1. **FIGHT THE MITE**
   EVICTING DEMODEX BLEPHARITIS

   TRACY DOLL, OD, FAAO
   PACIFIC DRY EYE SOLUTIONS
   AT PACIFIC UNIVERSITY COLLEGE OF OPTOMETRY

2. **MEET DR. DOLL AND DISCLOSURES**

   • DR. DOLL COORDINATES PACIFIC DRY EYE SOLUTIONS, PACIFIC UNIVERSITY COLLEGE OF OPTOMETRY’S OCULAR SURFACE DRYNESS CENTER OF EXCELLENCE
   • DR. DOLL IS HAS BEEN A CONSULTANT AND/OR SPEAKER FOR THE FOLLOWING COMPANIES:
     • ALLERGAN
     • ALCON
     • BIOTISSUE
     • NOVARITS
     • JOHNSON AND JOHNSON
     • SUN
   • DR. DOLL ONLY SUPPORTS DIAGNOSTICS AND THERAPEUTICS THAT WORK! THERE IS NO BIAS IN THIS PRESENTATION.

   ALL CONTENT IN THIS LECTURE IS ACADEMIC PROPERTY OF DR. TRACY DOLL AND CAN NOT BE DUPLICATED WITHOUT HER PERMISSION, INCLUDING CASE REPORT AND IMAGES

3. **MEET THE TENANT**

   • DEMODEX ARE SMALL MITES (0.1-0.4MM) THAT LIVE IN HUMANS
   • INCIDENCE VARIES IN STUDIES BETWEEN 30-100%
   • SEMI-TRANSPARENT WITH 2 FUSED SEGMENTS
WITH A CHITINOUS EXOSKELETON
• ADULTS HAVE 8 LEGS ON TOP SEGMENT
• HAVE A PIN-LIKE MOUTH PARTS

4 DEMODEX HOUSING
• THERE ARE TWO SEPARATE SPECIES
• DEMODEX BREVIS LIVE IN SEBACEOUS/ MEIBOMIAN GLANDS
• DEMODEX FOLLICULARIS
  LIVE IN HAIR/ EYELASH FOLLICLES

5 DEMODEX SUSTENANCE
• DEMODEX LIKE TO EAT
  • DEAD SKIN CELLS
  • THICKENED SEBUM
  • GLANDULAR/ FOLLICULAR EPITHELIAL CELLS!!
  • EYELIDS ARE A GREAT “BUFFET” LOCATION
    AS THEY HAVE FOLLICLES, SEBACEOUS GLANDS, AND SKIN
    TISSUE

6 OTHER LOCATIONS
OTHER THAN THE EYELID OTHER LOCATIONS INCLUDE:
• FACE: CHEEKS, NOSE, CHIN, FOREHEAD, TEMPLES, BROWS,
  NASO-LABIAL FOLDS
• HEAD: BALDING SCALP, NECK, EARS
• LESS COMMONLY UPPER AND MEDIAL REGION OF CHEST
  AND BACK, PENIS, MONS VENERIS, BUTTOCKS, AND IN THE
  ECTOPIC SEBACEOUS GLANDS IN THE BUCCAL MUCOSA

7 DEMODEX PRIME REAL ESTATE
• WHICH PATIENTS DO WE KNOW THAT HAVE EXCESSIVE
  AMOUNTS OF FLAKING DEAD SKIN CELLS?
• WHO DO WE KNOW THAT PRODUCES OILY SEBUM?
  • SKIN CONDITIONS: ROSACEA, ECZEMA, PSORIASIS
  • ELDERLY
• POOR HYGIENE
• COMPROMISED IMMUNE SYSTEM

8 MOVING DAY
• TRANSMISSION IS FROM HUMAN TO HUMAN SKIN CONTACT
• MITES CAN LIVE ON FOMITES (SURFACES) FOR SHORT PERIODS OF TIME, BUT TEND TO DIE DUE TO “DRYING-OUT”
  • PILLOWS/BEDDING
  • DUST CONTAINING EGGS

9 DEMODEX LIFE SPAN
DEMODEX LIFESPAN:
~2 WEEKS (14-16 DAYS)
• EGG TO LARVAL STAGE:
  2-4 DAYS
• LARVAL TO ADULT STAGE:
  ~7 DAYS
• ADULT STAGE: 4-5 DAYS

