Vascular Tumors

- Infantile hemangioma
- Congenital hemangioma
  - Rapidly involuting (RICH)
  - Non-involuting (NICH)
- Pyogenic granuloma
- Kaposiform hemangioendothelioma and tufted angioma

Vascular Malformations

Vascular Malformations

- Low flow
  - Capillary (port wine stain)
  - Venous
  - Lymphatic
    - Microcystic (lymphangioma)
    - Macrocystic (cystic hygroma)
  - Combined

- High flow
  - Arterial-venous (AFM, AVF)

Infantile Hemangiomas: the Basics

- Most common tumor of infancy
  - 5-10% by one year of age
  - Female:Male = 3:1
  - More common if born prematurely

- Typically become apparent during the first few weeks of life

- Express placental vascular antigens
  - GLUT-1
  - Placental differentiation vs embolization
A 9-month-old girl has had this lesion since 2 weeks of age, with marked enlargement over the first 5 months of life. What is the most appropriate management at this time?

A. Excision  
B. Intralesional corticosteroid  
C. Observation  
D. Pulsed dye laser  
E. Systemic corticosteroid

Natural History

• **Proliferation**  
  - 'Mark out territory' early on, then volumetric growth  
  - Most growth complete by age 9 months  
  - Deep lesions tend to grow ~1 month longer  
  - Bright red  
  - Firm/rubbery  
  - Warm

• **Involution**  
  - 30% by 3 years  
  - 50% by 5 years  
  - 90% by 9 years  
  - Dull red to gray  
  - Soft/spongy  
  - "Breaking apart"
**Hemangioma Precursors**

- Bluish bruise-like patch
- Telangiectasias with border of pallor
- Reddish, flat “stain”

**Superficial Hemangiomas (~50%)**
Deep Hemangiomas (~15%)

Superficial + Deep Hemangiomas (~35%)

Involuting Hemangiomas
Which of the following is most likely present in this infant?

A Congestive heart failure
B Consumptive coagulopathy
C Glaucoma
D Posterior fossa malformation
E Tethered spinal cord
PHACE(S) Syndrome

- Posterior fossa malformations
- Hemangioma (typically ‘segmental’ facial)
- Arterial cerebrovascular anomalies
- Cardiovascular defects, esp. coarctation
- Eye anomalies
- Sternal defects and supraumbilical raphe

1 – Frontotemporal*
2 – Maxillary
3 – Mandibular
4 – Frontonasal*

*Do not precisely correspond to classic embryonic facial prominences

Haggstrom et al Pediatrics 2006
Which of the following organs is most likely affected in this infant?

A Brain
B Eyes
C Gastrointestinal tract
D Liver
E Lungs
Neonatal “hemangiomatosis” (multifocal infantile hemangiomas with or without extracutaneous involvement)

- Multiple (≥5) hemangiomas
  - Usually small, superficial, “cherry-like”

- Risk of associated visceral involvement
  - Liver >> lungs, CNS, GI
  - Hepatomegaly, high-output CHF
  - Screen with hepatic US, esp. if <6 mos age

LOCATION, LOCATION, LOCATION
"Beard" Distribution: Risk of Airway Hemangiomas

- With full "beard", >50% chance of airway hemangiomas
- Usually manifest within 1st 3-4 months of life with biphasic stridor

Periocular Hemangiomas

**Risks:**
- Amblyopia
- Strabismus
- Astigmatism

Ulcerated hemangiomas

- Extremely painful
- High-risk sites
  - Lip
  - Diaper area
• **LUMBAR** syndrome
  - Lower body hemangioma (often large/segmental),
  - Lipomas and other cutaneous anomalies
  - Urogenital anomalies
  - Myelopathy (spinal dysraphism)
  - Bony deformities (eg limb underdevelopment)
  - Anorectal malformations and Arterial anomalies
  - Renal anomalies

  • **Evaluation**
    - Ultrasound of abdomen/pelvis and (if <3 mos) spine
    - MRI of spine if midline lumbar hemangioma or lipoma
    - MRA/MRV if extensive limb involvement

---

**Midline Skin Lesions: Markers of Spinal Dysraphism**

• 75% of individuals with spinal dysraphism vs <3% overall

• High-risk markers:
  - More than one type of skin lesion
  - “Tails”
  - Lipomas: most common marker overall
  - Hypertrichosis (e.g. “faun tail”)
  - Hemangiomas (risk > vascular stain)
  - >5 mm/deep dimples above the gluteal cleft
Identifying High-Risk Hemangiomas

- **Location**
  - Threat to vision, airway or other vital functions
  - Potential for disfigurement (esp. facial lesions)
- **Size/growth potential (depends on age)**
- **‘Segmental’ subtype**
- **Ulceration**

Which of the following is the most appropriate initial management of this enlarging lesion in a 5-week-old boy?

