A Prospective Study of Cutaneous Findings in Newborns in the United States: Correlation with Race, Ethnicity, and Gestational Status Using Updated Classification and Nomenclature

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Objective To provide incidence data based on ethnicity, prematurity, and body site for vascular, pigmented, and other common congenital cutaneous findings; to compare these results with previously published prospective studies; and to define updated nomenclature, classification, clinical course, and prognostic factors for the pediatric practitioner to promote a better understanding of benign versus more worrisome birthmarks.

Study design This prospective study enrolled 594 infants in San Diego, California. Cutaneous examination was performed by pediatric dermatologists in the first 48 hours of life, with subsequent longitudinal contact via telephone, and repeat evaluations if any new lesions were reported by parents. Incidence rates were calculated by ethnicity and prematurity status.

Results The most common vascular lesion was nevus simplex (83%), followed by infantile hemangioma (4.5% by age 3 months), capillary malformation (0.3%), and rapidly involuting congenital hemangioma (0.3%). Pigmented lesions seen at birth included dermal melanocytosis (20%), congenital melanocytic nevi (2.4%), and café au lait macules (2%). Other common skin findings were erythema toxicum neonatorum (7%), milia (8%), and sebaceous gland hyperplasia (42.6%).

Conclusion This study of congenital cutaneous lesions, using current nomenclature and data acquired by pediatric cutaneous lesion experts, provides data regarding the role of race and ethnicity in the incidence of birthmarks, and provides valid data on the prevalence of infantile hemangioma. *(J Pediatr 2012;161:240-5)*.

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Despite the large number of children born with cutaneous lesions, the incidence of congenital cutaneous lesions in the United States is unclear. A recent literature search found incidence studies of birthmarks from Mexico,[1] Taiwan,[2] Israel,[3] China,[4] Japan,[5] India,[6] Australia,[7] and Finland[8]; however, the most recent studies reported in the United States date back to the 1980s[9-11] and 1970s.[12] The United States is unique in its multicultural population, which is constantly changing. In this study, we evaluated the incidence of birthmarks in a prospective cohort from a hospital nursery serving a diverse ethnic and socioeconomic population and updated the incidence rates reported in previous studies. Our study can serve as a benchmark for comparison with international prospective studies of larger series, and can educate pediatric practitioners about the current classification nomenclature and incidence of congenital cutaneous findings. We sought to provide an up-to-date resource reflecting the current American demographics to increase pediatricians' understanding of the types and management of both transient and persistent birthmarks.

Methods

This prospective study followed 578 pregnant women through pregnancy and the postpartum period, as well as their infants for the first 9 months after birth, to determine the incidence and locations of congenital cutaneous lesions. The study was Institutional Review Board approved at four institutions: UCSD Medical Center, Rady Children's Hospital Center, the Scripps Research Institute, and Sharp Mary Birch Hospital for Women and Newborns (SMBH), all located in San Diego. Pregnant women were recruited from Sharp Mary Birch Hospital for Women and Newborns in San Diego, California, where they sought prenatal care. These women represented a socioeconomically and ethnically diverse cross-section of

DM	Dermal melanocytosis
CMN	Congenital melanocytic nevi
CALM	Café au lait macule
ETN	Erythema toxicum neonatorum
IH	Infantile hemangioma
NS	Nevus simplex
RICH	Rapidly involuting congenital hemangioma

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San Diego County. The women were asked to self-identify their ethnicity given the following categories: Caucasian, Hispanic (Mexican-American, Cuban-American, Puerto Rican, Central-American, South-American), African-American, Asian, and other. The infants' gestational age at birth was documented. Preterm neonates were defined as those born at gestational age <37 weeks, and full-term neonates were defined those born at gestational age ≥37 weeks. Sixteen women had twins, resulting in a total of 594 infants.

A total of 594 infants were examined in the newborn nursery or at the maternal bedside after delivery by pediatric dermatologists, who documented any congenital skin lesions observed. All diagnoses were made based on clinical examination; no skin biopsies were performed. The mothers were subsequently contacted by telephone at 1, 3, 6, and 9 months postdelivery to document the status of their infants and assess for the development of new lesions. Those infants with new vascular lesions were offered evaluation by a board-certified pediatric dermatologist in the outpatient setting to determine the nature of the new lesion. Ten women and their infants were lost to follow-up because the women declined skin examination while in the hospital and/or could not be contacted by telephone for follow-up.

Data were collected and documented using Excel (Microsoft, Redmond, Washington). Tables were created in Microsoft Word and GraphPad Prism (GraphPad Software, La Jolla, California). A PubMed search was performed to identify previous prospective and retrospective studies on the incidence of cutaneous lesions. Search terms included "incidence birthmarks." Representative lesions are depicted in **Figure**.

