

The background of the slide features a soft-focus image of hands being washed under water. Numerous water droplets of various sizes are scattered across the scene, some in sharp focus and others blurred, creating a sense of movement and cleanliness. The overall color palette is light and airy, with shades of white, light blue, and pale purple.

CONTACT LENS CARE AND COMPLIANCE

CARRI RIVERA, FCLSA, NCLEM, ABOC

FINANCIAL DISCLOSURES

- I WORK FOR BAUSCH & LOMB SPECIALTY VISION PRODUCTS
 - DIRECTOR OF CONSULTATION AND CUSTOMER SERVICE TEAMS

EVOLUTION OF SCL LENS CARE CIRCA 1971

- HEAT DISINFECTION WITH COMPONENTS:
 - DAILY CLEANER
 - SALINE RINSE
 - (HOMEMADE! WITH SALT TABLETS AND DISTILLED WATER)
 - STEAM DISINFECTION
 - SALINE SOLUTION HEATED TO 70-80 DEGREES FOR 10-20 MINUTES
 - WEEKLY ENZYME CLEANERS

PROBLEMS WITH HEAT DISINFECTION

- CAUSED DENATURED PROTEIN THAT INCREASED INCIDENCE OF GPC
- ONLY 90% OF UNITS WORKED;
ELECTRICAL FAILURE
- IN THE MORNING, PATIENTS WOULD RINSE LENS WITH HOMEMADE SALINE; WHICH WOULD DEFEAT THE PURPOSE OF THE HEAT DISINFECTION



EVOLUTION OF SCL LENS CARE CHEMICAL SYSTEMS

- CHEMICAL DISINFECTION:
 - DAILY CLEANERS
 - SALINE RINSE
 - OVERNIGHT CHEMICAL DISINFECTION
 - THIMEROSAL, CHLORHEXIDINE
 - MORNING SALINE RINSE
 - WEEKLY CLEANERS

EVOLUTION OF SCL LENS CARE CHEMICAL MULTIPURPOSE SOLUTIONS

- ALL-IN-ONE MULTIPURPOSE SOLUTIONS:
 - CLEAN, RINSE AND DISINFECT IN ONE STEP
- PATIENTS WERE TOLD THEY NO LONGER NEEDED TO “RUB AND RINSE” THEIR LENSES

RUB VS. NO RUB



- THE NO RUB LABEL WAS APPROVED BY REPLACING RUBBING WITH EXTRA RINSING
- EITHER *RUB IT OFF* OR *HOSE IT OFF*
- SILICONE HYDROGEL LENSES NEED TO BE DIGITALLY CLEANED TO PREVENT
 - LIPID BUILD UP (DECREASES WETTABILITY AND BLURS VISION)
 - DENATURED PROTEIN BUILD UP (INCREASES INFLAMMATION)
- 2010: FDA RECOMMENDED THE REMOVAL OF “NO RUB” FROM CONTACT LENS SOLUTION LABELS



LABEL: NO RUB MESSAGE: NO CARE

- THIS “NO CARE” CONCEPT HAS LED TO DANGEROUS COMPLACENCY AMONG PATIENTS AND PRACTITIONERS AS REGARDS TO DISINFECTION, COMFORT AND LENS FUNCTIONALITY
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2010: SOFT LENS DROPOUTS

- UNFORTUNATELY, A SIGNIFICANT NUMBER OF CONTACT LENS WEARING PATIENTS WERE LOST EACH YEAR DUE TO *DRYNESS PERCEIVED DISCOMFORT*
- 2010 SURVEY FOUND THAT THE MEAN DROPOUT RATES AMONG CONTACT LENS WEARERS WAS REPORTED AT 15.9% IN THE UNITED STATES
- **THIS REPRESENTS A LOSS OF 1 IN 6 CONTACT LENS WEARERS**



NEW FORMULATIONS

- INDUSTRY RESPONDED BY INTRODUCING NEW PRODUCT FORMULATIONS TO ADDRESS LENS DRYING CONCERNS
- LUBRICANTS/HUMECTANTS/OSMOTICS WERE ADDED TO LENS CARE PRODUCTS TO REDUCE LENS DEHYDRATION
- LENS MATERIALS WERE DEVELOPED WITH LESS WATER CONTENT TO HELP WITH DEHYDRATION
 - INTRODUCTION OF SILICONE HYDROGEL LENSES