A. Staged excision  
B. Intrallesional corticosteroid  
C. Observation  
D. Propranolol  
E. Pulsed dye laser

Hemangioma Treatment Options

- “Watchful waiting” / “Active nonintervention”  
- Local wound care for ulceration  
- Topical*, intrallesional, or systemic corticosteroids  
- Vincristine  
- Interferon (risk spastic diplegia)  
- Beta blockers – oral propranolol or topical timolol*  
- Pulsed dye laser*  
- Excisional surgery

*Beneficial primarily for superficial lesions
Vascular Tumors Associated with Kasabach-Merritt

Kasabach-Merritt Syndrome

- Vascular tumor + coagulopathy
  - Kaposiform hemangioendothelioma or tufted angioma
  - NOT classic infantile hemangiomas
- Rapidly enlarging, ecchymotic, indurated vascular mass
- Severe thrombocytopenia, DIC, microangiopathic hemolytic anemia

Pyogenic Granuloma

- Arise any time
- Do not reliably involute
- Pedunculated, friable, often bleed like crazy!
Birthmarks

This child is at greatest risk for which of the following?

A Congestive heart failure
B Consumptive coagulopathy
C Glaucoma
D Ocular axis occlusion
E Tethered spinal cord

The child pictured is at greatest risk for which of the following?
Sturge-Weber Syndrome

- Facial capillary malformation (port wine stain) in V1 (+/- V2, V3) distribution
- Ipsilateral leptomeningeal vascular malformation
  - Seizures, contralateral hemiplegia
  - Cerebral gyral calcifications
- +/- Choroidal vascular malformation
  - Ipsilateral glaucoma
- Somatic activating GNAQ mutation in affected tissues
  - Encodes Q-class G protein α-subunit

Port Wine Stain:
thickening/development of nodularity with age
Port Wine Stain: early treatment with pulsed dye laser

What is the most likely diagnosis in a 16-year-old boy with this solitary skin lesion?

A Becker’s melanosis  
B Congenital melanocytic nevus  
C McCune-Albright syndrome  
D Neurofibromatosis  
E Tuberous sclerosis

Becker’s melanosis

- Evident at birth or appear around puberty
- More often diagnosed in boys than girls
- Unilateral distribution favoring upper trunk and shoulder
- Tan to brown patch that breaks up into many smaller “islands” at periphery
- ~Half of lesions hypertrichotic
Brown Birthmarks

- Café-au-lait spot
- Becker's melanosis
- Congenital melanocytic nevus
- Plexiform neurofibroma

Congenital Melanocytic Nevi (CMN): Classification by Size

- **Small**
  - <1.5 cm final size

- **Medium**
  - 1.5-20 cm final size

- **Large or Giant**
  - >20 or 40 cm final size
  - ≥9 cm on the head of an infant
  - ≥6 cm on the body of an infant
**Congenital Melanocytic Nevi: Prevalence**

- Evident in 1-3% of neonates
  - *Tardive congenital or early onset* nevi, which become apparent between 3 months and 2 years of age, affect ≥6% of the population
- Most are small or medium-sized
- Estimated frequency of large CMN = 1 per 20,000

**Natural History of Congenital Melanocytic Nevi**

- Darker or lighter color
- Increase in thickness
- Changes in topography
- Development of hypertrichosis

**Melanomas in Small and Medium-Sized CMN**

- <1% lifetime risk
- Almost always *after* puberty
- Tend to arise superficially (at the dermo-epidermal junction)
Melanomas Associated with Large/Giant CMN

• ~5% lifetime risk
• Cutaneous melanomas often arise deep, making early recognition difficult
• Extracutaneous primary sites are relatively common – Especially CNS

Neurocutaneous Melanocytosis

• Proliferation of melanocytes within the leptomeninges (in addition to the skin)
  – Melanocytomas
  – Melanomas
• Somatic activating NRAS mutation in nevus and affected CNS tissue

Large/Giant CMN: Risk of Melanoma and Neurocutaneous Melanocytosis

• Higher risk
  – Larger size of CMN (e.g. >50 cm)
  – Large number of satellite nevi (esp. for NCM – even without ‘mother ship’)
  – Posterior axial location on the trunk (esp. for melanoma)
• Lower risk
  – Restricted to an extremity or the head
  – Satellite nevi themselves (for melanoma)

Bett BJ. J Am Acad Dermatol 2005;52:793
This 6-year-old boy has >10 well-defined hyperpigmented macules/patches >5 mm in diameter and numerous smaller hyperpigmented macules in intertriginous sites. Which of the following is the most characteristic complication of his underlying condition?

