

macular edema AND population”に相当するものを用いた。結果として 3539 論文 (2010 年現在) が該当した。そこからまずタイトルと抄録から本研究の趣旨に該当しないものを除外した。我々は一般的な発表論文を元にした系統的レビューとメタ研究では年齢や性別、罹病期間などの詳細な危険因子別の有病率を得ることができないと考え、国際共同研究として、該当する研究から原資料を収集し、再度統計学的解析を行うデータ集積に基づくメタ研究を行った。該当する論文の中から条件として (1) 一般住民を対象として行われた疫学研究あるいは一定の地域に住む糖尿病患者を対象とした疫学研究、(2) 糖尿病の診断、糖尿病網膜症の有病率を公表している研究、(3) 眼底写真に基づく糖尿病網膜症の診断がなされている、(4) 原資料の提供に同意が得られた研究、についてデータを集積して解析を行った。

C. 結果

糖尿病網膜症の有病率に関して上記の条件を満たし、資料の集積が可能であった研究は 35 研究 (延べ人数 22,896 人、白人種 44.4%、アジア人種 30.9%、ヒスパニックとアフリカ系アメリカ人 8.9%) であった。2010 年現在の世界糖尿病人口推計を用いて標準化した成人糖尿病患者 (20-79 歳) における糖尿病網膜症の有病率は全体で 35.4% (95% 信頼区間 35.2-35.6%) であり、性別で見ると男性で 36.3% (95% 信頼区間 36.0-36.6%)、女性で 34.5% (95% 信頼区間 34.2-34.7%) であった。重症糖尿病網膜症の有病率は全体で 11.7% (95% 信頼区間 11.6-11.8%) であった。糖尿病網膜症の有病率は糖尿病罹病期間に従って高くなっていった。

D. 考察

糖尿病網膜症の有病率は、年齢や罹病期間、性別、糖尿病の型など様々な因子によって異なることが明らかとなった。このことから今後、医療経済学的検討を行うに当たっては例えば、年齢別、性別、罹病機関別、糖尿病の型別などいくつかの分類ごと

に分けて解析を行うことが必要と思われる。糖尿病網膜症の自然予後や医療介入の種類とその効果、合併症については現在文献の同定とレビューを行っており、それらをあわせることによって医療経済学的な評価を行うことを予定している。

E. 結論

糖尿病網膜症は糖尿病の増加を受けて今後も重要な疾患となることが予想される。本研究では詳細な疫学資料に基づく医療経済学的な評価をもって我が国でもっとも有用なスクリーニング法を明らかにすることを目的としている。本年度は糖尿病網膜症の有病率についてデータ統合型メタ研究の手法を用いて危険因子別の詳細な有病率の推定を行った。引き続き自然予後、医療介入、合併症について調査を継続する予定である。

F. 健康危険情報

なし

G. 研究発表

1. 論文発表

原著

- (1) Ono K, Hiratsuka Y, Murakami A: Geographical distribution of ophthalmologists before and after the new postgraduate training program in Japan, *Ophthalmic Epidemiol* 17: 125-130, 2010.
- (2) Tano T, Hiratsuka Y, Ono K, Murakami A. Influence of cataract surgery and blood pressure changes caused by sodium restriction on retinal vascular diameter. *Clinical Ophthalmology* 4: 1299-1309, 2010.
- (3) Ono K, Hiratsuka Y, Murakami A. Global Inequality in Eye Health *Am J .Public Health* 100: 1784-1788, 2010.

- (4) Sosangko MB, Wong TY, Nguyen TT, Kawasaki R, Jenkins A, Shaw J, Wang JJ. Serum apolipoprotein AI and B are stronger biomarkers of diabetic retinopathy than traditional lipids. *Diabetes Care* 2011; 34:474-479.
- (5) Che Azemin MZ, Kumar DK, Wong TY, Wang JJ, Kawasaki R, Mitchell P, Arjunan SP. Fusion of multiscale wavelet-based fractal analysis on retina image for stroke prediction. *Conf Proc IEEE Eng Med Biol Soc.* 2010;1:4308-4311.
- (6) Yau JWY, Kawasaki R, Islam FMA, Shaw J, Zimmet P, Wang JJ, Wong TY. Retinal Fractals is increased in Persons with Diabetes but not Impaired Glucose Metabolism: The Australian Diabetes Obesity and Lifestyle (AusDiab) Study. *Diabetologia* 2010;53:2042-5.
- (7) Cheung N, Mosley T, Islam FMA, Kawasaki R, Sharrett AR, Klein R, Coker LH, Knopman DS, Shibata DK, Catellier D, Wong TY. Retinal Microvascular Abnormalities and Subclinical MRI Brain Infarct: A Prospective Study. *Brain* 2010; 133:1987-1993.
- (8) Lavanya R, Kawasaki R, Tay WT, Cheung GCM, Mitchell P, Saw SM, Aung T, Wong TY. Hyperopic Refractive Error and Shorter Axial Length are associated with Age-Related Macular Degeneration: The Singapore Malay Eye Study. *Invest Ophthalmol Vis Sci* 2010;51:6247-52.
- (9) Dirani M, McAuley AK, Maple-Brown L, Kawasaki R, McIntosh RL, Lamoureux EL, Wong TY, Tatipata S, Dunbar T, O' Dea K, Cunningham J. The Association of Retinal Vessel Calibre with Diabetic Retinopathy in an Urban Australian Indigenous Population. *Clinical and Experimental Ophthalmology* 2010;38:577-582.
- (10) Kawasaki R, Cheung N, Mosley T, Islam FMA, Sharrett AR, Klein R, Coker LH, Knopman DS, Shibata DK, Catellier D, Wong TY. Retinal Microvascular signs and 10-Year Risk of Cerebral Atrophy: The ARIC Study. *Stroke* 2010;41:1826-1828.
- (11) Rogers S, McIntosh RL, Cheung N, Lim L, Wang JJ, Mitchell P, Kowalski JW, Nguyen H, Wong TY, International Eye Disease Consortium (includes Kawasaki R). The prevalence of retinal vein occlusion: Pooled data from population studies from the United States, Europe, Asia, and Australia. *Ophthalmology* 2010;117:313-319 e311
- (12) Kawasaki R, Yasuda M, Song SJ, Chen SJ, Jonas JB, Wang JJ, Mitchell P, Wong TY. The Prevalence of Age-related Macular Degeneration in Asians: A Systematic Review and Meta-Analysis. *Ophthalmology* 2010;117:921-927.
- (13) Lamoureux E, Shyong Tai E, Thumboo J, Kawasaki R, Saw SM, Mitchell P, Wong TY. Impact of Diabetic Retinopathy on Vision-Specific Function. *Ophthalmology* 2010;117:757-765.
- (14) Grauslund J, Green A, Kawasaki R, Hodgson L, Sjølie AK, Wong TY. Retinal vascular fractals and

diabetes-related micro and macro vascular complications in type 1 diabetes. *Ophthalmology* 2010;117:1400-1405.

