Pediatric Skin Surgery
What’s New with Scars?
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Why Do Humans Scar at All?

- Evolutionarily, most wounds = post-combat or traumatic falls
- Injuries usually involved widespread areas of damage
- Human body needed a response system that seals area off quickly and controls infection

Embryonic Wound Healing

- Cutaneous wounds during 1st third of gestation in mammals heal via tissue regeneration!
- Uses reactivation of developmental pathways that originally gave rise to the tissue
- Notable absence of inflammatory cell activity
- Result = scar-less fetal wound healing!
- Mast cells seem to play key role ("less is less")*
- But adult mammals can’t work like lizards, right?

African Spiny Mouse

- Skin is weak, tears easily and during repair develops a porous ECM rich in Type III Collagen;
- Regenerate hair follicles, sebaceous glands, dermis, adipose tissue and cartilage!!!

Scar Epidemiology

- Annually: ~100 million newly acquired scars
  - ~11 million keloid
  - ~4 million hypertrophic burn scars
- Up to 70% may occur in children
- Better survival → "Survivor’s Paradox"
  - Increased survival after burns and trauma means lifelong disabling/disfiguring scars
  - Physical, psychological, social, and financial sequelae

Disclosures

The Scar Book
Wolters Kluwer, 2017

Textbook of Pediatric Procedural Dermatology
Wolters Kluwer, 2018


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Some Scars We Treat in Kids

When is a Scar Pathologic? (Getting past "just cosmetic"!)

- Many scars itch, hurt, stay red, etc.
- Contracture scars over joints may limit function
- Scars may contribute to chronic wounds
- Psycho-social discord; under-appreciated, under-reported, under-acknowledged

Society & Scars...

Ready for the Revolution? De-Evolution?

Fractionated 10,600 nm Carbon Dioxide Laser

UltraPulse with DeepFx™ and ScaarFx™ software
**Fractional CO2 & Wound Healing**

- Mechanical fenestration – near immediate!
- Effects wound contraction and collagen remodeling via localized thermal necrosis ("heat shock" response)
- Damage occurs within noncontiguous microscopic thermal zones
- Intact tissue serves as reservoir of normal epidermal/dermal cells; migrate to damaged area and effect healing
- Associated with increased MMP1, decreased Type 1 (adult) collagen expression, increased Type 3 collagen (fetal)
- Inhibits TGFβ1

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**A Turf Analogy...**

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**What We’ve Been Able to Do...**
8 yo female with burn wound from war at 3 yo!
AFR CO2: 80, 50, 20 ml; 5% density; 300 Hz; single pass
PDL:
11 J/cm2; 7mm spot; 1.5 msec; DCD 40/10
ILK 40mg/ml:
0.6 ml and “dripped”
General anesthesia: 2 treatments

**Multimodal Tx**

**Objective Functional Improvement**
*Even After Hitting Occupational Therapy Plateau*

**So, What’s New?**
**Timing of Treatments!**
**Benefits of starting early...**
Convenience
Reputation
Completeness
Revenue
Clinical outcomes!

**Evidence Suggests: Early May Be Better**
- Comparison of 2 punch biopsies taken from mature burn scars
- 3 treatments with 1,540-nm non-ablative fractional laser immediately upon biopsy collection and at monthly intervals up to total of 3 treatments
- Assessment at Baseline, 3-months/8-months post-op
- (LEFT) versus “untreated” (RIGHT)
- Significant differences observed (p=0.009)
- 6/9 treated scars “invisible” versus 0/9 untreated

**What’s New?**
**Overcoming Obstacles to Treatment!**
Overcoming Benevolent Anecdotalism

Overcoming Reimbursement Hurdles

What is the Current Evidence?

Formal Adoption by ASDS

Consensus statement approved and adopted by ASDS Board of Directors on November 9, 2016...

1. No need to delay focal or manual dermabrasion; avoid rotary or full face for 6 months
2. No evidence to delay vascular, non- ablative fractional, ablative fractional and hair removal laser/light devices; avoid fully ablative for 6 months
3. No need to delay superficial chemical peels; cannot make recommendations for medium or deep
4. STOP isotretinoin before LASIK surgery b/c risk of dry eyes; cannot make recommendations for excisional or incisional surgery but it may be medically necessary

An Evidence-Based Approach...

• Updates informed consent discussion from “well-intentioned wisdom” to “evidence-based medicine”
• Identifies willing experts capable of speaking to “what a similarly situated physician in the same or similar circumstances would do”
• Allows for possibility of early access & intervention by many patients at highest risk for scarring → improved Quality of Life!

Overcoming Reimbursement Hurdles

Two new Category III CPT codes have been created for ablative treatment of burn and traumatic scars for FUNCTIONAL IMPROVEMENT!

• 0479T
  Fractional ablative laser fenestration of burn and traumatic scars for functional improvement; first 100 cm² or part thereof, ≤ 1% of body surface area of infants and children.

• 0480T
  Fractional ablative laser fenestration of burn and traumatic scars for functional improvement; each additional 100 cm², or each additional 1% of body surface area of infants and children, or part thereof (list separately in addition to code for primary procedure)
What’s New?
Learning from Genoderms!
Remember my De-Evolution Slide?

RDEB: Unexpected Rapid Wound Healing
22 yo male with 7-cm diameter wound x 9 months
30 mJ; 5% density; x2 treatments 4 weeks apart

Goltz Syndrome: Unexpected Neocollagenesis
11 yo female with Goltz; PORCN mutation
35-20 mJ; 10% density; 300 Hz; Shape 2; Size 10
Krakowski, Ozog, Ginsberg, Cheng, Chaffins. JAMA Derm 2017; 130: 1285-1292.

RDEB: Unexpected SPECIFIC Neocollagenesis
27 yo female with 15x12-cm diameter crusted plaque
AFR + readily-available “topical special sauce”
• Normal intact skin used as control (white arrow)
• Direct immunofluorescence studies on patient’s…
  • Untreated affected skin
  • Clinically normal skin
  • Treated affected skin (orange arrow)
• Suggests mechanical manipulation may induce direct changes in collagen VII expression!
Schneider, Jahns, Lieferman, Chaffins, Krakowski, Ozog. ASLMS 2018 Poster (submitted)

Thank You!

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