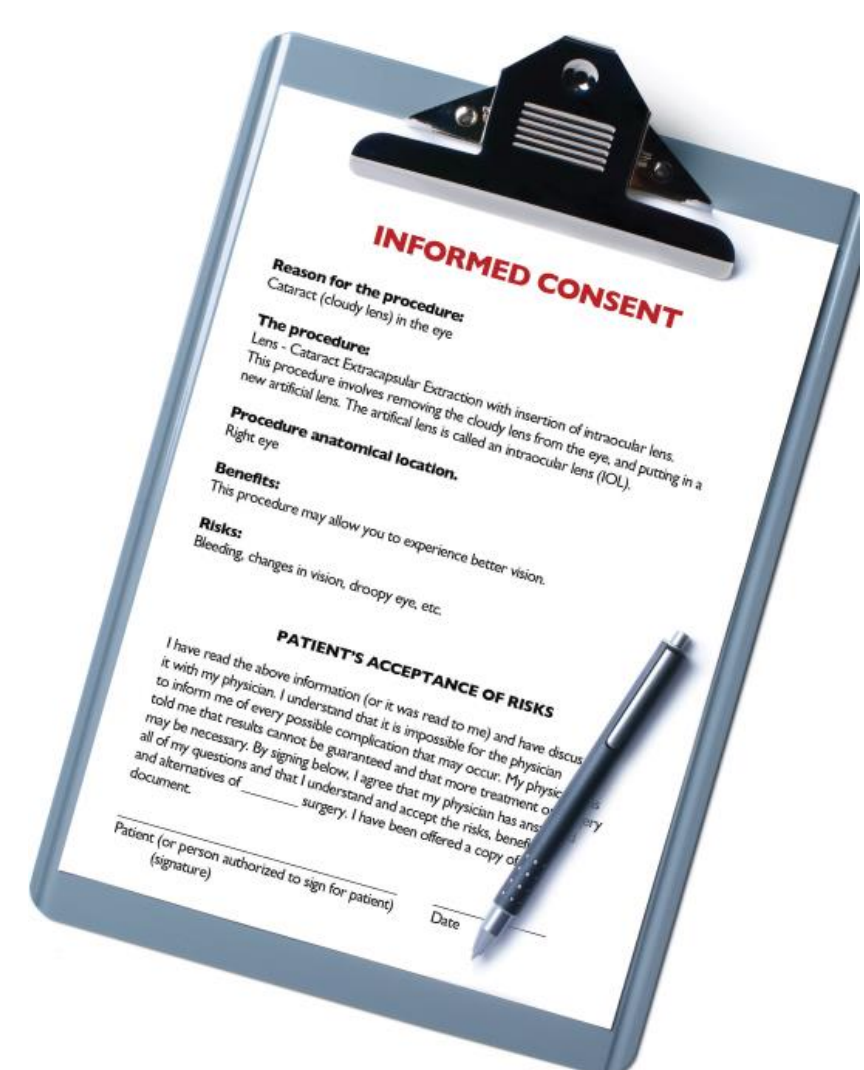
Questionnaire

OSDI (Ocular Surface Disease Index)					
Patient name	Date of birth		Patient ID		
Have you experienced any of the following during the last week?					
	All of the time	Most of the time	Some of the time	Not at all	
1. Eyes that are sensitive to light	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2. Eyes that burn, itch, or sting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3. Eyes that feel dry	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4. Periodic or constant tearing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5. Blurred vision	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
6. Poor vision	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Have you problems with your eyes/trouble you a performance any of the following during the last week?					
	All of the time	Most of the time	Some of the time	Not at all	
7. Redness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
8. Itching or burning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
9. Blurred vision or difficulty seeing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
10. Difficulty seeing at night	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
11. Difficulty seeing at day	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Have your eyes felt uncomfortable or itchy at any of the following situations during last week?					
	All of the time	Most of the time	Some of the time	Not at all	
12. Waking up	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
13. After meals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
14. After driving	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
15. After reading	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
16. After watching TV	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
17. After using a computer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
18. After using a smartphone	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
19. After using a tablet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
20. After using a laptop	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
21. After using a desktop computer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
22. After using a smartwatch	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Slit-lamp microscope