A Cardiac rhabdomyomas
B Cataracts
C Hyperinsulinemia
D Melanoma
E Pseudoarthrosis

Neurofibromatosis type 1

- Autosomal dominant disorder due to loss-of-function mutations in the *neurofibromin 1* tumor suppressor gene
  - Neurofibromin dampens effects of RAS proto-oncogene
- Classic clinical diagnostic criteria (requires ≥2)
  - ≥6 café-au-lait macules (>5 mm prepubertal, >15 mm postpubertal)
  - "Freckling" in axillary or inguinal areas
  - ≥2 neurofibromas or ≥1 plexiform neurofibroma
  - Optic glioma
  - ≥2 Lisch nodules
  - Osseous lesions (sphenoid dysplasia, pseudoarthrosis)
  - 1st degree relative with NF1

Pseudoarthrosis
Lisch nodules
Neurofibromas
Plexiform neurofibroma
Which of the following is typically the earliest cutaneous manifestation of tuberous sclerosis?

A  Café-au-lait macules
B  Facial angiofibromas
C  Hypopigmented macules
D  Periungual fibromas
E  Shagreen patch

Hypopigmented macules: polygonal, "ash leaf" 

"Confetti" macules of hypopigmentation

Tuberous sclerosis complex revised dx criteria

<table>
<thead>
<tr>
<th>Mucocutaneous</th>
<th>Extracutaneous</th>
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<tr>
<td><strong>Major features</strong></td>
<td><strong>Major features</strong></td>
</tr>
<tr>
<td>Hypomelanotic macules</td>
<td>Multiple retinal hamartomas</td>
</tr>
<tr>
<td>≥5 mm size (≥3)</td>
<td>Cortical dysplasias</td>
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<td>Angiofibromas (≥3)</td>
<td>Subependymal nodules or giant cell</td>
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<tr>
<td>or fibrous cephalic plaque</td>
<td>astrocytoma</td>
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<tr>
<td>Ungual fibromas</td>
<td>Cardiac rhabdomyomas</td>
</tr>
<tr>
<td>Shagreen patch</td>
<td>Lymphangiomyomatosis</td>
</tr>
</tbody>
</table>

| **Minor features**     | **Minor features**                  |
| Confetti macules       | Retinal achromic patch              |
| Intraoral fibromas (≥2)| Dental enamel pits (≥3)              |
|                        | Multiple renal cysts                |
|                        | Nonrenal hamartomas                 |

TS1 — hamartin  
TS2 — tuberin
A 1-day-old full-term girl develops an eruption of erythematous macules and tiny papulopustules surrounded by an erythematous flare. The lesions are located on the face, trunk, and proximal/mid extremities. Analysis of pustule contents is most likely to reveal:

A Eosinophils
B Gram-positive cocci
C Mononucleated giant cells
D Neutrophils
E Pseudohyphae + budding yeast

Erythema toxicum neonatorum
**Erythema toxicum neonatorum**

- Affects ~half of full-term neonates
- Onset typically 24-48 hours after delivery
  - Range birth-2 weeks
- Any site, but typically spares palms and soles

![Wright stain of pustule contents: EOSINOPHILS](image)

**Congenital candidiasis**

- Papulopustules + desquamation at birth
- Widespread, including palms and soles

![KOH of pustule scraping: PSEUDOHYPHAES + YEASTS](image)

**Neonatal/infantile candidiasis:** diaper area

- Satellite papulopustules

![Diaper area with satellite papulopustules](image)
Analysis of pustule contents would most likely have revealed:

- A. Eosinophils
- B. Gram-positive cocci
- C. Mononucleated giant cells
- D. Neutrophils
- E. Pseudohyphae + budding yeast

Transitional Neonatal Pustular Melanosis

- PHASE 1: Vesiculopustules with minimal/no erythema
- PHASE 2: Collarettes of scale
- PHASE 3: Hyperpigmented macules
Transient Neonatal Pustular Melanosis

- Affects ~5% of black and ~0.5% of white neonates
- Lesions typically evident at birth
  - Sometimes only brown, "freckle-like" macules
- Predilection for the forehead, neck, and diaper area
  - But any site can be affected

Wright stain of pustule contents: NEUTROPHILS

A 4-day-old boy develops this eruption of pustules in the diaper area. Analysis of pustule contents is most likely to reveal:

A Eosinophils
B Gram-positive cocci
C Mononucleated giant cells
D Neutrophils
E Pseudohyphae + budding yeast

Bullous Impetigo

Staphylococcus aureus
- Local production of exfoliative toxin
- Neonates > children

Staphylococcus aureus & Streptococcus pyogenes

Impetigo

Staphylococcus aureus
- Local production of exfoliative toxin
- Neonates > children
This febrile, irritable 2-year-old child presents with exquisitely tender erythroderma, superficial blister formation in flexural areas, and crusting with radial fissures in a periorificial distribution on the face. Which of the following is the most likely etiology?

