

# The Pattern Approach to Dermatologic Diagnosis

© 2021 Lowell Ackerman DVM DACVD MBA MPA CVA MRCVS. [Some of this content has been abstracted from *Atlas of Small Animal Dermatology* and may not be reproduced in any manner without the express written consent of author]

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.

<b>Step 1</b>	<b>Determine Pattern</b>
<b>Step 2</b>	<b>Formulate Differential Diagnostic List</b>
<b>Step 3</b>	<b>Perform diagnostic testing</b>

## 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

### 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

Category	Subcategory	Differential Diagnosis: Pigmented	
		Canine	Feline
<b>Pigmented</b>	<b>Red</b>	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 Urticaria pigmentosa
	<b>White (Depigmented)</b>	Lupus Erythematosus Albinism Uveodermatologic Syndrome Morphea Vitiligo Tyrosinase Deficiency	Lupus Erythematosus Albinism Waardenburg Syndrome Chediak-Higashi Syndrome Periocular Leukotrichia
	<b>Dark</b>	Basal-cell Tumor Melanoma Post-inflammatory change Hypothyroidism Hyperadrenocorticism GH-responsive Dermatitis Acanthosis Nigricans Adrenal sex-hormone dermatosis Lentigines Vascular Nevi Hemangioma/sarcoma Organoid Nevus Melanocytic Nevus Melanoderma and Alopecia	Basal-cell Tumor Melanoma Bowen's Disease Post-inflammatory change Feline viral plaques Ochronosis
<b>Skin-colored</b>		Epidermal Nevus Scar Papilloma Morphea Sebaceous-gland Hyperplasia Callus Sebaceous Nevus	Epidermal Nevus Scar
	<b>Other</b>	Dalmatian Bronzing Syndrome Acquired Aurotrichia Tyrosinase Deficiency Waardenburg-Klein Syndrome	Xanthomatosis Waardenburg-Klein Syndrome Chediak-Higashi Syndrome

<b>Differential Diagnosis: Vesiculopustular</b>			
<b>Category</b>	<b>Subcategory</b>	<b>Canine</b>	<b>Feline</b>
<b>Vesiculopustular/Vesicular</b>		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
	<b>Pustular</b>	Demodicosis Bacterial Pyoderma Dermatophytosis Subcorneal Pustular Dermatitis Sterile Eosinophilic Pustulosis Lupus Erythematosus Acne Linear IgA Dermatitis Adverse food reactions Pemphigus Collaretting syndrome Leishmaniasis	Demodicosis Bacterial Pyoderma Dermatophytosis Abscess Acne Lupus Erythematosus FIV Infection Adverse food reactions

Differential Diagnosis:

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

<b>Differential Diagnosis: Alopecia</b>			
<b>Category</b>	<b>Subcategory</b>	<b>Canine</b>	<b>Feline</b>
<b>Alopecia</b>	<b>Focal/Multifocal</b>	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
	<b>Patchy</b>	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 Follicular lipidosis	Demodicosis Cheyletiellosis Lice Infestation Dermatophytosis Drug Eruption Lupus Erythematosus Telogen Defluxion Hyperadrenocorticism Pseudopelade



<b>Regional</b>	<p> 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 </p>	<p> Discoid Lupus  Endocrine Alopecia  Hyperadrenocorticism  Psychogenic Alopecia  Post-clipping alopecia  Pinnal alopecia  Preauricular alopecia  Symmetrical Alopecia  Paraneoplastic Alopecia  Pseudopelade </p>
<b>Generalized</b>	<p> Dermatophytosis  Lupus Erythematosus  Drug Eruption  Demodicosis  Hypotrichosis  Telogen defluxion  Post-clipping alopecia </p>	<p> Dermatophytosis  Lupus Erythematosus  Drug Eruption  Alopecia Universalis  Hypotrichosis  Telogen defluxion </p>

<b>Differential Diagnosis: Erosive-Ulcerative</b>			
<b>Category</b>	<b>Subcategory</b>	<b>Canine</b>	<b>Feline</b>
<b>Erosive-Ulcerative</b>		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	Perforating dermatosis
		Idiopathic Erosive Dermatitis	Calicivirus infection
		Acrodermatitis	Feline leukemia virus
		Vesicular cutaneous lupus	
		Acute Neutrophilic Dermatitis	
		Acute Eosinophilic Dermatitis	
		Pyoderma gangrenosum	
	Leishmaniasis		

**Differential**

<b>Category</b>	<b>Subcategory</b>	<b>Diagnosis: Exfoliative Canine</b>	<b>Feline</b>
<b>Exfoliative</b>	<b>Patchy</b>	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			
	<b>Follicular</b>	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
<b>Regional</b>		Pemphigus Foliaceus	Pemphigus Foliaceus
		Pemphigus Erythematosis	Pemphigus Erythematosis
		Discoid Lupus Erythematosis	Discoid Lupus
		Hypothyroidism	Cheyletiellosis
		Zinc-responsive Dermatitis	Thymoma dermatitis
		Tyrosinemia	
		Nasodigital Hyperkeratosis	
		Leishmaniasis	
		Malasseziasis	
<b>Generalized</b>		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**

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

## Differential Diagnosis: Maculopapular

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

### 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.

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

**Recommended Reading:**

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

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