INTRODUCTION

Hair care products are utilized extensively by both men and women in the United States. This paper will discuss the ability of several self lens cleaning products to remove two brands of hair spray from a set of thirty-eight percent water hydrogel lenses. Physical appearance is extremely important to the majority of individuals. This is especially true with contact lens wearers, who often begin and continue with lens wear for the way they look without glasses. Cosmetics, however, are responsible for a reported 210 reactions requiring medical care per each million products sold. Hair care products are responsible for twenty-four percent of the problems. Eye makeup items contribute to four percent while the largest group of offending agents are other skin care products.[1]

Today members of both sexes utilize a miriad of cosmetics for changing appearance. In the U.S. Food and Drug Act a cosmetic is defined as "any article poured, sprinkled, or sprayed upon the human body for cleansing, beautifying, promoting attractiveness, or altering appearance."[2] According to Charlotte A. Tlachae, OD, FAAO, nearly eighty percent of teenage and adult females, and an increasing percent of male patients, use makeup and other personal grooming products. Some ten to fifteen percent have had prior adverse reactions. Only five percent of the women have never experimented with makeup.[3] With such numbers of patients

it is obviously important to adhere to proper usage of cosmetics and contact care regimens.

Dr. Tlachae classified cosmetic - induced ocular symptons into four basic categories:

1. Allergic: injection, pruritis, burning and epiphora
2. Blocked glands: chalazions, hordeolums and blepharitis
3. Foreign body sensation: flakes, fibers and particles embedded in the conjunctiva or floating in the tears
4. Conjunctival pigmentation: from excessive use of mascaras or eyeliner on the rims of the eyelids.

Two additional complications can be

5. An interference with vision and/or fitting characteristics from accumulation of the various oils, waxes, and other product constituents on a lens [4]
6. Contact dermatitis or other type IV hypersensitivity reactions: which may include adnexal or general skin irritation from a product component.

Although hair care products are unlikely to cause blocked glands or conjunctival pigmentation they can easily cause any or all of the other three complications.

METHODS

Two brands of hair sprays, Paul Mitchell® Freeze and Shine and Bold Hold® Salon Styling Spritz were used as sources of contaminants to the surface of hydrogel contact lenses. (See appendix for ingredients of all products.) The lenses used were Wesley-Jessen, DuraSoft® 2, which are phemfilcon A polymers having a water content of thirty-eight percent. All lenses

were plano in power with 8.20 mm base curves, 13.5 diameter, not previously opened and nonexpired.

The cleaners were chosen from different manufactures on the basis of popularity and differences in critical ingredients. For example, Opticlean® II contains abrasive particles, silicone containing polymeric beads, Restore® is a new product formulated from a finely milled salt. MiraFlow® has isopropyl alcohol as a prime ingredient. Pliagel® from manufacturer of the hydrophillic lens used in the study. The enzymes chosen were either different types such as, Renu® efferescent with Substilisin A and Allergan® enzymatic with papain, or different solvent saline as with the previous two and Ultrazyme® disolved in AOSEPT® hydrogen peroxide.

Fourteen blotted dry lenses were coated with each hair spray using two full pumps of the product in its original dispenser. The lenses were allowed to sit for one minute each prior to the start of cleaning. After cleaning the lenses were rinsed thoroughly with Unisol® 4 sterile preservative - free saline, blotted dry with Kimwipes® lint free tissues and viewed with naked eye and 7X loupe with and without oblique illumination. Classification as to the heaviness and extent of depositing was made. This was done with a modification of the Rudko classification system[5] (see table 1). The raw data are presented in table 2.

The cleaning regimen was the same for the three surfactant cleaners; MiraFlow®, Pliagel® and Opti-Clean® II. Cleaning consisted of appling three to five drops of the cleaner to both sides of the lens, followed by mechanical cleaning in the palm of hand for ten to fifteen seconds per side prior to rinsing andviewing as

previously described. Lenses in the enzyming regimine were blotted, sprayed, and allowed to sit for one minute prior to being placed directly into the properly prepared containers. One enzyme tablet was utilized for each lens. The enzymatic cleaners used were; Renu® efferescent, by Bausch & Lomb, Allergan® enzymatic, and Ultrazyme™ by Allergan. The Renu® efferescent and Allergan® enzymatic tablets were dissolved in Lens Plus® sterile preservative saline, while the Ultrazyme™ was dissolved in AOSEPT® solution. After the lenses had soaked for twelve hours in the enzyme they were rinsed for ten to fifteen seconds on each side, carefully avoiding mechanical rubbing of lenses prior to viewing. This was done in attempt to isolate the ability of each enzymatic cleaners ability to remove the hair spray.

The restore® regimine consisted of placing the coated lens in the palm and filling the concave surface of the lens with cleaner, wetting with Unisol® 4 saline and rubbing lens in palm for ten to fifteen seconds per side. Some additional saline and/or cleaner usually had to be added to maintain paste like consistency.

It should be noted that due to the high salinity creating a large osmotic difference between cleaning solution and lens, the lens will loose water and become somewhat more firm during this cleaning step! At this point the lenses were again rinsed for about twenty seconds (some additional time was reguired here to allow the lens to regain its normal flexability) prior to blotting and viewing.

