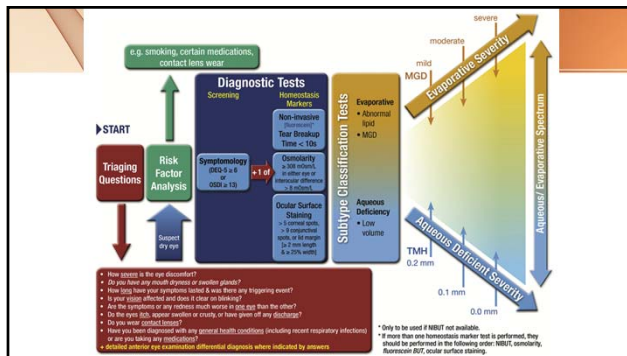


## Modernizing Care for the Delicate Ocular Surface

Justin Kwan, OD, FAAO  
- no financial disclosures

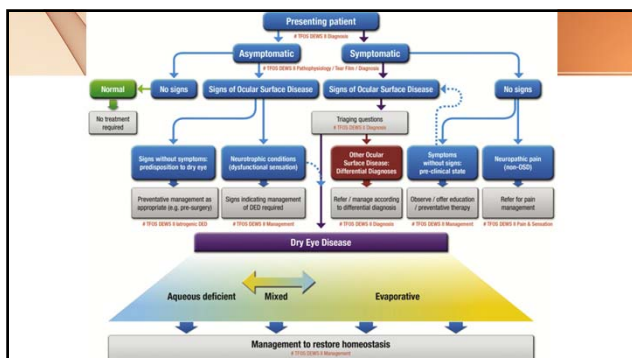


## MGD Workshop Definition (2011)

“Meibomian gland dysfunction is a chronic, diffuse abnormality of the meibomian glands, commonly characterized by terminal duct obstruction and/or qualitative/quantitative changes in the glandular secretion.

This may result in alteration of the tear film, symptoms of eye irritation, clinically apparent inflammation, and ocular surface disease.”

A screenshot of a Facebook page for the 'Dry Eye Syndrome Support Community'. It shows 4,745 members and 7,000 members in a sub-group. Other pages listed include 'The Dry Eye Show' (15K likes) and 'The Dry Eye Zone' (2K likes).



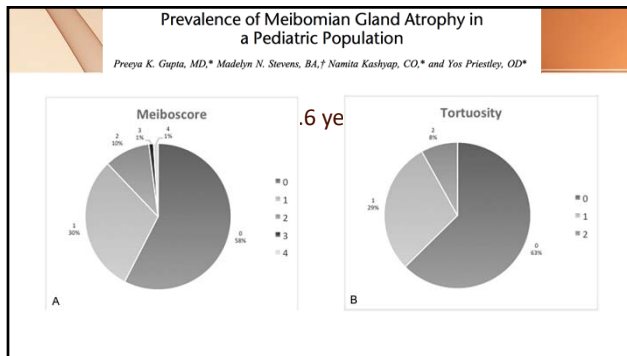
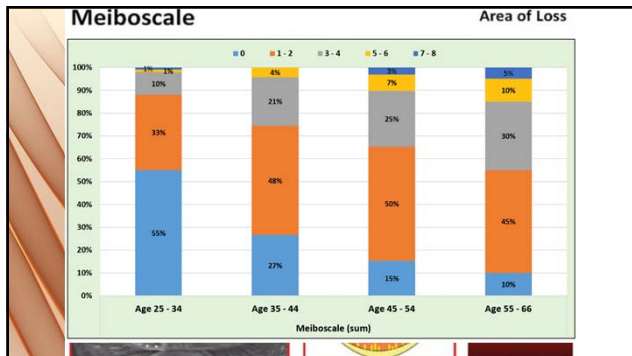
### Clinical and Epidemiologic Research

#### Functional and Morphologic Changes of Meibomian Glands in an Asymptomatic Adult Population

Nisha S. Yeotikar,<sup>1</sup> Hua Zhu,<sup>1-3</sup> Maria Markouli,<sup>1,3</sup> Kelly K. Nichols,<sup>4</sup> Thomas Naduvilath,<sup>1</sup> and Eric B. Papas<sup>1-3</sup>