- (15) Tanabe Y, Kawasaki R, Wang JJ, Wong TY, Mitchell P, Daimon M, Oizumi T, Kato T, Kawata S, Kayama T, Yamashita H. Retinal arteriolar narrowing predicts 5-year risk of hypertension in Japanese people: The Funagata Study. *Microcirculation* 2010;17:94-102.

2. 著書
なし

3. 学会発表

- (1) Kawasaki R. Diabetic retinopathy in Japan/Asia Asia-ARVO, Singapore January 2011, Singapore.

- (2) 川崎良. 糖尿病網膜症と大血管症. *Retina* 2010・第16回糖尿病眼学会総会シンポジウム. 大阪 2010年10月

- (3) Kawasaki R. Epidemiology of Retinal Vein Occlusions in Asia. Asia Pacific Academy of Ophthalmology Congress 2010, September 2010, Beijing, China

- (4) 川崎良. 眼科研究の報告. インストラクションコース「眼科数字力入門」. 神戸 2010年10月

- (5) Kawasaki R. The Asian Eye: How do the epidemiology and mechanism of eye disease differ between Asia and the West? Asia Pacific Academy of Ophthalmology Congress 2010, September 2010, Beijing, China

- (6) Kawasaki R, Wang JJ, Islam FMA, Rohtchina E, Aung Tin, Saw SM, Mitchell P, Wong TY. Are Asians with Age-related macular degeneration less likely to have

bilateral involvement than Caucasians? The Singapore Malay Eye Study and the Blue Mountains Eye Study. ARVO 2010 April, Fort Lauderdale, FL, USA.

- (7) Yanagi M, Kawasaki R, Mabelle-Brown L, Lamoureux EL, Harper A, Wong TY, Tatipata S, Dunbar T, O' Dea K, Cunningham J. Retinal Vascular Fractals and Diabetic Retinopathy: the DRUID Study. ARVO 2010 April, Fort Lauderdale, FL, USA.

- (8) Hodgson LAB, Sasongko MB, Kawasaki R, Wang JJ, Hsu W, Lee ML, Lau QP, Wong TY. Reproducibility of Semi-automated Retinal Vascular Geometric Measurements in Paired Stereoscopic images. ARVO 2010 April, Fort Lauderdale, FL, USA.

- (9) Okada M, Wong TY, Kawasaki R, Baharuddin N, Colville D, Buchanan R, Savage J. Retinal Venular Caliber is Increased in Patients with Autoimmune Rheumatic Diseases. ARVO 2010 April, Fort Lauderdale, FL, USA.

- (10) Koizumi H, Yamagishi T, Kawasaki R, Kinoshita S. Subfoveal Choroidal Thickness in Typical Age-related Macular Degeneration and Polypoidal Choroidal Vasculopathy. ARVO 2010 April, Fort Lauderdale, FL, USA.

- (11) Kawasaki R. Epidemiology of Retinal Diseases in Asia. Opening of SAILOR & 2nd Asia-Pacific Ocular Imaging Symposium in Singapore 2010, March 2010, Singapore.

- (12) 川崎良. 眼科手術における疫学必須知識. 第33回日本眼科手術学会総会. 東京 2010年1月
- (13) Kawasaki R. Major finding from the Funagata Study and novel retinal imaging techniques. Asahikawa Medical College Research Meeting, Asahikawa, Japan Jan 2010
- (14) 川崎良. 舟形町研究の成果・眼科疫学研究の展望. 関西眼疾患研究会. 京都 2010年1月

H. 知的財産権の出願・登録状況

1. 特許取得 なし
2. 実用新案登録 なし

Ⅲ. 研究成果の刊行に関する一覧表

研究成果の刊行に関する一覧表

書籍

著者氏名	論文タイトル名	書籍全体の編集者名	書籍名	出版社名	出版地	出版年	ページ
Hiratsuka Y.	Alcohol use and diseases of the eye.	Miller NS and Gold M S.	Addictive Disorders in Medical Populations.	Wiley-Blackwell	West Sussex	2010	P278-286

雑誌

発表者氏名	論文タイトル名	発表誌名	巻号	ページ	出版年
Robertson CB, Hiratsuka Y, Yamada M, Pezzullo ML, Yates K, Takano S, Miyake K, Taylor HR.	The economic cost of visual impairment in Japan.	Arch Ophthalmol	128	766-771	2010
Yamada M, Hiratsuka Y, Robertson CB, Pezzullo ML, Yates K, Takano S, Miyake K, Taylor HR.	Prevalence and causes of visual impairment in adult Japanese population: present status and future projection.	Ophthalmic Epidemiol.	17	50-57	2010
Hatou S, Yamada M, Akune Y, Mochizuki H, Shiraishi A, Joko T, Nishida T, Tsubota K.	Role of Insulin-Regulated Na ⁺ -K-Dependent ATPase Activity and Pump Function in Corneal Endothelial Cells.	Invest Ophthalmol Vis Sci.	51	935-3942	2010
Mizuno Y, Yamada M, Miyake Y, the Dry Eye Survey Group of National Hospital Organization in Japan.	Association between Clinical Diagnostic Tests and Health-Related Quality of Life Surveys in Patients with Dry Eye Syndrome.	Jpn J Ophthalmol	54	259-265	2010
Hatou S, Fukui M, Yatsui K, Mochizuki H, Akune Y, Yamada M.	Biochemical Analyses of Lipids Deposited on Silicone Hydrogel Lenses.	J Optom	3	164-168	2010
Mochizuki H, Fukui M, Hatou S, Yamada M, Tsubota K.	Evaluation of Ocular Surface Glycocalyx Using Lectin-Conjugated Fluorescein.	Clin Ophthalmol	4	925-930	2010

