# Pediatric Dermatology

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## Disclosure

I do not have any relevant financial/non-financial relationships with any proprietary interests.

- Pediatric Nevi
- Hemangiomas/Vascular Anomalies
- Vitiligo
- Warts/Mulluscum

# Pediatric Nevi

- Congenital melanocytic nevi (CMN) present at birth in 1-2% of children
- Increased risk of melanoma in large CMN
- Acquired nevi develop in childhood, Number of nevi increase until age ~40
- Genetics and sun exposure

- Nevi undergo growth/maturation
- Melanoma most frequently arises de novo
- Can arise within acquired/congenital nevus
- No clear evidence that nevi “transform into” melanoma

- Melanoma in preadolescent children rare, not associated with typical adult risk factors
- May be non-white, arise in sun protected areas, no family history, not associated with dysplastic nevi
- Melanoma in teenagers increasing in incidence, more like adult melanoma
- More likely fair, family history, atypical nevi

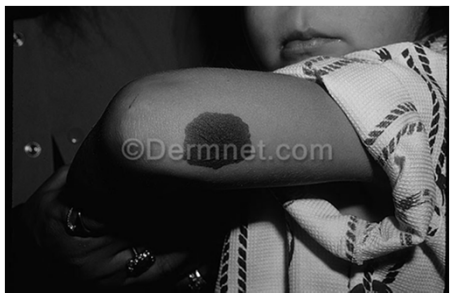
## Basic Rules

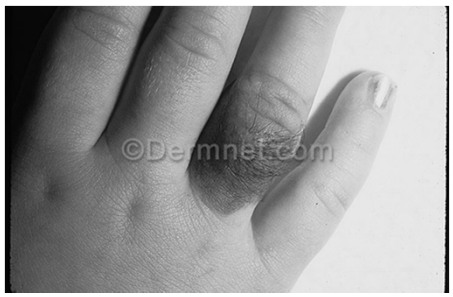
- Small and medium congenital melanocytic nevi (CMN) have low malignant risk but often look “scary”
- Giant CMN (>20 cm as adults) have slightly increased risk of MM (~6% lifetime risk) but a greater risk of neurocutanous melanosis and spinal dysraphism (when midline)
- Scalp nevi are “dynamic” and often have a targetoid appearance

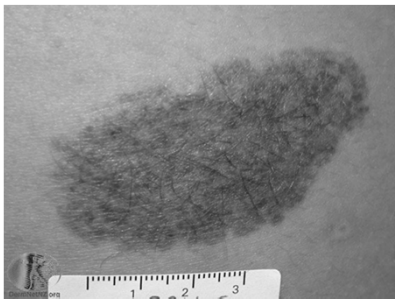
## Basic Rules - continued

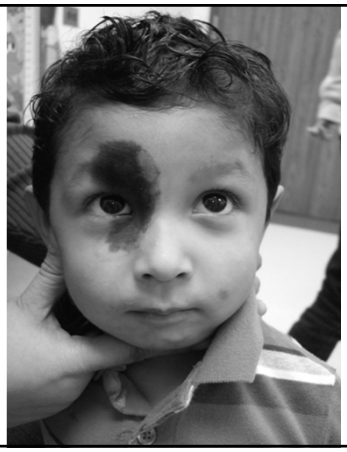
- It is normal for adolescents to develop new nevi and darkening of existing ones
- Spitz nevi can be observed but should be biopsied/excised if getting larger
- Family history of melanoma raises suspicion
- Look for the ugly duckling sign
- Halo nevi are a common phenomenon

Small and medium congenital melanocytic nevi (CMN) have low malignant risk but often look “scary”

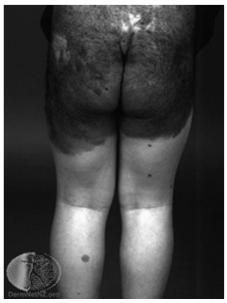


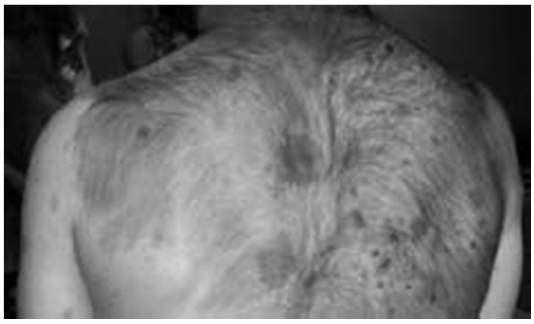


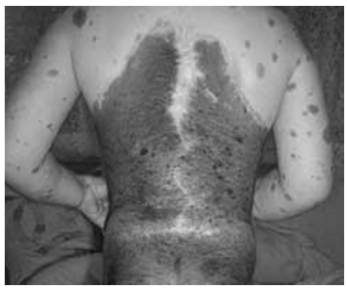
## Evaluation & Mamagement

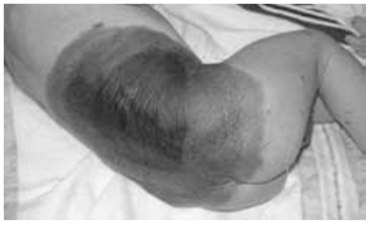
- Observe and measure nevi
- Refer to pediatric dermatology

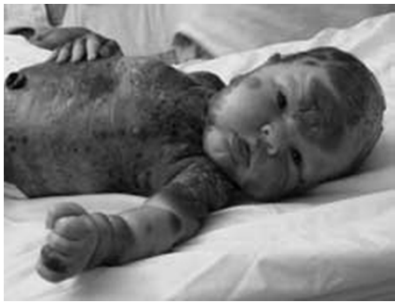
Giant CMN (>20 cm as adults) have slightly increased risk of MM (~6% lifetime risk) but a greater risk of neurocutanous melanosis and spinal dysraphism (when midline)







