

## Skin and Appendages – 1,2

PROF. DR. M. TARIQ JAVED

Department of Pathology,  
Faculty of Veterinary Science,  
University of Agriculture, Faisalabad, Pakistan.  
mtjaved@uaf.edu.pk

1

- The skin is the *largest organ* of the body
- The skin serves numerous functions but one of the most important is *protection* from the external environment
- The skin also has *normal microflora* that contribute to skin defense
- In addition to *keratinocytes* (85-90%) *small numbers of dendritic cells* (melanocytes, Langerhans cells, Merkel cells) also reside in the epidermis.
- The dermis is involved in *maintenance* and *repair* of the skin

### Pathology

- **Acantholysis** is a *loss of cohesion* between epidermal cells resulting in intra-epidermal *clefts, vesicles* and *bullae*
- **Acanthosis** specifically indicates an *increased thickness* of the stratum *spinosum*, and is due to *hyperplasia*

- **Atrophy**, in regard to the *epidermis*, is decreased thickness of the epidermis due to *decreased thickness of the stratum spinosum*
- **Ballooning degeneration** of the *epidermis* is due to *intracellular edema*
- **Bullae** are *collections of fluid* within or *below the epidermis* greater than 1.0 cm in diameter
- **Clefts** are *slit-like spaces*,
- **Crusts** are consolidated, desiccated surface masses composed of various combinations of keratin, serum, cellular debris and often microorganisms
- **Dermal edema** is recognized by *dilated lymphatics, widened spaces* between blood vessels and perivascular collagen (*perivascular edema*) or widened spaces between *dermal collagen* fibers (*interstitial edema*).

- **Folliculitis** is *inflammation of the hair follicle*.
- **Furunculosis** is *inflammation of the hair follicle* that has resulted in *destruction of the follicular epithelium* and *release of the luminal contents* into the dermis, causing *dermal inflammation*
- **Hyperkeratosis**, *increased thickness of the stratum corneum*,
- **Hyperpigmentation** refers to *increased melanin within the epidermis* and, *often, concurrently in dermal melanophages*
- **Panniculitis** (steatitis) refers to *inflammation of subcutaneous fat*.
- **Pustules** are *cavities* in the *epidermis* or *follicular epithelium* filled with inflammatory cells
- **Vesicle** is a *fluid filled blister* *less than 1.0 cm in diameter* in, or immediately below, the epidermis

### Congenital Malformations

- **Epitheliogenesis imperfecta**  
*is a congenital condition in which localized or widespread areas of the squamous epithelium of the skin and mucous membranes are absent.*
- **Hypotrichosis**  
Generalized or regional alopecia
- **Hypertrichosis**  
a condition characterized by an *excessive* amount of *hair*,
- **Dermoid cyst**
  - *is an uncommon developmental anomaly that has been reported in dogs, cats, horses, and cattle.*
  - *It is caused by defective epidermal closure along embryonic fissures, which isolates an island of ectoderm in the dermis or subcutis.*
  - It frequently consists of [skin](#), [hair follicles](#), and [sweat glands](#),



A small (4 cm) dermoid cyst of an ovary,

[http://en.wikipedia.org/wiki/Dermoid\\_cyst#/media/File:Mature\\_cystic\\_teratoma\\_of\\_ovary.jpg](http://en.wikipedia.org/wiki/Dermoid_cyst#/media/File:Mature_cystic_teratoma_of_ovary.jpg)

### DISORDERS OF EPIDERMAL DIFFERENTIATION

- **Seborrhea**  
*is a term used to describe a broad range of conditions ranging from dry flaky skin to severe oily or scaling, crusty lesions with alopecia.*
- **Keratoses**  
are firm, elevated, circumscribed areas of excessive keratin production

### PHYSICOCHEMICAL DISEASES OF SKIN

- **Decubitus ulcers**  
*are the result of ischemic necrosis that follows application of constant pressure to a localized area of skin.*
- **Cold injury**  
*Most cold-induced cutaneous lesions result not only from direct freezing and disruption of the cells, but more importantly from vascular injury and resultant tissue anoxia.*
- **Thermal injury**  
Heat may be applied to the skin in a variety of forms and, depending on duration and intensity, will produce *mild to severe necrotizing lesions.*

### • Burns

- are classified into **four degrees** according to depth of injury.
- **First-degree burns** involve only the *epidermis*. The heated areas are *erythematous* and *edematous* as a result of vascular reaction in the dermis, but *no vesicles*. The epithelial cells show no morphological sign of injury
  - **second-degree burns**, the *epidermis and part of the dermis* are damaged. *Coagulative necrosis* of the *epidermis* can occur in the absence of substantial dermal injury. The vascular changes are more prominent with marked *dermal edema*
  - **third-degree burns**, the destructive effect of the heat extends full thickness through the *epidermis and dermis*, causing *coagulation necrosis* of connective tissues, blood vessels and adnexa
  - **Fourth-degree burns** are similar in character to those of third degree but penetrate *below the dermis* to and beyond the *subcutaneous fascia*; their local consequences depend on what lies underneath.