Results

Of the 578 pregnant women recruited, 267 (45%) self-identified as Caucasian, 145 (25%) as Mexican-American/Puerto Rican/South-American (designated as Hispanic), 28 (4.7%) as African-American, 56 (9.4%) as Asian, and 82 (14.2%) as "other." Those women who declined to choose an ethnic category were grouped in the "other" category. Infants were assumed to be the same ethnicity as their mothers. Only 3 women chose 2 ethnic categories simultaneously, with all 3 choosing both Caucasian and Mexican-American; their infants were subsequently grouped in the Hispanic category. The demographic characteristics of our cohort approximate the current ethnic population profile trends of the United States and, notably, represent a shift in the makeup of the country since the last prospective studies on newborn cutaneous lesions conducted more than 20 years ago.[13,14] However, the Hispanic population might be more highly represented in San Diego, given its proximity to the Mexico–US border.

Among the 594 infants studied, 71 (12.1%) were born preterm (<37 weeks gestational age). Thirty-two (5.5%) were twins (16 Caucasian, 8 Hispanic, 2 African-American, 6 "other"); 26 of these infants (81.3%) were born preterm.

Our findings are summarized in **Table I**, which displays the incidence of cutaneous lesions in the total cohort, as well as the incidences in the Caucasian, Hispanic, African-American, Asian, and "other" subpopulations. Other congenital skin

Table I. Incidence of cutaneous lesions by ethnicity and prematurity status

Cutaneous lesion	Total, n (%)	Caucasian, n (%)	Hispanic, n (%)	African-American, n (%)	Asian, n (%)	Other, n (%)	Preterm, n (%)	Term, n (%)
NS	493 (83)	263 (98.1)	116 (78.4)	19 (67.9)	41 (75.9)	56 (70.9)	47 (66.2)	445 (86.7)
Nape/occiput	266 (45.5)	140 (52.2)	58 (39.2)	6 (21.4)	26 (48.1)	37 (46.8)	22 (31.0)	244 (47.6)
Glabella	67 (11.5)	36 (13.4)	15 (10.1)	5 (17.9)	4 (7.4)	8 (10.1)	7 (9.9)	60 (11.7)
Eyelid(s)	114 (19.5)	58 (21.6)	30 (20.3)	6 (21.4)	10 (18.5)	10 (12.7)	13 (18.3)	101 (19.7)
Nose	25 (4.3)	15 (5.6)	7 (4.7)	1 (3.6)	1 (1.9)	1 (1.3)	3 (4.2)	22 (4.3)
Philtrum	14 (2.4)	9 (3.4)	5 (3.4)	0	0	0	1 (1.4)	12 (2.3)
Leg(s)	2 (0.3)	2 (0.7)	0	0	0	0	0	2 (0.4)
Lumbar	3 (0.5)	2 (0.7)	0	1 (3.6)	0	0	0	3 (0.6)
Not specified	2 (0.3)	1 (0.4)	1 (0.7)	0	0	0	1 (1.4)	1 (0.2)
CM	2 (0.3)	0	2 (1.4)	0	0	0	0	2 (0.4)
IH*	27 (4.5)	12 (4.5)	9 (6.2)	1 (3.6)	3 (5.4)	2 (2.4)	7 (9.8)	22 (4.3)
NICH/RICH	2 (0.3)	2 (0.7)	0	0	0	0	0	2 (4.3)
DM	117 (20)	18 (6.7)	38 (25.7)	9 (32.1)	22 (40.7)	30 (38)	15 (21.1)	102 (19.9.)
Sacrum/buttocks	82 (14)	10 (3.7)	32 (21.6)	6 (21.4)	16 (29.6)	18 (22.8)	12 (16.9)	70 (13.6)
Extensive†	6 (1)	0	2 (1.4)	1 (3.6)	2 (3.7)	1 (1.3)	1 (1.4)	5 (1)
CMN	14 (2.4)	7 (2.6)	0	5 (17.9)	1 (1.9)	1 (1.3)	1 (1.4)	13 (2.5)
Small	8 (1.3)	4 (1.5)	0	3 (10.7)	0	1 (1.3)	0	8 (1.6)
Medium	6 (1)	3 (1.1)	0	2 (7.1)	1 (1.9)	0	1 (1.4)	5 (1)
Large/giant	0	0	0	0	0	0	0	0
CALM	12 (2)	5 (1.9)	3 (2)	2 (7.1)	1 (1.9)	1 (1.3)	1 (1.4)	11 (2.1)
ETN	42 (7)	21 (7.8)	5 (3.4)	1 (3.6)	6 (11.1)	9 (11.4)	0	42 (8.2)
Milia	48 (8)	21 (7.8)	12 (8.1)	0	7 (13)	8 (10.1)	3 (4.2)	45 (8.8)
Nose	21 (3.6)	8 (3)	7 (4.7)	0	3 (5.6)	3 (3.8)	2 (2.8)	19 (3.7)
Other location on face	27 (4.6)	13 (4.9)	5 (3.4)	0	4 (7.4)	5 (6.3)	1 (1.4)	26 (5.1)
SGH	253 (42.6)	117 (43.7)	63 (42.6)	14 (50)	22 (40.7)	37 (46.8)	30 (42.2)	223 (43.5)

CM, capillary malformation; *NICH*, noninvoluting congenital hemangioma; *SGH*, sebaceous gland hyperplasia.
*Diagnosis of IH was confirmed through follow-up; only 1 lesion was noted within the first 48 hours of life; 100% were noted by age 3 months.
†Extensive DM: more than 2 body locations involved.