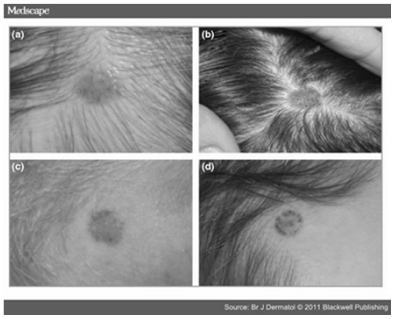




## Evaluation & Management

- Newborns:
  - Spinal ultrasound (if midline)
  - Consider MRI before age 4 months to assess for neurocutaneous melanosis
- Regular skin checks

## Scalp nevi are “dynamic” and often have a targetoid appearance




The JAMA Network

From: **No Biopsy Needed for Eclipse and Cockade Nevi Found on the Scalps of Children**

Arch Dermatol. 2009;145(11):1334-1336. doi:10.1001/archdermatol.2009.282

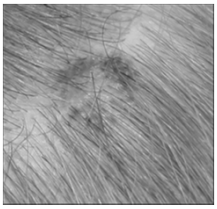


**Figure Legend:**
Eclipse nevus.

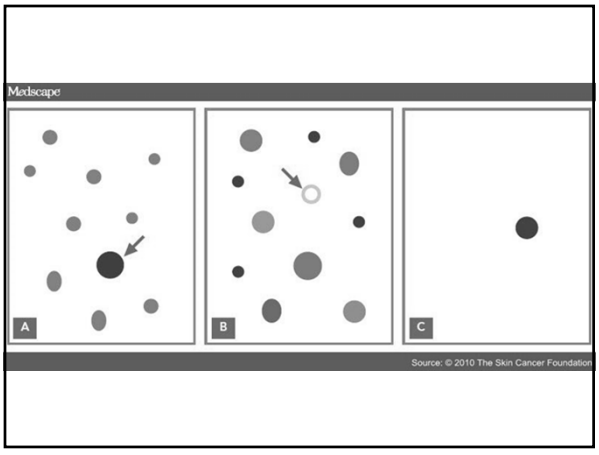


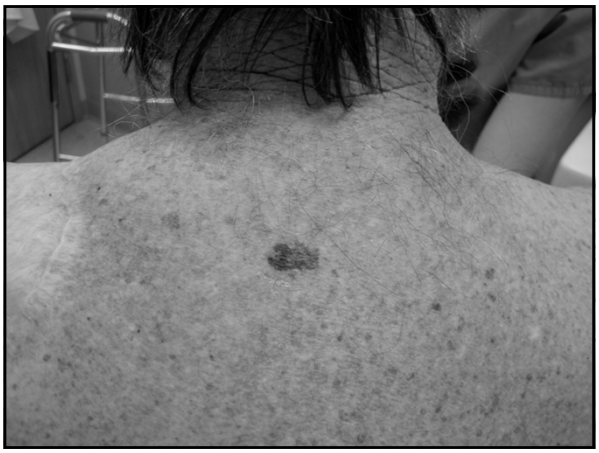
## Scalp Nevi: Evaluation and Management

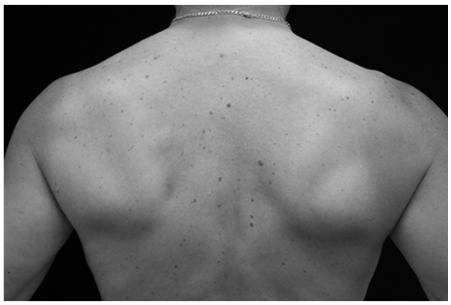
- Observe and measure nevi
- Refer to pediatric dermatology

It is normal for adolescents to develop new nevi and darkening of existing ones

Look for the ugly duckling sign







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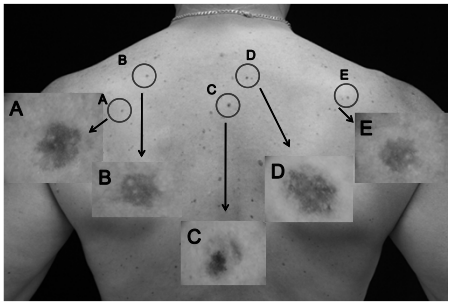


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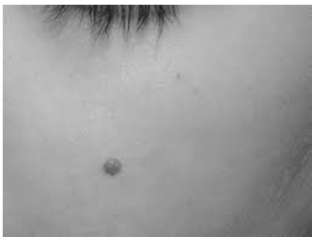
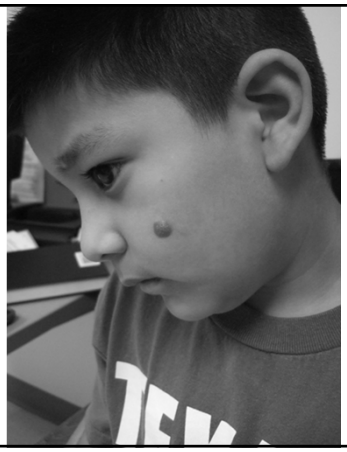
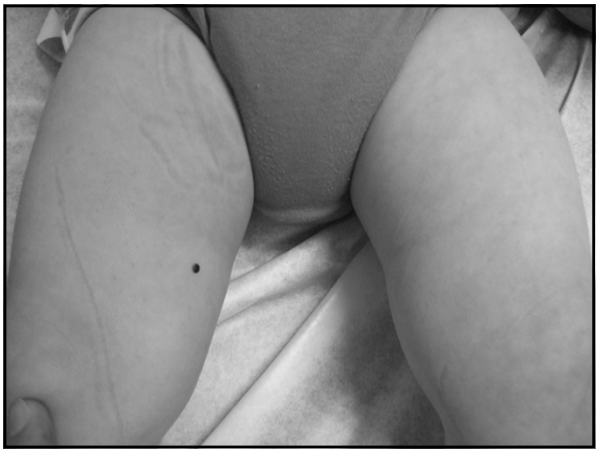
Spitz nevi can be observed but should be biopsied/excised if getting larger







