

The Pattern Approach to Dermatologic Diagnosis

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You might have wondered how dermatologists always seem to come up with some fantastic diagnosis or a comprehensive list of differential diagnoses after seeing a pet only briefly during a referral visit. These dermatologists then seem to know exactly which tests to run, and these tests are always ones that you didn't run before you referred the case. Many clinicians falsely believe that the diagnosis was reached because the dermatologist had seen cases just like theirs many times before. That may be true, but most of the time the reason is far more pragmatic; veterinary dermatologists quickly get into the habit of identifying cutaneous lesions properly and that provides critical information necessary to compile differential diagnoses and perform standard tests. There's nothing magical about it.

To do this effectively, you must know your primary and secondary lesions and be able to associate them with a predominant morphologic pattern. If you can't describe the morphologic pattern correctly, you can't diagnose the case correctly either in most cases.

To make a correct dermatologic diagnosis, we need to approach each case in three distinct steps. Of course, patient history and signalment are critical to narrowing down the diagnostic possibilities. However, this approach deals exclusively with the evidence you *see* during a clinical examination. If we follow these three steps, we'll arrive at a diagnosis in most cases.

Step 1	Determine Pattern
Step 2	Formulate Differential Diagnostic List
Step 3	Perform diagnostic testing

Step 1. Determine Pattern

Take your knowledge of primary and secondary lesions and carefully evaluate the animal to determine the predominant pattern. This is done by asking yourself a series of questions in a specific order. Remember to select the predominant pattern. A dog with profound scaling and 3 pustules doesn't have a vesiculopustular disorder; it has an exfoliative dermatosis. A cat with a large hairless mass on its back has a papulonodular pattern, not alopecia.

INITIAL ALGORITHM

1. Are there pigmentary changes ?
YES = Pigmented Lesions and Dermatoses
Red, White, Dark or Skin-colored?

If NO,
2. Are the lesions raised?
If YES,
 - a) Are the lesions fluid-filled?
YES = Vesiculopustular dermatoses
Primarily vesicular/bullous or pustular?

If NO,
 - b) Are the lesions solid and raised?
YES = Papulonodular dermatoses
Primarily nodules, plaques or vegetative lesions?

If NO,
3. Are the lesions flat, depressed, or only mildly elevated?
If YES,
 - a) Is hair loss prominent?
YES = Alopecic disorders
Primarily focal/multifocal, patchy, regional or generalized?

If NO,
 - b) Are breaks in epithelial integrity prominent?
YES = Erosive-ulcerative disorders
If NO,
 - c) Is scaling very prominent?
YES = Exfoliative dermatosis
Primarily patchy, regional or generalized?

If NO,
 - d) Is the skin palpably thickened?
YES = Indurated dermatoses
Primarily solid or turgid?

NO = Maculopapular dermatoses
Primarily macular or papular?

Lesions in Veterinary Dermatology

Lesion	Description	Pattern	1° or 2°
Macule	A circumscribed, flat non-palpable circumscribed area of change (discoloration) of the skin up to 1 cm in diameter	Maculopapular; pigmented	Primary
Patch	Macules greater than 1 cm	Maculopapular; pigmented	Primary
Papule	A circumscribed, elevated, superficial, solid lesion up to 1 cm in diameter	Maculopapular; papulonodular	Primary
Plaque	A circumscribed, elevated, flat-topped, superficial solid lesion > 1 cm. A papule that has enlarged in 2 dimensions	Papulonodular-plaque	Primary
Wheal	An edematous, transitory papule or plaque	Papulonodular-plaque; indurated-turgid	Primary
Nodule	A palpable, solid round or ellipsoidal lesion with depth. A papule that has enlarged in 3 dimensions	Papulonodular-nodule	Primary
Cyst	A closed epithelial-lined cavity containing fluid or semi-solid material	Vesiculopustular; Papulonodular-nodule	Primary
Vesicle	A circumscribed elevation of the skin, up to 1 cm in diameter, containing serous fluid	Vesiculopustular	Primary
Bulla	A vesicle > 1 cm in diameter	Vesiculopustular	Primary
Pustule	A circumscribed elevation of skin containing purulent fluid	Vesiculopustular	Primary
Petechia	A circumscribed deposit of blood or blood pigment up to 1 cm in diameter; the purplish discoloration noted is called purpura	Pigmented-red	Primary
Ecchymoses	A circumscribed deposit of blood or blood pigment > 1 cm in diameter; the purplish discoloration noted is called purpura	Pigmented-red	Primary
Scale	Shedding dead epidermal cells that may be dry or greasy	Exfoliative; maculopapular	Secondary
Epidermal collarette	A circular peeling rim of scale	Exfoliative; vesiculopustular	Secondary
Follicular plugging	Occlusion of the hair follicle (pore)	Exfoliative	Secondary
Erosion	An excavation in the skin limited to the epidermis and not breaking the integrity of the dermal-epidermal junction	Erosive-ulcerative	Secondary
Ulcer	An irregularly sized and shaped cavitation in the skin extending into the dermis	Erosive-ulcerative	Secondary
Crust	Variously colored collections of skin exudates	Erosive-ulcerative	Secondary
Excoriation	Abrasion of the skin, usually superficial and traumatic in origin	Erosive-ulcerative	Secondary
Fissure	A linear break in the skin, sharply defined with abrupt walls	Erosive-ulcerative	Secondary
Induration	Palpable thickening of the skin	Indurated	Secondary
Scar	A formation of connective tissue replacing tissue lost through injury or disease	Indurated	Secondary
Sclerosis	Hardening of the skin	Indurated	Secondary
Atrophy	Thinning or depression of the skin, due to reduction of underlying tissue	Indurated; maculopapular	Secondary
Lichenification	A diffuse area of thickening and scaling, with resultant increase in the skin lines and markings	Indurated; maculopapular	Secondary