A febrile, irritable 2-year-old child presents with exquisitely tender erythroderma, superficial blister formation in flexural areas, and crusting with radial fissures in a periorificial distribution on the face. Which of the following is the most likely etiology?

A Herpes simplex virus  
B Mycoplasma pneumoniae  
C Staphylococcus aureus  
D Streptococcus pyogenes  
E Sulfonamide antibiotic

Staphylococcal Scalded Skin Syndrome (SSSS)

- Primarily neonates & children <6 years of age
- Systemic elaboration of exfoliative toxin by S. aureus
  - Cleavage of desmoglein 1 in the granular layer of the upper epidermis
  - + Nikolsky sign
  - Intact bullae sterile
  - S. aureus in conjunctiva, nose, perianal area, etc.
- Erythematous, extremely painful skin → flaccid, superficial bullae
  - Initial involvement of flexural sites
A 10-year-old girl has a 2-day history of these lesions with a dusky/bullous center in a symmetric acral distribution. She is afebrile and has no mucosal lesions. Which of the following is the most likely trigger?

A  Hepatitis B vaccination
B  Herpes simplex virus
C  *Mycoplasma pneumoniae*
D  *Streptococcus pyogenes*
E  Sulfonamide antibiotic

**Erythema Multiforme (EM) minor**

- Children and young adults
- HSV is the primary trigger
  - Lesions PCR+ for HSV-DNA in up to 90%
- <10% BSA blistered, symmetric, acral
- Erythematous macules→papules→ typical targets
  - Dusky/bullous center
  - Pale, edematous ring
  - Peripheral erythema
- ≤1 mucous membrane site (usually oral)
- Recurrent in ~30%
EM major & Stevens Johnson syndrome

- **Both**
  - ≥2 mucous membrane sites
  - Skin detached in <10% BSA
- **EM Major**
  - HSV (50%) > drugs (15%)
  - Localized/acral
  - Typical targets and "raised atypical targets"
- **SJS**
  - Drugs (~50%) > HSV (15%)
  - More widespread
  - Vesicles/bullae on red-purple base
  - "Flat atypical targets” with central purpura
- **Mycoplasma-induced rash and mucositis (MIRM)** – mucosa predominant

SJS & toxic epidermal necrolysis

- Onset typically 10 days to 3 weeks after starting a drug
- Discontinue suspect drugs immediately
  - Decreased mortality if stop drug early
  - Increased mortality if drug has a long half-life
- **Culprit drugs**
  - TMP-SMX
  - Carbamazepine, phenytoin, phenobarbital
  - Aminopenicillins
  - NSAIDs
- **Treatment with intravenous immunoglobulin, consider other immunosuppressive agents**
A 15-month-old girl presents with a 2-month history of erythema, blistering, and erosions in periorificial distribution on the face, in the diaper area, and on the hands and feet. She has also been irritable and developed chronic diarrhea and alopecia during the same period. She was weaned from breast feeding to cow’s milk at age 12 months. Which of the following is the most likely etiology?

A  Impetiginized atopic dermatitis  
B  Contact dermatitis  
C  Food allergy  
D  Psoriasis  
E  Zinc deficiency

‘Nutritional Dermatitis’

- Erosive dermatitis in periorificial and acral sites = early sign  
- Alopecia  
- Diarrhea, failure to thrive  
- Acrodermatitis enteropathica = prototype  
- Other examples  
  - Organic acidurias  
  - Cystic fibrosis (also prominent edema)
Acrodermatitis Enteropathica

- Genetic form – mutations in SLC39A4
  - Encodes intestinal zinc transporter
  - Onset in first few weeks (or after weaning of zinc-enriched formula) if bottle fed
  - Onset after weaning if breast fed
- Acquired forms
  - Low zinc level in breast milk
  - TPN or prematurity without supplementation
  - GI disorder or high-fiber diet impairing absorption
- Additional findings
  - Low plasma zinc
  - Low serum alkaline phosphatase
  - Irritability, stomatitis/glossitis, photophobia

An otherwise healthy 8-month-old girl presents with a 2-month history of pruritic, oozy/crusted to scaly plaques on the forehead and cheeks and extensor aspects of the arms and legs. The eruption has improved minimally with use of a low potency topical corticosteroid and oral + topical antistaphylococcal antibiotics. Which of the following is the most appropriate treatment?