SILICONE HYDROGEL PROPERTIES/CHARACTERISTICS

- SI-HY LENS CHEMISTRY MAKES THEM BEHAVE DIFFERENTLY
 - VERY HIGH OXYGEN PERMEABLE
 - INCREASED LENS MODULUS OR STIFFNESS
 - LOWER WATER CONTENT = LESS LENS DEHYDRATION
 - LOW LEVELS OF TOTAL PROTEIN UPTAKE, BUT HIGHER BINDING OF DENATURED PROTEINS
 - HIGHER LEVELS OF LIPID UPTAKE
 - INCREASED GPC



LOOKING FOR THE PERFECT SOLUTION

- THE KEY TO PRESERVATIVE/DISINFECTION USE IS TO HAVE SUFFICIENT CONCENTRATIONS FOR ANTIMICROBIAL EFFICACY, YET LOW ENOUGH TO PREVENT TOXICITY
- TOXICITIES ARE DOSE RELATED EVENTS
- ALL PRESERVATIVES ARE TOXIC IF USED IN EXCESS CONCENTRATIONS

MPS FORMULA INGREDIENTS

- THE PRESERVATIVE COMBINATIONS ARE NOT THE ONLY COMPONENTS OF A SOLUTION.
- THE CHEMICAL COMBINATIONS OF BUFFERS, CHELANTS, SURFACTANTS, ELECTROLYTES, AND LUBRICANTS ALL WORK TOGETHER TO CREATE THE FINAL CONTACT LENS SOLUTION.

OPHTHALMIC PRESERVATIVES

○ **BAK (BENZALKONIUM CHLORIDE)**

- ADDED TO GLAUCOMA DROPS TO HELP DRUG PENETRATION
- TOXIC TO CORNEAL EPITHELIAL AND ENDOTHELIAL CELLS, INCREASES CONJUNCTIVAL ALLERGIC RESPONSE AND DECREASES LIPID LAYER

○ **POLYQUAD (POLYQUATERNIUM-1)**

- DETERGENT DERIVED FROM BAK
- GOOD COVERAGE AGAINST BACTERIA, FUNGI, YEASTS AND MOLDS
- BEEN SHOWN TO CAUSE SUPERFICIAL EPITHELIAL DAMAGE
- RELATED TO DECREASING AQUEOUS TEAR PRODUCTION

○ **PHMB (POLYHEXAMETHYLENE BIGUANIDE)**

- HIGH KILL RATE AGAINST ACANTHAMOEBA AND BACTERIA
- NON-IRRITATING TO CORNEAL CELLS
- LOW EFFICACY AGAINST FUNGUS

OPHTHALMIC PRESERVATIVES

- **ALDOX (MYRISTAMIDOPROPYL DIMETHYLAMINE)**
 - GOOD COVERAGE AGAINST FUNGI AND ACANTHAMOEBA CYSTS AND TROPHS
- **EDTA (EDETATE DISODIUM)**
 - CHELATING AGENT
 - ENHANCES THE ANTIMICROBIAL ACTIVITY OF DISINFECTANTS
 - DECREASES DEPOSIT FORMATION



INFECTION OUTBREAK

- WHILE INDUSTRY WAS TRYING TO CREATE NEW FORMULATIONS FOR BETTER DISINFECTION WITH LESS TOXICITY, NEW PRODUCTS CREATED WORLD-WIDE INFECTION OUTBREAKS





