Pediatric derm Procedures

Dana Harb, MD

Dermatology - Phoenix Children’s

Assistant Professor - University of Arizona College of Medicine

3/3/2026

BEIRUT, Lebanon

- Performing procedures on infants, children, and teenagers requires special considerations, skills and knowledge

Quality of Life

- Usually, procedures are performed in pediatric dermatology to improve QOL rather than to prevent morbidity or mortality
  - Self-limited conditions (e.g. ingrown nails or pyogenic granulomas): intervention → improve QOL
  - Emotional, social and cultural considerations in some conditions
  - Genodermatoses (e.g. giant congenital melanocytic nevi and large vascular malformations) → procedural interventions will result in a mixture of positive and negative QOL outcomes that can occur at the same time

TABLE 1.1 Quality of Life Definitions/Assessments

- **World Health Organization (WHO) definition of health:** "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity"
- **WHO definition of quality of life:** "the individuals' perception of their position in life, in the context of the cultural and value system in which they live and in relation to their goals, expectations, standards and concerns"
- **Pediatric-specific definition of quality of life:** "a measure of how a child views his/her life in relationship to how they could reasonably expect or desire it to be"[5]
- **Health-related quality of life:** "an individual's or group's perceived physical and mental health over time"
- **Quality-adjusted life years (QALYs):** a measure that combines length of life and quality of life into a single number
- **Disability-adjusted life years (DALYs):** a measure representing the total number of years lost to illness, disability, and premature death within a given population
- **Cost-effectiveness analysis:** a technique in which the costs of an intervention are compared with a predefined health outcome.
- **Cost-utility analysis:** a type of cost-effectiveness analysis utilizing QALYs as an outcome measure

Sources: World Health Organization. WHOQOL Measuring Quality of Life from Division of Mental Health and Prevention of Substance Abuse. Geneva, Switzerland; 1997; Centers for Disease Control and Prevention. Measuring Healthy Days: Population Assessment of Health-Related Quality of life. Atlanta, Georgia: Centers for Disease Control and Prevention; 2000; Griebsch I, Coast J, Brown J. Quality-adjusted life-years lack quality in pediatric care: a critical review of published cost-utility studies in child health. *Pediatrics*. 2005;115(5):e600–e614; World Health Organization. Metrics: Disability-Adjusted Life Year (DALY). http://www.who.int/healthinfo/global_burden_disease/metrics_daly/en/. Accessed May 14, 2018.

Negative Outcomes

- High expectations
- Downtime
- Missing school
- Unknown time to compete treatment
- Adjusting to new appearance
- Anxiety of surgery/procedure

Psychosocial support

- Clarke A, Thompson AR, Jenkinson E, et al. ***CBT for Appearance Anxiety: Psychosocial Interventions for Anxiety Due to Visible Difference***. Chichester, West Sussex: Wiley-Blackwell; 2013.

- Ginsburg KR, Ramirez McClain ZB, eds. ***Reaching Teens: Strength-Based, Trauma-Sensitive, Resilience-Building Communication Strategies Rooted in Positive Youth Development***. 2nd ed. Itasca, IL: American Academy of Pediatrics; 2020.

Veronica presents with scarring on both wrists resulting from self harm as a teenager. She wants these scars removed as they are reminders of an unhappy and difficult time in her life, and she finds them difficult to explain when other people ask her about them.

- Number of sessions needed
- Realistic vs personal expectations
- Residual lesions

Clarke A, Thompson AR, Jenkinson E, et al. *CBT for Appearance Anxiety: Psychosocial Interventions for Anxiety Due to Visible Difference*. Chichester, West Sussex: Wiley-Blackwell; 2013

Jack has a congenital condition which includes an absence of an ear on one side. Although he has undergone ear reconstruction with a good result, he is still anxious about the appearance of his ear and has avoided cutting his hair or going swimming. He continues to wear a hat pulled low over his head.

- Limitation of improvement
- Expectations
- Downtime

Clarke A, Thompson AR, Jenkinson E, et al. *CBT for Appearance Anxiety: Psychosocial Interventions for Anxiety Due to Visible Difference*. Chichester, West Sussex: Wiley-Blackwell; 2013

Common clinic examples

- 14 y o m with Alopecia areata
- Daily anxiety before going to school
- Time spent each day to style hair

- 17 y o girl
- Scars on wrist from previous suicidal attempts
- Obesity and hirsutism

Building Trust

Baalbek

Roman Ruins – World Largest Jupiter Temple

Ethics

- Involves 3rd party
- Dilemmas: desires of physician, guardians, patient not in allignment

- Two great resources for a moral or ethical framework to guide decision-making are the best interest standard, and the publication entitled, “Informed Consent in Decision-making in Pediatric Practice,” from the American Academy of Pediatrics

- In pediatrics, better to conceptualize medical decision-making as a combination of **informed permission** and **assent of the patient** rather than **informed consent**

Fitzpatrick skin phototypes

Skin type	Reaction to sun exposure*
I	Always burns, never tans
II	Always burns, minimal tan
III	Burns minimally, gradually tans
IV	Burns minimally, tans well
V	Very rarely burns, tans profusely
VI	Never burns, tans deeply

Numbing

Numbing - Lidocaine 2.5% & prilocaine 2.5%

- Individualized dose based on procedure and area involved
  - Infants and Children:
    - <5 kg: ≤1 g/10 cm^2; occlusive dressing max 60 min prior to procedure
    - 5-10 kg: 1-2 g/10 cm^2 ; occlusive dressing ≥ 60 min; max application: 20 cm^2, 4 hrs
    - 10-20 kg: 1-2 g/10 cm^2; occlusive dressing for ≥ 60 min. Max/24 hrs:10 g;100 cm^2; 4 hrs
    - ≥20 kg: 1-2 g/10 cm^2 area; occlusive dressing for at least 60 minutes. Max/24 hr: 20 g; 200 cm^2; 4 hrs
  - Adolescents: 2.5 g/20-25 cm^2 of skin surface area for at least 1 hr

EMLA

- 2.5% lidocaine and 2.5% prilocaine in a 1:1 ratio

- Mild cutaneous side effects: transient urticaria, edema, erythema, blanching, hyperpigmentation, and purpura (direct toxic effect on blood vessels), allergic contact dermatitis and irritant contact dermatitis

- The most severe complications of EMLA application are systemic:
  - ❖Methemoglobinemia (prilocaine metabolite) - especially when used in infants < 3 months, as they have lower levels of erythrocyte methemoglobin reductase
  - ❖CNS toxicity with seizures - Factors that predispose to higher absorption: immaturity of skin, as in premature infants, and compromised skin barrier, such as in cases of atopic dermatitis, as well as increased duration and surface area of application.

- 1 g of cream ~1.5 inches long and 0.2 inches wide

- Cream:
  - Onset of action: 1 hr (genital mucosa: 5-10 min)
  - Peak effect: 2-3 hrs
  - Duration: 1-2 hrs after removal (genital mucosa: 15-20 min)

Dose Adjustment

- Hepatic metabolism → Smaller areas of application with severe hepatic impairment
- Atopic dermatitis: Use with caution; rapid and greater absorption ➔ shorter application time should be used
- Cardiovascular disease: Use with caution if severe impairment of impulse initiation & conduction (grade II & III AV block, pronounced bradycardia)
- G6PD deficiency: more susceptible to drug-induced methemoglobinemia
  - Requires immediate treatment along with discontinuation of the anesthetic
  - Onset may be immediate or delayed (hrs) after anesthetic exposure
  - S&S: cyanosis, headache, rapid pulse, SOB, lightheadedness, fatigue
- Hypersensitivity: Allergic and anaphylactic reactions may occur
  - Patients allergic to para-aminobenzoic acid derivatives (eg, procaine, tetracaine, benzocaine) have not shown cross sensitivity to lidocaine and/or prilocaine

LMX4%:

- Topical anesthetic composed of 4% liposome-encapsulated lidocaine
- As effective as EMLA for alleviating pain
- Faster onset of anesthesia (w/in 30 min without occlusive dressing vs 60 minutes for EMLA + dressing)
- More favorable adverse-effect profile - has not been found to induce methemoglobinemia and produces only minor local effects, such as blanching and erythema
- Amount of absorption depends upon duration and surface area of application

Considerations & Screening

- ❖Setting expectations for final result/outcome
- ❖Ensuring the patient can care for the resulting wound
- ❖Appropriate and reasonable

- ✓Allergies to anesthesia, cleaning solutions, or other substances to be used

- ✓Factors that may result in bleeding, scarring (ie, history of keloids), or other medical complications


Procedures
Diagnostic
Treatment

Diagnostic procedures

- Biopsy
- Nail clipping
- Scraping with blade + KOH
- Swabs for bacterial culture
- Cheek swab for genetic testing

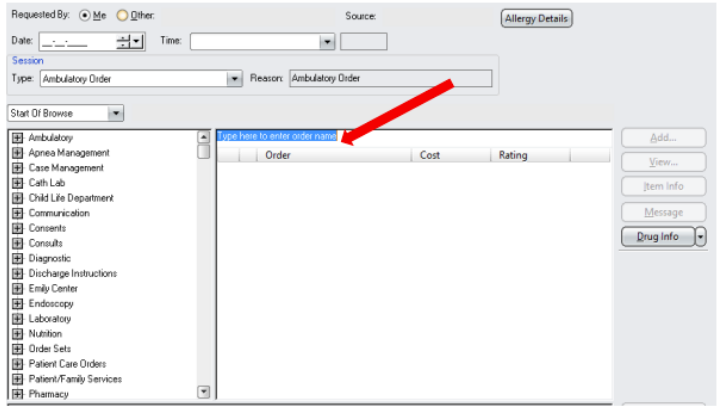
- Although skin biopsy is a minor surgical procedure, it should be remembered that this would feel like a major procedure for children and their parents