A Intravenous immunoglobulin
B Mid-potency topical corticosteroid
C Oral antifungal agent
D Oral prednisolone
E Topical permethrin

Infantile Atopic Dermatitis

- Up to 2 years of age
- Edema, oozing, crusting
- Often begins on the face and scalp
- Also favors the extensor extremities
- Spares the diaper area
Atopic Dermatitis: Epidemiology

- Affects 10–20% of schoolchildren in the US

- Early age at onset
  - First year of life in >50%
  - Before age 5 years in 90%

Atopic Dermatitis: Disease Impact

- Intense pruritus/discomfort
- Skin infections
  - *Staphylococcus aureus*
  - Herpes simplex virus (eczema herpeticum)
  - Molluscum contagiosum
- Sleep disturbances
- Impaired social and school functioning
- Disrupted family dynamics
The atopic triad

Atopic dermatitis

Asthma

Hay fever

The atopic march:

AD = ‘entry point’ for allergic disease

Atopic Dermatitis: Diagnostic Criteria (2003 AAD Consensus Conference)

- Essential features
  - Pruritus
  - Eczematous dermatitis in age-specific patterns
  - Chronic or relapsing course

- Important features
  - Early age at onset
  - Personal and/or family history of atopy
    - Respiratory allergy (personal or family) in 70% of AD patients, usually associated with increased total and allergen-specific IgE (extrinsic AD)
  - Xerosis
Childhood Atopic Dermatitis

- 2 years of age to puberty
- More prominent lichenification
- Shift to flexor surfaces of the arms and legs, especially the antecubital and popliteal fossae
- Hands/feet, wrists/ankles
- Periorbital and perioral areas of the face; neck

Triggers/Exacerbating Factors for Atopic Dermatitis

- Anxiety/stress
- Climate
  - Extremes of temperature (winter or summer)
  - Low humidity
- Irritants
  - Detergents, wool/other rough materials
  - Perspiration
- Infection – systemic (e.g. viral URI) or cutaneous
- Allergens - contact, inhaled, & food
  - Food allergies are a clinically significant trigger in only a small minority of patients. ~1/3 of infants/young children with treatment-refractory, moderate to severe atopic dermatitis
Basics of Skin Care

- Daily bathing
  - Luke-warm water
  - Minimal mild cleanser
- Application of topical medication then emollient immediately after bathing (‘soak and smear’)
- Emollients
  - Ointments or creams; not lotions
  - Avoid alpha-hydroxy, lactic, or salicylic acid

Atopic Dermatitis Treatment Plan

Exacerbation
Daily use of a topical corticosteroid of high enough potency to clear the skin

High-level maintenance to “hot spots”
Intermittent use of a topical corticosteroid and/or topical calcineurin inhibitor

Low-level maintenance to all skin
Daily use of emollients
Avoidance of triggers
+/− Bleach in bathwater (1/4 cup per tub)

Atopic dermatitis: associated findings

Keratosis pilaris
Ichthyosis vulgaris
Hyperlinear palms
Ichthyosis vulgaris (IV)

- Most common disorder of cornification
  - Prevalence ~1:100
- Caused by loss-of-function filaggrin mutations
  - Autosomal semidominant with incomplete penetrance
- Fine, whitish-to-brown scales
- Favors extensor surfaces of extremities

Filaggrin and atopic dermatitis (AD)

- Loss-of-function filaggrin mutations
  - Same mutations in ichthyosis vulgaris and AD
  - 20–50% in European/Asian children/adults with AD
  - >50% if moderate to severe AD
  - 5–10% in the general population (p<1x10^{-8})
- Overall odds ratio ≥4
  - One of strongest known genetic factors for a complex disease

A 5-year-old girl presents with a 2-month history of this recurrent pruritic eruption on the arms, legs, and abdomen. Each edematous papule lasts ~1 week. No one else at home is affected. What is the most likely diagnosis?

A  Foliculitis
B  Gianotti-Crosti syndrome
C  Molluscum contagiosum
D  Papular urticaria
E  Scabies
Bug bites

Insect Bite Reactions

- Pruritic, edematous, erythematous papules
  - Often grouped – ‘breakfast-lunch-dinner’ – at sites of bites
  - Frequently excoriated and may become vesicular
  - Disseminated papular urticaria can also occur
- Represents delayed-type hypersensitivity reaction
  - Individual lesions last days to weeks
  - Depends on individual immune response, so often only one family member is affected
- Treatment
  - Topical corticosteroid of at least moderate potency
  - Sedating antihistamines
- Prevention
  - Insect repellents/protective clothing for outdoor bugs (e.g. mosquitoes)
  - Treat affected animals/their environment (e.g. for fleas)
  - Exterminate home (e.g. for bed bugs)
A 3-year-old girl has a 2-month history of progressive development of this pruritic eruption that also involves the axillae, groin, and trunk. Which of the following is the most likely diagnosis?