FUNGAL KERATITIS

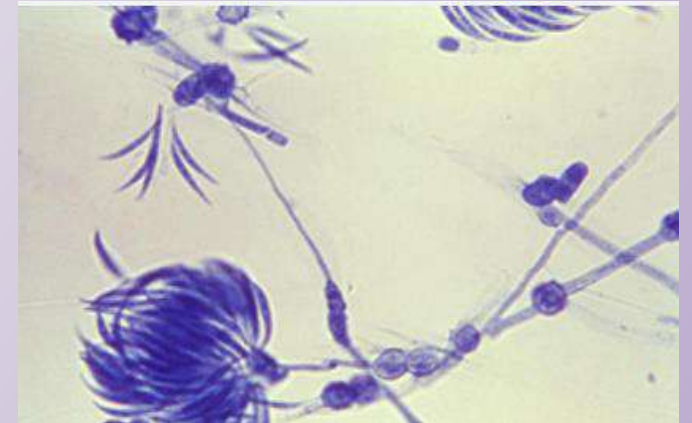
- CASES OF FUNGAL KERATITIS ASSOCIATED WITH *RENU WITH MOISTURE LOC* WERE REPORTED IN SUB TROPICS OF SOUTH ASIA AND LATER IN THE USA AND OTHER COUNTRIES

OUTBREAK OF *FUSARIUM* KERATITIS 2006

- CHANG ET AL. (USA)
 - CASE-CONTROL
 - 164 CONFIRMED CASES
 - 154 ASSOCIATED WITH *RENU WITH MOISTURE LOC*
- KHOR ET AL. (SINGAPORE)
 - 68 CASES
 - ASSOCIATED WITH POOR CONTACT LENS HYGIENE AND *RENU WITH MOISTURE LOC*

