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Pediatric Photosensitivity Disorders

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The authors report no conflict of interest.

Table 1.
Pediatric Photosensitivity Disorders

Disease	Pathophysiology	Clinical Features	Management/Prognosis	Other/Pearls
Actinic prurigo (hydroa aestivale, Hutchinson summer prurigo)	Strong association with HLA-DR4 (HLA-DRB1*0401/0407); may be a persistent variant of PMLE (delayed-type hypersensitivity) from UVA or UVB	Pruritic crusted papules and nodules in both sun-exposed and less frequently nonexposed sites (ie, buttocks); heal with scarring; mucosal and conjunctival involvement, with cheilitis often an initial or only feature; worse in summer but can extend to winter	Phototesting: lesions provoked by UVA or UVB; spontaneous resolution may occur during late adolescence; may follow a chronic course that persists in adulthood; photoprotection; topical corticosteroids and topical tacrolimus; NB-UVB or PUVA; cyclosporine or azathioprine; thalidomide (treatment of choice) for resistant disease	Native Americans, especially mestizos; hardening does *not* occur; histopathology: dermal perivascular mononuclear cell infiltrate, lacks papillary dermal edema, can see lymphoid follicles from lip biopsies; occurs hours to days following sun exposure (vs solar urticaria)
Bloom syndrome (congenital telangiectatic erythema)	AR; *BLM* (encodes RecQ helicase); results in chromosomal instability; 50% Ashkenazi Jewish ancestry	Malar telangiectatic erythema; café au lait macules; elongated narrow face with prominent nose; short stature	Diabetes mellitus; respiratory and GI infections; increased frequency of malignancies (eg, leukemia, lymphoma, GI adenocarcinoma)	Decreased fertility/sterility; decreased IgA, IgM, and IgG; increased chromosomal breakage, sister chromatid exchanges, and quadriradial configurations in lymphocytes and fibroblasts
Cockayne syndrome	AR; 2 complementation groups[a]; defective transcription-coupled nucleotide excision repair; unable to repair pyrimidine dimer photoproducts and oxidative DNA damage	Photosensitivity without pigmentary changes; cachectic dwarfism; prominent ears; malar erythema	Most common cause of death is neurologic degeneration; death by 3rd decade of life; no increase in malignancies	Basal ganglia calcification; demyelination; osteoporosis; MR; deafness; dental caries; salt-and-pepper retinopathy

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Table 1. (continued)

Disease	Pathophysiology	Clinical Features	Management/Prognosis	Other/Pearls
Hartnup disease	AR; *SLC6A19* (encodes B0AT1, a neutral amino acid transporter); decreased renal and GI absorption of tryptophan	Pellagralike dermatosis; neurologic abnormalities (cerebellar ataxia); aminoaciduria	Photoprotection; supplementation of nicotinic acid or nicotinamide	Glossitis; vulvovaginitis; angular stomatitis
Hydroa vacciniforme	Unclear; may be variant of PMLE; EBV isolated within cutaneous lesions; more common and greater severity in males	Pruritic or stinging symmetric erythematous macules within hours of sun exposure; evolve into tender plaques, vesicles, or bullae that umbilicate and become necrotic and heal with varioliform scarring; attacks can be associated with malaise, fever, or headache	Phototesting: lesions provoked by repeated monochromatic or broad-spectrum UVR; spontaneous resolution by late adolescence (mean duration, 9 y); photoprotection; broad-spectrum sunscreens with UVA coverage; phototherapy hardening by NB-UVB; systemic therapy: antimalarials, cyclosporine, azathioprine, thalidomide	Rare; can see hydroa vacciniforme–like eruptions in patients with chronic EBV infection: EBV-associated NK/T-cell lymphomas and subsequent hemophagocytic syndrome; histopathology: dense perivascular lymphohistiocytic infiltrate, epidermal necrosis
Kindler syndrome	AR; *KIND1* (*FERMT1*)	Early: photosensitivity, acral blistering; later: poikiloderma, atrophy	Avoidance of trauma; emollients; photoprotection	Mucosal membrane involvement; red friable hyperplastic gums
Rothmund-Thomson syndrome (poikiloderma congenitale)	AR; *RECQL4* (encodes a DNA helicase)	Onset at 3–6 mo; facial erythema, edema, and vesicles at onset during the first few months of life; later develop poikiloderma; acral keratosis, short stature, dental abnormalities, sparse hair, hypoplastic nails/thumb/radius/ulna, pituitary hypogonadism during childhood and adolescence	One-third of patients develop osteosarcoma in youth; increased risk for SCC at sites of keratotic and atrophic lesions; normal life span unless malignancy develops; juvenile cataracts; diarrhea/vomiting (during infancy)	Radial ray defects on radiograph; *RECQL4* mutation also causes RAPADILINO[b] syndrome and Baller-Gerold syndrome