- **Envenomation**  
The *venom* of insects, spiders, other arthropods and snakes can cause mild or severe skin lesions with or without systemic signs.
- **Thallotoxicosis**  
The heavy metal *thallium* is a potent toxin with pharmacological actions similar to lead and mercury
- **Arsenic toxicosis**
  - Arsenic is the metal most toxic to the skin
  - Arsenic is absorbed by the gastrointestinal tract and skin and is excreted in urine, bile, milk, hair, nails, and exfoliated epidermal cells.
  - Its presence in the skin increases the skin's *susceptibility* to damage by *UV light*.
- **Organochlorine and organobromine toxicoses**  
Organochlorine and organobromine compounds implicated in toxicities causing, among others, *cutaneous lesions*

- **Ergotism** is the oldest known mycotoxicosis. The ergot of *Claviceps* spp. fungi develops in the seed heads of many species of grasses and cereal
  - Of the various pharmacological effects exerted by the ergot alkaloids, the most important is *marked peripheral vasoconstriction* leads to thrombosis and ischemic necrosis of tissues.
- **Photosensitization dermatitis**
  - *Photosensitization dermatitis* occurs in animals when *photodynamic* or *fluorescent pigments* are deposited in sunlight exposed skin.
  - *Photodynamic pigments* absorb ultraviolet light or visible and convert it to light of a *longer wavelength*
  - The energy from the absorbed light leads to tissue injury by reacting directly with *molecular oxygen*, producing reactive oxygen intermediates such as superoxide anion, singlet oxygen and hydroxyl radical.

- **Primary photosensitization (type I photosensitization)**
  - *Plants* are the most common cause of primary photosensitization; hence herbivores are most commonly affected.
  - Additional sources include *mycotoxins, molds, chemicals and drugs*.
- **Photosensitization due to defective pigment synthesis (type II photosensitization)**
  - Photosensitization due to *endogenous pigment accumulation* is the result of a congenital enzyme deficiency causing abnormal *heme synthesis* with the resultant blood and tissue accumulation of photodynamic agents such as *uroporphyrin I, coproporphyrin I and protoporphyrin III*.

- **Hepatogenous photosensitization (type III photosensitization)**
  - *The most common form of photosensitization in domestic animals occurs in conjunction with primary hepatocellular damage* or, less commonly, *bile duct obstruction* and is due to impaired capacity of the liver to excrete the potent photodynamic agent, *phylloerythrin*.
  - *Phylloerythrin* is a chlorophyll catabolite formed by microbial action in the intestinal tract and transported to the liver via the portal circulation.
  - Hepatocytes assimilate the phylloerythrin and excrete it into the bile

#### NUTRITIONAL DISEASES OF SKIN

- **Vitamin A deficiency**
  - Vitamin A is involved in cellular growth and differentiation, as well as in visual processes and reproduction.
  - Vitamin A has a controlling effect on epithelial differentiation.
  - *Cutaneous lesions of vitamin A deficiency* are *squamous epithelial hyperkeratosis* and *squamous metaplasia* of secretory epithelia

## IMMUNE-MEDIATED DERMATOSES

### **Urticaria and angioedema**

- **Urticaria** (hives, heat bumps) and **angioedema** (angioneurotic edema) are *pruritic, edematous skin lesions produced by mediators released by basophils and dermal mast cells.*
- Urticaria and angioedema are most common in **horses**,
- A wide variety of **immunologic** and **nonimmunologic** causes have been implicated, but frequently the specific causative agent cannot be determined
- **Immunologic** causes of urticaria/angioedema are thought to involve **type I hypersensitivity** reactions primarily;
- Sometimes **type III hypersensitivity** is involved
- *Recognized initiators* in all species include **foods and food additives, drugs, biologic agents, stinging and biting arthropods, intestinal parasites, inhalant and contact allergens, and bacterial, fungal, and viral infections.**

- Irrespective of cause, the *final common pathway is increased vascular permeability and resultant edema produced by histamine, the major mediator, and possibly also by kinins, etc.*
- **Urticaria** is characterized by **wheals (hives)**, which are discrete, well circumscribed, erythematous, edematous plaques with a flat-top and steep sides
- They are **cool** and **pit upon pressure**
- Wheals are usually round; but in sometime assume bizarre and irregular shapes
- **Angioedema** consists of **larger, less well demarcated swellings** that originate **subcutaneously**.