Chang et al., JAMA 23:2006

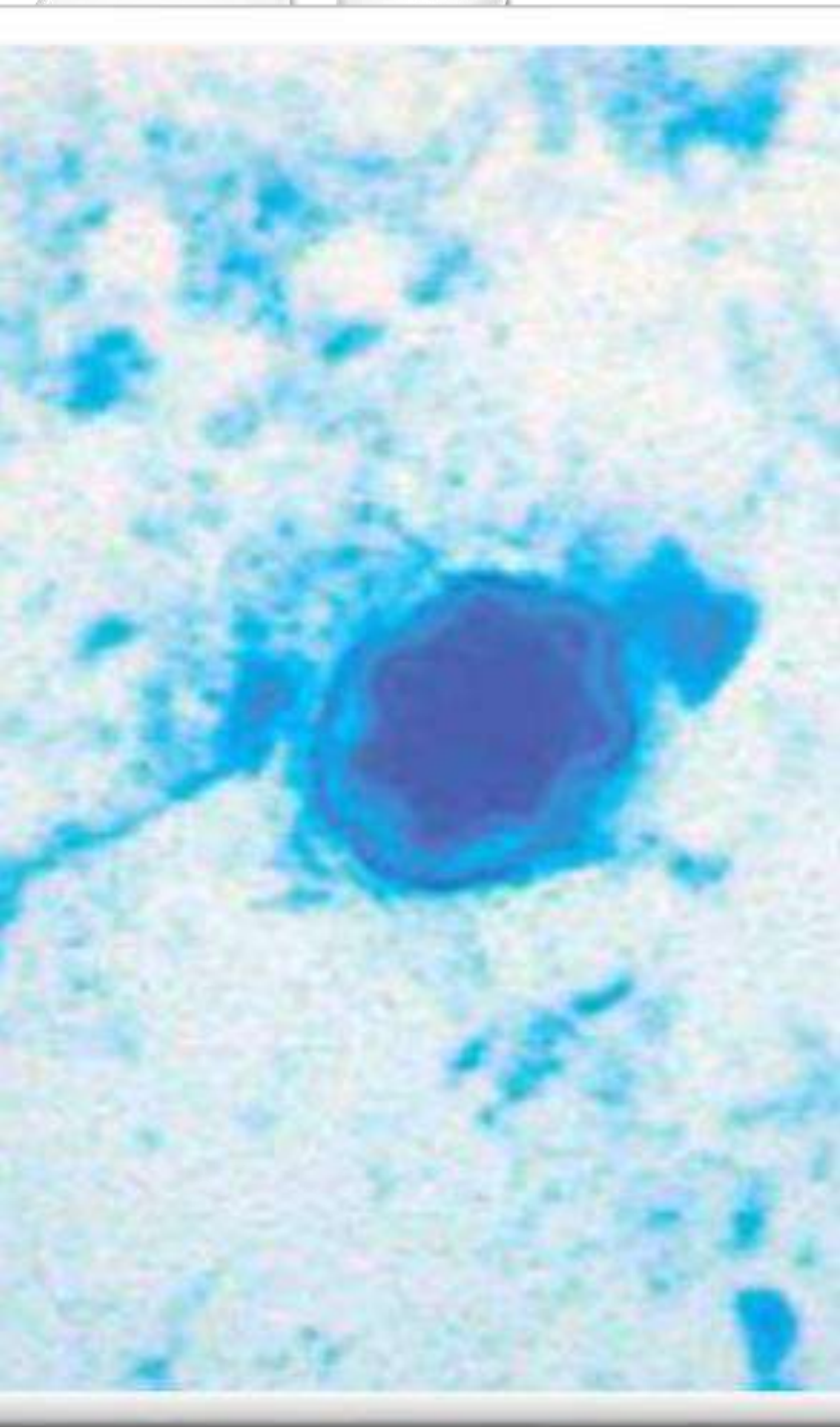
Khor et al., JAMA 295: 2006



ACANTHAMOEBA KERATITIS 2007



- ABBOTT MEDICAL OPTICS (AMO) (FORMERLY ADVANCED MEDICAL OPTICS)
 - RECALLED COMPLETE MOISTURE PLUS ON MAY 26, 2007
 - THIS ACTION FOLLOWED REPORTS AND DATA FROM CDC REGARDING A SEVENFOLD INCREASE OF ACANTHAMOEBA KERATITIS
 - SOLUTION WAS NOT CONTAMINATED BUT WAS FOUND INEFFECTIVE IN PREVENTING ACANTHAMOEBA KERATITIS



ACANTHAMOEBA KERATITIS 2007

- FIRST REPORTED IN 1973
- ACCORDING TO CDC, ESTIMATED 85% OF U.S. ACANTHAMOEBA KERATITIS CASES AFFECT CONTACT LENS WEARERS

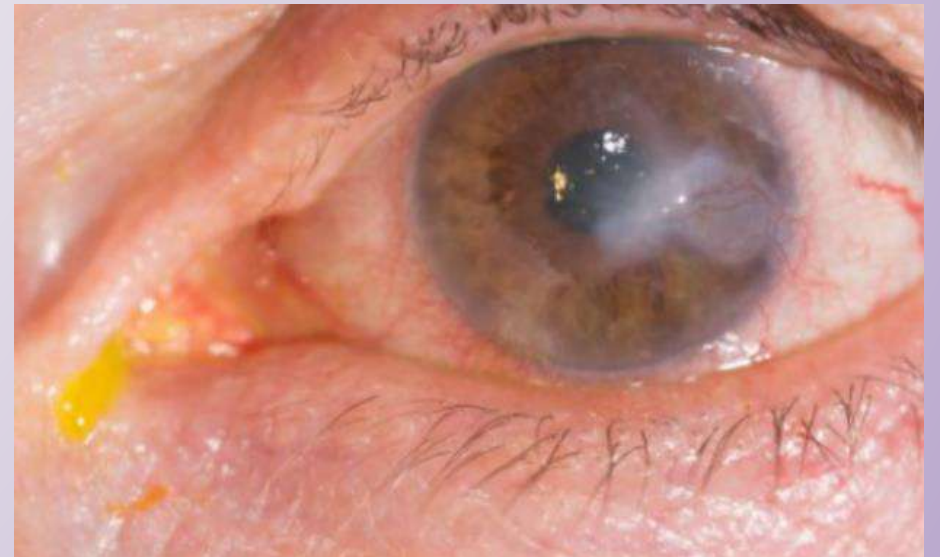
INCIDENCE OF MICROBIAL KERATITIS PER 10,000 CONTACT LENS WEARERS

- OVERALL INCIDENCE 4/10,000
 - RGP (DW) 1.2/10,000
 - RGP (EW) 7.7/10,000
 - DAILY DISPOSABLE 2.0/10,000
 - SOFT LENSES (DW) 1.9-4.1/10,000
 - SOFT LENSES (EW) 19.5/10,000