Hyperpigmentation	Darkening of the skin	Pigmented-dark; Maculopapular	Secondary
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Step 2: Formulate Differential Diagnostic List

Once you've pigeonholed the case into one of the eight major categories, you can create a comprehensive differential diagnostic list from the tables. This not only increases your awareness of possible dermatologic conditions, but it is extremely helpful to include the list when submitting samples for diagnostic testing, especially biopsies for histopathologic assessment.

The eight major patterns can be subdivided to render more specific differential diagnoses. The categories and subcategories are as follows:

1. Pigmented
 - Red
 - White (Depigmented)
 - Dark
 - Skin-colored
 - Other
2. Vesiculopustular
 - Vesicular
 - Pustular
3. Papulonodular
 - Nodular
 - Plaques
 - Vegetative
4. Alopecia
 - Focal/Multifocal
 - Patchy
 - Regional
 - Generalized
5. Erosive-ulcerative
6. Exfoliative
 - Patchy
 - Follicular
 - Regional
 - Generalized
7. Indurated
 - Turgid
 - Solid
8. Maculopapular
 - Macular
 - Papular

Differential Diagnosis: Pigmented			
Category	Subcategory	Canine	Feline
Pigmented	Red	Drug Eruption Petechiae Purpura Vasculitis Contact Dermatoses Lupus Erythematosus Photodermatitis Erythema Multiforme Fold Pyoderma Pyotraumatic Dermatitis Histiocytoma Demodicosis Flushing Syndrome Lyme Borreliosis Hookworm dermatitis Acute eosinophilic dermatitis	Drug Eruption Petechiae Purpura Vasculitis Contact Dermatoses Lupus Erythematosus Photodermatitis Erythema Multiforme Eosinophilic Plaque Linear Granuloma
	White (Depigmented)	Lupus Erythematosus Albinism Uveodermatologic Syndrome Morphea Vitiligo Tyrosinase Deficiency	Lupus Erythematosus Albinism Waardenburg Syndrome Chediak-Higashi Syndrome Periocular Leukotrichia
	Dark	Basal-cell Tumor Melanoma Post-inflammatory change Hypothyroidism Hyperadrenocorticism GH-responsive Dermatitis Acanthosis Nigricans Adrenal sex-hormone dermatosis Lentiginosities Vascular Nevi Hemangioma/sarcoma Organoid Nevus Melanocytic Nevus Melanoderma and Alopecia	Basal-cell Tumor Melanoma Bowen's Disease Post-inflammatory change Feline viral plaques
Skin-colored		Epidermal Nevus Scar Papilloma Morphea Sebaceous-gland Hyperplasia Callus Sebaceous Nevus	Epidermal Nevus Scar
	Other	Dalmatian Bronzing Syndrome Acquired Aurotrichia Tyrosinase Deficiency Waardenburg-Klein Syndrome	Xanthomatosis Waardenburg-Klein Syndrome Chediak-Higashi Syndrome