Child Life

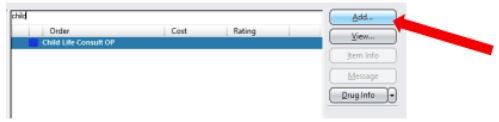
Summary: Consulting Outpatient Child Life

Step 1: Select patient in SCM and click 'enter order'

Step 2: type 'child' in the box

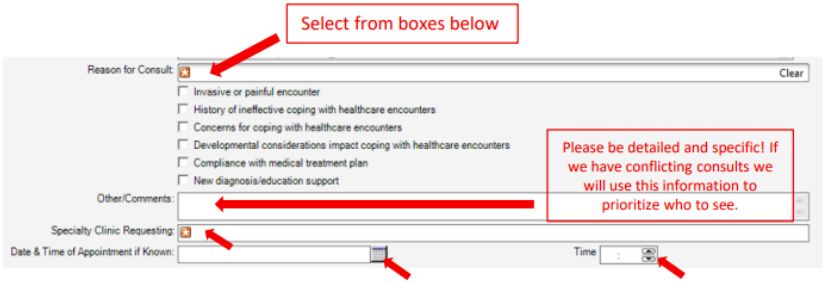


Step 3: select 'Child Life Consult OP' from the list and click 'add'

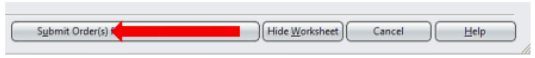


Step 4: fill out the order including:

- reason for consult
- comments
- specialty clinic requesting
- date & time of appointment (fill in when known)



Step 5: finalize order – click ok and then submit



When to call Child Life

Top reasons to consult Child Life:

1. **Preparing a Child for a Procedure**
   We use developmentally appropriate language and tools to reduce fear, increase understanding, and promote cooperation.

2. **Providing Support During Procedures**
   From distraction techniques to coping coaching, we help children manage anxiety and stay calm during IVs, blood draws, and more.

3. **Supporting Siblings and Families**
   We provide emotional support, education, and age-appropriate explanations for siblings and family members during hospitalization.

4. **Addressing Medical Anxiety or Compliance**
   We work with patients who are fearful or refusing care to understand their concerns and build trust and coping strategies.

5. **Promoting Positive Coping Skills**
   Through play, conversation, and tailored interventions, we help patients build resilience and reduce distress.

6. **Supporting New Diagnoses or Complex Education**
   We reinforce teaching from the medical team with child-friendly explanations to help kids understand what's happening and why.

7. **Providing Play to Promote Normalcy**
   Play is the work of children, and it is the way that they process what is happening in their world. We offer therapeutic play to support emotional expression, healing, and development.

8. **Preparing for Surgery or Anesthesia**
   We reduce pre-op anxiety and help families feel more confident by walking them through what to expect in a way kids can understand.

9. **Supporting Coping in Critical or End-of-Life Situations**
   We facilitate legacy building, memory making, and emotional support to patients and families.

10. **Facilitating Communication Between Patient/Family and Care Team**
    We can help bridge communication gaps when children are scared, nonverbal, or struggling to express themselves.

> **Pediatr Dermatol**. 2020 Sep;37(5):804-810. doi: 10.1111/pde.14187. Epub 2020 Jun 16.

Pediatric dermatology eConsults: Reduced wait times and dermatology office visits

Kira Seiger [1], Elena B Hawryluk [1 2], Daniela Kroshinsky [1 2], Joseph C Kvedar [1 2], Shinjita Das [1 2]

Affiliations + expand

PMID: 32544276 DOI: 10.1111/pde.14187

Abstract

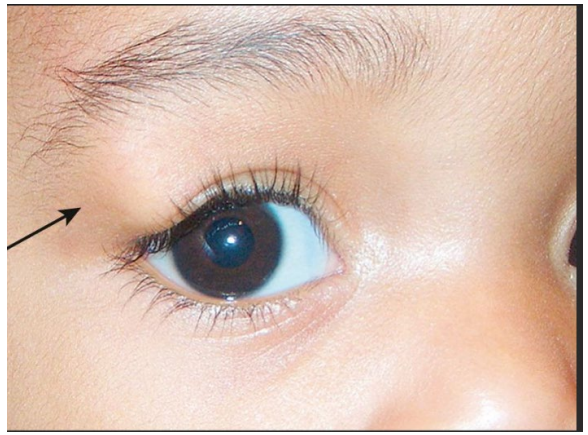
Background/objectives: Store-and-forward teledermatology provides pediatricians with specialist guidance in managing skin disease. This study evaluates **wait times** and face-to-face (FTF) **dermatology** visit avoidance associated with a **pediatric dermatology eConsult** program at an urban academic medical center.

Methods: In this retrospective cohort study, electronic medical records were reviewed for patients under age 18 for whom a **dermatology eConsult** was completed between November 1, 2014, and December 31, 2017. **Wait times** for **eConsult** completion and initial FTF **dermatology** appointments were calculated and compared to average **wait times** for new patient **dermatology office** appointments from 2016 to 2017. Recommendations for FTF **dermatology visits** were assessed, along with FTF visit attendance and potential cost savings.

Results: One hundred eighty **pediatric** patients with 188 unrelated skin conditions ("cases") were referred to the program. Of 188 cases, FTF **dermatology visits** were recommended for 60 (31.9%). Actual FTF **dermatology** visit avoidance was 53.7% of total cases (n = 101 for whom FTF visit was not recommended and no **dermatology** visit occurred within 90 days after **eConsult** submission). The program generated potential savings of $24 059 ($9840 out-of-pocket) in 2016 dollars. Average turnaround for **eConsult** completion was 1.8 calendar days (median: 1 calendar day, target: 2 business days). Average **wait time** to initial FTF **dermatology** evaluation was 37.3 calendar days (versus 54.1 days for **pediatric** patients referred directly to **dermatology** clinic between 2016 and 2017).

Conclusion: Pediatric dermatology eConsults reduce wait times for specialist care, triage cases for in-**office** evaluation, **reduce** need for FTF **dermatology visits**, and offer potential cost savings for payers and patients.

Dermoid cysts



- Midline lesions may have an intracranial extension and should be imaged through CT/MRI before surgery
- Refer to ENT/Craiofacial

Atypical accessory Tragus/preauricular pits/sinuses

- Refer to ENT

4-year-old healthy boy presents to PCP visit with 3-month history of spreading umbilicated papules on trunk and extremities.

What is the most appropriate next step?

A – reassure and provide options about topical treatment
B – Refer to Dermatology
C – Workup for underlying immunodeficiency
D – Curette lesions in office

4 y/o healthy boy presents to PCP visit with 3-month history of spreading umbilicated papules on trunk and extremities. What is the most appropriate next step?

Molluscum Contagiosum

- Common cutaneous viral infection in children
- Caused by a poxvirus (MCV)

- It classically presents as clusters of small (2–5 mm) dome-shaped, flesh-colored papules with central umbilication.

- Lesions are usually asymptomatic and self-limited, often resolving spontaneously within months to a few years.

- Treatment options
  - Hydrocortisone ointment for itch
  - Differin/tretinoin
  - Zelsuvmi

  - Ycanth
  - In July 2023, YCANTH™ (cantharidin 0.7% topical solution) was approved for the topical treatment of molluscum contagiosum in adult and pediatric patients 2 years of age and older in the USA.

Table 1

Treatment	Administration	Key points[7]
Cantharidin	By clinician	Applied topically; suitable for adults and children aged 2 years and older.
Cimetidine	Self-administered	Oral prescription medication; beneficial for patients with atopic dermatitis or widespread lesions.
Cryotherapy	By clinician	Device-based treatment; can be painful, making it less ideal for young children or patients with extensive lesions.
Curettage	By clinician	Involves scraping; effective for older children, teenagers, and adults.
Imiquimod cream	Self-administered	Topical prescription; not recommended for younger children.
Pulsed dye laser	By clinician	Device-based; effective for patients with numerous or treatment-resistant lesions, such as those with AIDS; may cause temporary skin pigmentation changes; high cost.
Salicylic acid	Self-administered	Topical, available over the counter.
Sinecatechin	Self-administered	Topical prescription required.
Tretinoin	Self-administered	Topical; requires a prescription.
Scalpel/forceps removal	By clinician	Manual extraction; painful and may not be suitable for children or those with many lesions; risk of spreading the infection if not performed correctly.

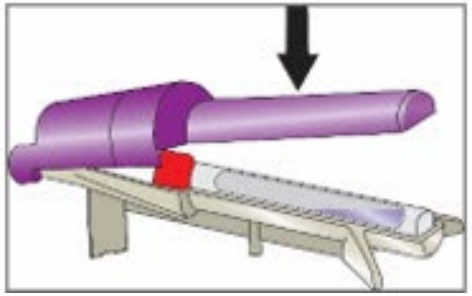
Source: https://www.aad.org/public/diseases/a-z/molluscum-contagiosum-treatment.

Y-canth

- Cantharidin 0.7% topical solution is for topical use only and is not for oral, mucosal, or ophthalmic use.
- Single application of cantharidin topical solution 0.7% applied directly to each molluscum contagiosum lesion every 3 weeks as needed.
- No more than 2 applicators should be used during a single treatment session.
- Treated lesions should be allowed to dry completely (up to 5 min) and should not be covered with bandages.
- Application near the eyes and mucosal tissue or to healthy skin should be avoided.
- If contact with any unintended surface occurs (including healthy skin), remove immediately by wiping with a cotton swab or gauze.
- Cantharidin 0.7% topical solution should be removed from the skin by washing with soap and water 24 h after treatment or earlier if severe local skin reactions (e.g., severe blistering, severe pain or other severe adverse reactions) occur

Keam SJ. Cantharidin topical solution 0.7%: First approval. *Pediatric Drugs*. 2024;26(1):95-100.