Consent



- OSDI
- Maximum Blinking Interval (MBI, in 30s)
- Blink Number in 30s

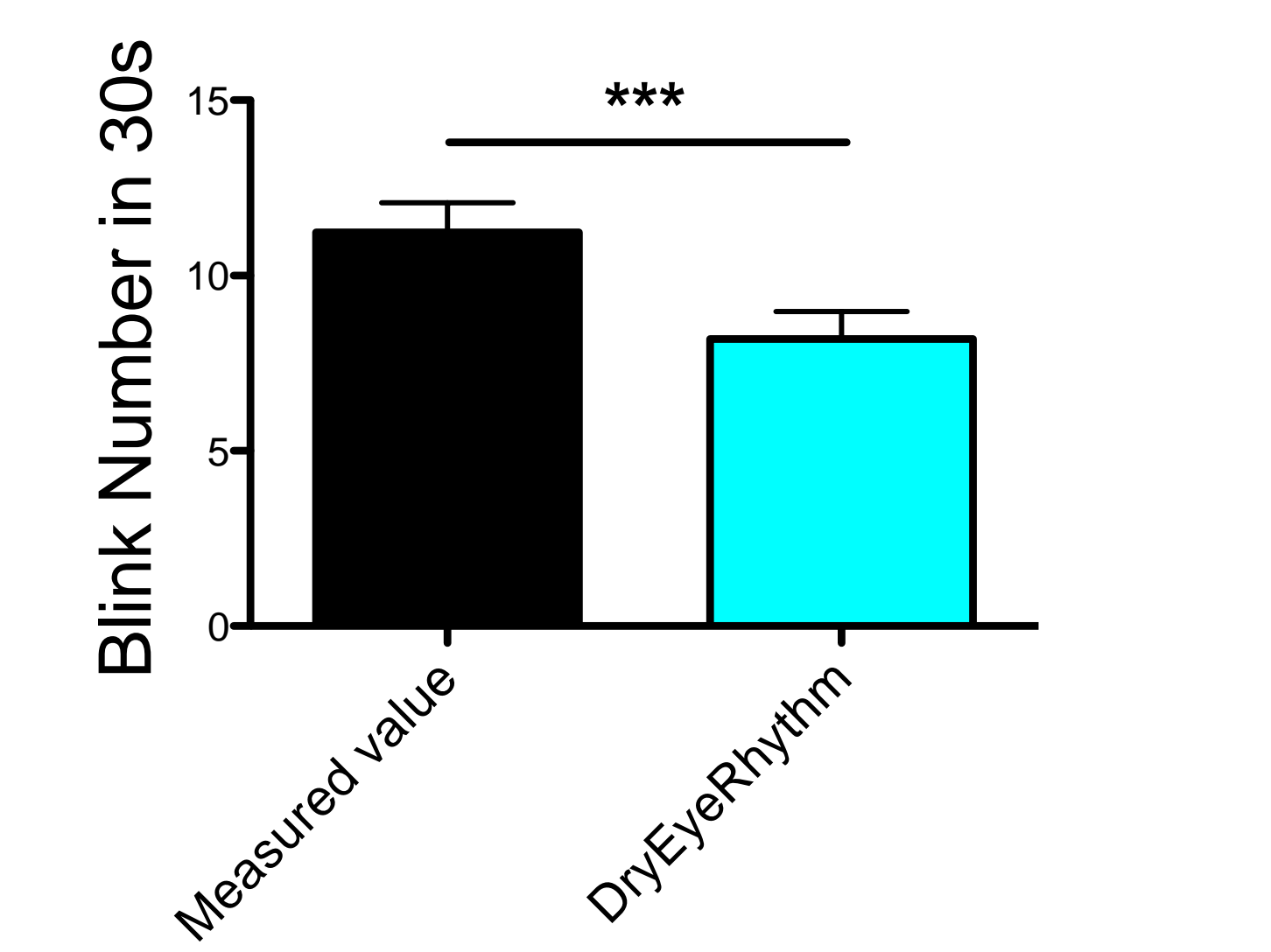
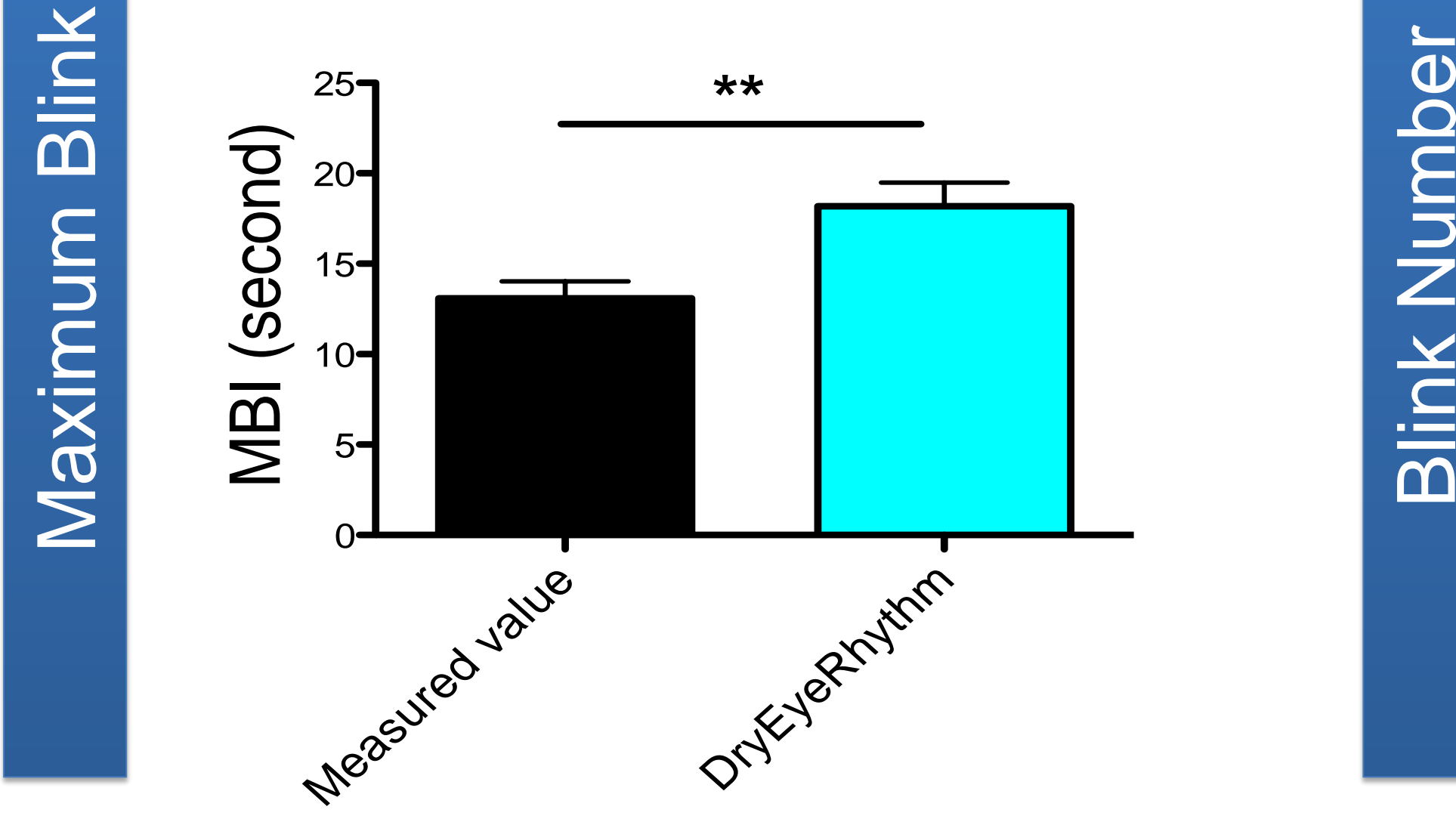