発表者氏名	論文タイトル名	発表誌名	巻号	ページ	出版年
Nickerson ML, Kostihina BN, Brandt W, Fredericks W, Xun KP, Yu FS, Gold B, Chodosh J, Goldberg M, Lu da W, Yamada M, Tervo TM, Grutzmacher R, Croasdale C, Hoeltzenbein M, Sutphin J, Malkowicz SB, Wessjohann L, Kruth HS, Dean M, Weiss JS.	UBIAD1 mutation alters a mitochondrial prenyltransferase to cause Schnyder corneal dystrophy.	PLoS One	5	e10760	2010
Shigeyasu C, Mizuno Y, Yokoi T, Nishina S, Azuma N, Yamada M.	Clinical features of anterior segment dysgenesis associated with congenital corneal opacities.	Cornea	in press		
Eye Care Comparative Effectiveness Research Team (ECCERT).	Cost-effectiveness of cataract surgery in Japan.	Jpn J Ophthalmol	in press		
Fujiike K, Mizuno Y, Hiratsuka Y, Yamada M, Study Group.	Quality of Life and Cost-Utility Assessment of Strabismus Surgery in Adults.	Jpn J Ophthalmol	in press		
谷井啓一、羽藤晋、横井匡、東範行、山田昌和。	角膜輪部デルモイドの屈折異常と弱視に関する検討。	あたらしい眼科	27	1149-1152	2010
鈴木由美、山田昌和、井之川宗右、浜由起子、富田香、平形明人。	陈旧性下直筋断裂に下直筋縫合が有効であった1例。	眼臨紀要	4	254-258	2011
窪野裕久、水野嘉信、重安千花、山田昌和	難治性とされたフリクテン性角結膜炎、カタル性角膜潰瘍の要因。	あたらしい眼科	27	809-813	2010
天野史郎、有田玲子、木下茂、横井則彦、外園千恵、小室青、鈴木智、島崎潤、田聖花、前田直之、高静花、堀裕一、西田幸二、久保田久世、後藤英樹、山口昌彦、小幡博人、山田昌和、村戸ドル、小川葉子、松本幸裕、坪田一男	マイボーム腺機能不全ワーキンググループ。マイボーム腺機能不全の定義と診断基準。	あたらしい眼科	27	627-631	2010

発表者氏名	論文タイトル名	発表誌名	巻号	ページ	出版年
藤池佳子, <u>山田昌和</u> .	高齢者のための斜視手術、QOLと効用分析による評価.	眼科手術	23	426-429	2010
重安千花, <u>山田昌和</u> .	経口抗癌剤による角膜上皮障害.	日本の眼科	81	877-878	2010
<u>山田昌和</u> .	眼科領域の Value-Based Medicine と効用分析.	眼科	52	1683-1688	2010
望月弘嗣, <u>山田昌和</u> .	フルオレセイン染色.	Frontiers in Dry Eye	5	94-99	2010
<u>山田昌和</u> .	弱視スクリーニングのエビデンス.	あたらしい眼科	27	1635-1639	2010
<u>山田昌和</u> .	臨床疫学研究の基本的事項.	あたらしい眼科	28	5-10	2011
<u>山田昌和</u> .	巻頭言：点眼液によるドライアイの治療.	日眼会誌	115	105-106	2011
Hayashino Y, <u>Fukuhara S</u> , Okamura T, Tanaka H, Ueshim, H.	High oolong tea consumption predicts future risk of diabetes among Japanese male workers: prospective cohort study.	Diabetic Medicine	In press		
Hasegawa T, Bragg-Gresham JL, Pisoni RL, Robinson BM, <u>Fukuhara S</u> , Akiba T, Saito A, Kurokawa K, Akizawa T.	Changes in anemia management and hemoglobin levels following revision of a bundling policy to incorporate recombinant human erythropoietin.	Kidney International	79	340-6	2011
Higashi T, Nakayama T, <u>Fukuhara S</u> .	Opinion of Japanese Rheumatology Physicians on Methods of Assessing the Quality of Rheumatoid Arthritis Care	The Journal of Evaluation in Clinical Practice	In press		
Untas A, Thumma J, Rascole N, Rayner H, Mapes D, Lopes AA, <u>Fukuhara S</u> , Akizawa T, Morgenstern H, Robinson BM, Pisoni RL, Combe C.	The Associations of Social Support and Other Psychosocial Factors with Mortality and Quality of Life in the Dialysis Outcomes and Practice Patterns Study.	Clinical Journal of the American Society of Nephrology	6	142-52	2011

発表者氏名	論文タイトル名	発表誌名	巻号	ページ	出版年
Furuya M, Hayashino Y, Tsujii S, Ishii H, <u>Fukuhara S.</u>	Comparative validity of the WHO-Five Well-being Index and two-question instrument for screening depressive symptoms in patients with type 2 diabetes.	Acta Diabetologica	in press		
Hayashino Y, <u>Fukuhara S.</u> , Akizawa T, Asano Y, Wakita T, Onishi Y, Kurokawa K.	Cost-effectiveness of administering oral adsorbent AST-120 to patients with diabetes and advance-stage chronic kidney disease.	Diabetes Research and Clinical Practice	90	154-9	2010
Yamamoto Y, Tanioka M, Hayashino Y, Mishina H, Kato M, <u>Fukuhara S.</u> , Utani A, and Miyachi Y.	Application of two-question screening instrument to detect depressive symptoms in patients with vitiligo: a pilot study.	Journal of the American Academy of Dermatology	in press		
Kawaguchi T, Tong L, Robinson B, Sen A, <u>Fukuhara S.</u> , Kurokawa K, Canaud B, Lameire N, Port F, Pisoni R.	C-Reactive Protein and Mortality in Hemodialysis Patients: The Dialysis Outcomes and Practice Patterns Study (DOPPS).	Nephron Clinical Practice	117	67-178	2010
Suzukamo Y, <u>Fukuhara S.</u> , Green J, Kosinski M, Gandek B, Ware JE.	Validation testing of a three-component model of SF-36 scores.	Journal of Clinical Epidemiology	64	301-8	2011
Hayashino Y, Yamazaki S, Nakayama T, Sokejima S, <u>Fukuhara S.</u>	The association between socioeconomic status and prevalence of diabetes mellitus in rural Japan.	Archives of Environmental and Occupational Health	65	224-9	2010
Kakudate N, Morita M, <u>Fukuhara S.</u> , Sugai M, Nagayama M, Kawanami M, Chiba I.	Application of self-efficacy theory in dental clinical practice	Oral Diseases	16	747-52	2010
Tsushima K, Sone S, Fujimoto K, Kubo K, Morita S, Takegami M, <u>Fukuhara S.</u>	Identification of occult parenchymal disease such as emphysema or airway disease using screening computed tomography.	COPD	7	117-25	2010