Y-canth applicator



- Consists of a glass ampule containing the cantharidin 0.7% solution, an applicator tube and an applicator cap
- Ampule is crushed prior to application, using the provided break tool – can be used for more than 1 treatment → discard after 12 uses or it shows signs of damage
- After the ampule is crushed, solution flows into the tip of the applicator
- Nitrile or vinyl gloves and eye protection should be used during preparation and administration of cantharidin 0.7% topical solution
- The cantharidin 0.7% topical solution formulation includes gentian violet to help distinguish treated and untreated lesions during application, and denatonium benzoate, a bittering agent to deter potential oral ingestion

Keam SJ. Cantharidin topical solution 0.7%: First approval. *Pediatric Drugs*. 2024;26(1):95-100.

Zelsuvmi

- Zelsuvmi, a topical gel containing 10.3% berdazimer - approved in January 2024 for the topical treatment of MC in adult and pediatric patients 1 year of age and older in USA, and can be administered by patients or parents/caregivers at home

- Berdazimer interferes with viral DNA synthesis and assembly, ultimately leading to inhibition of viral replication and spread and exhibits immunomodulatory properties, enhancing body's natural defense against MCV infection → dual-action mechanism suppresses viral proliferation and promotes resolution of existing lesions

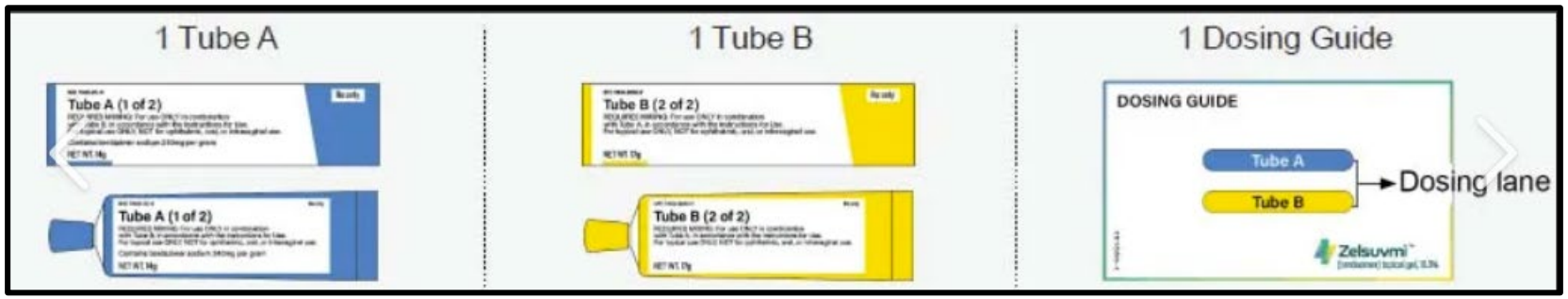
Keam, S.J. Berdazimer Topical Gel, 10.3%: First Approval. *Drugs* **84**, 363–368 (2024). https://doi.org/10.1007/s40265-024-02012-9

- Favorable safety profile and low risk of systemic side effects ➔ overall good tolerance, with low discontinuation rates due to adverse events

- Allows for convenient at-home application, improving patient adherence and treatment compliance.

Berdazimer topical gel, 10.3%

- Tube A containing berdazimer gel, Tube B containing hydrogel and a dosing guide
  - ➢Equal amounts (0.5mL) of gel should be dispensed from Tube A and Tube B on the dosing guide.
  - ➢Tubes A and Tube B should be recapped tightly immediately after dispensing.
  - ➢The gels should be mixed together on the dosing guide and should be applied immediately to each MC lesion in a thin layer, once daily (up to 12 weeks)
  - ➢Allow to dry for 10 min after application



- Should not be premixed and once mixed, should not be stored
- Hands should be washed after applying gel
- Avoid application to uninvolved skin and avoid transfer to other areas, including the eye
- Swimming, bathing or washing should be avoided for 1 h after application.

- Treatment with once daily berdazimer topical gel, 10.3% was effective in treating molluscum contagiosum lesions in the randomized, double-blind, vehicle-controlled phase 3 B-SIMPLE4 trial (NCT04535531) in adult and pediatric patients with MC

- Complete clearance of all MC lesions at 12 weeks (primary endpoint) was seen in significantly more berdazimer topical gel, 10.3% recipients (n = 444) than vehicle recipients (n = 447) [32.4% vs 19.7%; treatment difference 12.7%; OR 2.0; 95% CI 1.5–2.8; $p < 0.001$].

Sugarman JL, Hebert A, Browning JC, et al. Berdazimer gel for molluscum contagiosum: An integrated analysis of 3 randomized controlled trials. *J Am Acad Dermatol*.

Warts

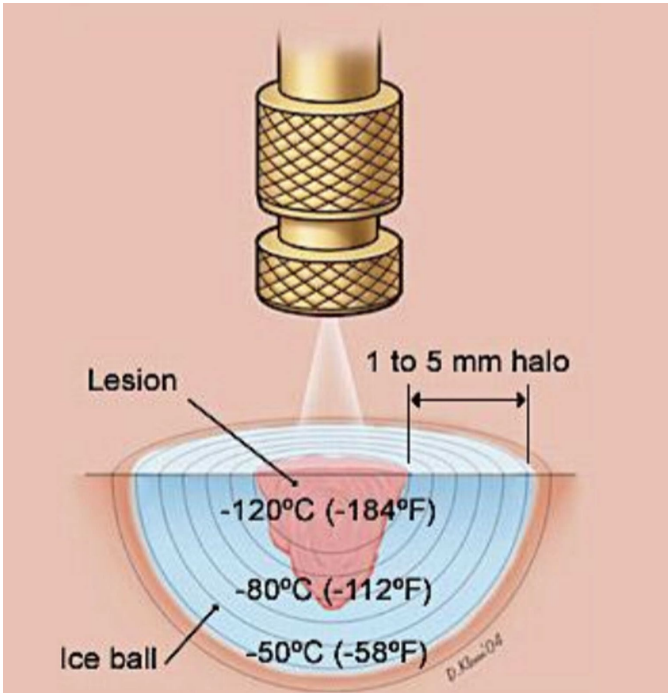
- HPV
- Spreads easily

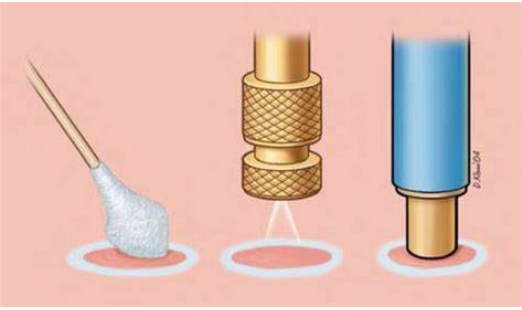
- Topical SA, SA + 5FU, imiquimod, podophyllin
- Soak and scrape
- Liquid nitrogen
- Candida

Cryotherapy

- Liquid nitrogen – most common
  - Has boiling point of -196°C compared with OTC products, such as dimethyl ether (-24°C) and tetrafluoroethane (-26.3°C), which may be advertised to the public for medical uses (eg, wart removal)
  - Most effective cryogen - can attain much cooler temperatures than other cryogenic agents ➔ better tissue destruction

- Causes tissue necrosis by acting as a heat sink → cell destruction by ice crystal formation, cellular membrane disruption and vascular stasis





- **Open spray technique** – no direct contact with patient
  - practical tool in outpatient setting
  - minimize cross-contamination among patients

- **Dipstick technique** – preferable for more precision and control (eg, on small lesions near the eyes), also in children (avoid the loud noise of the spray, which can be unsettling)
  - Poured into container (disposable paper cup) ➔ reduces risk of cross-contamination
  - Cotton-tipped applicator dipped into container then quickly applied to lesion
  - May not reach temperatures as cold as spray
  - All materials discarded afterwards and not used on subsequent patients

- **Tweezer technique** – filiform warts and skin tags

Ahmed I, Agarwal S, Ilchyshyn A, Charles-Holmes S, Berth-Jones J. Liquid nitrogen cryotherapy of common warts: cryo-spray vs. cotton wool bud. *Br J Dermatol*. 2001;144(5):1006-1009.

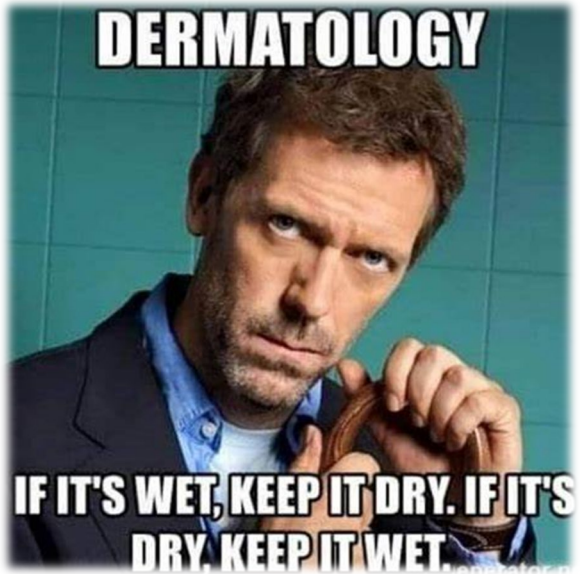
- For small, thin lesions → one cycle of cryotherapy may suffice
- Thicker lesions → at least two total freeze/thaw cycles.
  - After 1st freeze cycle, lesion allowed to thaw spontaneously before repeating → Rapid cooling and slow thawing maximize tissue destruction
  - Melanocytes: -5°C
    - relatively mild degree of freezing causes irreversible melanocyte damage ➔ hypopigmentation, common adverse outcome

- **Benign lesions** — solar lentigines, seborrheic keratoses, keloids, and warts
  - **Common warts** — first-line treatment
    - Treatment should extend beyond visible lesion (2 mm) to treat subclinical virus → avoid "donut" or "ring" warts, resulting from virus replication around the treated area.
    - Creating a visible frozen area that thaws over 30-60 seconds
    - **Freeze-thaw cycle 2-3 times total (10-30s each cycle)**

      Connolly M, Bazmi K, O'Connell M, Lyons JF, Bourke JF. Cryotherapy of viral warts: a sustained 10-s freeze is more effective than the traditional method. *Br J Dermatol*. 2001;145(4):554-557.