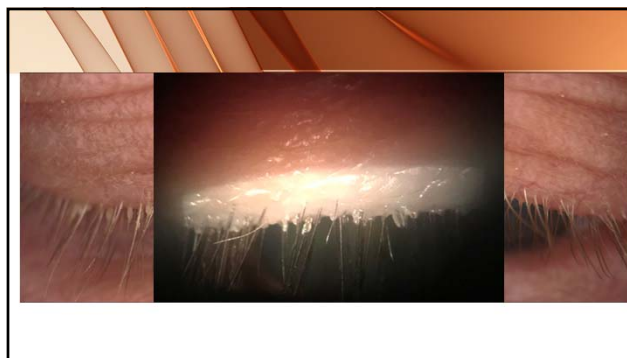
<sup>1</sup>Brien Holden Vision Institute, University of New South Wales, Sydney, New South Wales, Australia  
<sup>2</sup>Vision CRC, Sydney, New South Wales, Australia  
<sup>3</sup>School of Optometry & Vision Science, University of New South Wales, Sydney, New South Wales, Australia  
<sup>4</sup>The Ocular Surface Institute, University of Houston, Houston, Texas, United States

Age Group	N				Total
	Normal	Mild	Moderate	Severe	
25-34	35	10	4	1	50
35-44	28	10	7	2	47
45-54	25	14	8	2	49
55-66	25	9	2	3	39
Total	113	43	21	8	185



Research Article  
**Polar lipids in human meibomian gland secretions**  
 Ward E. Shine & James P. McCulley  
 Pages 89-94 | Published online: 02 Jul 2009

- Phosphatidylcholine (PC)
  - Lecithin is not PC
- Phosphatidylethanolamine
- Sphingomyelin
  - Regulator of cholesterol distribution



### DAILIES TOTAL1® CONTACT LENSES

The total package for your patients with two technologies

**Water Gradient Technology**  
Increases water content near the lens surface, so all that touches your patient's eye is a cushion of moisture!

+

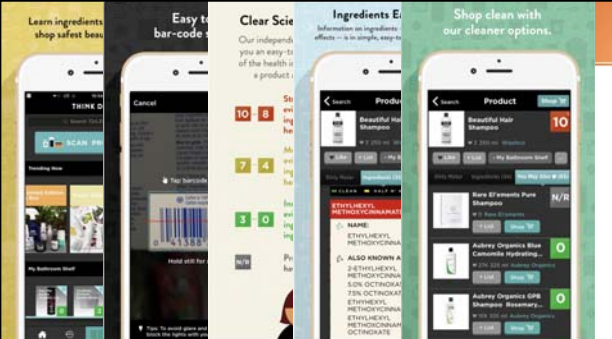
**SmarTears® Technology**  
Releases phosphatidylcholine (PC), an ingredient that is found naturally in tears, that helps stabilize the lipid layer of the tear film!

### Tea tree oil formulations

### TheraTears vs diluted baby shampoo



**Johnson's Baby Tear Free Shampoo, 20 Fl. Oz.**  
by Johnson's Baby  
**\$4.92** (\$0.25/Ounce) \$8.57 fresh



Learn ingredients shop safely best  
Easy to bar-code  
Clear Science Our ingredients you an easy-to of the health is a product i  
Ingredients E Information on ingredients effects - is to simply, step in  
Shop clean with our cleaner options.