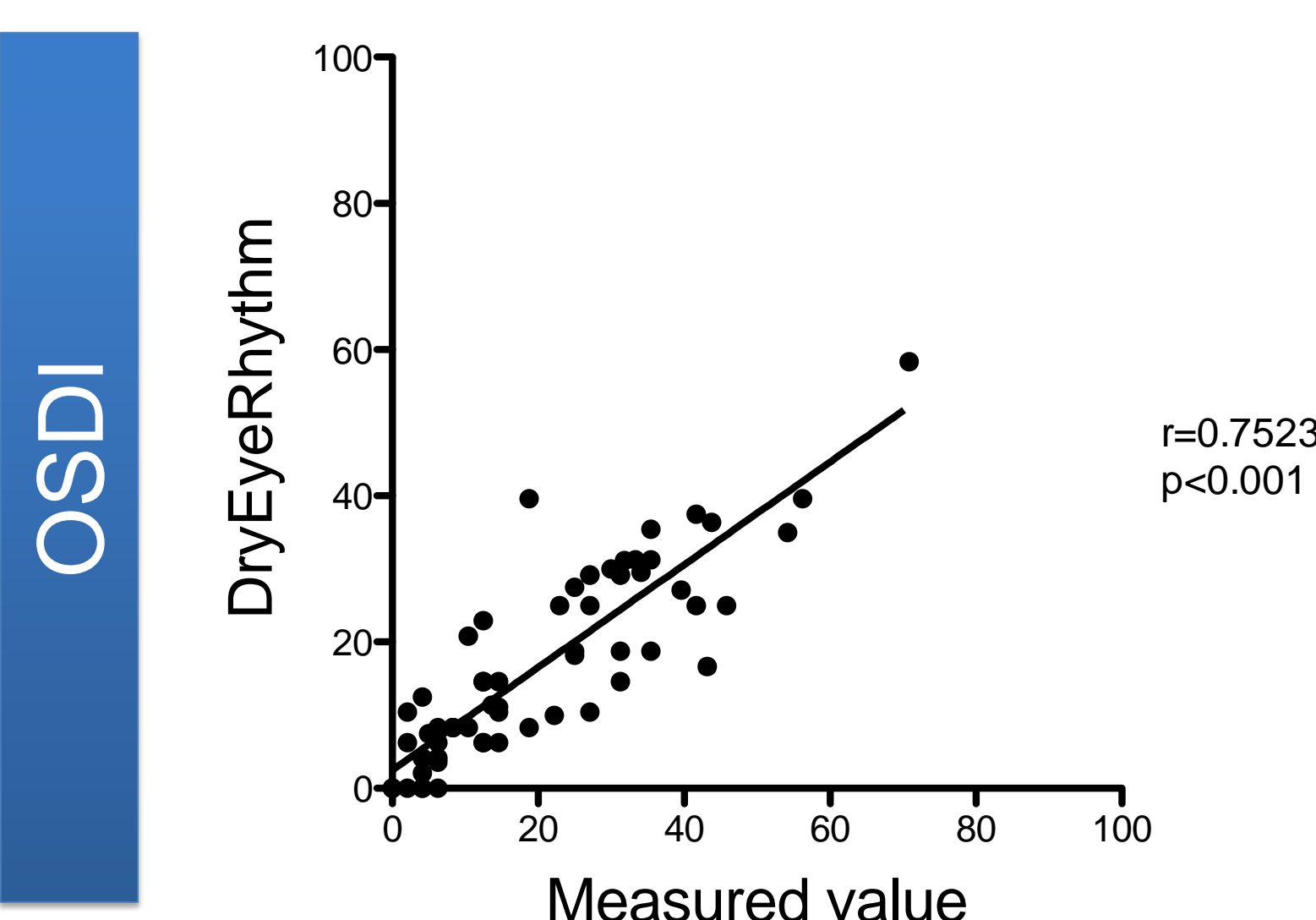
- OSDI
- MBI (in 30s)
- Blink Number in 30s
- Corneal fluorescein staining (CFS) score
- TBUT (Tear Break up time, s)
- Schirmer I (mm)