発表者氏名	論文タイトル名	発表誌名	巻号	ページ	出版年
Kakudate N , Morita M, Fukuhara S, Sugai M, Nagayama M, Isogai E, Kawanami M, Chiba I.	Development of the outcome expectancy scale for self-care among periodontal disease patients.	Journal of Evaluation in Clinical Practice	in press		
Sakai M, Nakayama T, Shimbo T, Ueshima K, Kobayashi N, Izumi T, Sato N, Yoshiyama M, Yamashina A, <u>Fukuhara S.</u>	Post-discharge depressive symptoms can predict quality of life in AMI survivors: A prospective cohort study in Japan.	International Journal of Cardiology	146	379-84	2011
Kakudate N, Morita M, Sugai M, Nagayama M, <u>Fukuhara S,</u> Kawanami M, Chiba I.	Comparison of Dental Practice Income and Expenses According to Treatment Types in the Japanese Insurance System.	Japanese Dental Science Review	46	4-10	2010
Shakudo M, Takegami M, Shibata A, Kuzumaki M, Higashi T, Hayashino Y, Suzuki Y, Morita S, Katsuki M, <u>Fukuhara S.</u>	Effect of Feedback in Promoting Adherence to an Exercise Programme: a randomized controlled trial.	Journal of Evaluation in Clinical Practice	17	7-11	2011
Mishina H, Hayashino Y, Takayama JI, Kasahara M, <u>Fukuhara S.</u>	Can pediatricians accurately identify maternal depression at well-child visits? Pediatrics International	Official Journal of the Japan Pediatric Society	52	284-9	2010
Yamamoto Y, Hayashino Y, Higashi T, Matsui M, Yamazaki S, Takegami M, Miyachi Y, <u>Fukuhara S.</u>	Keeping vulnerable elderly patients free from pressure ulcer is associated with high caregiver burden in informal caregivers.	Journal of Evaluation in Clinical Practice	16	585-9	2010
Hirakata H, Tsubakihara Y, Gejyo F, Nishi S, Iino Y, Watanabe Y, Suzuki M, Saito A, Akiba T, Inaguma D, <u>Fukuhara S,</u> Morita S, Hiroe M, Hada Y, Suzuki M, Akaishi M, Aonuma K, Akizawa T.	Maintaining high hemoglobin levels improved the left ventricular mass index and quality of life scores in pre-dialysis Japanese chronic kidney disease patients.	Clinical and experimental nephrology	14	28-35	2010
Hayashino Y, <u>Fukuhara S.</u>	Diabetes in Asia.	Lancet	375	981-2	2010
Higashi T, Nakayama T, <u>Fukuhara S,</u> Yamanaka H, Mimori T, Ryu J, Yonenobu K, Murata N, Matsuno H, Ishikawa H, Ochi T.	Opinions of Japanese Rheumatology Physicians Regarding Clinical Practice Guidelines.	International Journal for Quality in Healthcare.	22	78-85	2010

発表者氏名	論文タイトル名	発表誌名	巻号	ページ	出版年
Kakudate N, Morita M, Yamazaki S, <u>Fukuhara S</u> , Sugai M, Nagayama M, Kawanami M, Chiba I.	Association between self-efficacy and loss to follow-up in long-term periodontal treatment.	Journal of Clinical Periodontology	37	276-82	2010
Chin K, Oga T, Takahashi K, Takegami M, Nakayama-Ashida Y, Wakamura T, Sumi K, Nakamura T, Horita S, Oka Y, Minami I, <u>Fukuhara S</u> , Kadotani H.	Associations between obstructive sleep apnea, metabolic syndrome and sleep duration, as measured with an actigraph, in an urban male working population in Japan.	Sleep	33	89-95	2010
Hayashino Y, Yamazaki S, Takegami M, Nakayama T, Sokejima S, <u>Fukuhara S</u> .	Association between number of comorbid conditions, depression, and sleep quality using the Pittsburgh Sleep Quality Index: results from a population-based survey.	Sleep Medicine	11	366-71	2010
Kawaguchi T, Ieiri N, Yamazaki S, Hayashino Y, Gillespie B, Miyazaki M, Taguma Y, <u>Fukuhara S</u> , Hotta O.	The clinical effectiveness of steroid pulse therapy combined with tonsillectomy in patients with Immunoglobulin A nephropathy presenting glomerular hematuria and minimal proteinuria.	Nephrology	15	116-23	2010
Takahashi O, Ohde S, Jacobs JL, Tokuda Y, Yanai H, Okubo T, Shimbo T, <u>Fukuhara S</u> , Hinohara S, Fukui T.	Population-level preferences for primary care physicians' characteristics in Japan:	Internal Medicine	49	125-30	49
<u>福原俊一</u> .	診断推論における「時間の軸」：動的診療のススメ.	日本プライマリ・ケア連合学会誌	-	423 - 6	2010
横山葉子, 野崎和彦, 中山健夫, <u>福原俊一</u> .	未破裂脳動脈瘤の治療選択における意思決定支援ツールの開発と評価,	脳卒中の外科	38	142-147	2010
三品浩基, 高山ジョーニョ, <u>福原俊一</u> .	University of California, San Franciscoで体験した医師の臨床研究教育におけるメンタリングについて.	医学教育	41	55-7	2010
渡部一宏, 横山葉子, 大野慎也, 川井朋子, 倉田洋子, 網岡克雄, 関根祐子, 井関健, <u>福原俊一</u> .	薬剤師のニーズに合致した臨床研究教育ワークショップの立案・実施・評価	薬局薬学	2	44-52	2010

発表者氏名	論文タイトル名	発表誌名	巻号	ページ	出版年
渡部一宏, 横山葉子, 佐藤恵子, 竹上未紗, 関根祐子, 網岡克雄, 大西良浩, 福原俊一.	臨床薬剤師を対象とした臨床研究への関心度とその教育学的解析	医療薬学	36	277-83	
Yamada M, <u>Hiratsuka Y</u> , Roberts CB, Pezzullo ML, Yates K, Takano S, Miyake K, Taylor HR.	Prevalence of Visual Impairment in the Japanese Population by Cause and Severity and Future Projections.	Ophthalmic Epidemiology	17	50-57	2010
Ono K, <u>Hiratsuka Y</u> , Murakami A.	Geographical distribution of ophthalmologists before and after the new postgraduate training program in Japan.	Ophthalmic Epidemiol.	17	125-30.	2010
佐々木秀憲, 大山晃弘, 平塚義宗, 村上晶.	白内障の術前説明: 患者は何を知りたいのか.	臨床眼科	64	369-373	2010
Roberts CB, <u>Hiratsuka Y</u> , Yamada M, Pezzullo ML, Yates K, Takano S, Miyake K, Taylor HR.	The economic cost of visual impairment in Japan.	Archives of Ophthalmology	128	766-771	2010
Marumoto T, <u>Hiratsuka Y</u> , Murakami A.	The Significance of The Determination of Lymphocytes with Clinical Manifestation of Ophthalmic Zoster Syndrome Herpete.	Clinical Ophthalmology	4	1-6	2010
Ono K, <u>Hiratsuka Y</u> , Murakami A.	Global inequality in eye health: country-level analysis from the Global Burden of Disease Study.	Am J Public Health	100(9)	1784-8	2010
田野貴俊, 古沢千晶, 土至田宏, 平塚義宗, 村上晶.	軟部好酸球肉芽腫症と視神経周囲炎の合併を疑う1例	臨床眼科	64	1207-1211	2010
Kobayakawa S, <u>Hiratsuka Y</u> , Watabe Y, Murakami A, Tochikubo T.	Comparison of the influence of intracameral gentamicin, gatifloxacin, and moxifloxacin on the corneal endothelium in a rabbit model.	Jpn J Ophthalmol	54	481-5	2010
Tano T, <u>Hiratsuka Y</u> , Ono K, Murakami A.	Influence of cataract surgery and blood pressure changes caused by sodium restriction on retinal vascular diameter.	Clinical Ophthalmology	4	1299-1309	2010