Eye/d cleanser	Baby shampoo
Water	Water
PEG-40 Sorbitan Laurate	PEG-40 Sorbitan Laurate
Sodium Tridecyl Sulfate	Sodium Tridecyl Sulfate
Cocamidopropyl Betaine	Cocamidopropyl Betaine
PEG-150 Distearate	PEG-150 Distearate
Sodium Chloride	Sodium Chloride
Sodium Hydroxide	Phosphatidylcholine
Water/Aqua/Eau, Butylene Glycol, Hydroxyethylcellulose, Keratin, Hydrolyzed Keratin, Biotin, Sodium Hyaluronate, Isopropyl Cloprostenate, Octapeptide-2, Allantoin, Panthenol, Copper Tripeptide-1, Panthethine, Polypeptide-23, Cucurbita Pepo (Pumpkin) Seed Extract, Glycerin, Sea Water, Malus Domestica Fruit Cell Culture Extract, Hydrolyzed Glycosaminoglycans, Prunus Amygdalus Dulcis (Sweet Almond) Fruit Extract, Backhousia Citriodora Leaf Oil, Dipotassium Glycyrrhizate, Rhizobian Gum, Styrene/Acrylates/Ammonium Methacrylate Copolymer, Xanthan Gum, PVP, Lecithin, PEG-12 Dimethicone, Alcohol Denat., Chlorphenesin, Phenoxyethanol, Sorbic Acid, Sodium Hydroxide.	
Ferulic Acid	Sodium Hydroxide
Allantoin	Potassium Acrylates Copolymer
Cocamidopropyl PG Dimonium Chloride	Yellow 6
Malvacea Alternifolia Leaf Oil	Yellow 10
Triiodium EDTA	Parfum
Electronic Acid	
Citric Acid	
Sodium Hydroxide	

### SANDE Questionnaire

PLEASE COMPLETE THE FOLLOWING QUESTIONS REGARDING THE FREQUENCY AND SEVERITY OF YOUR DRY EYE SYMPTOMS.

**1. Frequency of symptoms:**  
Please place an 'X' on the line to indicate how often, on average, your eyes feel **dry and/or irritated**:

Rarely \_\_\_\_\_ All the time

**2. Severity of symptoms:**  
Please place an 'X' on the line to indicate how severe, on average, you feel your symptoms of **dryness and/or irritation**:

Very Mild \_\_\_\_\_ Very Severe

© 2000 Massachusetts Eye and Ear Infirmary

### THINK DIRTY

**A MESSAGE FROM THE FOUNDER**


Think Dirty® is a project born out of a personal journey to understand the truth in the beauty industry. Due to a family history of cancer, I decided to research into the many causes behind breast cancer, including toxic ingredients in cosmetic and personal care products.

I never realized the environmental impact cosmetics had on our health, until I watched Anne Lewand's "100% of Cosmetics," which examined the pervasive use of toxic chemicals in our everyday personal care products.

There are hormone disruptor chemicals in many products that have been possibly linked to breast cancer. I was shocked the cosmetics industry was not regulated like the food and drug sectors, and like most women, my hygiene and shampoo are products I would never think to question or "test" or could contain cancer-causing chemicals.

Finding safer alternatives for myself was a huge challenge. Although some products are labeled "natural" or "organic", there is little transparency in labeling cosmetics. There was also no real tool out there for consumers to find information easily. With my background in design and marketing, I wanted to develop and create something not only for myself but for others as well, and that's how Think Dirty® was founded.

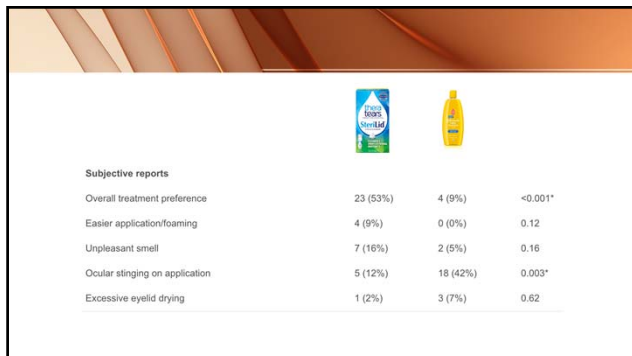
**4.2K BRANDS**  
**1.1M PRODUCTS**  
**19.8M UNIQUE SCANS**



SANDE score	Baseline	4.0 ± 2.8	4.1 ± 2.7	0.84
Day 28	2.1 ± 1.8	2.7 ± 2.3	0.03*	
p	<0.001*	0.002*		
Difference	-2.0 ± 2.5	-1.4 ± 2.4	0.04*	


