

Review

Supplementary Materials: Global Research Trends and Hotspots in Meibomian Gland Dysfunction (2014–2023): A Comprehensive Bibliometric and Visualization Analysis

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Table S1. Synonym substitution.

Label	Replace by
vivo confocal microscopy	in vivo confocal microscopy
dry eye disease	dry eye
dry eyes	dry eye
dry-eye disease	dry eye
dry-eye	dry eye
dry eye disease (ded)	dry eye
dry eye syndrome	dry eye
keratoconjunctivitis sicca	dry eye
dry eye syndromes	dry eye
evaporative dry eye disease	evaporative dry eye
intense pulsed-light	intense pulsed light
lipid layer	tear film lipid layer
film lipid layer	tear film lipid layer
human meibomian gland	meibomian gland
meibomian glands	meibomian gland
obstructive meibomian gland dysfunction	meibomian gland dysfunction
gland dysfunction	meibomian gland dysfunction
mgd	meibomian gland dysfunction
meibomian glands dysfunction	meibomian gland dysfunction
meibomian-gland dysfunction	meibomian gland dysfunction
film	tear film
tear-film	tear film
precorneal tear film	tear film
contact-lens wearers	contact-lens wear
meibomian gland dysfunction (mgd)	meibomian gland dysfunction
gland dysfunction report	dysfunction report
ocular rosacea	rosacea
ipl	intense pulsed light
meibomian gland disease	meibomian gland dysfunction
lipid	lipids
noncontact infrared meibography	meibography
infrared meibography	meibography



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Table S1. *Cont.*

Label	Replace by
ocular-surface	ocular surface
sjogrens-syndrome	Sjogren's syndrome
meibocytes	meibocyte
ppar gamma	ppar-gamma
proteins	protein
cytokines	cytokine
mass spectrometry	mass-spectrometric analysis
omega-3	omega-3-fatty-acids
risk-factors	risk factor
cataract-surgery	cataract surgery
lid hygiene	eyelid hygiene
demodex folliculorum	demodex mite
demodex-folliculorum	demodex mite
demodex	demodex mite
mites	demodex mite
treatment	therapy
tear osmolarity	tear film osmolarity
therapies	therapy
warm compress	compress
warm compresses	compress
human meibum	meibum
tear	tears
workshop	TFOS international workshop

Table S2. Top ten leading countries/regions regarding MGD research from 2014 to 2023.

Rank	Country/Region	Count	Citations
1	USA	308	7040
2	China	297	3821
3	South Korea	124	2217
4	Japan	108	2864
5	Turkey	76	977
6	Germany	70	1909
7	Italy	55	1077
8	Spain	55	537
9	Australia	52	1039
10	England	49	910

Table S3. Top ten leading organizations/institutions in MGD research from 2014 to 2023.

Rank	Organization	Count	Citations
1	Yonsei University (South Korea)	41	1290
2	Harvard Medical School (USA)	37	609
3	Fudan University (China)	36	513
4	Keio University (Japan)	36	1094
5	Wenzhou Medical University (China)	36	736
6	The University of Alabama at Birmingham (USA)	32	465
7	Itoh Clinic (Japan)	31	1004
8	University of Auckland (New Zealand)	30	955
9	University of Waterloo (Canada)	26	426
10	Capital Medical University (China)	24	255

Table S4. Top 163 keywords in keywords co-occurrence analysis regarding MGD research.

Keywords (Cluster 1 in Red)	Keywords (Cluster 2 in Green)	Keywords (Cluster 3 in Blue)	Keywords (Cluster 4 in Yellow)
international workshop (579)	dry eye (818)	meibomian gland dysfunction (773)	tear film (321)
meibomian gland (266)	ocular surface (260)	symptoms (173)	subcommittee (305)
dysfunction report (175)	meibography (190)	diagnosis (155)	disease (243)
dysfunction (144)	tear film lipid layer (98)	intense pulsed light (99)	prevalence (197)
pathophysiology (119)	lipid layer thickness (85)	therapy (96)	definition (107)
meibum (80)	corneal (59)	expression (90)	epidemiology (83)
inflammation (57)	tears (51)	efficacy (86)	classification (82)
age (56)	ocular surface disease (45)	management (85)	risk factor (78)
lipids (46)	evaporation (44)	blepharitis (65)	association (59)
gene-expression (40)	in vivo confocal microscopy (35)	signs (53)	population (52)
surface (37)	sjogren's syndrome (34)	rosacea (39)	morphology (47)
anatomy (29)	cornea (30)	demodex mite (35)	dry eye symptoms (39)
differentiation (29)	confocal microscopy (23)	azithromycin (34)	workshop (38)
conjunctiva (27)	quality-of-life (23)	evaporative dry eye (32)	system (36)
mass-spectrometric analysis (23)	stability (23)	cytokine (29)	chinese (24)
lacrimal gland (22)	glaucoma (22)	tear film osmolarity (29)	lipiflow (22)
sex (22)	osmolarity (22)	trial (26)	cataract surgery (21)
identification (21)	contact-lens wear (21)	compress (20)	impact (21)
layer (21)	blinking (20)	fatty-acids (20)	contact lens (20)
androgen deficiency (18)	break-up time (19)	meibomian gland expression (19)	thermodynamic treatment (20)
chronic blepharitis (18)	optical coherence tomography (19)	temperature (19)	osdi (18)
protein (18)	thickness (19)	device (18)	children (17)
cells (16)	keratograph (16)	ophthalmic solution (17)	in-situ keratomileusis (16)
epithelial-cells (16)	repeatability (16)	outcomes (17)	discomfort (15)
meibocyte differentiation (16)	tear film stability (16)	skin (17)	health (15)
model (16)	aqueous-deficient (14)	eyelid hygiene (16)	TFOS international workshop (13)
cholesteryl esters (15)	classification subcommittee (14)	tests (16)	corneal sensitivity (12)
aging (14)	reliability (14)	folliculorum (15)	sensitivity (12)
physiology (14)	time (13)	demodicosis (14)	severity (12)
ppar-gamma (14)	in-vivo (12)	multicenter (14)	wear (12)
acid (13)	topical antiglaucoma medications (12)	eye (13)	lasik (11)
ocular surface changes (13)	versus-host-disease (12)	ocular surface disease index (13)	lid margin (11)
secretions (13)	artificial tears (11)	topical azithromycin (13)	incomplete blinking (10)
activation (12)	dynamics (11)	omega-3-fatty-acids (12)	meibomian gland dropout (10)
estrogen (12)	impression cytology (11)	isotretinoin (11)	questionnaire (10)
oxidative stress (12)	interferometry (11)	matrix-metalloproteinase-9 (11)	
complications (11)	meibomian gland loss (11)	diquafosol (10)	
meibocyte (11)	age-related-changes (10)	doxycycline (10)	
metabolism (11)	benzalkonium chloride (10)	manifestations (10)	
microbiome (11)	intraocular-pressure (10)	safety (10)	
ocular surface inflammation (11)	kinetic-analysis (10)		
apoptosis (10)			
atrophy (10)			
diabetes (10)			
eyelid (10)			
mouse (10)			
proliferation (10)			