発表者氏名	論文タイトル名	発表誌名	巻号	ページ	出版年
Ono K, Hiratsuka Y, <u>Murakami A.</u>	Geographical distribution of ophthalmologists before and after the new postgraduate training program in Japan	Ophthalmic Epidemiol	17	125-130	2010
Tano T, Hiratsuka Y, Ono K, <u>Murakami A.</u>	Influence of cataract surgery and blood pressure changes caused by sodium restriction on retinal vascular diameter.	Clinical Ophthalmology	4	1299- 1309	2010
Ono K, Hiratsuka Y, <u>Murakami A.</u>	Global Inequality in Eye Health	Am J .Public Health	100	1784-1788	2010
Sosangko MB, Wong TY, Nguyen TT, <u>Kawasaki R</u> , Jenkins A, Shaw J, Wang JJ.	Serum apolipoprotein AI and B are stronger biomarkers of diabetic retinopathy than traditional lipids.	Diabetes Care	34	474-479	2011
Che Azemin MZ, Kumar DK, Wong TY, Wang JJ, <u>Kawasaki R</u> , Mitchell P, Arjunan SP.	Fusion of multiscale wavelet-based fractal analysis on retina image for stroke prediction.	Conf Proc IEEE Eng Med Biol Soc	1	4308-4311	2010
Yau JWY, <u>Kawasaki R</u> , Islam FMA, Shaw J, Zimmet P, Wang JJ, Wong TY.	Retinal Fractals is increased in Persons with Diabetes but not Impaired Glucose Metabolism: The Australian Diabetes Obesity and Lifestyle (AusDiab) Study.	Diabetologia	53	2042-5	2010
Cheung N, Mosley T, Islam FMA, <u>Kawasaki R</u> , Sharratt AR, Klein R, Coker LH, Knopman DS, Shibata DK, Catellier D, Wong TY.	Retinal Microvascular Abnormalities and Subclinical MRI Brain Infarct: A Prospective Study.	Brain	133	1987-1993	2010
Lavanya R, Kawasaki R, Tay WT, Cheung GCM, Mitchell P, Saw SM, Aung T, Wong TY.	Refractive Error and Shorter Axial Length are associated with Age- Related Macular Degeneration: The Singapore Malay Eye Study.	Invest Ophthalmol Vis Sci	51	6247-52	2010
Dirani M, McAuley AK, Maple-Brown L, <u>Kawasaki R</u> , McIntosh RL, Lamoureaux EL, Wong TY, Tatipata S, Dunbar T, O' Dea K, Cunningham J.	The Association of Retinal Vessel Calibre with Diabetic Retinopathy in an Urban Australian Indigenous Population.	Clinical and Experimental Ophthalmology	38	577-582	2010

発表者氏名	論文タイトル名	発表誌名	巻号	ページ	出版年
Kawasaki R, Cheung N, Molesley T, Islam FMA, Sharrett AR, Klein R, Coker LH, Knopman DS, Shibata DK, Catellier D, Wong TY.	Retinal Microvascular signs and 10-Year Risk of Cerebral Atrophy: The ARIC Study.	Stroke	41	1826-1828	2010
Rogers S, McIntosh RL, Cheung nN, Lim L, Wang JJ, Mitchell nP, Kowalski JW, Nguyen H, Wong TY, nInternational Eye Disease nConsortium (includes K Kawasaki R).	The prevalence of retinal vein occlusion: Pooled data from population studies from the United States, Europe, Asia, and Australia.	Ophthalmology	117	313-319 e311	2010
Kawasaki R, Yasuda M, Song SJ, Chen SJ, Jonas JB, Wang JJ, Mitchell P, Wong TY.	Prevalence of Age-related Macular Degeneration in Asians: A Systematic Review and Meta- Analysis.	Ophthalmology	117	921-927	2010
Lamoureux E, Shyong Tai E, Thumboo J, Kawasaki R, Saw SM, Mitchell P, Wong TY.	Impact of Diabetic Retinopathy on Vision- Specific Function.	Ophthalmology	117	757-765	2010
Grauslund J, Green A, Kawasaki R, Hodgson L, Sjølie AK, Wong TY.	Retinal vascular fractals and diabetes-related micro and macro vascular complications in type 1 diabetes.	Ophthalmology	117	1400-1405	2010
Tanabe Y, Kawasaki R, Wang JJ, Wong TY, Mitchell P, Daimon M, Oizumi T, Kato T, Kawata S, Kayama T, Yamashita H.	Retinal arteriolar narrowing predicts 5-year risk of hypertension in Japanese people: The Funagata Study.	Microcirculation	17	94-102	2010

IV. 研究成果の刊行物・別刷

CLINICAL INVESTIGATION

Association Between Clinical Diagnostic Tests and Health-Related Quality of Life Surveys in Patients with Dry Eye Syndrome

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Abstract

Purpose: This study was performed to assess the impact of dry eye on patients' quality of life (QOL) and to analyze the association between subjective symptoms and ocular surface findings of dry eye.

Methods: The study population consisted of 158 patients with dry eye aged 20 years or older who visited any of the 15 medical care facilities enrolled in the study. The backgrounds and ocular findings of the patients were investigated, and their QOL was evaluated with the Japanese version of the 25-item National Eye Institute Visual Functioning Questionnaire (VFQ-25) and of the Medical Outcomes Study (MOS) 8-item Short-Form Health Survey (SF-8) to examine the association between subjective symptoms and ocular surface findings.

Results: Of the patients enrolled, 15 were men and 143 were women, and their average age was 62.5 ± 12.6 years. Sixty patients (38.0%) had comorbid Sjögren syndrome (SS). The results of Schirmer testing, fluorescein staining, and rose bengal staining for SS patients were significantly worse than those for the non-SS patients, but the VFQ-25 and SF-8 scores were not significantly different between the SS and non-SS patients. In the ocular surface findings, a weak association between the fluorescein staining scores and general vision scores, a subscale of the VFQ-25, was found. However, the ocular surface findings and VFQ-25/SF-8 results in the simple correlation analysis as well as in the multiple linear regression analysis showed no significant associations.