## Evaluation & Mamagement

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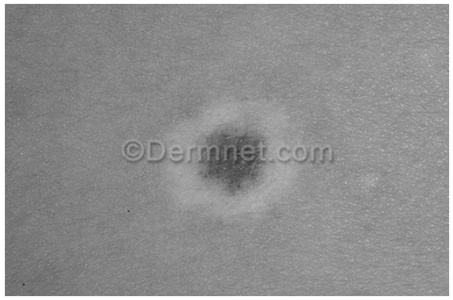
- Refer to pediatric dermatology

Halo nevi are a common phenomenon



## When to Worry

- Nevus inside halo is irregular
- Nevus is itchy or bleeds easily
- Multiple halo nevi are reassuring
- Often seen with vitiligo

## Evaluation & Mamagement

- Observe and measure nevi
- Refer to pediatric dermatology

## The ABCDEs


One half of the lesion is unlike the other half.


An irregular, scalloped or poorly defined border.


Varies from one area to another; has multiple shades, usually tan, brown or black; but also pink and sometimes white, red or blue.


Melanomas usually are greater than 6 mm (the size of a pencil eraser) when diagnosed, but they can be smaller.


A mole or skin lesion that looks different from the rest or is changing in size, shape or color.

*Patients can download the AAD's body mole map to document their self-examinations*

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## Vascular Lesions

- Proliferative lesions
- Malformations

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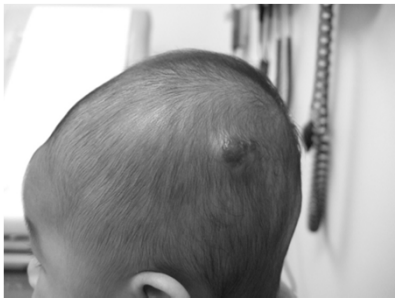
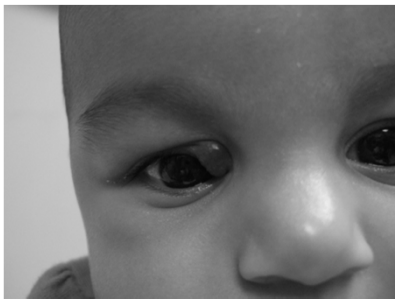
## Proliferative Vascular Lesions

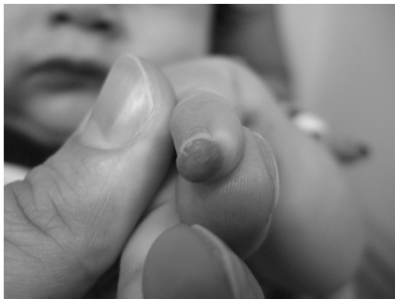
- Infantile hemangioma
- Pyogenic granuloma
- Tufted angioma
- Kaposiform hemangioendothelioma
- Rapidly involuting congenital hemangioma (RICH)
- Non-involuting congenital hemangioma (NICH)

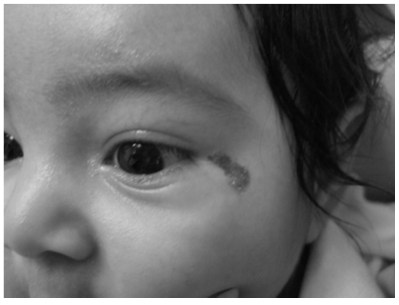
## Infantile Hemangioma

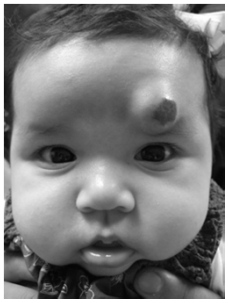
- Not present at birth
- Appears as a red macule within first few weeks of life
- Rapid proliferation during first 4-6 months of life
- Slow involution after 1 year of age
- GLUT1 positive