  - **Hidradenitis suppurativa** — Cryo-insufflation for sinuses and fistulas
    - Using 21-gauge needle mounted on spray cryosurgical unit, sinuses/fistulas can be infiltrated by pulsing liquid nitrogen for 5 sec for 3 cycles; 1 sec pause between cycles
    - Reach smaller cavities, causing scarring that results in symptomatic relief

- **Postoperative wound care** — minimal
  - Avoid getting wound soiled
  - wash with soap and water
  - Apply petrolatum ointment and a simple bandage



- **Adverse outcomes and considerations** — most common adverse outcome is hypopigmentation
  - Avoid lip vermilion border - risk of blunting of vermilion/cutaneous border and suboptimal cosmetic outcome.
  - Avoid aggressive cryotherapy → scarring/retraction, especially in areas with free margin (nasal ala, ear) and on areas that may heal slowly or poorly (lower leg)
  - Care not to damage the nail matrix when treating lesions around the nail.
  - Avoid in those with cold sensitivity (cold urticaria, cryoglobulinemia/fibrinogenemia).
  - Blistering and crusting of the treated area are expected outcomes
  - Healing usually within 1-3 wks

Effectiveness and comparative trials

- Randomized controlled trial by Bruggink et al. comparing cryotherapy with liquid nitrogen to salicylic acid: cryotherapy more effective for common warts (49% cure rate) but no significant difference for plantar warts

  Bruggink SC, Gussekloo J, Berger MY, et al. Cryotherapy with liquid nitrogen versus topical salicylic acid application for cutaneous warts in primary care: randomized controlled trial. *CMAJ*.

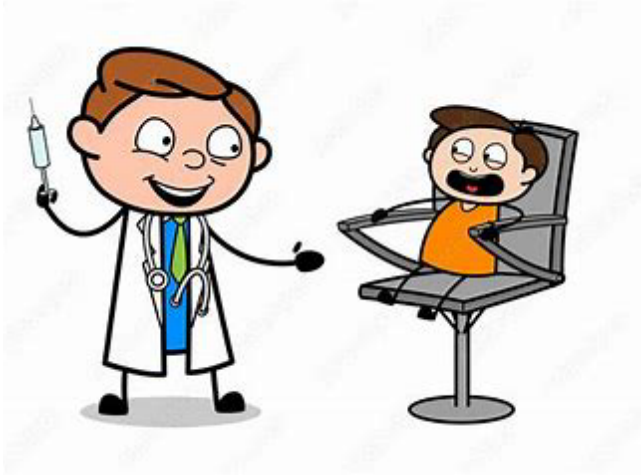
- Cochrane systematic review by Kwok et al. analyzed multiple trials: cryotherapy versus placebo showed no significant overall difference, though subgroup analysis suggested better outcomes for hand warts than foot warts

  Kwok CS, Gibbs S, Bennett C, Holland R, Abbott R. Topical treatments for cutaneous warts. *Cochrane Database Syst Rev*.

- Mulhem and Pinelis reviewed treatment options and reported cure rates of 50-70% after three to four cryotherapy treatments

  Mulhem E, Pinelis S. Treatment of non-genital cutaneous warts. *Am Fam Physician*. 2011;84(3):288-293.

Intralesional Candida



The consensus protocol involves injecting 0.1–0.3 mL of Candida antigen into the largest wart every 2–3 weeks for up to 3–5 sessions or until complete clearance.

Dosing variations include antigen dilutions of 1/100 or 1/1000, with the 1/100 concentration demonstrating superior efficacy (94.3% vs 77.1% complete clearance). Most protocols inject only the single largest ("mother") wart per session, allowing systemic immunity to address remaining lesions

Maximum number of sessions ranges from 3 to 5 treatments before considering the patient a non-responder.

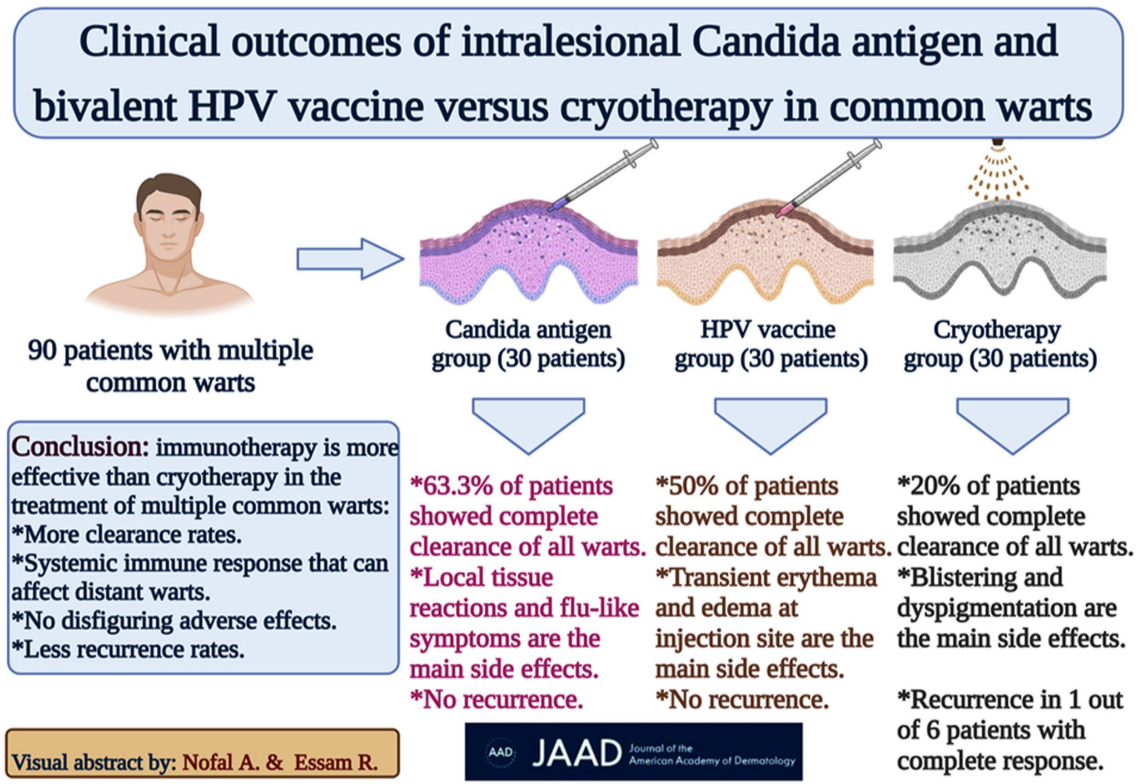
Average treatment duration to achieve complete clearance is approximately 2.7 sessions, with most responders clearing within 3–4 treatments

Fawzy MM, Nofal A, Alakad R. Intralesional antigen immunotherapy for the treatment of plane warts: A comparative study. *Dermatol Ther*. 2020;33(6):e13807.

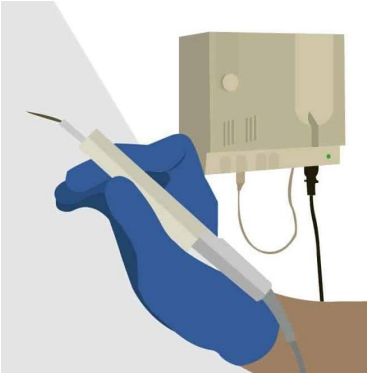
Comparative efficacy of intralesional Candida antigen, intralesional bivalent human papilloma virus vaccine, and cryotherapy in the treatment of common warts

Amany Nassar, MD • Rania Alakad, MD • Reham Essam, MD • Noha M. Bakr, MD • Ahmad Nofal, MD

Published: August 27, 2021 • DOI: https://doi.org/10.1016/j.jaad.2021.08.040 •



CURETTAGE AND ELECTRODESICCATION



- Current converted to heat via resistance in tissue → destruction
- Appropriate mask and/or smoke evacuator to reduce the surgical smoke inhaled
- Seborrheic keratoses, sebaceous hyperplasia, verrucae, small milia, skin tags, and angiomas
- **Contraindications**
  - Infected, fibrotic, or malignant lesions with significant dermal or deeper component
  - Patients with implanted devices (eg, defibrillators and pacemakers, deep brain stimulators or cochlear implants) - curettage alone may be considered

- **Postoperative wound care**
  - Petrolatum and bandage after procedure for 1-2 wks
  - Soapy water to clean area daily

- **Adverse outcomes and considerations**
  - Scarring - main adverse outcome, given amount of damage to dermis
  - Infection and bleeding - infrequent

LASER

LASER

Gamma rays	X-rays	Ultraviolet*	Visible	Near infrared	Far infrared	Microwaves and radiowaves
<0.1 nm	0.1-10 nm	10-400 nm	400-760 nm	760-1000 nm	1000-100,000 nm	>100,000 nm