- PERMANENT VISION LOSS (> 2 LINES): 0.6

IN SUMMARY

- OVERNIGHT OR EW CTL MAY BE ASSOCIATED WITH A 6-15 FOLD INCREASE IN RISK OF INFECTIOUS KERATITIS
- DAILY DISPOSABLE CTL HAVE LOWER RISK OF INFECTION SEVERITY AND VISION LOSS
- IMPROPER MAINTENANCE AND WEARING BEHAVIOR INCREASE RISK OF INFECTIOUS KERATITIS

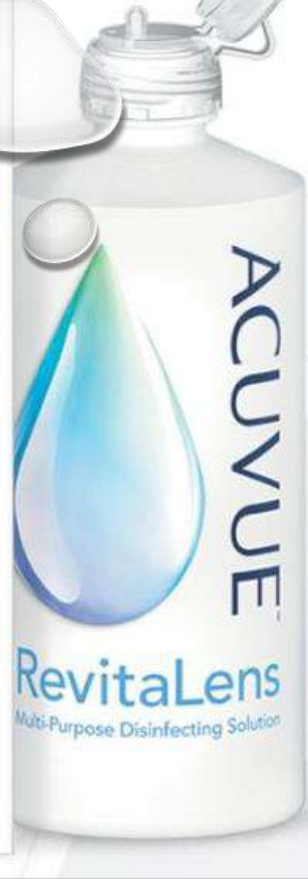
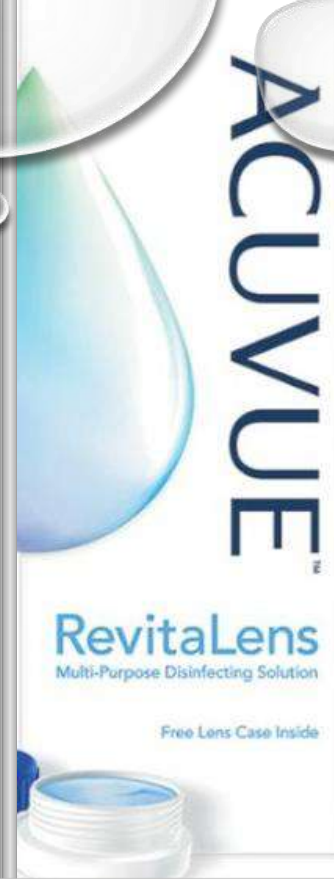


IN SUMMARY

- >80% OF CTL WEARERS REPORT AT LEAST ONE BEHAVIOR THAT PUTS THEM AT RISK FOR INFECTION
 - WETTING THE LENS WITH SALIVA
 - REUSING MPS SOLUTION
 - TOPPING OFF SOLUTION
 - FAILURE TO RUB AND RINSE LENSES WITH MPS SOLUTION
 - USING SALINE TABLETS AND DISTILLED WATER
 - NOT CLEANING OR REPLACING CTL CASE
 - SHOWERING IN LENSES







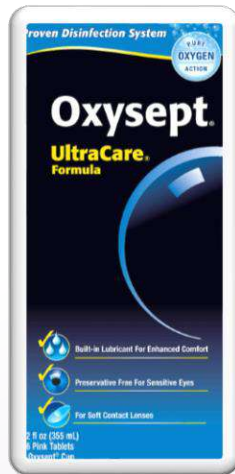
CURRENT MPS FORMULATIONS

HOW DO PRODUCTS DIFFER?