10 DEMODEX NIGHT LIFE
• DEMODEX SURFACE NEAR THE SKIN AT NIGHT TO REPRODUCE
  • DO NOT LIKE LIGHT
  • ONLY MALES EXIT THE FOLLICLE AND MOVE RATHER SLOWLY (8-16MM/HOUR)
  • FEMALES CAN LIVE 5 DAYS LONGER TO LAY 20-24 EGGS

11

12 OVERPOPULATION
OVERPOPULATION WITH DEMODEX HAS NEGATIVE EFFECTS KNOWN AS “DEMODICOSIS”
• A DENSITY OF > 5 MITES PER FOLLICLE AS A PATHOGENIC CRITERION
• EXPIRED BODIES
• TOXINS AND WASTE
• BLOCKAGE OF EXIT PATHWAYS

13 □ UN-INVITED GUESTS
• CARRY STAPH AND STREP BACTERIA
• ALSO HAVE OWN BACTERIAL SPECIES: BACILLUS OLERONIUS
  • ANTIGENS TO THESE BACTERIA (AND DEMODEX THEMSELVES) ARE KNOWN TO BE CAUSE HYPERSENSITIVITY REACTIONS
• AN INCREASE IN WHITE BLOOD CELL ACTIVITY (CD-4 T-CELLS/LANGERHAN) AND IGM LEVELS THAT ARE INVOLVED WITH INFLAMMATION HAVE BEEN DETECTED
• POSITIVE CORRELATION WITH MMP-9 (A MARKER IF INFLAMMATION AND TISSUE REMODELING) AND INCREASED MITES IN LASH SAMPLES

14 □ RESULTS OF DEMODICOSIS
• LASHES: MISDIRECTION (TRICHIASIS), LOSS (MADAROSIS)
• LID MARGIN: INFLAMMATION
  HYPERKERATINIZATION + LIPIDS +SEBUM → CYLINDRICAL DANDRUFF, WHICH IS PATHOGNOMONIC FOR DEMODICOSIS
  •

15 □

16 □ DEMODICOSIS AND GLANDS
• MEIBOMIAN GLANDS: MECHANICAL BLOCKAGE OF THE GLAND ORIFICES (MGD), CHALAZIA/ HORDEOLA DUE TO GRANULOMATOUS REACTION OF CHITON EXOSKELETON
  •

17 □ DEMODICOSIS AND OCULAR SURFACE
• CONJUNCTIVA: INFLAMMATION
• CORNEA: INFLAMMATION LEADING TO NEO, INFILTRATES, PHLYCTENULE –LIKE OPACITIES

18 □ BLEPHARITIS TYPES

19 □ SIGNS OF EXCESS OCCUPANCY
• CYLINDRICAL DANDRUFF OR ANY OF THE OCULAR SIGNS
• HISTORY OF SKIN PROBLEMS
• GERIATRIC POPULATION
• SYMPTOMS OF IRRITATION, ITCH, COSMETIC “FLAKINESS”/ CRUSTING

20 DETECTING DEMODEX IN SLIT LAMP
 THESE MITES CAN BE EASILY SEEN WITH BIOMICROSCOPY, IF YOU KNOW WHAT TO LOOK FOR
• LOCATE AN EYELASH WITH CYLINDRICAL DANDRUFF PRESENT
• REMOVE DANDRUFF WITH A MOISTENED COTTON-TIP APPLICATOR
• WITH GENTLE CIRCULAR MOTION “TUG AND TWIRL” THE CLEAN LASH WITH A PAIR OF EPILATION FORCEPS
• DEMODEX TAILS WILL SURFACE AT THE LASH-BASE

21 TWIRL- TUG TEST
• THESE MITES CAN BE SEEN WITH BIOMICROSCOPY
• CAN ALSO EPILATE A LASH AND LOOK UNDER A MICROSCOPE
• MAKE SURE TO REMOVE SCURF FIRST

• THE “TWIRL TEST”
• START AT 43 SECONDS: HTTPS://YOUTU.BE/16BSXFCS0WI

22 DETECTING DEMODEX WITH MICROSCOPY
 THESE MITES CAN BE SEEN WITH MICROSCOPY ON 10-40X MAG EASILY
• AGAIN, REMOVE THE DANDRUFF FIRST FROM LASH FIRST
• EPILATE LASH(ES), PLACE ON A SLIDE WITH LIPID TEAR DROP + COVER SLIP
• ADDITION OF METHYLENE BLUE/SODIUM FLUORESCIN CAN ENHANCE
• CAN ALSO COLLECT A CHEEK SAMPLE WITH TAPE AND PLACE ON SLIDE
• EXAMINATION WILL REVEAL DEMODEX ON LASH FOLLICLE/SKIN SAMPLE
• DEMODEX OFTEN TRY TO “HIDE FROM THE LIGHT SOURCE—TRY TAPPING THE SLIDE TO SEE THE MITES MOVE