*** Ultraviolet spectrum divisions and wavelengths (nm)**

Vacuum ultraviolet	10-200
UVC	200-290
UVB	290-320
UVA2	320-340
UVA1	340-400

LASER: light amplification by stimulated emission of radiation

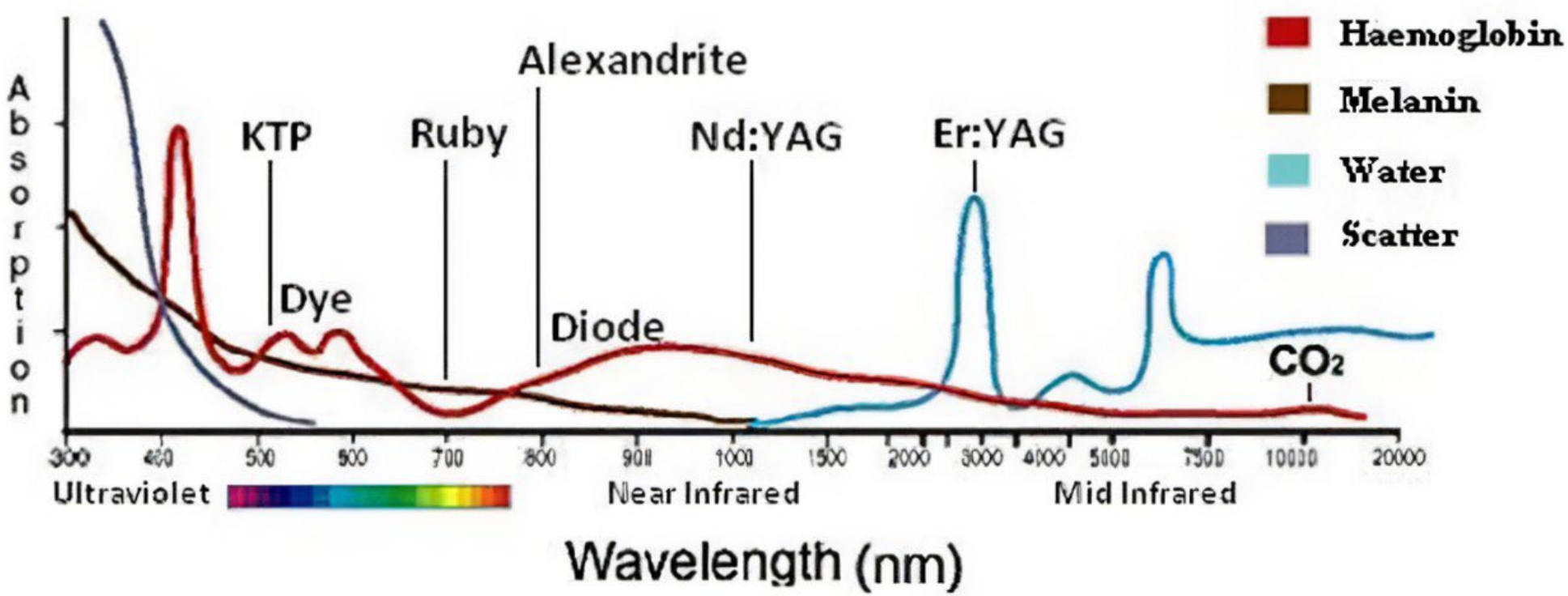
- Deliver monochromatic, coherent, collimated, high intensity beams of light
- Selective photothermolysis: parameters by which light is used to selectively destroy targets in skin through selective absorption of light and spatial confinement of the effect
- Cooling technology limits inadvertent damage to tissues adjacent to targeted sites, allowing higher levels of light energy to be directed toward the targe
- In contrast, IPL devices are filtered flashlamps that emit polychromatic, noncoherent light in a broad range of wavelengths → less powerful than lasers.

Absorption

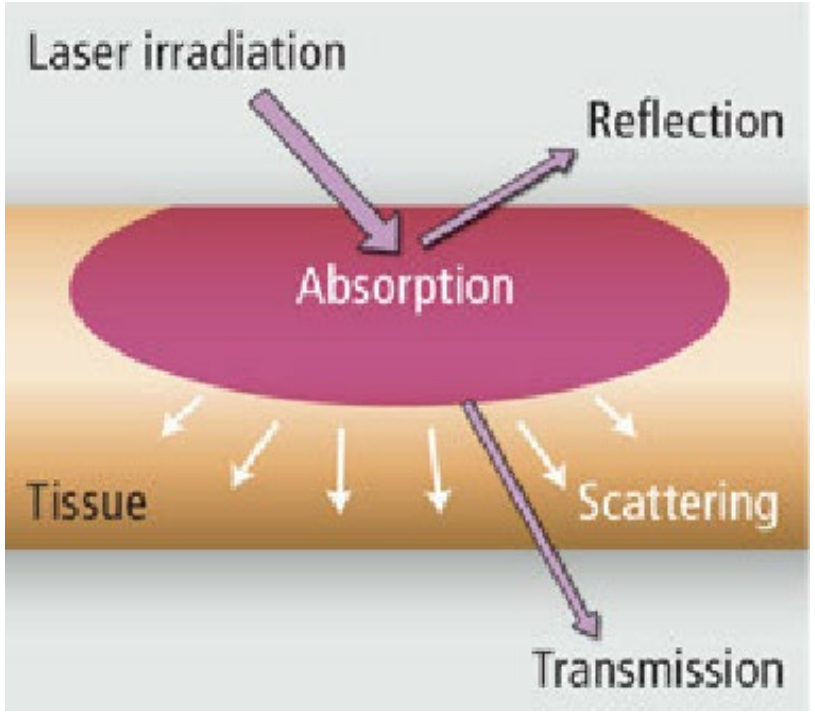
- Required for light to exert effects (both beneficial and adverse) on tissue

- Molecules that absorb light are called chromophores
  - Melanin, oxyhemoglobin, water, tattoo ink

- Light absorbed into target chromophore → converted to thermal energy → heating and destruction of chromophore


Absorption
KTP
Dye
Ruby
Alexandrite
Diode
Nd:YAG
Er:YAG
CO2
Haemoglobin
Melanin
Water
Scatter
300
400
500
600
700
800
900
1000
1500
2000
3000
4000
5000
7500
10000
20000
Ultraviolet
Near Infrared
Mid Infrared
Wavelength (nm)

- **Scattering**
  - Redirection of photons away from the primary direction of light travel – Dermal collagen
  - Decreases with the use of long wavelengths of light and the delivery of light through large spot sizes
- **Reflection**
  - Portion of light can be reflected away from skin surface without exerting a clinical effect - Stratum corneum
- **Transmission**
  - Light can pass through tissue without being absorbed, scattered, or reflected - No clinical effect



Ideal situation:

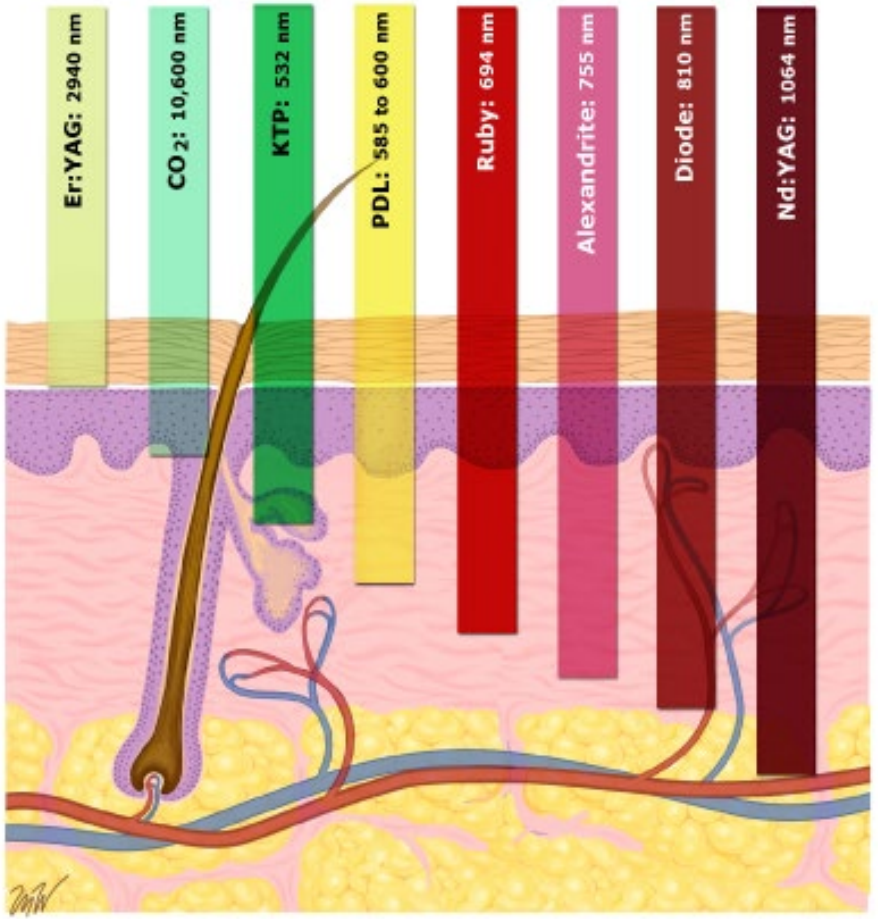
- The **wavelength** of light utilized should be **absorbed** preferentially by the **target chromophore** and must **penetrate the skin to a sufficient depth**

- Must be delivered in a **period of time short enough to prevent transfer of excessive heat to adjacent structures**

- The energy delivered per unit area (**fluence**) must be sufficient to exert the desired **therapeutic effect** but should also be at a level that **minimizes collateral tissue damage**

- Lasers that emit long wavelengths of light penetrate more deeply than lasers that emit shorter wavelengths

- Mid-infrared (eg, Er:YAG) and far-infrared (eg, CO_2) lasers do not follow this rule - heavy absorption by water in skin greatly limits penetration



Safety Measures

- Protective eyewear essential for all individuals present in treatment room

- Patient protective eyewear depends on location to be treated:
  - Non-facial areas: laser safety goggles similar to those of the clinical staff.
  - Face treatment outside periorbital area: protective pads specific for laser procedures or laser treatment metal goggles
  - Eyelid or immediate periorbital area is treated: corneal shields inserted with the aid of ocular anesthetic drops/lubricant using appropriate size and placement

- **Topical anesthesia –** Topical anesthetics can be used, although may blanch the vessels

- **General anesthesia –** General anesthesia for safe and complete treatment of large lesions

- The US FDA has issued a warning regarding use of general anesthetics in children under three years of age
  - academic performance/cognitive performance/learning disability

PDL

- Most common laser used for red-colored lesions such as port-wine stains, facial telangiectases, superficial hemangiomas, and red scars