- CHEMISTRY
 - DISINFECTANT PERFORMANCE
 - CLEANING PERFORMANCE
 - BIO-COMPATIBILITY – LENS IS A “DELIVERY DEVICE” FOR MPS TO THE EYE
- PHYSICAL PROPERTIES
 - VISCOSITY
 - WETTING PROPERTIES ON LENS AND EYE
- CLINICAL PERFORMANCE



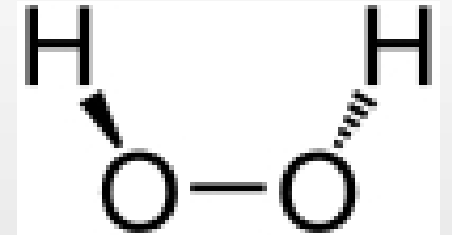
HYDROGEN PEROXIDE DISINFECTION SYSTEMS



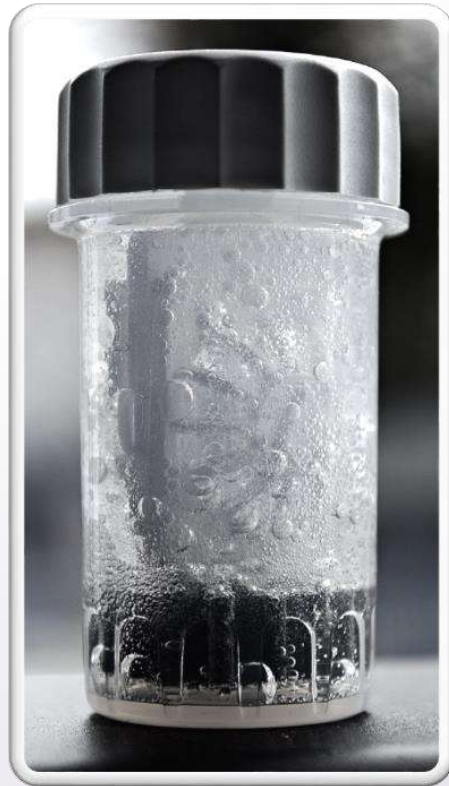
- CATALASE ENZYME NEUTRALIZED (OXYSEPT)
 - FULL 3% STRENGTH FOR >20 MIN; DELAYED NEUTRALIZATION USING TABLET
- CATALYTIC DISC NEUTRALIZED (CLEARCARE)
 - DECREASING PEROXIDE CONCENTRATION
 - AGE OF DISC DETERMINES IF NEUTRALIZATION OCCURS IN A FEW MINUTES OR SEVERAL HOURS
 - TRIPLE ACTION IS ORIGINAL FORMULA
 - HYDRAGLYDE HELPS WITH WETTABILITY TO HELP DECREASE LENS DEHYDRATION

HYDROGEN PEROXIDE MODE OF ACTION

- $\text{H}_2\text{O}_2 \Rightarrow \text{H}_2\text{O} + \text{O}_2$
 - PRODUCES FREE RADICAL SUPEROXIDE; WHICH IS TOXIC TO MICROBES
 - DAMAGES DNA
- STRONG OXIDANT
- NOT AFFECTED BY ORGANIC MATTER
- REMOVES PROTEINS AND LIPIDS FROM LENS SURFACES



HYDROGEN PEROXIDE DISINFECTION SYSTEMS



- VERY EFFECTIVE AND PRESERVATIVE-FREE
- FOR DAILY USE; NOT FOR OCCASIONAL CL WEARERS
- CAUTION PATIENTS NOT TO STORE “SPARE LENSES” IN NEUTRALIZED PEROXIDE
- MOST COMMON PROBLEM IS TOXICITY FROM NON/INSUFFICIENTLY NEUTRALIZED H₂O₂

GAS PERMEABLE CARE SYSTEMS



BOSTON ORIGINAL/ADVANCE FORMULA 3 STEP CLEANING PROCESS



- USES DAILY CLEANER, CONDITIONING SOLUTION AND LIQUID ENZYME
 - DAILY CLEANER
 - SURFACTANT CLEANER; CAN NOT BE USED WITH ALL GP LENS MATERIALS/SURFACE TREATMENTS AS IT WILL SCRATCH THE LENSES
 - USED EVERY NIGHT AND RINSED WITH SALINE
 - CONDITIONING/STORING SOLUTION
 - A STERILE, AQUEOUS BUFFERED, SOLUTION CONTAINING A CELLULOSE DERIVATIVE POLYMER AND POLYVINYL ALCOHOL AS WETTING AND CUSHIONING AGENTS
 - LIQUID ENZYME
 - USED WEEKLY TO REMOVE PROTEIN/LIPID BUILDUP