23 □ HELLO *FOLLICULARIS* ON 40X

24 □ HELLO BREVIS ON 10X AND 40X

25 □ MAKE-UP MASKING
• CYLINDRICAL DANDRUFF AND MITES CAN BE HARD TO DETECT WITH THE APPLICATION OF THICK MASCARA/EYELINER
• WE KNOW MAKE-UP CAN BE EASILY CONTAMINATED WITH MICROBES.
• CAN STILL DO THE TWIRL-TEST, BUT IF INCONCLUSIVE, TRY REMOVING MAKE-UP FIRST

26 □ DEMODICOSIS TREATMENT
• TEA TREE OIL
• HYPOCHLOROUS ACID
• OKRA PLANT
• MECHANICAL ACTION

27 □ TEA TREE OIL
TEA TREE OIL (TTO)/MELALEUCA OIL AT DIFFERENT CONCENTRATIONS HAS DIFFERENT EFFECTS ON DEMODEX
• 50% TTO HAS DIRECT KILLING EFFECT ON THE MITES
• 5% TTO MAY INTERRUPT THEIR LIFE CYCLE BY PREVENTING MATING
• THE ACTIVE INGREDIENT IDENTIFIED IS 4-TERPINEOL
ALSO KILLS BACTERIA (NO RESISTANCE) AND FUNGUS

28 □ TEA TREE IN THE OFFICE
• HIGHER CONCENTRATION (50%) OF TEA TREE/MELALEUCA OIL, THAT IS MEANT TO BE APPLIED ONLY BY A DOCTOR, AS IT WILL IRRITATE THE CORNEA
• CLEAN THE LIDS OF CYLINDRICAL DANDRUFF DEBRIS
• SITS 5-10 MINUTES, THEN CLEANED-OFF WITH STERILE SALINE LID SCRUB, CORNEA CHECKED
• REPEATED 2X, ONE MONTH APART TO KILL BOTH MITES AND LARVAE
  • OUST DEMODEX SWABSTIX KIT
  • BLEPHADEX KIT
  • 50% DILUTION OF TTO IN CARRIER OIL (MACADAMIA NUT, COCONUT/JOJOBA, ETC.)
  •

29 □ TEA TREE OIL AT HOME
• IN CONCENTRATION 2-10%
• MOST PRODUCTS HAVE AN ASTRINGENT/ TINGLING SENSATION
• LID WIPES: CLIRADEX, OUST DEMODEX, OASIS
• FOAM: THERA TEARS STERILID, TRANQUILEYES, BLEPHADEX, OASIS, WE LOVE EYES
• GEL: CLIRADEX LITE
• BAR: HEYEDRATE
• MAKE-UP REMOVER: HEKA CLEAN, WE LOVE EYES

30 □ HYPOCHLOROUS ACID
• MAY NOT KILL DEMODEX IN VITRO (ARVO PAPER BY KABAT)
• REMOVES FOOD SOURCE AND BACTERIA
• CAN USE BID FOR MAINTENANCE AFTER IN-OFFICE TTO/ MECHANICAL TX
• ALTERNATIVE FOR TTO ALLERGIES/ SENSITIVITIES
• REQUIRES PATIENT TO SPRAY AND ON A COTTON-PAD, SOME ALSO ARE RECOMMENDED TO RINSE OFF
• AVAILABLE OTC
  • 0.01%: AVENOVA, ZENOPTIQ
  • 0.015: HEYEDRATE
  • 0.02%: OCUSOFT HYPOCHLOR

31 □ OKRA PLANT: ABELMOSCHUS ESCULENTUS
OKRA PLANT: Abelmoschus Esculentus

- Available in the Zocular line of lid care
- Okra has antioxidant, anti-inflammatory and immunomodulatory, antibacterial, anticancer, antidiabetic, organ protective, and neuropharmacological activities

**Product Line:**
- Zocuwipes
- Zocufoam
- Zocushield lid gel
- Zocufill elixer – eye-cream
- Zocuzap

Recent white paper suggests it may kill *Demodex follicularis* (when soaked in 20ml for 1.52 hours)