Results

Table1. Characteristics of Participants

Characteristic	non-DED N = 36	DED N = 12	DEDsuspect N = 17	Total N = 65
Age, mean (SD), y	36.3 (8.8)	34.9 (7.0)	30.1 (4.7)	34.4 (8.0)
Sex, No. (%)				
Male	28 (77.8)	10 (83.3)	6 (33.3)	43 (66.2)
Female	8 (22.2)	2 (16.7)	11 (64.7)	22 (33.8)
OSDI questionnaire, mean (SD)	13.9 (13.5)	33.0 (18.0)	24.4 (13.6)	20.2 (16.1)
Clinical dry eye tests				
Corneal fluorescein staining, mean (SD)	0.7 (0.8)	3.3 (1.4)	2.0 (1.6)	1.5 (1.6)
Tear film breakup time, mean (SD), s	6.7 (4.9)	2.4 (0.9)	3.1 (0.9)	5.0 (4.2)
Schirmer testing, mean (SD), mm	22.5 (11.6)	18.8 (11.3)	20.3 (10.4)	21.3 (11.2)

We diagnosed DED using the “Definition and Diagnosis of Dry Eye 2006” from the Japan Dry Eye Society.



Conclusion

A new smartphone application, “DryEyeRhythm”, is useful for assessing subjective symptoms and blinking for dry eye disease examination.