Differential Diagnosis: Vesiculopustular			
Category	Subcategory	Canine	Feline
Vesiculopustular/Vesicular		Pemphigus Pemphigoid Erythema Multiforme Dermatomyositis Epidermolysis Bullosa Dermatitis Herpetiformis Mucinosis Idiopathic Ulcerative Dermatitis Vesicular LE	Pemphigus Pemphigoid Lupus Erythematosus Epidermolysis Bullosa Cat Pox Herpesvirus infection
	Pustular	Demodicosis Bacterial Pyoderma Dermatophytosis Subcorneal Pustular Dermatitis Sterile Eosinophilic Pustulosis Lupus Erythematosus Acne Linear IgA Dermatitis Adverse food reactions Pemphigus Collaretting syndrome	Demodicosis Bacterial Pyoderma Dermatophytosis Abscess Acne Lupus Erythematosus FIV Infection Adverse food reactions

		Differential Diagnosis: Papulonodular	
Category	Subcategory	Canine	Feline
Papulonodular	Nodular	Parasitic	Abscess
		Deep Pyoderma	Acne
		Atypical Pyoderma	Atypical Pyoderma
Dermatophytosis		Dermatophytosis	
Intermediate Mycoses		Intermediate Mycoses	
Deep Mycoses		Deep Mycoses	
Lupus Profundus		Parasitoses	
Neoplastic		Neoplastic	
Dermoid Cyst		Dermoid Cyst	
Nodular Panniculitis		Nodular Panniculitis	
Juvenile Cellulitis		Lupus Profundus	
Mucinosis		Xanthoma	
Eosinophilic Granuloma		Eosinophilic Granuloma	
Sebaceous Adenitis	Leprosy		
Sterile Pyogranuloma	Opportunistic mycobacteria		
Opportunistic mycobacteria			
Acral pruritic nodule			
Calcinosis Circumscripta			
Nodular fasciitis			
Protothecosis			
Dracunculiasis			
	Plaques	Dermatophytosis	Dermatophytosis
		Urticaria	Urticaria
		Lymphoma	Lymphoma
		Bacterial Hypersensitivity	Sporotrichosis
		Lupus Profundus	Eosinophilic Plaque
		Viral Papillomatosis	Mast-Cell Tumor
		Calcinosis Cutis	Linear Granuloma
		Calcinosis Circumscripta	Vitamin E Deficiency
		Histiocytoma	Mucopolysaccharidosis
		Histiocytosis	Xanthomatosis
		Keratoses	Tumoral Calcinosis
		Nevi	Nevi
		Lichenoid Dermatoses	Lichenoid Dermatoses
		Mucinosis	Erythema Multiforme
		Erythema Multiforme	Papillomavirus infection
		Acanthosis Nigricans	Perforating Dermatitis
		Dermatitis Herpetiformis	Feline viral plaques
		Urticaria Pigmentosa	
		Acral lick dermatitis	
		Malassezia dermatitis	
		Acute eosinophilic dermatitis	
	Vegetative	Mast-cell Tumor	Mast-Cell Tumor
		Cutaneous Papilloma	Squamous-cell Carcinoma
		Fibroma	Fibroma
		Nevi	Nevi
		Sebaceous-gland Hyperplasia	
		Transmissible Venereal Tumor	
		Pemphigus Vegetans	

Differential Diagnosis: Alopecia

Category	Subcategory	Canine	Feline
Alopecia	Focal/Multifocal	Demodicosis Bacterial Pyoderma Dermatophytosis Alopecia Areata Cutaneous Asthenia Traction Alopecia Morphea Injection Site Reaction Cicatricial Alopecia	Demodicosis Bacterial Pyoderma Dermatophytosis Alopecia Areata Cutaneous Asthenia Traction Alopecia Injection Site Reaction Cicatricial Alopecia
	Patchy	Demodicosis Cheyletiellosis Lice Infestation Dermatophytosis Bacterial pyoderma Lupus Erythematosus Telogen Defluxion Protein Deficiency Drug Eruption Sebaceous Adenitis Bronzing Syndrome Color-Mutant Alopecia Spiculosis Leishmaniasis Familial Benign Pemphigus Mucinous mural folliculitis Pseudopelade	Demodicosis Cheyletiellosis Lice Infestation Dermatophytosis Drug Eruption Lupus Erythematosus Telogen Defluxion Hyperadrenocorticism Pseudopelade

Regional	<ul style="list-style-type: none"> Discoid Lupus Erythematosus Hypothyroidism Hyperadrenocorticism Growth Hormone-responsive Adrenal Sex-hormone Dermatitis Seasonal Flank Alopecia Hyperestrogenism Hypoestrogenism Pattern Baldness Testicular Neoplasia Dermatomyositis Follicular Dysplasia Toxicity (e.g., Thallium) Post-clipping alopecia Pinnal alopecia Benign Familial Chronic Pemphigus Melanoderma and Alopecia Waterline Disease Ischemic folliculopathy 	<ul style="list-style-type: none"> Discoid Lupus Endocrine Alopecia Hyperadrenocorticism Psychogenic Alopecia Post-clipping alopecia Pinnal alopecia Preauricular alopecia Symmetrical Alopecia Paraneoplastic Alopecia
Generalized	<ul style="list-style-type: none"> Dermatophytosis Lupus Erythematosus Drug Eruption Demodicosis Hypotrichosis Telogen defluxion Post-clipping alopecia 	<ul style="list-style-type: none"> Dermatophytosis Lupus Erythematosus Drug Eruption Alopecia Universalis Hypotrichosis Telogen defluxion