Inflammatory Markers	Baseline	6.70 ± 3.95	8.42 ± 5.39	0.34
MMP-9 expression	Day 28	0.54 ± 2.84	6.23 ± 3.71	0.12
p	0.04*	0.79		




	Eyeid cleanser	Baby shampoo	p-value
Overall treatment preference	23 (53%)	4 (9%)	<0.001*
Easier application/foaming	4 (9%)	0 (0%)	0.12
Unpleasant smell	7 (16%)	2 (5%)	0.16
Ocular stinging on application	5 (12%)	18 (42%)	0.003*
Excessive eyelid drying	1 (2%)	3 (7%)	0.62

### Hypochlorous Acid


See hypochlorous acid




OCUSOFT Hypochlorous Acid  
\$18.75  
Amazon.com




Neutrogena Hydro Boost...  
\$16.99  
Boxed \$20 min. order



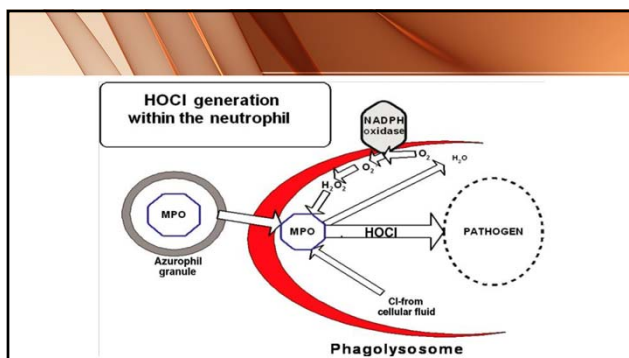
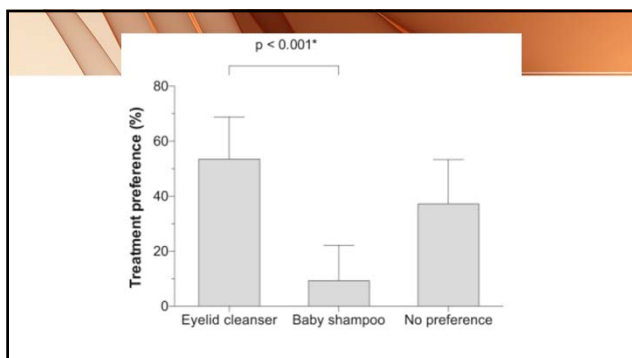
Heyedrate Lid & Lash Cleanser f...  
\$19.97  
Amazon.com  
Free shipping




3M 6003 Organic Vapor/Acid Gas...  
\$16.00  
ULINE




OCUSOFT Hypochlorous Acid  
\$18.75  
Jet.com  
★★★★★ (26)







The Body Shop Tea Tree Skin...  
★★★★★ (235)




So Fresh So Clean COOL Cucumber...  
★★★★★ (137)



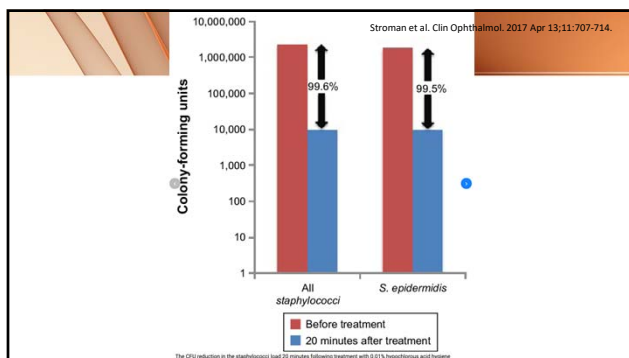
Facial Wipes Shea Moisture  
★★★★★ (137)



Formula 10.0.6 Keep Me Clean...  
★★★★★ (314)



Earth Therapeutic: 30-ct. Tea...  
★★★★★ (13)