**Mechanical scurf removal**

- For severe or non-compliant blepharitis
- Surgical grade PVC sponge (Blephex) or plastic disc (Lidpro) then rotates between 1,000-10,000 RPM
- A disposable head/tip can be used in conjunction with a lid scrub solution containing TTO
- The goal here is to remove all scurf that is associated with *Demodex* blepharitis.
- Debridement is recommended every 4-6 months.
- Not currently covered by insurance

**Blephex vs. Lid pro**

**Debridement of lid margin/ Line of Marx**

- Line of Marx (LOM) is located at the mucocutaneous junction between conjunctiva-eyelid skin
- LOM is keratinized deposits and debris from the friction between eyelid with cornea /conjunctiva.
- Ocular surface dryness increases the thickness of the LOM
- Easily seen with application of lissamine green
35 **LID WIPER EPITHELIOPATHY AND LID DEBRIDEMENT**
- THICKENED LINE OF MARX, BLOCKING THE MEIBOMIAN GLANDS ORIFICES= **LID WIPER EPITHELIOPATHY (LWE)**
- LWE PREVENTS NORMAL COMPLETE LID CLOSURE → EVAPORATION

36 **DEBRIDEMENT PROCEDURE**
- THE GOAL WITH DEBRIDEMENT IS SIMPLY TO REMOVE ALL LISSAMINE DYE/ KERATINIZED MATERIAL FROM THE EYELID MARGIN.
- INSTILL A TOPICAL ANESTHETIC, THEN USE A GOLF SPUD/ SMALL CURETTE TO GENTLY DEBRIDE
- NO CPT CODE/ OUT OF POCKET

37 **INTENSE PULSED LIGHT**
- INTENSE PULSED LIGHT IS ENERGY DELIVERED TO SKIN TISSUE IN THE VISIBLE SPECTRUM.
- IPL IS NORMALLY USED IN THE TREATMENT OF ROSACEA-ASSOCIATED DRY EYE TO CAUSE COAGULATION OF TELANGIECTATIC BLOOD VESSELS IN THE CHEEKS AND EYELIDS

38 **IPL FOR DEMODEX**
- IPL DECREASES *DEMODEX* (AND ASSOCIATED BACTERIAL) LOAD ALONG THE LID MARGIN
- THE PIGMENTED EXOSKELETON OF *DEMODEX* CONTAINS CHROMOPHORES THAT ABSORBS IPL ENERGY
- HISTOLOGIC ANALYSIS HAS DEMONSTRATED THAT IPL TREATMENT INDUCES COAGULATION AND NECROSIS OF DEMODEX MITES!!
- DEMODEX BBQ!

39 **OTHER CLASSIC INTERVENTIONS**
- SMOTHER WITH OINTMENT
- TOPICAL ANTIBIOTIC OINTMENTS/DROPS
  - METRONIDAZOLE
- ORAL ANTI-PARASITIC
• IVERMECTIN
• TOPICAL ANTI-PARASITIC
• IVERMECTIN OR PERMETHRIN (OFF-LABEL ON EYELIDS)

DO THESE TREATMENTS MEET THE PRIMARY GOALS OF CONTROLLING Demodex POPULATIONS, WITHOUT BREATING BACTERIAL RESISTANCE?

40 □ THE CRACKED LID
• 70 YOWF
• ORIGINALLY PRESENTED AS A REFERRAL FOR BLEPHARITIS AND CRACKED UPPER EYELID
• DERMATOCHALASIS WITH HOODING OD >> OS, HAD BEEN TOLD IT WAS SURGICAL LEVEL
• OTHER MEDICAL HISTORY: THYROID DISEASE ON SYNTHROID, ROSACEA SKIN TYPE WITH TELANGIECTASIA OF THE CHEEKS

41 □ DEMODEX “CRACKING”
• AS A REMINDER, Demodex LIE IN SKIN FOLDS
• CYLINDRICAL DANDRUFF
• OBVIOUS MGD ALSO NOTED WITH TURBID SECRETIONS
• TREATED WITH 50% TTO DILUTED SOLUTION IF-OFFICE
• PLACED ON NIGHTLY TTO SOLUTION TO KEEP DEMODEX POPULATION UNDER CONTROL

42 □ TEA-TREE OIL TREATMENT RESULTS
• 1 MONTH LATER RESULTED IN COMPLETE RESOLUTION OF RIGHT “CRACKED LID”, AND SPEED Q DROPPING TO 8!
• REFERRED FOR UPPER EYELID BLEPHAROPLASTY TO TARGET MAIN RISK FACTOR, WITH MGD TREATMENT PRIOR TO SURGERY
• PATIENT TOOK A 2 MONTH TRIP TO EUROPE, BUT CONTACTED SURGEON UPON RETURN