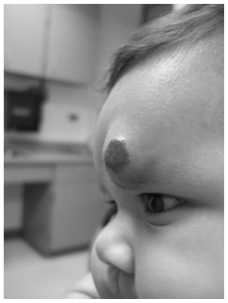


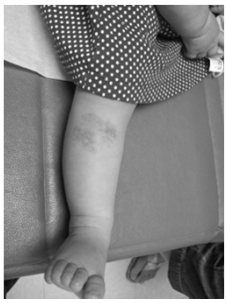


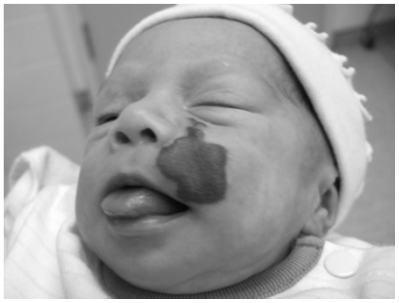




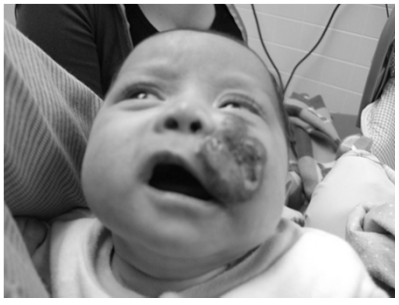


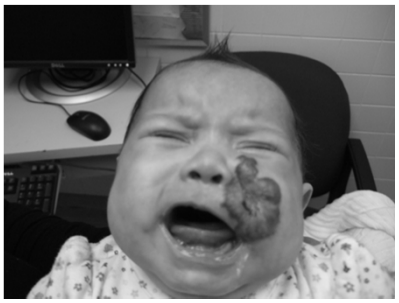






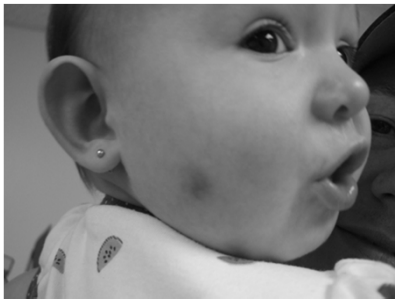
Ulcerated Hemangioma



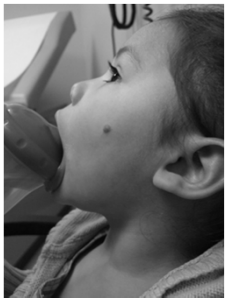


## Ulcerated Hemangioma

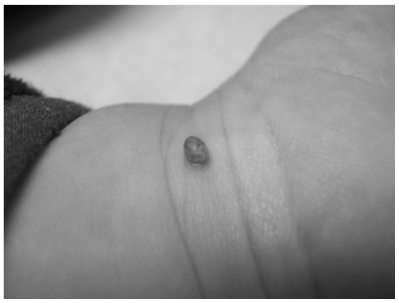
## Pilomatrixoma



## Spitz Nevus



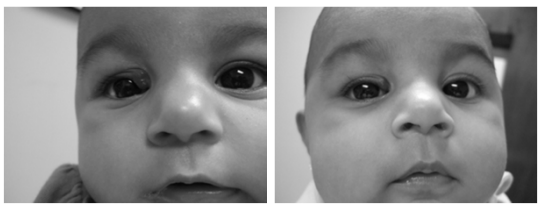
## Pyogenic Granuloma



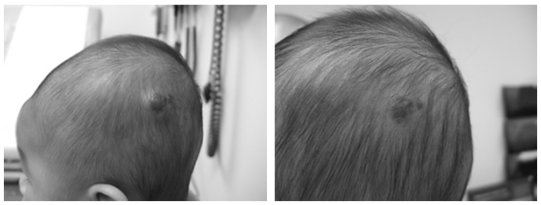
## Infantile Hemangioma: Treatment

- Active Non-Intervention
- Topical Steroids
- Intralesional steroids
- Imiquimod
- Surgery
- Laser (when flat)
- Prednisolone 3mg/kg/day
- Propranolol 2mg/kg/day
- Timolol 0.5% gel-forming solution

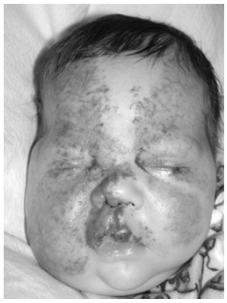
## Propranolol x 1-month

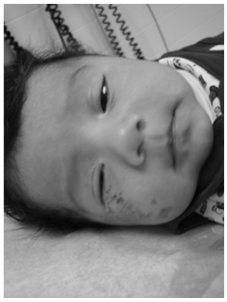


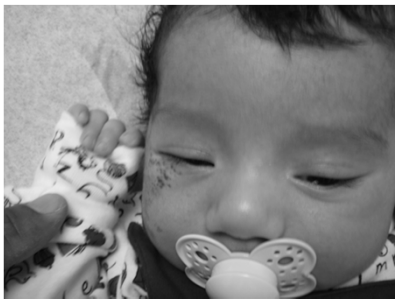
Propranolol x 1-month

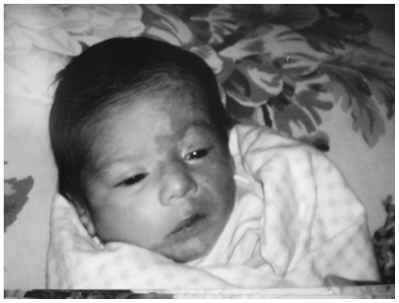


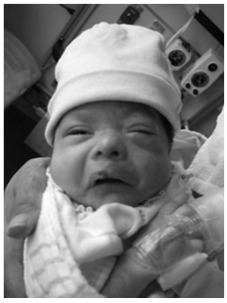
PHACE Syndrome











## PELVIS Syndrome

- Perineal hemangioma
- External genitalia malformations
- Lipomyelomeningocele
- Vesicorenal abnormalities
- Imperforate anus
- Skin tag

Girard C, Bigorre M, Guillot B, Bessis D. Arch Dermatol. 2006 Jul;142(7):884-8

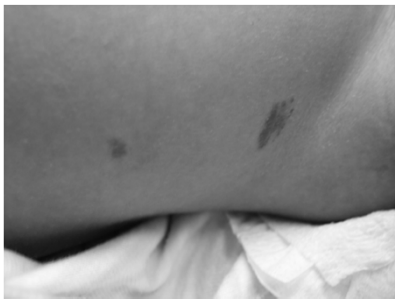
## SACRAL Syndrome

- Spinal dysraphism,
- Anogenital anomalies,
- Cutaneous anomalies,
- Renal and urologic anomalies,
- associated with Angioma of
- Lumbosacral localization.