Category	Subcategory	Differential Diagnosis: Erosive-Ulcerative	
		Canine	Feline
Erosive-Ulcerative		Fleas	Fleas
		Demodicosis	Demodicosis
		Sarcoptic Mange	Notoedric Mange
		Skin-Fold Pyoderma	Superficial Pyoderma
		Pyotraumatic Dermatitis	Systemic Mycoses
		Perianal Fistulae	Cat Pox Infection
		Bacterial Granuloma	Bacterial Granuloma
		Mycetoma	Mycetoma
		Mycobacteriosis	Mycobacteriosis
		Pemphigus	Pemphigus
		Pemphigoid	Pemphigoid
		Cutaneous Vasculitis	Cutaneous Vasculitis
		Toxic Epidermal Necrolysis	Toxic Epidermal Necrolysis
		Drug Eruption	Drug Eruption
		Lupus Erythematosus	Lupus Erythematosus
		Lupoid Dermatitis	FIV Infection
		Vesiculopustular dermatoses	Indolent Ulcer
		Leishmaniasis	Squamous-cell Carcinoma
		Thallium toxicosis	Bowen's Disease
		Cutaneous asthenia	Sporotrichosis
		Epitheliogenesis imperfecta	Hyperadrenocorticism
		Ectodermal defect	Vesiculopustular dermatoses
		Burn	Burn
		Contact eruption	Contact eruption
		Septicemia/Toxemia	Septicemia/Toxemia
		Dermatomyositis	Cutaneous asthenia
		Erythema multiforme major	Erythema multiforme major
		Cutaneous T-cell lymphoma	Ectodermal defect
		Familial Benign Pemphigus	Dermatophilosis
		Familial Vasculopathy	Epidermolysis Bullosa
		Dermatophilosis	Acquired Skin Fragility
		Candidiasis	Herpesvirus infection
		Metabolic Dermatoses	Idiopathic neck ulcer
	Epidermolysis Bullosa		
	Idiopathic Erosive Dermatitis		
	Acrodermatitis		
	Ulcerative Dermatitis		
	Acute Neutrophilic Dermatitis		
	Acute Eosinophilic Dermatitis		

Differential Diagnosis: Exfoliative

Category	Subcategory	Canine	Feline
Exfoliative	Patchy	Ectoparasitism	Ectoparasitism
		Dermatophytosis	Dermatophytosis
		Drug Eruption	Drug Eruption
		Pemphigus Foliaceus	Pemphigus Foliaceus
		Fatty Acid Deficiency	Fatty Acid Deficiency
		T-cell Lymphoma	Protein Deficiency
		Pagetoid Reticulosis	Vitamin-A Deficiency
		Sjögren's Syndrome	Vitamin-E Deficiency
		Hyperestrogenism	Biotin Deficiency
		Vit-A responsive Derm.	Lynxacariasis
		Sebaceous Adenitis	Adverse Food Reactions
		Generic Dog Food Disease	Perforating Dermatitis
		Subcorneal Pustular Dermatitis	
		Chronic Maculopapular Dermatoses	
		Parapsoriasis	
Adverse Food Reactions			
Hypothyroidism			
Lupoid dermatosis			
Leishmaniasis			
	Follicular	Follicular keratosis	Acne
		Sebaceous adenitis	Comedones
		Acne	Milia
		Comedo syndrome	Folliculitis
		Milia	Demodicosis
		Bacterial folliculitis	Dermatophytosis
		Demodicosis	Sebaceous adenitis
		Dermatophytosis	Pseudopelade
		Vitamin A-responsive	Thymoma dermatitis
Regional		Pemphigus Foliaceus	Pemphigus Foliaceus
		Pemphigus Erythematosus	Pemphigus Erythematosus
		Discoid Lupus Erythematosus	Discoid Lupus
		Hypothyroidism	Cheyletiellosis
		Zinc-responsive Dermatitis	Thymoma dermatitis
		Tyrosinemia	
		Nasodigital Hyperkeratosis	
		Leishmaniasis	
		Malasseziasis	
Generalized		Dermatophytosis	Dermatophytosis
		Drug Eruption	Drug Eruption
		Systemic Lupus	Systemic Lupus
		Pemphigus Foliaceus	Pemphigus Foliaceus
		Keratinization Disorders	Keratinization Disorders
		Demodicosis	Cheyletiellosis
		Hypothyroidism	Hypereosinophilic Syndrome
		Vitamin E Deficiency	Lynxacariasis
		Ichthyosis	T-cell Lymphoma
		T-cell Lymphoma	Metabolic Disorders
		Metabolic Disorders	Paraneoplastic syndrome
		Leishmaniasis	
		Graft-versus-Host Disease	

