Western University of Health Sciences
Silver Falls Dermatology

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EPIDEMIOLOGY

- 40-50 million individuals in the US affected each year

- Infants to adults

- Peaks in adolescence and affects 85% of people between age 12-24 years old

- 35% of women and 12% of men

- $2.5 billion in annual cost
THE FOUR MAIN PATHOGENIC FACTORS

1. Microcomedo formation
   - Alteration in the keratinization process/epidermal hyperproliferation
   - Secondary to androgens, decreased linoleic acid, increased IL-1 alpha

2. Sebum production
   - Androgens

3. *P. acnes* follicular colonization
   - Breaks down TGs, stimulates ab production, inflammatory response,
   - Binds TLR2 → release of IL-1a, IL-8, IL-12, TNFa
   - Coproporphyrin III

4. Release of inflammatory mediators
   - Before or after microcomedo formation
Dietary Factors

- Controversial

- High glycemic diets and dairy (especially milk) have been found to be associated with increased prevalence and severity.

- High glycemic index foods and dairy consumption increase androgen levels and insulin-like growth factor-1 (IGF-1).

- IGF-1 controls the signaling of the Fox01 nuclear transcription factor.

- Fox01 in combination with nutrient-sensitive kinase mTOR complex 1 signaling currently hypothesized to be primary mediators of food-induced acne promotion.
CLINICAL FEATURES OF ACNE

- Non-inflammatory
  - Comedones (follicular)
    - Open (blackhead)
    - Closed (whitehead)

- Inflammatory
  - Papules
  - Pustules
  - Cysts
  - Nodules
  - Sinus tracts

Scarring can occur from all forms, including comedones

PIH and persistent erythema can be permanent
NEONATAL AND INFANTILE ACNE

- Neonatal: 2-3 weeks to 3 months, no comedones, Malassezia

- Infantile: 3-6 months, comedones presents, transient elevation of DHEA
ACNE CONGLOBATA

• Severe nodulocystic acne WITHOUT systemic symptoms

• Follicular occlusion tetrad
  • Acne conglobata, dissecting cellulitis of the scalp, hidradenitis suppurativa, pilonidal cyst

• Treatment: Isotretinoin
ACNE FULMINANS

- Most severe form of acne
- Abrupt onset in young men
- Systemic symptoms
  - Fever, arthralgias, myalgia, hepatosplenomegaly
  - Osteolytic bone lesions in the clavicle and sternum
- Painful, oozing, friable plaques with hemorrhagic crusts
- Labs: elevated ESR, leukocytosis, anemia, proteinuria
- Treatment: Isotretinoin + oral corticosteroids
- May be associated with SAPHO syndrome
  - Synovitis, Acne, Pustulosis, Hyperostosis, Osteitis
  - Treatment: NSAIDS, sulfasalazine, infliximab
**PAPA SYNDROME**

- Pyogenic Arthritis, Pyoderma gangrenosum, Acne
- PSTPIP1 gene encoding CD2 antigen-binding protein 1 (CD2BP1)
- Tx: Infliximab, Anakinra
OTHERS

- Acne mechanica
- Acne excoriee des jeunes
- Acne with endocrine abnormality
  - PCOS/Stein-Leventhal syndrome
- Congenital adrenal hyperplasia
DRUG-INDUCED ACNE

- Monomorphorous inflammatory papules
- Hormones
  - Anabolic steroids (danazol, testosterone)
  - Corticosteroids, Corticotropin
- Phenytoin
- Lithium
- Isoniazid
- Iodides, bromides
- EGFR inhibitors
ACNEIFORM ERUPTION WITH EGFR- INHIBITOR
CHLORACNE

- Exposure to chlorinated aromatic hydrocarbons
  - Chloracnegens – fat-soluble, persist in body fat
  - Insecticides, insulators, fungicides, herbicides, wood preservatives
- Malar, retroauricular, mandibular, axillae, scrotum
- Scarring, recurrent outbreaks for many years
- TREATMENT
  - Topical/oral retinoids and antibiotics
TREATMENT

- Topicals
- Systemics
- Light/Laser
- Surgery
TOPICAL THERAPIES

- Benzoyl peroxide (BPO), salicylic acid, glycolic acid, azelaic acid, lipohydroxy acid, sulfur, tea tree oil
- Antibiotics: Clindamycin, Dapsone
- Retinoids:
  - 1st gen – Tretinoin, isotretinoin
  - 2nd gen – Etretinate, alitretin
  - 3rd gen – Tazarotene, adapalene, bexarotene
    - Cornerstone of combination therapy
    - Bind nuclear retinoic acid receptors – RAR, RXR
    - Reverse abnormal keratinization; down regulating K6, K16
    - Comedolytic effect
    - Anti-inflammatory effect via inhibition of TLR-2
SYSTEMIC

- Antibiotics: doxycycline, cephalosporins, minocycline
- Isotretinoin:
  - Teratogenic → ipledge
  - Adverse effects: xerostomia/cheilitis, pseudotumor cerebri, hypertriglyceridemia
    - Hypertriglyceridemia: 150 – 499 → lifestyle changes >500 → first line = treatment
      - 1st line treatments: niacin, omega 3 fatty acids
      - 2nd line: fibrates, statins
- OCPs
- Spironolactone
- Zinc
- Probiotics
LASER AND LIGHT TREATMENTS

- P. acnes makes coproporphyrin III → light (blue) → reactive oxygen species
- Red light penetrates deeper
- PDT
### Table 1

Mechanism of action of light-based therapies

<table>
<thead>
<tr>
<th>Therapy</th>
<th>Wavelength (nm)</th>
<th>Mechanism of action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Narrowband blue light</td>
<td>415</td>
<td>Bactericidal effects on <em>Propionibacterium acnes</em></td>
</tr>
<tr>
<td>Narrowband red light</td>
<td>660</td>
<td>Bactericidal effects on <em>P. acnes</em>; disrupt sebaceous gland function; exert anti-inflammatory effects</td>
</tr>
<tr>
<td>Intense pulsed light</td>
<td>400-1200</td>
<td>Bactericidal effects on <em>P. acnes</em>; disrupt sebaceous gland function; exert anti-inflammatory effects</td>
</tr>
<tr>
<td>Pulsed dye laser</td>
<td>585</td>
<td>Bactericidal effects on <em>P. acnes</em>; disrupt sebaceous gland function; exert anti-inflammatory effects</td>
</tr>
<tr>
<td>Potassium titanyl phosphate laser</td>
<td>532</td>
<td>Bactericidal effects on <em>P. acnes</em>; disrupt sebaceous gland function</td>
</tr>
<tr>
<td>Infrared lasers</td>
<td>1320, 1450, 1540</td>
<td>Disrupt sebaceous gland function</td>
</tr>
<tr>
<td>Photodynamic therapy</td>
<td>630, 500-700 (variable depending on light source-lasers, light-emitting diodes, fluorescent lamps, filtered incandescent or arc lamps)</td>
<td>Disrupt sebaceous gland function</td>
</tr>
<tr>
<td>Photopneumatic technology</td>
<td>400-1200</td>
<td>Negative pressure opens sebaceous gland allowing for more effective evacuation of sebum, bacteria, and dead skin cells; increases efficiency of energy transmission from light source</td>
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LASERS FOR ACNE RESURFACING

- CO2
- Picosecond PDL
- Picosecond Alexandrite
- Histology suggest improvement in scarring from laser goes beyond remodeling of collagen
REFERENCES