BOSTON SIMPLUS MULTIPURPOSE

- FOR CLEANING, REMOVING PROTEIN, RINSING, DISINFECTING, CONDITIONING, STORING
- RECOMMENDED THAT NO EVENING RUB REQUIRED; JUST RUB AND RINSE IN THE MORNING PRIOR TO LENS INSERTION
- NO WEEKLY PROTEIN REMOVER NEEDED



UNIQUE PH MULTIPURPOSE

- FOR CLEANING, REMOVING PROTEIN, RINSING, DISINFECTING, CONDITIONING, STORING
- RECOMMENDED THAT NO EVENING RUB REQUIRED; JUST RUB AND RINSE IN THE MORNING PRIOR TO LENS INSERTION
- NO WEEKLY PROTEIN REMOVER NEEDED



TANGIBLE CLEAN MULTIPURPOSE



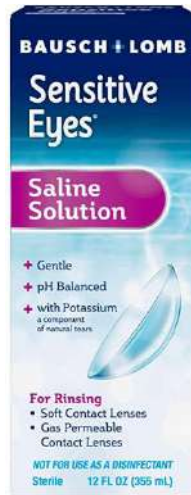
- FOR CLEANING, REMOVING PROTEIN, RINSING, DISINFECTING, CONDITIONING, STORING
- RECOMMENDED THAT NO EVENING RUB REQUIRED; JUST RUB AND RINSE IN THE MORNING PRIOR TO LENS INSERTION
- NO WEEKLY PROTEIN REMOVER NEEDED



CLEARCARE HYDROGEN PEROXIDE SYSTEM

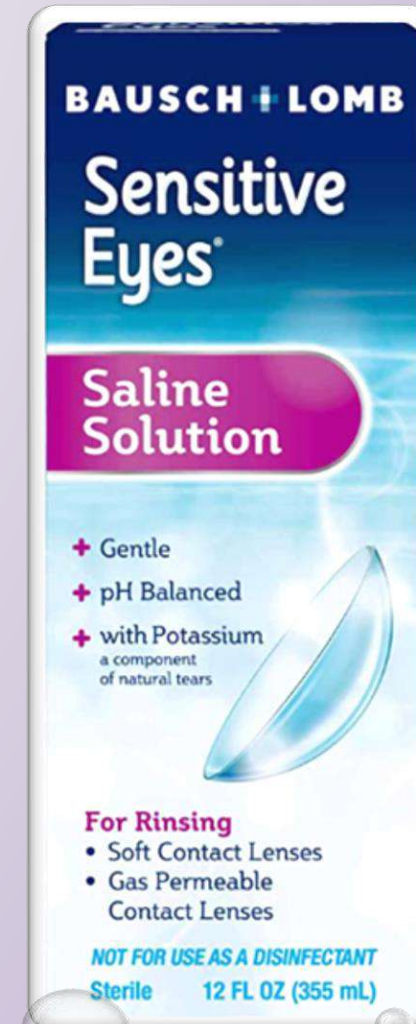
- APPROVED BY FDA FOR USE WITH SOFT LENSES AND GAS PERMEABLE LENSES
- PRESERVATIVE-FREE BENEFITS
- FOR ADDED LENS WETTABILITY, HAVE PATIENTS RUB AND INSERT GAS PERMEABLE LENS WITH BOSTON CONDITIONER OR ARTIFICIAL TEAR

SALINE



SENSITIVE EYES SALINE BAUSCH & LOMB

- NOT PRESERVATIVE FREE
- BUFFERED ISOTONIC SOLUTION THAT CONTAINS POTASSIUM AND IS PH BALANCED
- USED TO RINSE CLEANER OFF OF LENSES AND TO INSERT LENSES
- CONTAINS BORIC ACID, SODIUM BORATE AND SODIUM CHLORIDE



PRESERVATIVE FREE SALINE

- BOTTLES MUST BE DISCARDED WITHIN 30 DAYS OF BEING OPENED
- SODIUM CHLORIDE VIALS
- SINGLE USE DOSAGE
 - 3ML; 5ML; 10ML; 15ML