Differential Diagnosis: Indurated

Category	Subcategory	Canine	Feline
Indurated	Turgid	Urticaria Angioedema Myxedema Juvenile Cellulitis MucinosiS Nephrotic Syndrome Urticaria Pigmentosa Hookworm dermatitis Acute eosinophilic dermatitis	Urticaria Angioedema GH-secreting Tumor Mucopolysaccharidosis Relapsing Polychondritis Plasma Cell Pododermatitis
	Solid	Cellulitis Bacterial Granuloma Fungal Granuloma Calcinosis Cutis Tumoral Calcinosis Scar Neoplasia Amyloidosis Scleroderma Chronic Maculopapular Derm. Sebaceous Adenitis	Cellulitis Bacterial Granuloma Fungal Granuloma Calcinosis Cutis Scar Neoplasia Amyloidosis Intermediate Mycosis Chronic Maculopapular

Differential Diagnosis: Maculopapular

Category	Subcategory	Canine	Feline
Maculopapular	Macular	Allergic Inhalant Dermatitis Food Allergy Allergic Contact Dermatitis Irritant Contact Dermatitis Irritant Drug Eruption Bacterial pyoderma Erythema Multiforme Lupus Erythematosus Alopecia Areata Endo/Ecto parasitism Acanthosis Nigricans Acute eosinophilic dermatitis	Allergic Inhalant Dermatitis Food Allergy Allergic Contact Dermatitis Contact Dermatitis Drug Eruption Endo/Ecto Parasitism Erythema Multiforme Lupus Erythematosus Alopecia Areata
	Papular/Papulocrustous	Parasitic Dermatoses Vit A-responsive dermatosis Bacterial Folliculitis Drug Eruption Food Allergy Dermatophytosis Comedones/Acne Pemphigus foliaceus Erythema Multiforme Hormonal Hypersensitivity Dermatitis Herpetiformis	Miliary Dermatitis Parasitic Dermatoses Bacterial Folliculitis Drug Eruption Food Allergy Dermatophytosis Pemphigus foliaceus Comedones/Acne Erythema Multiforme Hypereosinophilic Syndrome

Step 3: Perform Diagnostic Testing

One now has not only a pattern diagnosis, but also a list of potential differential diagnoses. At this time, the considerations can be prioritized on the basis of history, specific clinical presentation, breed predisposition and a variety of other clues. If one is not comfortable taking that next step, information below can be used to create a minimum database; this will uncover the most common conditions with that presentation. If the minimum data base doesn't suggest a diagnosis, the next step listed in the charts proposes additional testing.

Classification	Minimum Data Base	Next Step
Pigmented	Histopathology	As per biopsies
Vesiculopustular	Skin scrapings Cytology	Dietary/parasite trials Histopathology Cultures
Papulonodular	Skin scrapings Cytology (e.g. fine needle aspirate) Histopathology CBC/Biochemistry	As indicated by MDB tests Cultures, blood tests, etc.
Alopecic		
Focal	Skin scrapings DTM Trichogram	Histopathology
Widespread	Skin scrapings DTM Trichogram CBC Biochemistries Urinalysis	Endocrine profiles Histopathology
Erosive-Ulcerative	Skin scrapings Cytology (e.g., impression smear)	Histopathology
Exfoliative	Skin scrapings CBC Biochemistries Urinalysis Fungal culture	Histopathology Endocrine profile
Indurated		
Turgid	CBC Biochemistry Urinalysis Fecal	Histopathology
Solid	Cytology Histopathology	CBC Biochemistries Cultures
Maculopapular	Skin Scrapings Cytology Fecal(s) CBC	Dietary Trial Parasite-control trial Allergy Testing Cultures Histopathology

Recommended Reading:

Ackerman, L: Atlas of Small Animal Dermatology, Inter-Medica, 2008

Nesbitt, G; Ackerman, L: Canine & Feline Dermatology, Veterinary Learning Systems, 1998, 498pp.