A. Folliculitis
B. Milia
C. Molluscum contagiosum
D. Scabies
E. Verruca vulgaris

**Molluscum Contagiosum**

- Common chronic poxvirus infection in children
  - Spontaneous resolution occurs after a few months to several years
- Favors skin folds and the genital area
  - Can occur anywhere on the skin
- Dome-shaped, pearly, umbilicated papules
  - Frequently associated with eczematous dermatitis, especially in children with an atopic diathesis
  - "Boil"-like inflamed lesions can develop

**Molluscum dermatitis**
Warts
- Affect 20% of school-age children
- Caused by a variety of human papillomavirus (HPV) types
- Favor hands/fingers, feet, elbows/knees, face

Flat warts (verruca planae)

Common warts (verruca vulgaris)

Plantar warts (verruca plantares)

A 9-month-old girl presents with a 1-month history of this widespread pruritic eruption. Which of the following is the most appropriate treatment?

A Crotamiton cream
B Ivermectin orally
C Lindane lotion
D Permethrin cream
E Sulfur petrolatum ointment

Scabies
- Skin infestation by *Sarcoptes scabiei* var. *hominis* mite
  - Spread by close personal contact > fomites (lives up to 3 days off host)
  - Typically 5-15 mites on host
  - Latent period of ~4 weeks between initial infestation and onset of symptoms
- Intensely pruritic eruption
  - Pathognomonic burrows (2-10 mm)
  - Erythematous excoriated papules, vesicles, nodules, eczematosus dermatitis
- Treat patient and close contacts with overnight application of permethrin 5% cream
  - Neck (adults)/head (infants) to toe
  - Repeat in one week
Scabies: classic sites of predilection

- Groin
- Flexural wrist
- Interdigital web spaces
- Axilla
- Waistline/umbilicus
- Ankles & feet

Scabies in Infants
- Any cutaneous site, including face, scalp and neck
- Often widespread and eczematous
- Clue = vesiculopustules on palms/soles

An otherwise well, afebrile 13-year-old boy presents with this tender, erythematous, warm, fluctuant nodule with a central pustule on the neck. He exhibits cervical lymphadenopathy. Which of the following is the most likely diagnosis?

A Cellulitis
B Folliculitis
C Furuncle
D Impetigo
E Necrotizing fasciitis
S. aureus (*) and Strep. pyogenes (†): skin infections beyond impetigo

Folliculitis* - Topical antibiotic if localized - Oral antibiotic if widespread/recurrent
Furuncle* (abscess of hair follicle) - I&D sufficient if uncomplicated - Common form of MRSA infection
Erysipelas† - Spreading erythematous plaque with "shelf-like" raised border - Fever
Cellulitis† - Spreading area of erythema, swelling, warmth, & tenderness - Lymphangitis - Fever
Necrotizing Fasciitis† - Rapidly spreading, dusky red, tense/woody induration ± bullae, watery discharge - Fever

A 15-year-old boy has been using benzoyl peroxide gel daily for 2 months with some improvement and good tolerance. He requests further treatment for his acne. Physical examination reveals numerous open and closed comedones and a few small inflammatory papules on the forehead and mid face. Which of the following is the most appropriate treatment?

A Add ‘microbead’ cleanser
B Add oral tetracycline
C Add topical clindamycin
D Add topical tretinoin
E Continue topical benzoyl peroxide alone

Acne: 4 key pathogenic factors

Androgens of puberty

Sebocyte

Excessive sebum production

Keratinocyte

Abnormal desquamation of follicular corneocytes

Proliferation of Propionibacterium acnes

Inflammation
Spectrum of efficacy of topical anti-acne agents

<table>
<thead>
<tr>
<th></th>
<th>Comedo-lysis</th>
<th>Sebum</th>
<th>Anti-microbial</th>
<th>Anti-inflammation</th>
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<tr>
<td>Tretinoin</td>
<td>++</td>
<td>-</td>
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<td>Adapalene</td>
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BPO = benzoyl peroxide

Acne: therapeutic ladder

- Mild primarily comedonal
  - Topical retinoid
- Mild primarily inflammatory
  - Topical antibiotic + BPO or
    - Topical retinoid + topical antibiotic and/or BPO
- Moderate inflammatory (variable comedonal)
  - Oral antibiotic* + topical retinoid (+ BPO if >2 mos)
  - For teen girls, consider adding oral contraceptive
- Severe nodulocystic/recalcitrant inflammatory
  - Oral retinoid (isotretinoin)

*1st line = doxycycline or minocycline

A 15-year-old boy has been using a benzoyl peroxide wash daily for 2 months with little improvement but good tolerance. He requests further treatment for his acne. Physical examination reveals numerous inflammatory papules/pustules admixed with many open and closed comedones on the face, chest, and back. Which of the following is the most appropriate treatment?