**Stockman A, Boralevi F, Taïeb A, Léauté-Labrèze C. Dermatology. 2007;214(1):40-5.**

## Disseminated Neonatal Hemangiomatosis

- Multiple small hemangiomas all over the body
- When > 5, need to image for intrahepatic hemangiomas
- Large intrahepatic hemangioma
  - high output heart failure
  - hypothyroidism (type 3 iodothyronine deiodinase)



## Danger Zones for Infantile Hemangioma

- Periocular
- Nasal tip
- Lips
- “Beard” distribution
- Diaper area
- Any area prone to ulceration

## Management of Ulceration

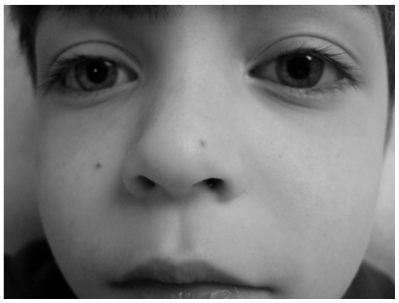
- Propranolol
- Comfort care: acetaminophen +/- codeine, topical lidocaine
- Mupirocin ointment
- Metronidazole Gel when in the diaper area
- Petrolatum
- Consider systemic antibiotics
- Laser

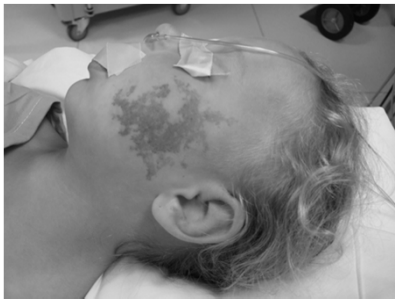
## Vascular Malformations

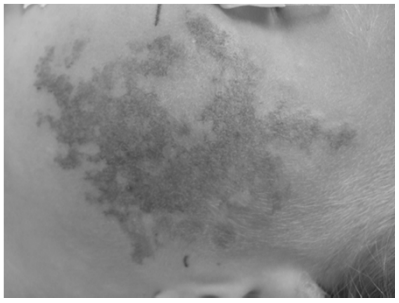
- Hamartomas
- Capillary
- Venous
- Lymhatic
- Arterial venous malformations

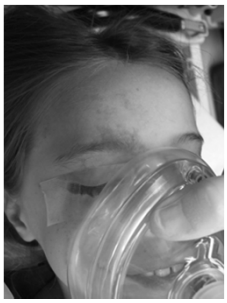
## Capillary Malformation

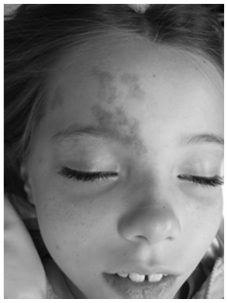
- Collections of capillaries in the dermis
- Nevus simplex (salmon patch, angel's kiss, stork bite)
- Port-Wine Stain





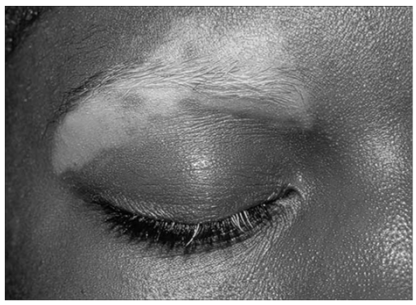


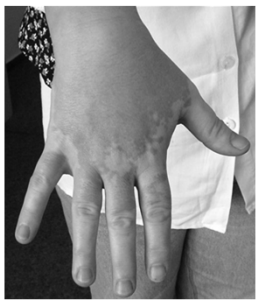




## Vitiligo

- Autoimmune-induced *depigmentation* of skin
- More obvious in darker skin types
- Can have a few affected areas or be widespread
- Caution must be taken due to risk of sunburn
- Treatment: topical steroids, phototherapy





# Warts and Molluscum

## Background

- Warts are caused by HPV
- ~100 HPV strains exists
  - HPV 1/3: palmar and plantar warts
  - HPV 6/11: genital warts
  - HPV 2: common warts
- Infect epithelia of skin and mucous membranes

## Epidemiology

- Spread via personal contact or fomites (e.g. shower floor, swimming pool, etc)
- High rate of recurrence
- Prevalence of 20% in school children
- Spontaneous regression often occurs

## Genital HPV

- 20-45% occurrence in women, probably same in men
- Risk factors:
  - Sexual intercourse at an early age
  - High number of lifetime sexual partners
  - Partner with a high number of sexual partners
  - Men who have sex with men: high risk for anogenital HPV infection

## Pathogenesis

- dsDNA virus, non-enveloped
- Spherical capsid
  - 2 proteins: L1 and L2

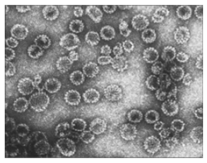
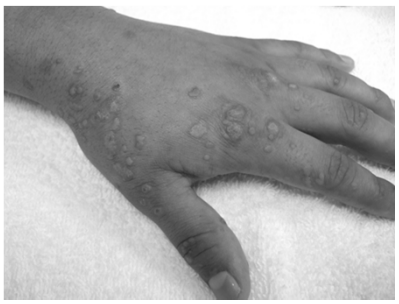
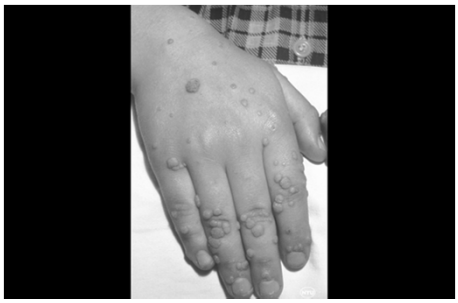


*Fig 78.3, Bolognia*

## Warts





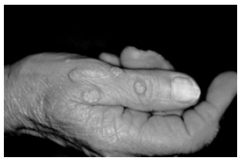


*Fig 78.6, Bolognia*

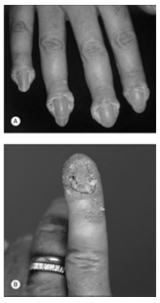


*Fig 78.7, Bolognia*

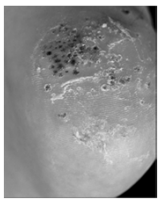


*Fig 78.8, Bolognia*

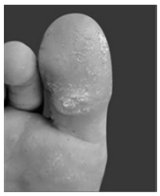
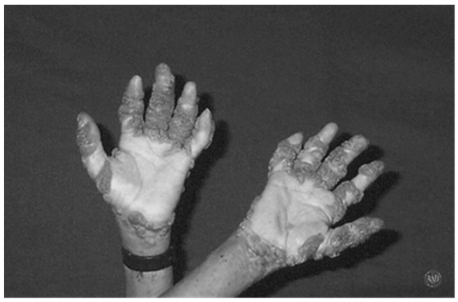