Conclusions: Ocular surface findings and QOL scores of patients with dry eye appear to disagree. Therefore, it is necessary to address subjective symptoms and QOL scores in addition to examination findings when evaluating dry eye. *Jpn J Ophthalmol* 2010;54:259–265 © Japanese Ophthalmological Society 2010

Keywords: burden of disease, diagnostic test, dry eye, quality of life, VFQ-25

Introduction

The reported prevalence of dry eye varies from <0.1% to 33%, depending on the survey method, the participants, and the region of each study, but dry eye is recognized as a

common eye disease with high prevalence in many nations, including Japan.^{1,2} Although the probability of dry eye causing blindness or visual impairment is low, it has a non-negligible impact on the daily and social lives of patients. Indeed, Miljanovic and associates³ reported that patients with dry eye syndrome had more difficulty reading, carrying out professional work, using a computer, watching television, and driving compared with those without dry eyes. Schiffman and associates⁴ reported that the mean utility of moderate dry eye was 0.81 and that of severe dry eye was 0.72. The burden of dry eye disease from the standpoint of both prevalence and patient morbidity appears consider-

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able. However, very few studies on the burden of dry eye disease have been conducted in Japan.

Dry eye is a syndrome that includes various clinical signs and can be broadly divided into two groups, namely, tear-deficient dry eye, represented by Sjögren syndrome (SS), and evaporative dry eye, caused by abnormality in the quality of tear fluids.⁵ Generally, patients with dry eye and SS comorbidity demonstrate higher severity in terms of clinical findings of tear function or ocular surface. In a considerable number of cases, however, dry eye symptoms interfere with the daily and social lives of patients whose clinical findings do not indicate high severity of the disease. Many cases of lack of association between clinical findings and subjective symptoms among patients with dry eye have been reported.^{6,7} Some studies have also proposed that the changes in subjective symptoms be included with the clinical findings such as ocular surface examination results in order to properly evaluate the severity of the disease and the treatment effects of patients with dry eye.^{7–10} Against such a background, the recently revised definitions and diagnostic criteria of dry eye both in Japan and worldwide include subjective symptoms such as ocular discomfort and visual disturbance.^{5,11}

Clinical studies have conventionally focused mainly on physician-based outcomes such as improvements in laboratory data and survival rate. Recently, however, this trend has been changing to focus more on patient-based outcomes such as health-related quality of life (HRQOL) and society-based outcomes such as consumption of medical resources and cost-utility analysis results. Questionnaire-based surveys have been used to assess subjective symptoms and daily-life functions, but the conventional studies conducted so far mainly used disease-specific questionnaires; therefore, their validity and reliability have not been fully verified. That the results of questionnaires cannot be compared with those of patients suffering from other diseases is also a problem. Recently, however, the 25-item National Eye Institute Visual Functioning Questionnaire (VFQ-25), a common vision-related quality of life (QOL) measurement tool that can be universally used with ocular diseases, has enabled ophthalmologists to assess outcomes by understanding, comparing, and treating the conditions of patients with chronic eye disorders.^{4,7,9,10,12–16} The VFQ-25, developed by the National Eye Institute of the United States,¹⁷ has been widely used to describe QOL and to assess the treatment of patients with ocular disease, and a Japanese version of the VFQ-25 has also been made.¹⁸ In addition, the Medical Outcomes Study (MOS) 36-item Short-Form Health Survey (SF-36)^{19,20} and the MOS 8-item Short-Form Health Survey (SF-8) are also used as comprehensive QOL measurements aimed at the concept of general health, regardless of the type of disease or condition. They are widely used in studies and at clinical sites as they yield results that can be compared with those of patients with other medical complaints.²¹ The validity and reliability of the VFQ-25 and SF-36 for the assessment of QOL of patients with dry eye have been verified by several studies.^{4,9,12,13,21}

Against such a background, the Dry Eye Survey Group, consisting of 15 facilities, mostly affiliates of the National

Hospital Organization of Japan, has been conducting a 3-year multicenter prospective cohort study of patients with dry eye to investigate the impact of the disease on HRQOL. This paper reports the results of the analysis of the association between subjective severity and ocular surface clinical findings in the baseline data of the patients enrolled in the study.

Participants and Methods

This is a multicenter study being conducted at 15 facilities: Keio University, Tokyo Dental College, and 13 affiliate hospitals of the National Hospital Organization of Japan. The participants are patients with dry eye aged 20 years or older who visit any of these facilities. The diagnostic criteria used in this study primarily comply with those defined by the Japanese Dry Eye Society with slight modification (Table 1).¹¹ All patients with definite dry eye diagnosed according to the criteria were enrolled in the study. The principles of the World Medical Association's Declaration of Helsinki were followed. Each participant received a thorough explanation of the purpose of the study and of all the procedures involved, and provided written informed consent prior to enrollment. Approval for this research was granted by the Committee for the Protection of Human Subjects at each hospital.

Registration took place between April 2005 and March 2007, with a total of 171 patients being initially registered. Of those, 13 were excluded because of incomplete data due to lack of information about clinical findings or failure to complete or submit questionnaires. For the registered patients, information on ocular findings was collected from their physicians, and information on HRQOL was collected from the patients through a survey questionnaire. Information on ocular findings included (1) corrected visual acuity at the time of enrollment; (2) refraction (spherical equivalent); (3) Schirmer testing score; (4) tear film break-up time (BUT); (5) fluorescein staining score (range, 0–9); (6) rose bengal staining score (range, 0–9); (7) presence of systemic disease such as SS; (8) presence of meibomian gland dysfunction (MGD); and (9) treatment modalities for dry eye at the time of enrollment. The Japanese versions of the VFQ-25 and SF-8 questionnaires were used, and the patients were asked to fill in the questionnaires at home and to

Table 1. Diagnostic criteria for dry eye used in this study

- 1 Having subjective symptoms due to dry eye
- 2 Abnormality in tear function
 - 1) Schirmer-I testing (without anesthesia) < 5 mm
 - 2) Tear film break-up time < 5 s
 Positive when either of 1) or 2) applies
- 3 Abnormality in corneal and conjunctival epithelium
 - 1) Fluorescein staining score (range, 0–9) > 3
 - 2) Rose bengal staining score (range, 0–9) > 3
 Positive when either 1) or 2) applies

The criteria complied with those defined by the Japanese Dry Eye Society with slight modification.¹¹ Definite dry eye was diagnosed when conditions 1), 2), and 3) were all met.

return them by post. The Japanese versions of the VFQ-25 and SF-8 were both developed by Fukuhara and associates, and their validity and reliability have been verified.^{18,19}

The baseline data at the time of enrollment were used for analysis. The relationships between ocular surface findings and the VFQ-25 and SF-8 scores were examined by the Pearson product-moment correlation coefficient. In addition, stepwise multiple regression analysis was conducted by determining the VFQ-25 or SF-8 as the dependent variables and the ocular findings as the independent variables. The Mann-Whitney test was used first to compare the ocular findings of the patients when they were grouped into SS and non-SS groups and then to compare the VFQ-25 scores and SF-8 scores of each group. For the statistical analyses described above, a probability (*P*) value < 0.05 was considered significant. SPSS version 16.0 software (SPSS Japan, Tokyo, Japan) was used.