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Table 1. (continued)

Disease	Pathophysiology	Clinical Features	Management/Prognosis	Other/Pearls
Smith-Lemli-Opitz syndrome	AR; *DHCR7* (encodes 7-dehydrocholesterol reductase); photosensitivity to UVA	Hypospadias; syndactyly of 2nd and 3rd toes	Improvement of photosensitivity with cholesterol supplementation	
Trichothiodystrophy	AR; 4 genes: *ERCC2/XPD* (most common), *ERCC3/XPB, MPLKIP/C7orf11, GTF2H5*	PIBIDS[c] syndrome	No increase in malignancies; can have sideroblastic anemia, eosinophilia, and hepatic angioendotheliomas	Low cysteine (sulfur) content in hair shafts; hair shaft: tiger tail banding; alternating light and dark bands with polarizing microscopy; trichoschisis; trichorrhexis nodosa; receding chin and protruding ears
Xeroderma pigmentosum	AR; defect in global genomic nucleotide excision repair; 7 different complementation groups (A–G) and 1 variant[a]; photosensitivity to UVA and UVB (primarily at 290–340 nm)	Lentigines; BCC; SCC; melanoma	Photoprotection +/− oral retinoids; increased risk for malignancies: brain, lung, oral cavity, GI tract, kidney, and hematopoietic system	~30% develop neurological abnormalities (De Sanctis-Cacchione syndrome); microcephaly; progressive MR; ataxia; quadriparesis; poor growth and sexual development; deafness

Abbreviations: PMLE, polymorphous light eruption; NB-UVB, narrowband UVB; PUVA, psoralen plus UVA; AR, autosomal recessive; GI, gastrointestinal; MR, mental retardation; EBV, Epstein-Barr virus; UVR, UV radiation; NK, natural killer; SCC, squamous cell carcinoma; BCC, basal cell carcinoma.

[a]See Table 2 with Cockayne syndrome and xeroderma pigmentosum subtypes.

[b]RA, radial ray malformations; PA, patella and palate abnormalities; DI, diarrhea and dislocated joints; LI, limb abnormalities and little size; NO, slender nose and normal intelligence.

[c]Photosensitivity (50% of patients), ichthyosis, brittle hair, intellectual impairment, decreased fertility, short stature.

Table 2.

Cockayne Syndrome and Xeroderma Pigmentosum Subtypes

Disease	Gene/Subtypes	Features
CS	CS-A: *ERCC8*; CS-B: *ERCC6* (most common)	
XP	XP-A: *DDB1*; XP-B: *ERCC3*; XP-C: endonuclease (most common); XP-D: *ERCC2*; XP-E: *DDB2*; XP-F: *ERCC4*; XP-G: endonuclease; XP-variant: DNA polymerase	XP-A: Japan, + neurological complications; XP-variant: no neurological complications
CS + XP	XP-G: *ERCC5*; XP-B; XP-D	Solar lentigines; skin cancers; pigmentary retinal degeneration; basal ganglion calcification

Abbreviations: CS, Cockayne syndrome; XP, xeroderma pigmentosum.

Practice Questions

1. Which photosensitivity disorder is characterized by decreased immunoglobulin-mediated immunity?
a. Bloom syndrome
b. Cockayne syndrome
c. hydroa vacciniforme
d. Kindler syndrome
e. poikiloderma congenitale

2. Which of the following is an *inappropriate* treatment for a young Mexican girl with cheilitis and treatment-resistant chronic pruritic crusted papules and scars on both sun-exposed and nonexposed sites?
a. oral isotretinoin
b. oral prednisone
c. oral thalidomide
d. topical calcineurin inhibitors
e. topical corticosteroids

3. Which gene is mutated in a patient with a history of congenital acral blistering and then gradual onset of cutaneous atrophy and fragility, oral lesions, and photosensitivity?
a. *DHCR7*
b. *KIND1*
c. *RECQL4*
d. *SLC6A19*
e. *XPD*

4. Which photosensitivity disorder is associated with an increased risk for osteosarcoma?
a. actinic prurigo
b. Rothmund-Thomson syndrome
c. Smith-Lemli-Opitz syndrome
d. trichothiodystrophy
e. xeroderma pigmentosum

5. All of the following are features seen in De Sanctis-Cacchione syndrome *except*:
a. ataxia
b. basal ganglion calcification
c. deafness
d. hypogonadism
e. short stature

Fact sheets and practice questions will be posted monthly.