*Fig 78.9, Bolognia*



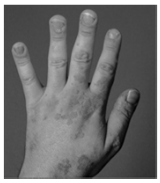


*Fig 78.11, Bolognia*

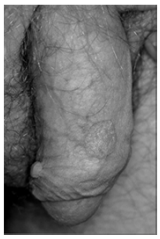


*Fig 78.15, Bolognia*

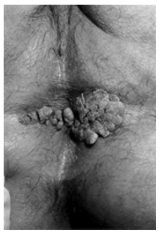


*Fig 78.16, Bolognia*

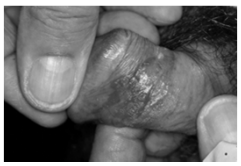
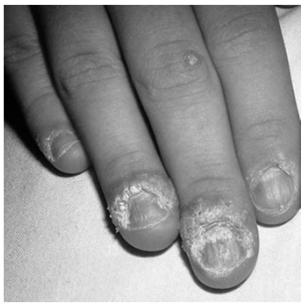
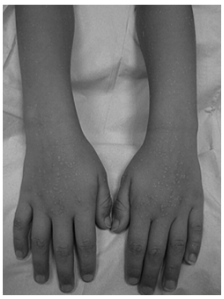
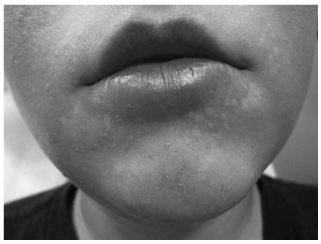


*Fig 78.19, Bolognia*





*J Am Acad Dermatol. 2012 Feb;66(2):292-311. Epub 2011 May 14.*



*J Am Acad Dermatol. 2012 Feb;66(2):292-311. Epub 2011 May 14.*

The JAMA Network

From: **Disfiguring Generalized Verrucosis in an Indonesian Man With Idiopathic CD4 LymphopeniaVerrucosis Associated With CD4 Lymphopenia**

Arch Dermatol. 2010;146(1):69-73. doi:10.1001/archdermatol.2009.330

**Figure Legend:**

Clinical appearance of the patient's warts in June 2007 before treatment. A, Chest; B, arm and hand; and C, lower extremities.



## Evaluation

- History / Physical
- If atypical:
  - Check CBC with differential
  - Quantitative immunoglobulin's
  - CD4 level
  - Zinc level
- Consider referral for biopsy of numerous (>100) flat warts to r/o EDV

## Treatment

- Cytotoxic/antiviral
  - Podophyllin, Cidofovir, 5-fluoruracil, bleomycin, Veregen®
- Physical destruction
  - Liquid nitrogen, electrodesiccation, cantharadin, salicylic acid, retinoids, laser
- Immunomodulators
  - Imiquimod, candida antigen, cimetidine, zinc, contact sensitizers (squaric acid, DCP)

# What about duct tape?

Arch Pediatr Adolesc Med 2002 Oct;156(10):971-4.

**The efficacy of duct tape vs cryotherapy in the treatment of verruca vulgaris (the common wart).**

Focht DR 3rd, Spicer C, Fairchok MP.

# Cytotoxic/antiviral

## Podophyllin

- FDA-approved for treatment of genital warts in adults
- Podocon-25®
- 25% solution applied in the doctor's office
- Works by arresting cells in mitosis, resulting in cytotoxicity

## Topical Cidofovir

- Not FDA-approved, not commercially available
- Can be compounded into a cream 1-3%, applied to warts twice a day without occlusion
- Often used in immunocompromised patients as a last resort
- Inhibits viral DNA polymerase
- Risk of nephrotoxicity with IV cidofovir

## Topical 5-Fluorouracil

- FDA-approved to treat actinic keratoses and superficial basal cell carcinoma in adults
- Carac®, Efudex® (Texas Medicaid Formulary)
- Applied to warts once or twice daily
- Often used for plantar warts, can be occluded
- Works as a pyrimidine analog, inhibits DNA and RNA synthesis

## Bleomycin

- Not FDA-approved for treating warts
- Injected directly into warts
- Very painful
- Works by inhibiting DNA synthesis

## Veregen

- Veregen® (sinecatechins)
- FDA-approved for treating genital warts in adults (Texas Medicaid Formulary)
- Applied directly to warts without occlusion three times a day for a maximum of 16 weeks
- Mechanism of action unknown, thought to have antioxidase activity (derived from green tea)

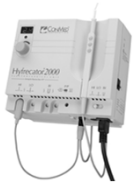
# Physical destruction

## Liquid Nitrogen

- Use of a cotton swab or spray canister to apply liquid nitrogen to a wart
- Liquid nitrogen is -196 C, works by causing tissue destruction and blistering
- Blisters usually form and will fill with fluid, takes 7-14 days to resolve
- Can leave a scar and warts may recur

## Electrodesiccation

- Use of an electric cautery device to physically burn a wart
- Requires use of lidocaine injection prior to use
- Can leave scar and recurrence is common



## Laser

- Pulse dye laser (585-595nm) is most commonly used laser
- Works by targeting hemoglobin (red)
- Can curette wart to pinpoint bleeding and then laser the bleeding vessels
- If under general anesthesia, can fully electrodesiccate and curette wart, followed by laser of the base

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## Cantharadin

- Harvested from the blister beetle
- Works by causing a blister upon contact
- Upside: painless
- Downside: often makes warts bigger (ring warts)