Alexandrite Laser

- Hair removal
  - Hypertrichosis
  - Hidradenitis Suppurativa

Nd-YAG

- Deep vascular lesions

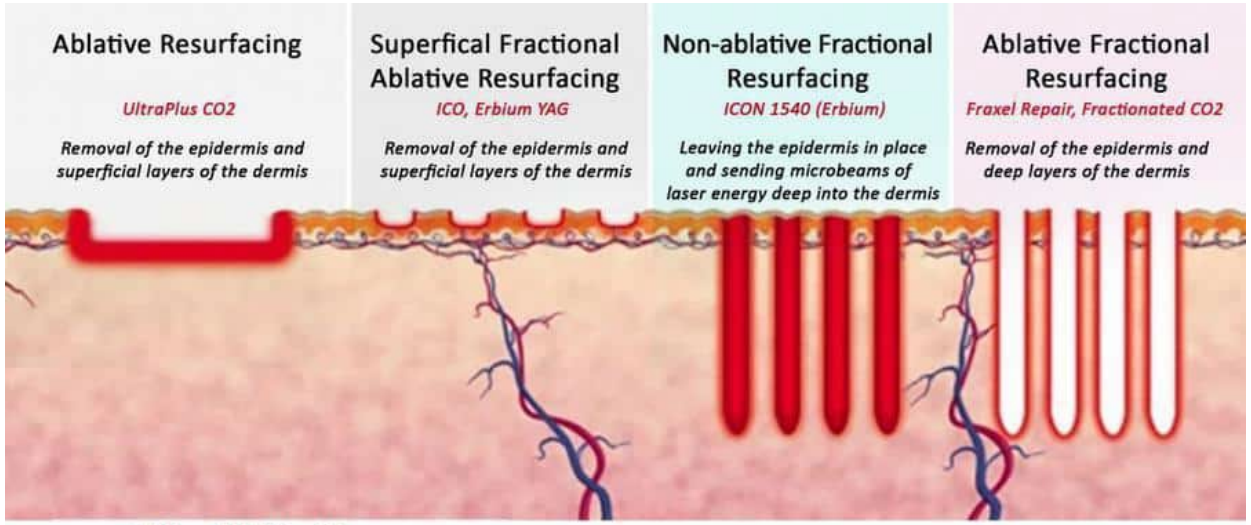
- Unwanted hair and hidradenitis suppurativa in darker skin types
  - 50% reduction in hair density after 9 treatments

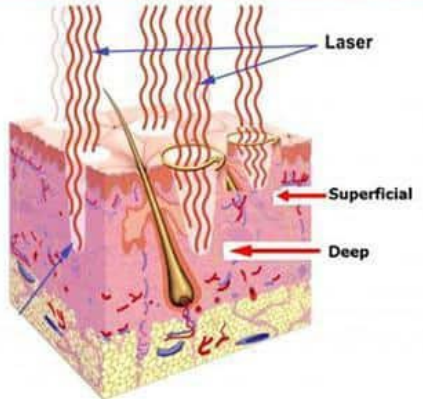
CO2 laser

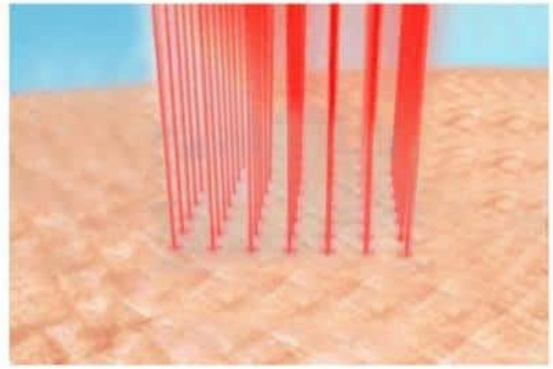
- Ablative – syringomas, epidermal nevi, angiofibromas

- Fractional ablative/non-ablative:
  - Scars
  - Deliver medicine
  - SE: prolonged erythema/hyperpigmentation

Collagen remodeling procedure



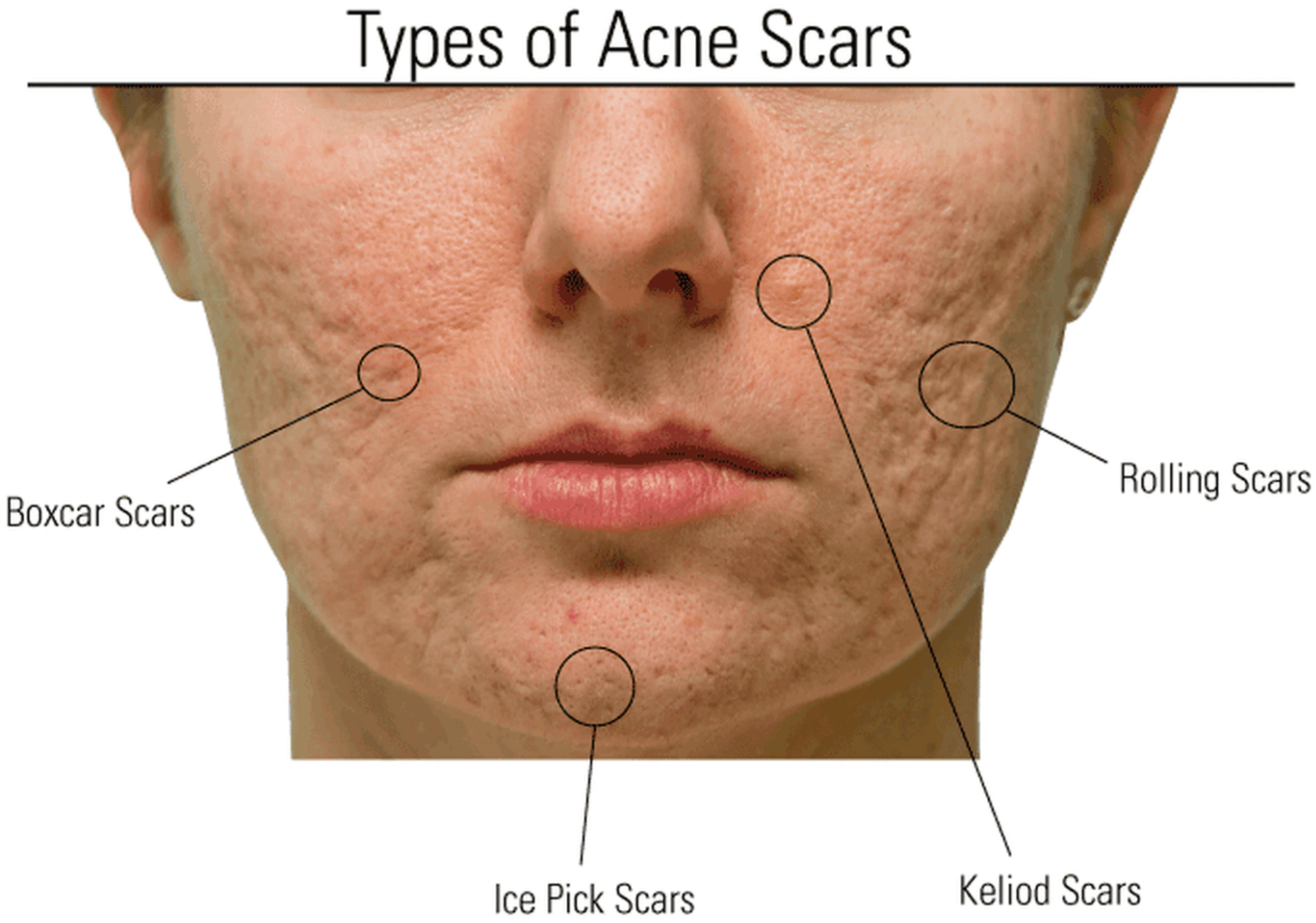




Target water in skin → ablation of epidermis and dermis

Thermal injury caused promotes collagen contraction, collagen remodeling, and skin tightening ➔ improvement in scar appearance

Acne scars


Types of Acne Scars
Boxcar Scars
Rolling Scars
Ice Pick Scars
Keliod Scars

- Focal treatments most appropriate based upon scar type:
  - **Ice pick scars** – Punch excision or CROSS technique
  - **Boxcar scars** – CROSS for small scars, punch or elliptical excision, punch elevation, or focal dermabrasion
  - **Rolling scars** – Subcision or injectable soft tissue fillers

PDL for acne scars

- Most common laser used for the treatment of PAE
  - ✓Targets oxyhemoglobin within vessels → coagulation
  - ✓Anti-inflammatory effects by elevating levels of transforming growth factor (TGF)-β1
  - ✓Destroys sebaceous glands and kills propionibacterium acnes (PBA)
  - ✓Improvement in skin elasticity, proliferation of dermal fibroblasts, and increased levels of collagen

PDL for acne scars

- Treatment sessions ranged from 1 to 6 sessions with treatment interval of 2–8 weeks

- Successful treatment usually requires 3-4 or more treatments at approximately one-month intervals

Amiri R, Khalili M, Mohammadi S, Iranmanesh B, Aflatoonian M. Treatment protocols and efficacy of light and laser treatments in post-acne erythema. *J Cosmet Dermatol*. 2022;21(2):648-656. doi:10.1111/jocd.14729

Skin needling - microneedling

- Induce small columns of damage in epidermis and dermis, leaving intervening skin untouched
- Needling device studded with 1-2.5 mm long needles rolled over skin surface → numerous perforations in epidermis and dermis → stimulating neocollagenesis
- Advantages of skin needling:
  - low cost
  - relatively short recovery period (two to three days)
  - very low risk for post-inflammatory hyperpigmentation
- Mild transient erythema and edema is expected

Hypertrophic acne scars and keloids

- Firm and raised

- **First-line therapy —** Intralesional corticosteroid injections
  - Proposed mechanism: decreased fibroblast proliferation and collagen synthesis along with a reduction in inflammatory mediators
  - Triamcinolone acetonide (10 to 20 mg/mL) injected directly into scar. Higher concentrations (up to 40 mg/mL) used for very thick scars
  - Every 4-6 wks
  - Discontinue if at least a partial response not evident within 4 sessions
  - Dose-dependent adverse effects: hypopigmentation, dermal atrophy, and telangiectasias

- 17 y o male
- Acne scars
- s/p 7 PDL sessions and ILK, 3 sessions of cryotherapy

Laser Hair Removal (Alex vs Nd-YAG)

Ideal subjects for laser hair removal: lightly pigmented skin and dark hair in whom most of the laser energy is absorbed by melanin in the hair bulb rather than by the surrounding epidermis.