Results

The age of the 158 patients (15 men and 143 women) enrolled in the study ranged from 22 to 84 years (62.5 ± 12.6

years). Sixty patients (38.0%) had comorbid SS. Table 2 presents the characteristics of the patients, divided into SS and non-SS groups, by age, sex, and clinical examination findings. There were no significant differences between the SS and non-SS patients in age (*P* = 0.49, Mann-Whitney test) or sex (*P* = 0.11, Fisher exact test). With respect to the ocular surface examination findings for all participants, the following scores were obtained: Schirmer testing, 4.6 ± 4.2 mm (range, 0–27); BUT, 3.5 ± 1.7 s (range, 0–10); fluorescein staining, 2.4 ± 2.0 (range, 0–9); and rose bengal staining, 2.5 ± 2.4 (range, 0–9). Eighty patients had comorbid MGD. When the patients were divided according to SS or non-SS, the SS group showed significantly worse results in the Schirmer testing, fluorescein staining, and rose bengal staining scores (*P* < 0.01, Mann-Whitney test). As calculated by the χ -squared test, MGD comorbidity was not significantly different between the SS and non-SS groups. One hundred forty-five patients (91.8%) had been treated with some kind of eye drops: 60 (38.0%) were treated with artificial tears and 106 (67.1%) with hyaluronic acid eye drops.

The VFQ-25 subscale scores of the participants are shown in Table 3. The VFQ-25 scores are expressed from 0 to 100 on each subscale with 0 representing the worst score,

Table 2. Characteristics of patients with dry eye in this survey

Patients with dry eye enrolled in the study	SS (<i>n</i> = 60)	Non-SS (<i>n</i> = 98)	Total (<i>n</i> = 158)
Age, mean \pm SD (years)	61.8 \pm 12.3	63.0 \pm 12.8	62.5 \pm 12.6
Sex			
Male	3 (5.0%)	12 (12.2%)	15 (9.5%)
Female	57 (95.0%)	86 (87.8%)	143 (90.5%)
Clinical tests of dry eye (worse eye)			
Schirmer testing, mean \pm SD (mm)	3.5 \pm 3.2	5.2 \pm 4.7*	4.6 \pm 4.2
BUT, mean \pm SD (s)	3.4 \pm 1.9	3.6 \pm 1.5	3.5 \pm 1.7
Fluorescein staining, mean \pm SD	3.2 \pm 2.3	2.0 \pm 1.7*	2.4 \pm 2.0
Rose bengal staining, mean \pm SD	3.5 \pm 2.6	1.8 \pm 2.1*	2.5 \pm 2.4
Meibomian gland dysfunction (+)	31 (51.7%)	49 (50.0%)	80 (50.6%)

SS, Sjögren syndrome; BUT, tear film break-up time.

**P* < 0.01, Mann-Whitney test. The SS group showed significantly worse results in Schirmer testing, fluorescein staining, and rose bengal staining scores. No significant differences were found between SS and non-SS patients in age (*P* = 0.49, Mann-Whitney test), sex (*P* = 0.11, Fisher exact test), or presence of meibomian gland dysfunction (*P* = 0.84, Fisher exact test).

Table 3. VFQ-25 subscale scores of patients with dry eye

Subscale	SS (<i>n</i> = 60)	Non-SS (<i>n</i> = 98)	Total (<i>n</i> = 158)
General health	45.7 \pm 16.6	48.1 \pm 17.2	47.2 \pm 16.9
General vision	67.0 \pm 16.2	66.9 \pm 14.7	67.0 \pm 15.2
Ocular pain	56.7 \pm 24.3	54.3 \pm 24.8	55.2 \pm 24.6
Near vision	68.2 \pm 19.4	69.6 \pm 18.0	69.1 \pm 18.5
Distance vision	72.1 \pm 17.6	72.5 \pm 16.5	72.3 \pm 16.0
Vision specific:			
Social functioning	84.4 \pm 14.3	83.7 \pm 15.1	84.0 \pm 14.8
Mental health	70.5 \pm 23.3	67.9 \pm 20.8	68.9 \pm 21.7
Role difficulties	80.6 \pm 18.7	77.3 \pm 18.0	78.5 \pm 18.3
Dependency	85.5 \pm 20.2	86.1 \pm 17.2	85.8 \pm 13.4
Driving	68.2 \pm 26.3	69.5 \pm 20.0	69.0 \pm 22.3
Color vision	85.2 \pm 19.8	89.7 \pm 13.4	88.0 \pm 16.2
Peripheral vision	66.4 \pm 25.0	66.2 \pm 21.1	66.3 \pm 22.5

Results are expressed as mean \pm standard deviation. No statistically significant differences in any of the subscale scores were indicated between SS and non-SS (*P* > 0.05, Mann-Whitney test).

VFQ-25, 25-item National Eye Institute Visual Functioning Questionnaire.

Table 4. SF-8 subscale scores of patients with dry eye

Subscale	SS (<i>n</i> = 60)	Non-SS (<i>n</i> = 98)	Total (<i>n</i> = 158)
General health	43.0 ± 7.2	45.1 ± 7.1	44.3 ± 7.2
Physical functioning	46.1 ± 6.3	45.2 ± 6.9	45.5 ± 6.7
Role physical	44.3 ± 9.8	44.2 ± 8.2	44.2 ± 8.8
Bodily pain	44.2 ± 8.7	43.7 ± 8.2	43.9 ± 8.4
Vitality	46.9 ± 7.6	47.3 ± 6.7	47.2 ± 7.0
Social functioning	44.5 ± 10.1	43.5 ± 9.7	43.9 ± 9.8
Mental health	46.2 ± 7.8	46.8 ± 7.3	46.6 ± 7.5
Emotional role	45.2 ± 9.4	46.1 ± 8.1	45.7 ± 8.6
Physical component summary	43.2 ± 7.3	42.9 ± 7.9	43.0 ± 7.6
Mental component summary	45.9 ± 8.8	46.6 ± 7.8	46.3 ± 8.2

Results are expressed as mean ± standard deviation. No statistically significant differences in any of the subscale scores were indicated between SS and non-SS ($P > 0.05$, Mann-Whitney test). SF-8, Medical Outcomes Study 8-item Short-Form Health Survey.