A. Add oral doxycycline and topical tretinoin
B. Add topical clindamycin
C. Add topical tretinoin
D. Change to benzoyl peroxide + erythromycin gel
E. Change to oral isotretinoin
A 16-year-old boy presents with a 3-month history of this eruption on the upper trunk. The well-demarcated hypopigmented macules coalesce centrally in areas of involvement and fine white scale is evident upon stretching the skin. Which of the following treatments is most appropriate?

A Avoid offending allergen
B Moderately potent topical corticosteroid
C Narrowband UVB
D Oral griseofulvin
E Topical selenium sulfide

Tinea (pityriasis) versicolor

- Most common in adolescents, warm humid environments
- Favors neck and upper trunk
- Hypo- and hyperpigmented (pinkish tan) variants
- Overgrowth of Malassezia furfur (Pityrosporum ovale)

KOH of skin scrapings: hyphae + spores (‘spaghetti and meatballs’)

A 10-year-old girl has had this eruption of sharply demarcated pink plaques with adherent scale for the past 4 months. What is the most likely diagnosis?

A Nummular eczema
B Pityriasis rosea
C Psoriasis
D Seborrheic dermatitis
E Tinea corporis
Psoriasis

- Affects 2-6% of the population
  - 25-50% have onset in childhood
  - 10-30% have arthritis
- Favors elbows/knees, hands/feet, scalp, sacral area
  - ‘Inverse’ variant affects groin, axillae
  - Koebner phenomenon: sites of trauma
- Guttate (drop-like) variant
  - Predilection for children
  - Often triggered by streptococcal infection

Psoriasis Clues

- Micaceous scale
- Auspitz sign: remove scale → pinpoint bleeding
- ‘Oil drop’
- Irregular, large nail pits

Pityriasis Rosea

- Peak incidence in adolescence
  - Eruption typically lasts 6-8 weeks
  - Role of HHV-7/-6
- Herald patch in ~50%
  - Initial larger, solitary lesion
- Favors trunk and proximal extremities
  - ‘Christmas tree’ distribution
  - ‘Inverse’ variant affecting groin, axillae more common in young children
Pityriasis Rosea
Salmon-pink oval to round papules/plaques with a slightly raised border

- Fine scale centrally, darker pink peripherally
- Trailing collarette of scale

Seborrheic Dermatitis

- Patients with active sebaceous glands
  - Infants
  - Adolescents
- Sites of predilection
  - Scalp: ‘cradle cap’ & dandruff
  - Face: eyebrows, nasolabial fold
  - Ears: posterior, canals
  - Skin folds (esp. infants): axillae, groin, umbilicus
- Pink plaques with ‘greasy’ yellow scale

Cutaneous Dermatophytoses

- *Trichophyton rubrum* is a common culprit organism
- *Tinea corporis*, *faciei*, & *cruris*
  - Annular, scaly plaques
  - Clue = pustules in advancing border
  - Use of topical corticosteroid can reduce scale (‘tinea incognito’)
- Can usually be treated with a topical antifungal agent (e.g. azole, terbinafine, ciclopirox)
An 8-year-old girl presents with a lichenified plaque on the lower abdomen and numerous pruritic erythematous papules in a symmetric distribution on the extensor aspects of the arms and legs. Which of the following is the most likely diagnosis?

A. Atopic dermatitis
B. Contact dermatitis
C. Nummular eczema
D. Papular urticaria
E. Scabies
Contact Dermatitis

- Clinical appearance
  - Often streaky linear, angular or bizarre configurations ('outside job')
  - Acute: blistering, oozing, crusting
  - Chronic: scaling, lichenification

- Allergic contact dermatitis
  - Delayed-type hypersensitivity reaction requiring prior sensitization
  - Nickel and poison ivy are common allergens
  - "Id" reaction (disseminated eczema) can develop

- Irritant contact dermatitis
  - Direct toxic effect of chemical or physical agent
  - Water and detergents are common culprits (e.g. frequent hand washing, lip licking)

An 8-year-old girl presents with an acute, extremely pruritic eruption of edematous and vesiculated, irregularly shaped papules and plaques on the face, arms and legs that developed the day after playing in the park. She has experienced similar but milder episodes in the past. Which of the following is the most appropriate treatment?

