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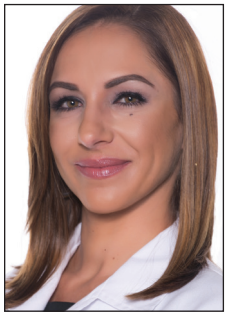
Important immunohistochemical stains in dermatology

by Sheila M. Valentín-Nogueras, MD, and Osward Y. Carrasquillo, MD, MPH

Angiosarcoma	**CD31+** **CD34+** **ERG+** (most sensitive and specific) **FLI-1+**	c-MYC amplifications are positive in radiation-induced angiosarcoma
Atypical fibroxanthoma	**Vimentin+** **CD99+** **CD10+** **Pro-collagen-1+** **LN-2 (CD74)-** **MNF116-**	CD68+ (57-62%) α1 anti-trypsin and α1 anti-chymotrypsin + in >50%
Malignant fibrous histiocytoma	**LN-2 (CD74)+**	Weak staining for CD99
Basal cell carcinoma (BCC)	***bcl-2+*** (diffuse staining) **peanut agglutinin+** (band-like peri tumorous reaction) **Ber-Ep4+** **Androgen receptor+** **CD34-**	Clinically aggressive BCCs have low labeling with *bcl-2*
Trichoepithelioma (TE)	***bcl-2+*** (only in basal layer) **peanut agglutinin-** **Ber-Ep4+** (~75% of desmoplastic TE) **Androgen receptor-** **CD34+** (peritumoral fibroblasts)	Desmoplastic trichoepitheliomas are CK20+ due to the presence of Merkel cells (uncommon in BCC)
Basaloid squamous cell carcinoma	**Cytokeratin 5/6+** **HMWK 34βE12 +** **bcl-2-** **Ber-Ep4+/-**	CK 5/6 → distinguishes primary cutaneous adnexal CA (+) from metastatic adenocarcinoma from internal organs (-)
Basosquamous Carcinoma	**Pan-cytokeratin AE1/AE3+** **Proliferative Cell Nuclear Antigen (PCNA)+** **Ber-Ep4+**	p16+/-
Sarcomatoid or spindle cell squamous cell carcinoma	**MNF116+** **Pan-cytokeratin AE1/AE3-** (in high grade variant)	
Dermatofibroma	**CD34-** **FXIIIa+** **Stromelysin-3+** **D2-40+**	
Dermatofibrosarcoma protuberans	**CD34+** **FXIIIa-** **Stromelysin-3-** **D2-40-**	
Epithelioid sarcoma	**Cytokeratin (CK8, CK19)+** **EMA+** **Vimentin+**	~50% are CD34+
Granular cell tumor	**S100+** **NSE+** Granules are: **PAS+** **PTAH+**	Myelin basic protein staining variable



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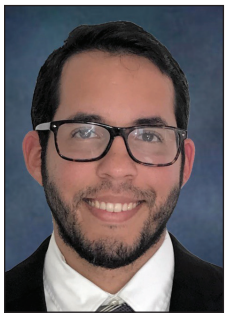

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Hemangioma of infancy	**GLUT-1+**	
RICH *NICH* *Vascular malformations (capillary, lymphatic, venous, and arteriovenous)*	**GLUT-1-**	
Infantile digital fibromatosis	Eosinophilic cytoplasmic inclusion bodies are: **PTAH+** **Masson's trichrome+** (stains red) **Actin+** **PAS-**	
Kaposi's sarcoma	**LANA-1 of HHV-8+** (nuclear staining)	Variable staining for CD31, CD34, *Ulex Europeans*, and factor VIII-related antigen
Langerhans cell histiocytosis	**S100+** **CD1a+** **Langerin (CD207)+** **Factor XIIIa-** **CD68-** **HAM56-**	BRAF V600E mutation in 60%
Non-Langerhans cell histiocytosis	**S100-** in all except in Rosai-Dorfman and Indeterminate cell histiocytosis **CD1a**- in all except Indeterminate cell histiocytosis **Langerin (CD207)-** **Factor XIIIa +/-** **CD68+**	
Leiomyosarcoma	**Vimentin+** **Desmin+** **Smooth muscle actin+**	
Lymphangioma circumscriptum and Cystic hygroma	**LYVE-1+** **D2-40 (podoplanin)+**	
Lymphomatoid papulosis	**CD3+** **CD30+** **CD8-** except type D	CD2 +/- CD5 +/- CD7 +/-
Mastocytosis	**Giemsa+** **Toulidine blue+** **Leder (chloracetate esterase)+** **c-kit (CD117)+**	CD25+ on cutaneous mast cells from adult patients with UP is predictive of systemic mastocytosis
Melanoma	**S100+** **HMB-45+** **MART-1+** **MITF+**	Desmoplastic melanoma: **SOX-10+** **S100+** **p75 Neurotropin receptor (p75 NTR)+** HMB-45- MART-1- MITF-
Merkel cell carcinoma	**CK20+:** paranuclear dot staining **CK7-** **Thyroid transcription factor (TTF-1) -**	neuron-specific enolase (NSE), EMA, synaptophysin, and chromogranin + CD44+ may indicate metastatic potential

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Metastatic small cell lung carcinoma	**CK20-** **CK7+** **TTF-1+**	
Microcystic adnexal carcinoma	**CEA+** **EMA+** **Ber-Ep4-**	Morpheaform BCC and desmoplastic trichoepithelioma are Ber-Ep4+
Mycosis fungoides	**CD2, CD3, CD4, and CD45RO+** **CD8-** **CD30-**	Loss of CD7 (most common, nonspecific), CD5 and CD2 (least common, more specific) Hypopigmented variant usually CD4-/CD8+
Mammary Paget's disease	**CK7**, **CEA**, **EMA**, low molecular weight cytokeratins (**CAM 5.2**), **PAS**, **Alcian blue**, and **mucicarmine +**	
Primary extra-mammary Paget's disease	**CK7+/CK20-/GCDFP-15+**	Both are CEA, EMA, low molecular weight cytokeratins, PAS, Alcian blue, and mucicarmine + CK7+ associated with malignancies above diaphragm (breast, lung) CK20+ associated with malignancies below diaphragm (colon, stomach)
Secondary extra-mammary Paget's disease (Associated with an underlying visceral carcinoma)	**CK7+/CK20+/GCDFP-15-**	
Sebaceous carcinoma	**Adipophilin+** **Androgen receptor+** **EMA+** **Ber-EP4-**	Ocular tumors usually express CK7
Spitz nevus	**S100A6+** **p16+**	vs Melanoma: weak staining with p16 and S100A6 Most Spitz nevi exhibit a distinct mutation profile from common nevi and melanoma, featuring more HRAS, rather than BRAF or NRAS mutations

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