TABLE 1

Lens Deposit Classification System
(Modification of Rudko Classification System)

Class	Heaviness of Deposit
I	Clean
II	Visible under oblique light using 7X magnificatic
III	Visible under oblique light, unaided eye
IV	Visible without special light, unaided eye

Class	Extent of Deposit
a	0 - 25% of lens
b	25 - 50% of lens
c	50 - 75% of lens
d	75 - 100% of lens

TABLE 2

Cleaner	Paul Mitchell		Bold Hold	
group 1	Trial 1	Trial 2	Trial 1	Trial 2
Opti-Clean® II	II B	IIA	IIA	IIA
MiraFlow®	IIB	IIA	IIB	IIA
Pliagel®	IVD	IVC	IVD	IVD
Group 2				
Restore®	IIA	IIA	IIA	IIA
group 3				
Renu® efferescent	IIIA	IIIB	IIIB	IIIC
Allergan enzymatic	IIIC	IIIB	IIIA	IIIb
Ultrazyme®	IIIB	IIIC	IIIA	IIIB

RESULTS

A difference exists between the ability of several soft contact lens cleaning products to remove two brands of hair spray from the surface of a set of DuraSoft® 2 contact lenses. For practicle purposes I will classify the cleaning products into three groups;

First: The surfactant cleaners where Opti-Clean® II appears to remove slightly more hair spray than MiraFlow® Pliagel® was least effective in this group as well as in least effective overall in removing hair spray from the hydrophillic lenses.

Second: The second group which consisted of only the Resto® product, showed to be the single best agent for removing hair spray from the surface of the DuraSoft® lenses.

Note: This product has not been F.D.A. approved as of yet and usage is limited by Federal Law to investigational use only.

Third: The enzymatic cleaners showed no significant difference in ability of the Allergan® enzymatic, Ultrazyme® or Renu® efferescent cleaners to remove the hair spray. This group, however, showed slightly greater variability in cleaning than the the other four products.

CONCLUSION

When hair sprays are suspected as the primary culprits as surface deposits on group three low water ionic lenses, such as DuraSoft® 2 hydrophillic lenses, the following cleaning regimine may

provide the best results. First diligent use of a surfactant or surfactant/abrasive cleaner like Opti-Clean II, MiraFlow, or Restore should F.D.A. approval be made. Although this study did not include a combined procedure of daily cleaner and enzymatic cleaner it is an assumption of the author that following manual cleaning, an enzyme and disinfection cycle should be performed prior to observation of the lenses and certainly before continuation of lens wear by patient. The single best way to avoid complications with hair sprays and contact lens wear would be proper technique in appling the products. This is best done by closing the eyes while using the hair spray then walking out of the area before reopening them.

Index

Product Ingredients:

Bold Hold Salon Styling Spritz;SD Alcohol 40, Water, Butyl Ester of PVM/Ma Copolymer, Propylene Glycol, Pantenol, Amino Methyl Propanol, Polysorbate 80 (and) Cetyl Acetate (and) Acetylated Lanolin Alcohol, Fragrance.

Paul Mitchell Freeze and Shine: Special Denatured Alcohol 40, Aloe Extract, Ethyl Ester of PVM/MA Co-Polymer, Dimethicone Copolyol, Quaternium-23, Hydrolyzed Keratin Protein, Glucose Glutanate (Derived from Plant Source), DL-Panthenol (Vitamin B-15), Fragrance, Amino Methyl Propanol, Benzophenone-3 (Excellent Sun Screen).

Opticlean II: Is a buffered, isotonic formulation containing; Tween 21 and special polymeric cleaning berds with edetate di-sodium 0.1% and POLYQUAD (Polyquatermium-1) 0.001% as preservatives.

Miraflow: Purified water,isopropyl alcohol 20%v/v, poloxamer 407, amphoteric 10.

Pliagel: Sorbic acid 0.25% and edtate trisouium an preservatives.

Pestore: Contains: A finely milled powder containing poloxamine, sodium chloride, USP, and sodium bicarbonate.

Allergan Enzymatic: Papain, sodium chloride, sodium carbonate, sodium borate, and edetate disodium.

ReNu Effervescent: Subtilisin A.

Ultrazyme: Subtilisin A.

Unisol 4 Saline: Buffered saline in 4 oz. bottles.

References

1-3. Tlachac, Charlotte A: Cosmetics for Contact Lens Wearers. Contact Lens Spectrum, Vol. 3, Aug. 1988 pp. 65-70.

4. Greco, Albert: Cosmetics and Contact Lens Wear. International Eyecare, Vol. 1, No. 1, June 1985 pp. 41-43.

5. Ng, Mostardi, & Mandell: Adherence of Mascaras to Soft Contact Lenses, Internationsl Contact Lens Clinic, Vol. 1 No. 2, Feb. 1988 pp. 64-68.

Special Thanks to Dr. Denise DeSylvia for supervision of this study throughout its entirety.

Special Thanks to Dr. John Pole for expert advice and suppling the contact lenses and solutions for this study.