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## Salicylic acid

- Available both OTC and as prescription
- Apply directly to wart once or twice a day
- Works better with occlusion



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## Topical Retinoids

- FDA-approved for acne
- Tretinoin or adapalene applied once a day (under occlusion) or twice a day (without occlusion) for 1-2 months
- Can apply qHS for flat warts (no occlusion needed)

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## Immunomodulators

## Imiquimod

- FDA-approved for the treatment of genital warts, actinic keratosis, and superficial BCC
- Available as 5% cream (Aldara®) or 3.75% cream (Zyclara®)
- Apply to warts nightly x 1-2 months, cover with duct tape

## Candida Antigen

- Not FDA-approved for treating warts
- Apply 0.1-0.3ml total q month x 3
- Caution on fingers
- Great for older patients who can tolerate the pain

## Cimetidine

- H2 blocker, used for GERD
- Not FDA-approved for warts
- 10mg/kg TID, max 400mg TID
- Thought to increase lymphocyte counts
- Many studies have supported its use while an equal number of studies have denied its efficacy
- Be careful with other drugs (cytochrome p450 inhibitor)

## Zinc

- Zinc Sulfate, not FDA-approved, can get OTC or Texas Medicaid Formulary
- 10mg/kg/day – max of 600mg per day
- Once a day dosing
- Probably most effective in those with zinc deficiency

J Dermatol. 2011 Jun;38(6):541-5. doi: 10.1111/j.1346-8138.2010.01056.x. Epub 2010 Nov 2.

## Contact Sensitization

- Not FDA-approved
- Squaric acid dibutyl ester 2%
- Diphenylcyclopropenone (DCP) 2%
- Applied to hip and directly to warts for sesitization
- Then lower concentration, usually 0.05%, is applied to warts at home
- Upside: painless, no scarring
- Downside: not covered by insurance, itching can be severe, very unpredictable

## My Choice

- First do no harm!
- Salicylic acid under 24 hour occlusion x 1-2 months
- Liquid Nitrogen
- Laser
- Candida antigen
- DCP

## Special Situations…

## Preadolescent Genital Warts

- Rarely caused by sexual abuse but very important to screen for abuse
- Prenatal, inoculation by care giver, self
- Refer to CPS if story is unusual
- Treat with Aldara 5% cream 5x/week at night, increase to nightly after 1-month
- Can also consider Veregen ointment TID
- Laser is last resort

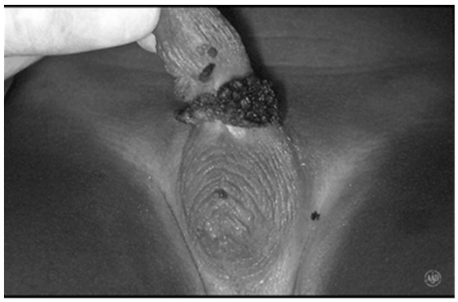
**Nonsexual Transmission of Anogenital Warts in Children: A Retrospective Analysis**

Valerie Jones, Shawn J. Smith, and Hatim A. Omar
*Division of Adolescent Medicine, Department of Pediatrics, University of Kentucky, Lexington, KY 40536*

**E-mail:** haomar2@.uky.edu

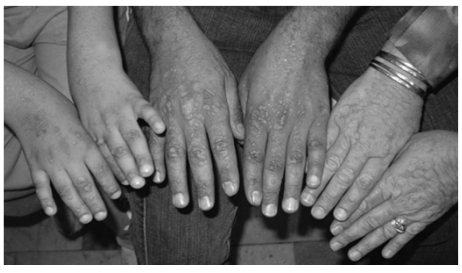
*Received August 20, 2007; Revised September 19, 2007; Accepted September 20, 2007; Published November 26, 2007*

**The purpose was to evaluate the prevalence of sexual abuse in patients who were referred to a pediatric gynecologist for evaluation based on the clinical findings of anogenital warts. A retrospective analysis was performed on 131 patients between the ages 6 month and 9 years referred to a pediatric gynecologist after the finding of anogenital warts by a clinical provider, parent or caregiver. A complete physical examination under colposcopy by a the same, trained pediatric gynecologist was completed, and a complete medical and family history including maternal and sibling history for evidence of Human Papillomavirus (HPV) and anogenital warts. The legal system completed a full investigation to examine the sexual abuse allegations. In 131 patients with anogenital warts, a maternal history of warts, cervical dysplasia or both was present in 66 (50%). The remaining patients had either a negative maternal history for HPV clinical findings (54 patients or 41.2%), or maternal history was unknown (11 patients, or 8.3%). Of 131 patients, 81 (61%) patients had a sibling. Of those with siblings 40 (49.4%) had warts and 41 (50.6%) did not. Forty-five (34%) of the cases had a positive maternal history for warts, dysplasia or both but also had a sibling. In that cohort, 32 (71%) of the siblings also had anogenital warts. Three of 131 patients were ruled suspicious for sexual abuse by the legal authorities but not confirmed. Of those three patients two were female and one was male. Two had no maternal history for HPV and both of these patients had a sibling without anogenital warts. Most cases of anogenital warts in children are likely to be the result of non-sexual transmission, namely prenatal mode. Thus, these patients should be handled differently by the legal system unless other reasons for suspicion exist. This study also showed the importance of maternal gynecologic history.**

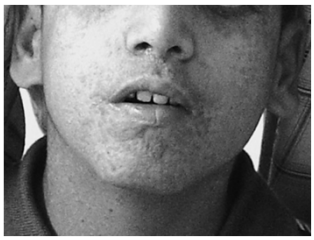


## Epidermodysplasia Verruciformis

- Inherited (*EVER1* or *EVER2* mutation) or acquired (via immunodeficiency) propensity to HPV infection of unusual strains such as 5, 8, 9 and others that non-affected people are immune to
- Often looks like flat warts on the arms and hands
- Risk of squamous cell carcinoma