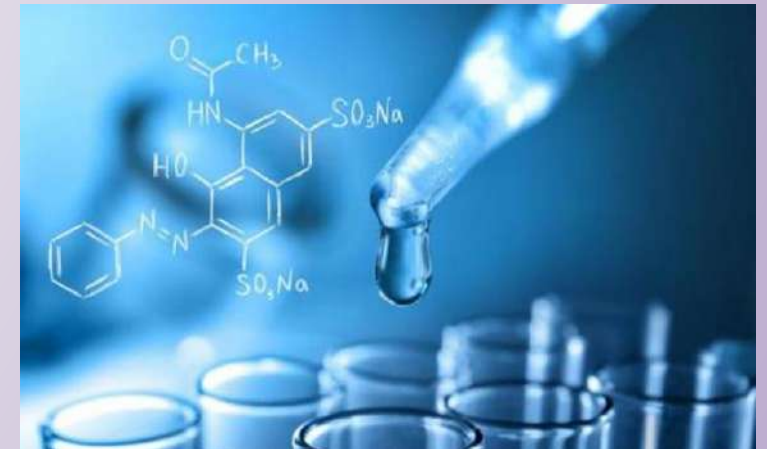
PRESERVATIVE FREE SALINE

- 5 NATURAL ELECTROLYTES TO MIMIC BODY'S NATURAL TEARS
 - SODIUM, PHOSPHATE, POTASSIUM, CALCIUM, MAGNESIUM
 - PH OF 7.4
- SINGLE USE DOSAGE 10ML



HYALURONIC ACID (HA)

- A NATURAL SUBSTANCE FOUND IN THE FLUIDS IN THE EYES AND JOINTS
- ACTS AS A CUSHION AND LUBRICANT IN THE JOINTS AND OTHER TISSUES
- DIFFERENT FORMS OF HYALURONIC ACID ARE USED FOR COSMETIC PURPOSES
- INCREASES TEAR FILM VISCOSITY AND THICKNESS HELPS WITH EVEN DISTRIBUTION OF TEARS ACROSS THE OCULAR SURFACE





RECOMMENDATIONS

- LENS CARE
 - WASH HANDS
 - COMPLIANT LENS REPLACEMENT
 - DO NOT STORE OPENED “SPARE LENSES”
 - RUB AND RINSE DAILY
 - USE FRESH SOLUTIONS DAILY
 - DO NOT TOP-OFF SOLUTION

RECOMMENDATIONS

- CASE CARE
 - EMPTY/RINSE DAILY
 - CLEAN CASE WITH MILD DETERGENT AND HOT WATER OR H₂O₂
 - AIR DRY DAILY
 - WIPE OUT WITH TISSUE OR CLEAN TOWEL
 - REPLACE AT LEAST EVERY 3 MONTHS



RECOMMENDATIONS

- PATIENT EDUCATION
 - GIVE SAMPLE RECOMMENDED SOLUTION
 - EXPLAIN THEY SHOULD NOT USE ALTERNATIVE SOLUTION
 - GIVE VERBAL INSTRUCTIONS OF CLEANING TECHNIQUE
 - GIVE WRITTEN INSTRUCTIONS OF CLEANING TECHNIQUE
 - WEARING SCHEDULE
 - SPECIFIC EYE DROP BRAND AND USE
 - FOLLOW-UP SCHEDULE
 - REVIEW ADAPTATION SYMPTOMS
 - WHAT IS NORMAL?
 - WHAT IS NOT NORMAL?

2017: SOFT LENS DROPOUTS

- IMPROVED TECHNOLOGY IS DECREASING CONTACT LENS DROPOUTS BUT THERE ARE STILL CONTACT LENS PATIENTS THAT ARE LOST DUE TO *CONTACT LENS DISCOMFORT*
 - RECENT STUDY FOUND THAT THE RETENTION RATE FOR NEW SOFT LENS WEARERS DURING THE FIRST 12 MONTHS OF WEAR WAS 77.6% (531 TOTAL PARTICIPANTS)
 - **THIS REPRESENTS A LOSS OF 1 IN 12 CONTACT LENS WEARER**



QUESTIONS?