Modalities for photoepilation

System	Skin types*	Advantages	Disadvantages
1064 nm Nd-YAG	I-VI	Good for darker skin types	▪ Pain ▪ Possible folliculitis
755 nm alexandrite	I-III	Good for lighter hair	▪ Pain ▪ Possible folliculitis
810 nm diode	I-V	Good for darker skin types	▪ Pain ▪ Possible folliculitis
IPL¶	I-IV	Less expensive system to purchase	▪ May not be as effective as laser systems

* Fitzpatrick skin types:
  - I - always burns, never tans;
  - II - always burns, sometimes tans;
  - III - sometimes burns, always tans;
  - IV - rarely burns, always tans;
  - V - moderately pigmented;
  - VI - darkly pigmented.

¶ Intense pulsed light.

- Reduce hair via selective photothermolysis
- Total removal of hair is uncommon - realistic expectations: less hair, lighter hair, and thinner hair
- Target: melanin, in the case of hair
- Efficacy of most lasers and IPL is greatest for darker pigmented hair (black > brown > gray, red, or blonde > white), while the risk of burns increases with increasing skin pigmentation

LHR TREATMENT SETTINGS- ALEX / YAG
GOAL - Hair Free in 3-4 Treatments!!

DO NOT BURN PATIENTS
Burn Prevention Protocols supersedes everything!!

SLOW DOWN!!
To prevent burns & for good results

ICE THOROUGHLY = PRE & POST ICE
For Pain and Better Results

SHAVE THOROUGHLY
Prevent singeing & window damage

CLEAN TX AREA THOROUGHLY
No Makeup, Deodorant, Moisturizer

ALEX/YAG

SKIN TYPE	Tx # 1	Tx # 2	Tx # 3	Tx # 4	Tx # 5	Tx # 6	DCD
I-II	ALEX 18mm 18j	ALEX 15mm 24j	ALEX 15mm 30j	ALEX 15mm 30j Double Pass	ALEX 15mm 30j Double Pass	ALEX 15mm 30j Double Pass	30/20/0
III	ALEX 18mm 16j	ALEX 18mm 20j	ALEX 15mm 24j	ALEX 15mm 30j	ALEX 15mm 30j Double Pass	ALEX 15mm 30j Double Pass	30/20/0
IV	YAG 15mm 36j	YAG 15mm 40j	YAG 12mm 48j	YAG 12mm 48j	YAG 12mm 48j Double Pass	YAG 12mm 48j Double Pass	30/20/0
V	YAG 15mm 30j	YAG 15mm 38j 30msec	YAG 15mm 38j 30msec	YAG 15mm 42j 30msec	YAG 15mm 44j 30msec	YAG 15mm 44j 30msec	30/20/0
VI	YAG 15mm 26j	YAG 15mm 28j	YAG 15mm 30j	YAG 15mm 30j	YAG 15mm 30j	YAG 15mm 30j	30/20/0

NECK / BBE (LABIA ONLY)	ALEX 18mm 14j	For all Treatments	DCD 30/20/0
NECK / BBE (LABIA ONLY)	YAG 18mm 24j	For all Treatments	DCD 30/20/0

Machine:Alex or YAG. **Spot Size**-eg18mm,15mm,12mm. **Fluence**:eg 18 joules/cm2 **Pulse Duration**:YAG10msec unless specified. Alex3msec machine default can't change it. **DCD-Dynamic Cooling Device**:30/20/0. Pre/Intra/Post Proc. Cooling respectively

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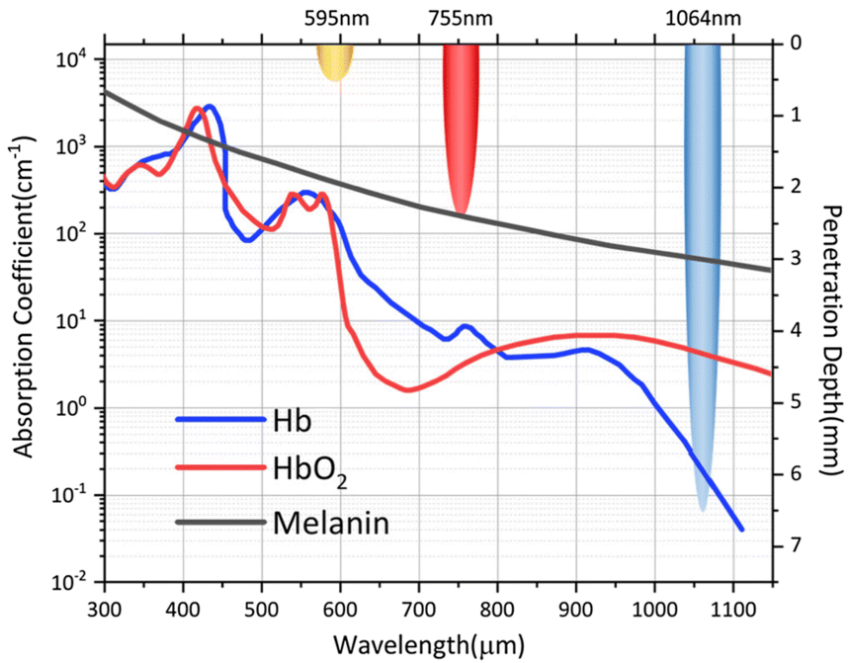
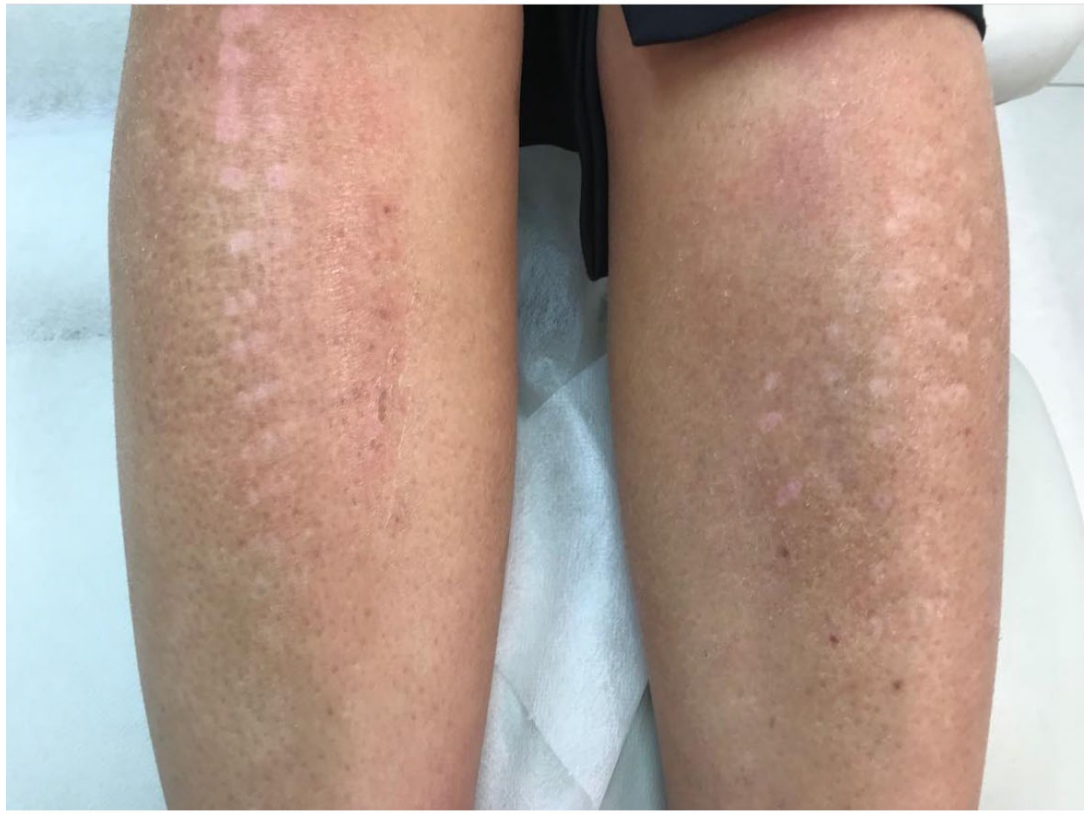