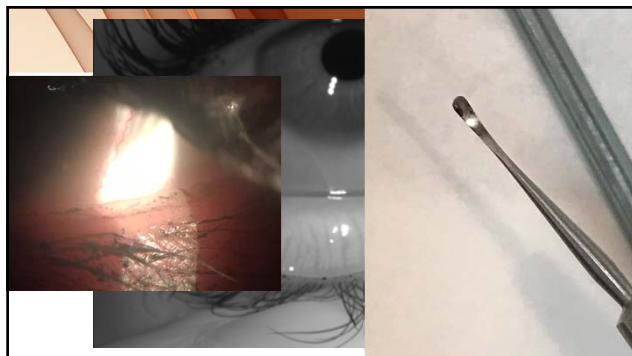
Compare the Difference			
	Bruder	RX Products	Other OTC HClO Solutions
Prescription	Not required	Required	Not required
Purity/ Concentration	100% Pure HClO / .020%	100% Pure HClO / .010%	Varies. Can contain sodium hypochlorite, bleach or other undesirable impurities
Strength	Gentle enough for everyday, long-term use	Gentle but requires a prescription	Too strong for daily use; recommended only for treatment of moderate to severe conditions
Stability/ Shelf Life	Amber bottle preserves solution to maintain stability and ensure efficacy. Closed bottle allows for 3 year shelf life; open bottle is effective for 60 days	Amber bottle; 2 year shelf life; open bottle effective for 30 days.	Plastic bottles increase the risk of spoilage
Daily Use	Yes – gentle enough for daily, long-term use	Yes	Not recommended by manufacturers. Additives limited extended use
Volume	Supplied in two convenient bottle sizes (1 fl. oz and 2 fl. oz.) to ensure all solution is used. Used as directed, 1 fl. oz is a 1 month supply.	Varies; bottles can be too large to be used within prescribed shelf life	Varies. Bottle size selection limited leading to high cost per use



Avenov a	Bruder	Acucyn	Hypochlor	Heyedra te	Ocubliss	We Love Eyes	Zenoptiq	HyClear
.01%	.02%	.01%	.02%	.015%	.018%	.012%	.01%	.01%
40 mL	30 mL 60 mL	40 mL 80 mL	60 mL	30 mL 120 mL	30 mL	50 mL	100 mL	60 mL
*\$35 to \$60	\$20 \$36	*\$200	\$20	\$18 \$50	\$35	\$40	\$30	\$20 to \$30
\$1.50	\$0.60	\$5.00	\$0.33	\$0.42	\$1.17	\$0.80	\$0.30	\$0.42







### TREHALOSE



**223 customer reviews**  
 ★★★★★: 4.7 out of 5 stars

5 star	83%
4 star	7%
3 star	3%
2 star	2%
1 star	5%



**83 customer reviews**  
 ★★★★★: 4.5 out of 5 stars

5 star	75%
4 star	8%
3 star	6%
2 star	5%
1 star	5%


### TREHALOSE



### Pipeline - Lubricin

Lubricin functions like biologic Teflon® – it is naturally produced throughout the human body protecting tissues and other surfaces from friction-related damage and wear.

*ECF843 is a new therapeutic approach and potential first-in-class Rx treatment in dry-eye, which in a small phase II study[2] showed the potential to provide instant relief of symptoms and improve signs*



### TREHALOSE

**Trehalose: Natural cell bioprotector®**






### Topical Administration of Lacritin Is a Novel Therapy for Aqueous-Deficient Dry Eye Disease

Trinka Vijmasi,<sup>1</sup> Feeling Y. T. Chen,<sup>1</sup> Suganthalakshmi Balasubbu,<sup>1</sup> Marianne Gallup,<sup>1</sup> Robert L. McKown,<sup>2</sup> Gordon W. Laurie,<sup>3</sup> and Nancy A. McNamara<sup>1,4,5</sup>