43 □ BACK ON THE ROAD
PREP FOR SURGERY- 6 MONTHS LATER
• NEW GOAL WAS TO INSURE PATIENT HAD THE BEST SURGICAL EXPERIENCE, BY DECREASING INFLAMMATION IN THE EYELIDS
• 3 ROUNDS OF TOYOS IPL SETTINGS, SPACED 1 MONTH APART
• RESULTED IN ALL GLANDS SECRETING CLEAR
• BILATERAL UPPER BLEPHAROPLASTY 1.25 MONTHS AFTER LAST IPL ROUND

44 POST- SURGERY
• REPORTED EXCELLENT HEALING AND SATISFACTION WITH SURGICAL RESULTS, MINIMAL SCARRING, AND INCREASED VISUAL FIELD
• SPEED Q WAS STILL BELOW 10
• HAD STOPPED TTO LIDS SCRUBS (UNSURE IF SHE COULD USE WITH HEALING SCARS0, WITH MILD CYLINDRICAL DANDRUFF RETURNING
• PRESCRIBED PATIENT RESTART TTO LIDS SCRUBS AT NIGHT, ALONG WITH A LID SEAL SLEEP MASK AND GEL DROP

45 UNDER CONTROL
• RECALL WILL BE 6 MONTHS AFTER BLEPHAROPLASTY
• REPEAT IPL TREATMENTS ANNUALLY
• CONTINUE TTO BASED LID SCRUBS EVERY OTHER NIGHT
• LIFITEGRAST 5% BID
  (PATIENT IS ALSO LOOKING INTO CYCLOSPORINE 0.09% FOR COST COMPARISON)

46 FIGHT THE MITE!!
• KNOW THE PATIENTS MOST AT RISK FOR OVERPOPULATION
• IDENTIFY THE SIGNS OF OVER-OCCUPANCY
• REDUCE POPULATIONS IN-OFFICE AND AT HOME USING WELL-RESEARCHED MODERN THERAPIES

47 FINAL WORD
• SORRY, BABY SHAMPOO DOESN’T CUT IT
• JINGBO LIUA. CURR OPIN ALLERGY CLIN IMMUNOL. 2010 OCTOBER ; 10(5): 505–510. DOI:10.1097/ACI.0B013E32833DF9F4
• COX, S. D., MANN, C. M., MARKHAM, J. L., BELL, H. C.,


• HTTPS://WWW.REVIEWOFOPTOMETRY.COM/ARTICLE/PUT-A-LID-ON-DEMODEX


• HTTPS://WWW.RESEARCHGATE.NET/PUBLICATION/325393002_IN-VITRO_DEMODICIDAL_ACTIVITY_OF_COMMERCIAL_LID_HYGIENE_PRODUCTS

• MASTROTA KM. METHOD TO IDENTIFY DEMODEX IN THE EYELASH FOLLICLE WITHOUT EPILATION. OPTOM VIS SCI. 2013 JUN;90(6):E172-4. DOI: 10.1097/OPX.0B013E318294C2C0. PMID: 23670124

• METHOD TO IDENTIFY DEMODEX IN THE EYELASH FOLLICLE WITHOUT EPILATION.

• YING-YING GAO, MARIO A. DI PASCUALE, WEI LI, DANIEL TZONG-SHYUE LIU, ALIREZA BARADARAN-RAFII, ANTONIO ELIZONDO, TETSUYA KAWAKITA, VADREVU K. RAJU, SCHEFFER C. G. TSENG; HIGH PREVALENCE OF DEMODEX IN EYELASHES WITH CYLINDRICAL DANDRUFF. INVEST. OPHTHALMOL. VIS. SCI. 2005;46(9):3089-3094. DOI: 10.1167/IOVS.05-0275.

• HTTPS://WWW.HEALIO.COM/OPTOMETRY/CORNEA-EXTERNAL-DISEASE/NEWS/PRINT(PRIMARY-CARE-OPTOMETRY-NEWS/%7B586C29A0-2BF5-4548-9670-14E88FAE9B98%7D/DEMODEX-INFESTATION-REQUIRES-IMMEDIATE-AGGRESSIVE-TREATMENT-BY-DOCTOR-PATIENT

• HTTPS://EN.WIKIPEDIA.ORG/WIKI/DEMODEX_FOLLICULORUM#CITE_NOTE-SCHACHNER_2011-6