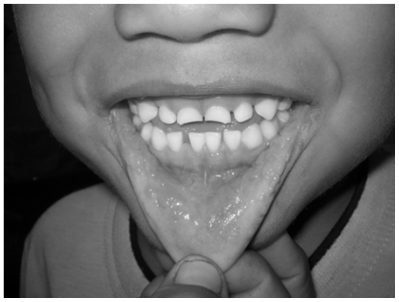
*From the Geneva Medical Foundation for Education and Research*

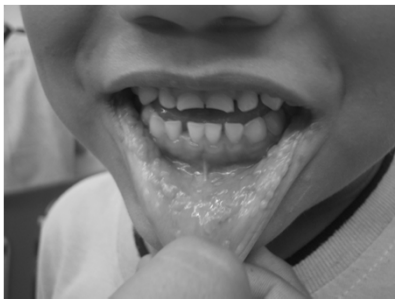


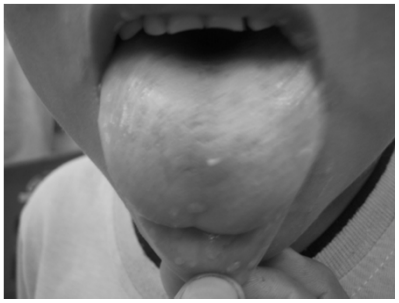
*From the Geneva Medical Foundation for Education and Research*

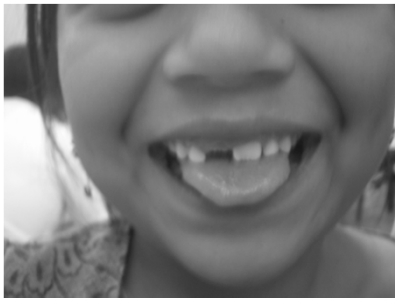
## Heck's Disease

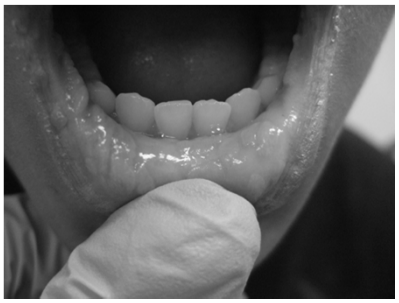
- Focal epithelial hyperplasia
- Autosomal dominant
- HPV 13 & 32
- Multiple papules on the buccal, gingival, or labial mucosa
- Rare in Caucasians but common in children of indigenous South Americans or Eskimos



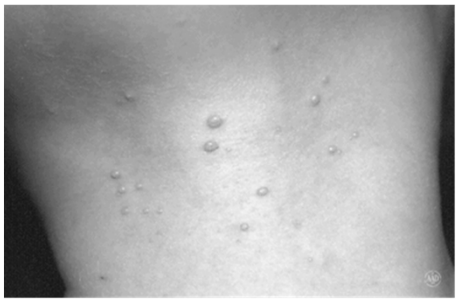


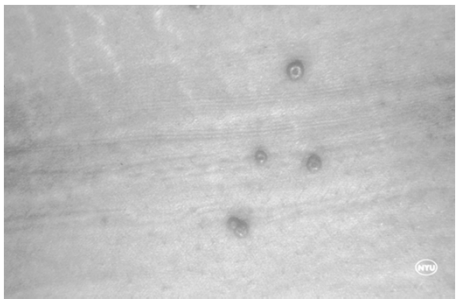


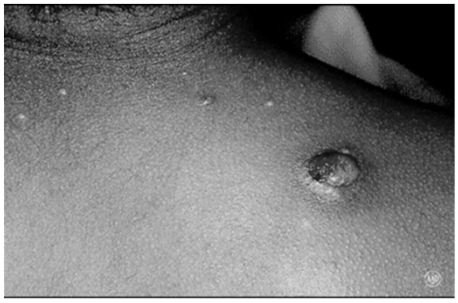




Differential Diagnosis





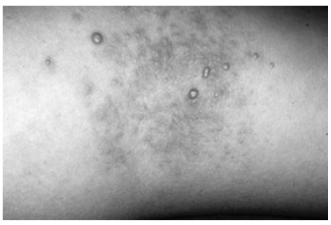


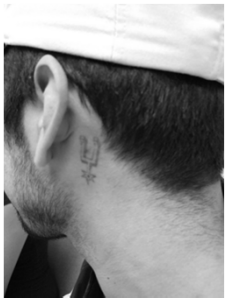
## Molluscum Contagiosum

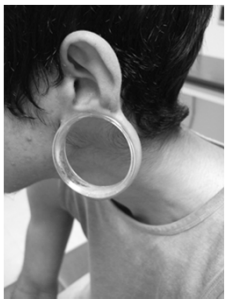
- Caused by a pox virus
- Common in children, think about STI in adolescents
- Self-limited, average infection lasts about two years
- Treatment: observation, cantharadin, salicylic acid, liquid Band-Aid, imiquimod, liquid nitrogen, home curettage, topical retinoid

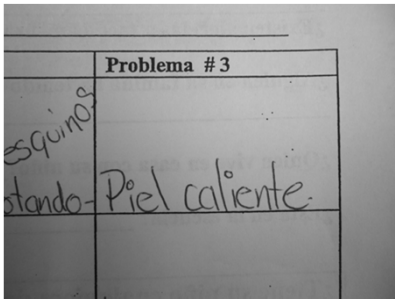
## Molluscum Dermatitis

- Immune reaction against the molluscum contagiosum virus.
- Can use topical steroids as needed.
- Will resolve once the molluscum infection resolves.










The End

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