Table 5. Pearson's product-moment correlation coefficient between VFQ-25 subscale scores and results of clinical tests of dry eye

Subscale/test	Schirmer	BUT	Fluorescein staining	Rose bengal staining
General health	-0.034	-0.031	-0.083	-0.018
General vision	0.109	0.111	-0.176*	-0.019
Ocular pain	-0.08	0.031	-0.04	0.059
Near vision	0.023	0.052	-0.155	0.03
Distance vision	0.031	0.093	-0.12	0.059
Vision specific:				
Social functioning	0.061	0.076	-0.031	0.073
Mental health	0.041	0.002	-0.117	0.035
Role difficulties	0.006	0.023	-0.082	-0.002
Dependency	0.067	0.099	-0.112	0.046
Driving	0.02	-0.01	0.14	0.173
Color vision	-0.004	0.085	-0.14	0.072
Peripheral vision	0.031	-0.072	0.012	0.105

* $r = -0.176$, $P < 0.05$ (Pearson's product-moment correlation). Except for this weak, negative correlation between fluorescein staining scores and general vision, there were no significant correlations between clinical findings and the VFQ-25 subscale results.

and 100 the best. Some patients recorded extremely low VFQ-25 scores, such as 47.2 ± 16.9 for general health and 55.2 ± 24.6 for ocular pain. In addition, the scores for general vision, near vision, mental health, driving, and peripheral vision were in the 60s. When grouped according to SS and non-SS, however, none of the subscale scores showed any significant differences.

Participants' SF-8 subscale scores are shown in Table 4. SF-8 scores are shown as adjusted standard deviation scores, normalized to a standard value for Japanese patients of 50. Participants' SF-8 scores were between 42 and 48 on each subscale. Accordingly, the physical component summary (PCS) and mental component summary (MCS) were lower than those of healthy people. When the patients were grouped according to SS and non-SS, however, none of the subscales showed any significant differences.

Table 5 presents the results of the simple correlation analysis between the participants' ocular surface examination findings and the VFQ-25 subscale results. The fluorescein staining scores and general vision showed a significant, but weak, negative correlation ($r = -0.176$, $P < 0.05$, Pearson's product-moment correlation), but no significant cor-

relations between any other clinical findings and the VFQ-25 subscales were found. Table 6 presents the results of the simple correlation analysis between participants' ocular surface examination findings and the SF-8 subscale results. No significant differences between any finding and any SF-8 subscale result were found.

Tables 7 and 8 respectively present the results of the multiple regression analysis with VFQ-25 or SF-8 as the dependent variables and ocular surface findings as the independent variables. Stepwise multiple regression analyses were applied without making a choice of independent variables since the correlation coefficients were almost the same, although higher correlation coefficients in simple correlation analyses are generally taken as independent variables in multiple regression analysis. No significant coefficients of determination in any of the subscales were found.

Discussion

This multicenter study analyzed the correlations between the objective findings of clinical diagnostic tests and the

Table 6. Pearson's product-moment correlation coefficient between SF-8 subscale scores and results of clinical tests of dry eye

Subscale/test	Schirmer	BUT	Fluorescein staining	Rose bengal staining
General health	0.007	0.024	-0.126	-0.084
Physical functioning	-0.12	-0.06	-0.052	0.052
Role physical	-0.1	0.045	-0.136	0.036
Bodily pain	-0.045	0.068	-0.092	0.03
Vitality	-0.056	0.044	-0.134	0.001
Social functioning	-0.076	-0.069	-0.026	0.018
Mental health	-0.03	-0.048	-0.038	-0.103
Emotional role	-0.024	0.06	-0.101	-0.037
Physical component summary	-0.092	0.037	-0.121	0.064
Mental component summary	-0.014	-0.024	-0.043	-0.083

There were no significant correlations between any clinical findings and SF-8 subscale results, including the physical and mental component summary scores.

Table 7. Multiple regression analysis of VFQ-25 subscale results and results of clinical tests of dry eye

Subscales/tests	R ²	Schirmer (β)	BUT (β)	Fluorescein staining (β)	Rose bengal staining (β)	P value
General health	0.014	-0.039	-0.67	-0.131	0.04	0.715
General vision	0.05	0.1	0.045	-0.209	0.115	0.093
Ocular pain	0.017	-0.075	0.009	-0.105	0.1	0.627
Near vision	0.043	0.023	-0.017	-0.245	0.165	0.152
Distance vision	0.038	0.036	0.04	-0.194	0.172	0.199
Vision specific:						
Social functioning	0.02	0.074	0.056	-0.071	0.129	0.529
Mental health	0.032	0.047	-0.059	-0.21	0.153	0.292
Role difficulties	0.009	0.003	-0.01	-0.116	0.059	0.843
Dependency	0.035	0.073	0.05	-0.165	0.15	0.24
Driving	0.037	0.069	0.018	0.062	0.156	0.682
Color vision	0.05	0.003	0.02	-0.242	0.204	0.097
Peripheral vision	0.025	0.056	-0.097	-0.099	0.164	0.436

No significant correlations were found for any of the subscale scores, and all coefficients of determination were insignificant.

Table 8. Multiple regression analysis for SF-8 subscales and clinical tests of dry eye

Subscale/test	R ²	Schirmer (β)	BUT (β)	Fluorescein staining (β)	Rose bengal staining (β)	P value
General health	0.017	-0.013	-0.014	-0.12	-0.023	0.627
Physical functioning	0.033	-0.114	-0.095	-0.154	0.105	0.272
Role physical	0.046	-0.104	-0.011	-0.226	0.134	0.127
Bodily pain	0.02	-0.047	0.033	-0.14	0.097	0.536
Vitality	0.029	-0.064	-0.008	-0.193	0.091	0.335
Social functioning	0.015	-0.073	-0.089	-0.088	0.045	0.681
Mental health	0.016	-0.05	-0.051	0.001	-0.117	0.648
Emotional role	0.013	-0.038	0.031	-0.103	0.012	0.741
Physical component summary	0.046	-0.089	-0.019	-0.228	0.166	0.125
Mental component summary	0.009	-0.031	-0.03	-0.012	-0.085	0.852

No significant correlations were found for any of the subscale scores, and all coefficients of determination were insignificant.

subjective severities reported by patients with dry eye using the VFQ-25, which can assess vision-related QOL, and the SF-8, which can assess HRQOL regardless of the type of disease. To avoid as much intercenter variance in the diagnosis of dry eye as possible, the diagnostic criteria defined by the Japanese Dry Eye Society were used with slight modification.

The VFQ-25 subscales scores were generally low, with extremely low scores for general health and ocular pain. The low VFQ-25 scores of patients with dry eye in the present study correspond well to those reported by Nichols and associates⁷ and Vitale and associates.⁹ Other than for ocular

pain, the VFQ-25 scores reported here are slightly higher than those of the preoperative cataract patients reported by Oshika and associates²⁷ but nearly equal to those of the patients with mild bilateral visual impairment reported by Varma and associates.²³ These results might indicate that dry eye has a great impact on QOL. Only one of the 12 VFQ-25 subscales is for ocular pain, which is apparently related to the typical symptoms of dry eye. Many patients with dry eye, however, complain about their daily vision-related problems such as having difficulties in driving or reluctance to read, even when their corrected visual acuity is normal. Such complaints are estimated to reflect problems that dry