A Diphenhydramine topically
B Loratadine orally
C Pramoxine topically
D Prednisone orally for 2 weeks
E Triamcinolone cream topically

What is the most likely cause of this 8-year-old boy’s patchy hair loss?

A Alopecia areata
B Seborrheic dermatitis
C Tinea amiantacea
D Tinea capitis
E Trichotillomania
A 7-year-old boy presents with a 3-week history of an enlarging, tender lump on the scalp. Physical examination reveals this alopecic, boggy plaque studded with pustules. Which of the following is the most appropriate treatment?

A  Cefazolin intravenously
B  Griseofulvin orally
C  Incision and drainage
D  Ketoconazole topically
E  Mupirocin topically

Tinea Capitis: Inflammatory Reactions

Kerion: boggy inflamed plaque studded with pustules

"Id" reaction of pruritic eczematous papules on neck and upper trunk upon starting antifungal therapy
Tinea Capitis

- *Trichophyton tonsurans (~95%) >> Microsporum canis in US*

- Favors prepubertal children
  - Predilection for those of African descent
  - Always consider in school-age child with scaly scalp
  - Posterior cervical lymphadenopathy often present

- Treatment
  - Requires ORAL antifungal agent: griseofulvin (20-25 mg/kg/day x 6-8 wks) or terbinafine (~5-8 mg/kg x 3-4 wks; *T. tonsurans* only)
  - Perform fungal culture prior to initiating therapy
  - Antifungal shampoo (patient and household contacts) to prevent spread, fomite control

Alopecia Areata

- Hair-specific autoimmune disease
  - Lifetime prevalence of ~2%
  - Increased incidence of other autoimmune conditions in patients/their families

- Discrete round to oval areas of complete hair loss
  - Short ‘exclamation mark’ hairs (tapered proximal end)
  - Usually no scale or lymphadenopathy

- Hair frequently regrows spontaneously
  - Unpredictable course
  - Rare progression to alopecia totalis/universalis

- Treatment options
  - Topical (high potency) and intralesional corticosteroids
  - Topical irritants and immunotherapy

Psoriasis: large, irregular pits

Alopecia areata: roughening or regular grid of tiny pits
Trichotillomania

• Hair pulling/plucking by patient
  – Scalp hair, eyebrows, and/or eyelashes
• Most often affects 5- to 12-year-old girls
  – Different from self-limited hair pulling ‘phase’ in infants/toddlers (boys>girls)
• Irregularly shaped areas of hair loss
  – Often contain hairs of varying lengths
• Behavioral modification therapy can be effective

Seborrheic dermatitis: caveat – tinea capitis can mimic
‘Tinea’ amiantacea: variant of seborrheic dermatitis with thick concretions

Telogen Effluvium

• Period of excessive shedding of normal telogen hairs
  – DIFFUSE pattern of thinning
• Hair loss begins 2-3 months after precipitating event such as:
  – High fever/severe illness
  – Severe psychological stress
• Complete recovery expected
Nevus Sebaceus

- Waxy, yellow-orange, hairless thin plaque at birth
  - Become thicker & verrucous at puberty
  - Caused by mosaic HRAS mutations
- Favors scalp, face, neck
  - Linear configuration for larger lesions
  - Extensive lesions sometimes associated with ocular or CNS abnormalities
- Secondary neoplasms may develop
  - Usually after puberty
  - Benign growths (e.g. syringocystadenoma papilliferum, trichoblastoma) >> basal cell carcinoma
- Excision around puberty often recommended

Dermoid Cysts

- Result from sequestration of ectodermal tissue along embryonic fusion planes during development
- Lateral eyebrow is most common site
- Midline nasal and scalp lesions can be associated with intracranial extension
  - Sinus ostium with protruding hairs may be evident
  - Require imaging (e.g. MRI) prior to excision

Effects of Sun Exposure

- UVB (290-315 nm)
  - 1000-fold more efficient at causing sunburn
- UVA (315-400 nm)
  - Penetrates deeper into the skin, less filtered by glass
  - 20- to 100-fold more UVA than UVB in sunlight
- Acute effects
  - Sunburn: erythema (peak 6-24 hours after exposure), blistering, desquamation
  - Tanning (peak 3 days after exposure)
  - Immunosuppression
- Chronic effects
  - Photoaging: wrinkles, lentigines
  - Photocarcinogenesis: increased risk of basal cell carcinomas, squamous cell carcinomas, and melanoma