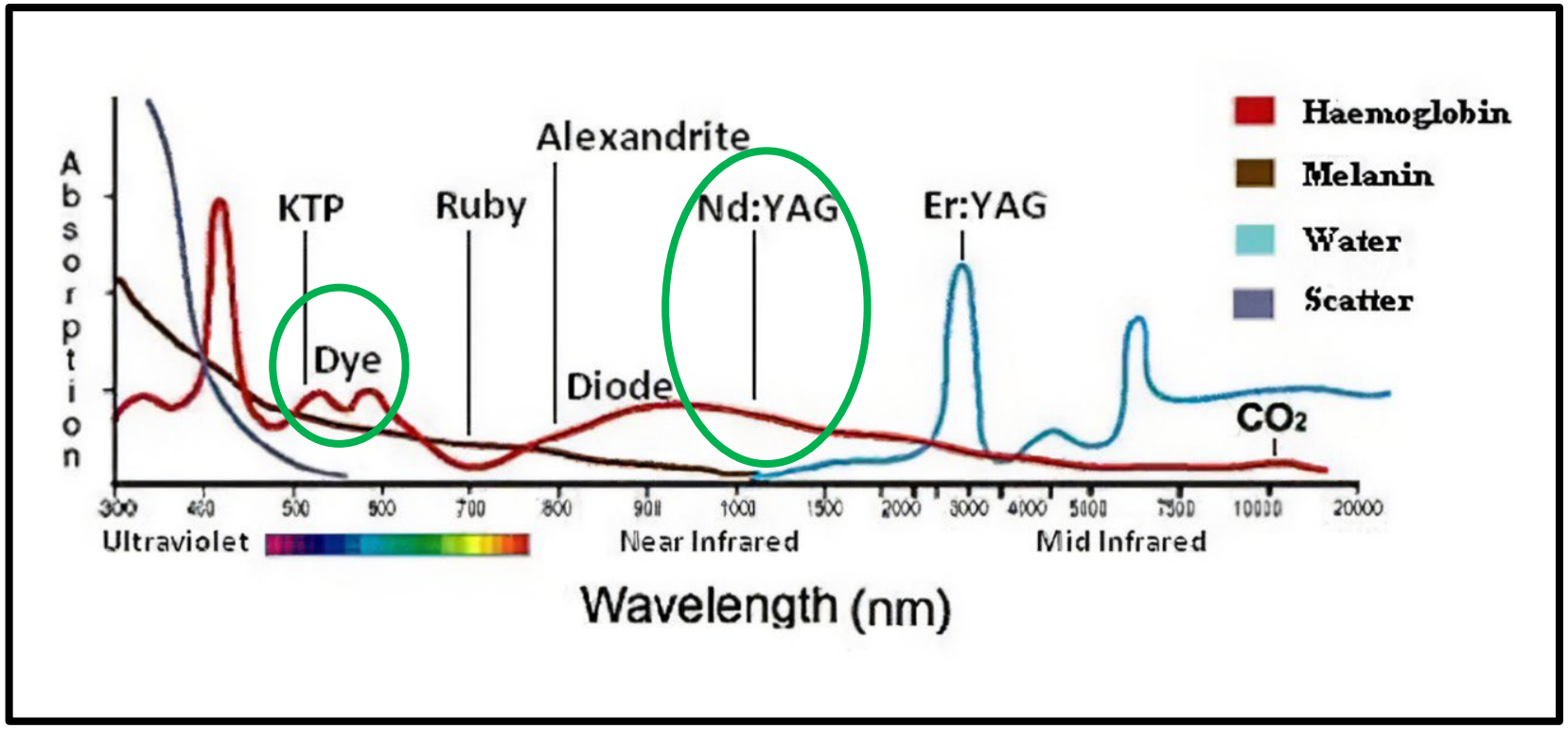


Vascular Laser

- Light absorption by melanin progressively increases as wavelengths of light decrease, leading to higher risk of dyspigmentation - concern in patients with dark skin
- Epidermal skin cooling techniques and adjustments to laser settings to reduce the incidence of adverse effects secondary to epidermal melanin absorption
- Absorption of light by epidermal melanin can also affect the efficacy of treatment through reducing the amount of light that reaches vessels in the dermis

Pulsed dye lasers - 585/595nm

- Long history of safe and effective use for vascular lesions



Near infrared lasers - long-pulsed Nd:YAG (1064 nm)

- A secondary, lower peak for the absorption of light by oxyhemoglobin occurs in the near-infrared range

- Relatively long wavelengths emitted by these lasers penetrate the skin to greater depths than is possible with PDL - utilized for vessels deeper in the skin and for larger vessels

- Disadvantage: relatively lower absorption by hemoglobin in this range demands the use of higher fluences during vascular treatment ➔ greater risk of scarring compared with PDLs

PWS

When is the optimal timing to start Pulse Dye Laser for Port-Wine Stains?

A. Around the start of adolescence

B. After puberty is complete

C. Infancy

D. Only if it thickens

When is the optimal timing to start Pulsed Dye Laser (PDL) to treat Port Wine Stains?

PWS

- Congenital low-flow vascular malformations of dermal capillaries and postcapillary venules presenting as pink to erythematous to violaceous patches

- Complications such as nodules, bleeding, pyogenic granulomas, and tissue hypertrophy can occur in mature lesions

- **Pulsed dye lasers —** first-line treatment

- Early treatments → improved results - within first month of life

- Very young children (under one year of age) may require fewer treatments for lesion clearance and may be more likely to achieve greater overall lightening
  - increased hemoglobin concentration (first 6 -12 months), presence of thinner skin and smaller vessels compared with older individuals

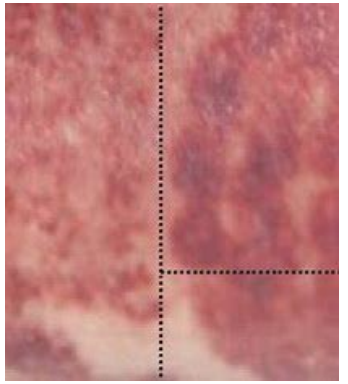
- **Cooling** – reduce the risk of epidermal damage and scarring and allow for the use of higher fluences particularly in patients with darkly pigmented skin to prevent hyperpigmentation or hypopigmentation

- Every 4-6 wks

- Keep treating until lesions are clear/nearly clearly/no further improvement

- Factors associated with lower likelihood for complete response:
  - Older child/adult
  - Darkly pigmented skin – Use of appropriate laser settings, which may include longer pulse durations and lower energies and epidermal cooling
  - Location: extremity, or central face (medial cheek, upper lip, nose)
  - Nodular, large, or hypertrophic lesions – increased resistance to PDL ➔Treatment with other types of lasers with longer wavelengths may be beneficial / use with caution

Adverse effect



- **Purpura** – desired tissue response - typically resolves within 10 to 14 days - pain medications that inhibit clotting, such as NSAIDs, should be avoided??
- **Edema** – Local edema and sunburn-like pain are common after treatment → Elevation, ice packs, oral analgesics that do not affect clotting, and bland topical emollients are useful for decreasing patient discomfort
- **Hyperpigmentation** – Post-treatment sun avoidance to reduce the risk
- **Other** – Blistering, scarring, cutaneous atrophy, and hypopigmentation
  →**Gray or white discoloration –** denotes epidermal injury and should be avoided

- **Combination therapies** — Combined modality lasers (eg, 595 and 1064 nm) combination therapy with PDL and fractionated Er:YAG laser, and combination of PDL plus topical agents with antiangiogenic properties, such as timolol or rapamycin, may have benefit

- Fractionated lasers may be effective for improving fibrofatty residua that remain after involution of hemangiomas

- 1 y o female
- PWS on nose
- s/p 7 PDL sessions

- 15 y o male
- PWS on left cheek
- s/p 9 sessions PDL

Infantile Hemangiomas

- Beneficial effects of laser therapy are most likely to occur in patients with small, superficial, or ulcerated lesions - PDL can only penetrate to 1.2mm
- For larger lesions, combination of PDL treatment with oral beta blockers may provide additional benefit
- Reduction in lesion thickness was observed in more superficial lesions than mixed lesions

- The most accepted use of PDL in the management of hemangiomas: treating ulceration, post-involution erythema, and telangiectasias

- Controversy regarding how early to treat

- Systemic therapy with propranolol is preferred over lasers for infantile hemangiomas

Krowchuk DP, Frieden IJ, Mancini AJ, et al. Clinical Practice Guideline for the Management of Infantile Hemangiomas. *Pediatrics*. 2019;143(1):e20183475.

- 4 y o male
- Infantile hemangioma
- s/p Propranolol and Timolol

- s/p 2 PDL sessions

Laser for hypertrophic scars and keloids

- PDL selectively targets hemoglobin in dermal blood vessels of neovascularized scar tissue → resulting tissue hypoxia → remodeling and re-alignment

- Main clinical effects of PDL therapy: decreases of scar erythema, pruritus (decrease histamine release), and improved texture and pliability

- **Timing and technique** — PDL can be successfully be used **at six months** postinjury, and possibly sooner, to reverse or diminish the inflammatory response in hypertrophic burn scars

- PDL treatments should continue until erythema, hyperemia, and pruritus responses reach a plateau (~ 4 sessions) → fractional laser treatment can be started to improve scar texture and pliability

Botulinum toxin injection

- Hyperhidrosis (palmar, axillary, plantar)
- Asymmetry, headache due to tension from skin tightening due to sclerosing conditions (morphea)
- Anesthesia: Topical (LMX, EMLA), Regional, Ice Packs, Vibration

CO2 laser

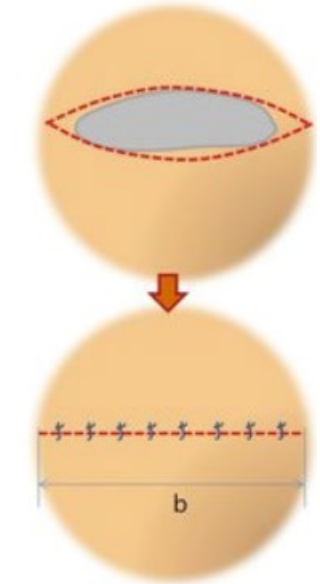
- 7 y o girl
- Epidermal nevus
- s/p 1 session CO2 laser (10,000nm)

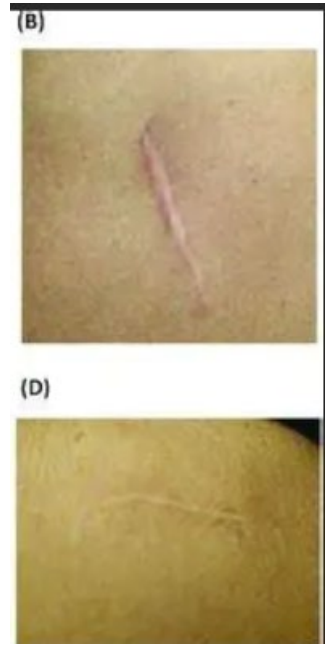
Alopecia Areata

- Intralesional steroids

Excisions

- Pilomatricoma
- Epidermal inclusion cyst
- Dysplastic/atypical moles/melanomas





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Thank you!