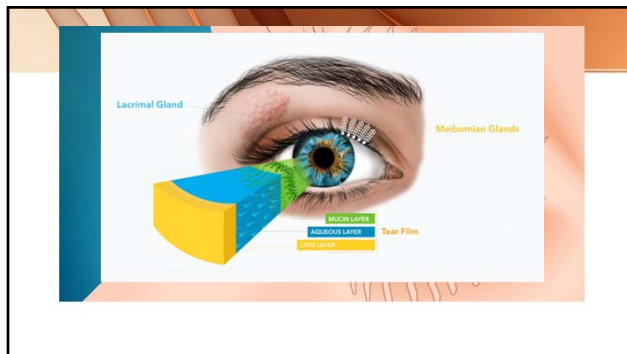
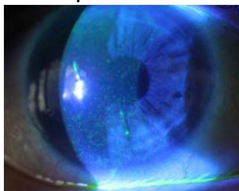
- Prosecretory
- Prosurvival
- Mitogenic

**NEW DRY EYE DRUG IS FIRST THAT AIMS TO TREAT CAUSE, RATHER THAN SYMPTOMS**



## Filamentary Keratitis

- Remove filaments with moistened cotton-tipped applicator vs forceps
- Bandage SCL



## Early biomarkers for Sjogren's

## Sequence

- Comprehensive annual eye exam
  - Demodex: 1% or 2% tea tree oil foam cleanser QD to BID
  - Non-obvious MGD or flakes and crusts: hypochlorous acid BID
- Schedule dry eye work up in **2 weeks**
  - MGYLS lower eyelid
  - Lissamine green staining
  - Eyelid margin debridement scaling
  - Mastrota paddle expression
  - In-office 20% tea tree oil or ZocuShield
  - Lotemax Gel
- Dry eye follow up in **4 weeks**
  - Lifitegrast 5%, cyclosporine 0.05%, 0.1% or 0.09%

## Persistent Epithelial Defects

- Bandage soft
- Amniotic membrane
- Autologous serum



Table 1. Comparison of the biochemical properties of normal human tears and serum<sup>(2,3)</sup>

	Tears	Serum
pH	7.4	7.4
Osmolarity	298	296
EGF (ng/ml)	0.2-3.0	0.5
TGF-β (ng/ml)	2-10	6-33
Vitamin A (mg/ml)	0.02	46
Lysozyme (mg/ml)	1.4	6
IgA (μg/ml)	1190	2
Fibronectin (μg/ml)	21	205

EGF= epithelial growth factor; TGF= transforming growth factor

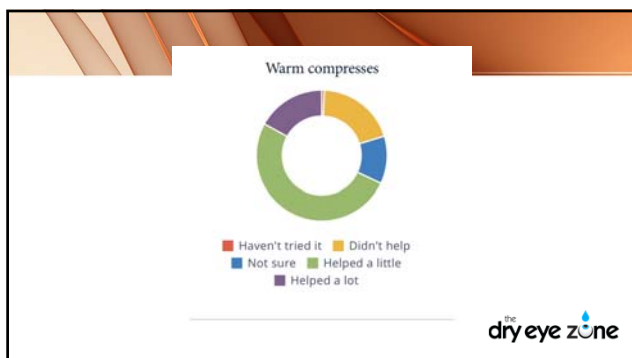
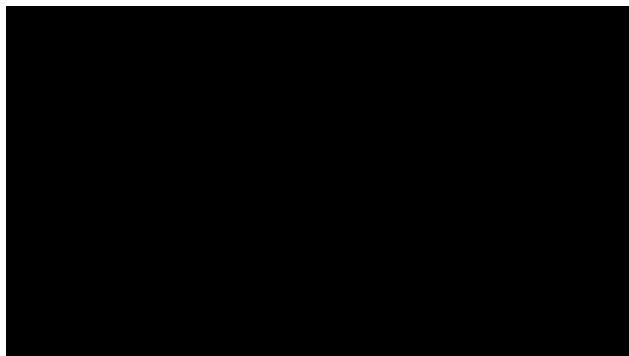
## DREAM

### Omega 3 EFAs



Search on Amazon:  
"Omega 3 fish oil"  
"Triglyceride Omega 3 fish oil"





Conclusion

- Wellness, preventative approach
- Keep Meibomian gland secretions LIQUID
- Reduce inflammation
- Build trust by forming a long term plan