Angioedema



Hives / Urticaria

<http://studydroid.com/imageCards/01/t1/card-22972214-front.jpg>

<http://www.equestrianlife.com.au/images/genera/24-08-c?size=11>

### **Atopic dermatitis**

- **Atopy** is an *inherited tendency to produce IgE antibodies and develop clinical allergy to pollens and other innocuous environmental antigens*
- In animals, atopic dermatitis is much more common than the respiratory
- **Atopic dermatitis is a multifactorial skin disease**
- clearly a **genetic disorder**,
- The *underlying immunoregulatory imbalance* producing activation of a subpopulation of **T helper type 2** lymphocytes that release **cytokines** important to the pathogenesis of **atopic dermatitis**
- An immediate type **hypersensitivity** reaction develops within minutes of allergen exposure when **mast cells** bearing **allergen specific IgE** bind allergen and release a variety of preformed mediators, most notably **histamine**.



Atopic Dermatitis in Dogs

[http://www.ncstatevets.org/wp-content/uploads/2013/05/Moncie\\_before1.png](http://www.ncstatevets.org/wp-content/uploads/2013/05/Moncie_before1.png)

### **Allergic contact dermatitis**

- is an *uncommon* hypersensitivity condition in domestic animals.
- Is a typical delayed (**type IV**) hypersensitivity reaction,
- Upon **subsequent exposure** to the contact allergen, specifically **sensitized T cells** in skin and circulation become activated, and elaborate various **cytokines**
- Numerous *plants and chemicals* have been suspected or shown to cause allergic contact dermatitis in animals.
- *Primary lesions include erythema, papules, plaques, and vesicles,*
- *Pruritus*, ranging from mild to severe.
- *Chronic secondary lesions are more commonly seen and include alopecia, scaling, crusting, excoriations, and pigmentary changes.*



Allergic contact Dermatitis in Dogs

[http://upload.wikimedia.org/wikipedia/commons/8/80/Contact\\_allergic\\_dermatitis\\_3.jpg](http://upload.wikimedia.org/wikipedia/commons/8/80/Contact_allergic_dermatitis_3.jpg)

### **The pemphigus complex**

- refers to a group of *autoimmune* skin diseases characterized clinically by *pustules, vesicles, bullae, erosions and ulcers* and histologically by *loss of adhesion between cells*
- **Autoantibodies** directed against antigens within various stratified squamous epithelia, including skin, muco-cutaneous junctions, oral mucosa, esophagus, and vagina
- Vesicles, pustules, or bullae form within the various layers of the **epidermis**
- **Pemphigus vulgaris** is the *most severe* and the *more rare* form of pemphigus in animals.
- Lesions involve mucous membranes, mucocutaneous junctions and skin in areas such as the **inguinal** and **axillary** regions.
- **Oral involvement** is present in **90% of cases**, and in 50% of cases the lesions commence in the mouth.

### ***Lupus erythematosus***

- Lupus erythematosus occurs in two forms:
  - *systemic lupus erythematosus*, affecting multiple tissues including the skin,
  - *discoid lupus erythematosus* that is localized to the skin.
- The localized cutaneous form or **discoid** form of **lupus erythematosus** (DLE) is described most commonly in the **dog**,
- *Sunlight exacerbates* the lesions, which typically affect the **nasal planum** in dogs
- The **epidermis** may be more **hyperplastic** and the infiltrate is predominantly comprised of **lymphocytes** and **macrophages** with fewer plasma cells



### **VIRAL DISEASES OF SKIN**

- **Poxviral infections**
  - The Poxviridae is a large family of complex DNA viruses.
  - *Highly epitheliotropic, they cause cutaneous and systemic disease in birds, wild and domestic mammals and humans.*
- **Cowpox**
  - *Cowpox virus* and cowpox-like viruses belong to the genus *Orthopoxvirus*.
  - They are closely related to, but antigenically different from, *Vaccinia virus*.
  - Cowpox affects a range of species including *wild and domestic Felidae, cattle, dogs, rodents, humans, and several zoo animal*
  - In cattle, *Cowpox virus* infection is manifested by poxvirus lesions that develop on the *teats and udder*, and occasionally at other sites such as the *muzzle* of suckling calves.

### – **Buffalopox virus,**

- an *Orthopox virus*, is the cause of buffalopox. It has been reported in Pakistan, Indonesia, Egypt, Italy, and Russia.
- The lesions predominantly affect the **teats, udder**, medial aspects of the **thighs, lips** and **muzzle** but may be generalized, especially in calves.
- *Buffalopox virus can be zoonotic*



### – **Sheeppox**

- *Sheeppox is the most serious of the pox diseases of domestic animals.*
- It exists in Africa, Asia, and the Middle East
- *Sheeppox causes extensive economic loss* through **high mortality**, reduced **meat, milk** or **wool** yields
- Sheeppox occurs in **all ages** of sheep with high morbidity, and mortality as high as **50%**; but the disease is most severe in lambs, with mortality reaching **80-100%**.
- Sheeppox is a *systemic disease*.
- Infection is usually by the **respiratory route** but may occur through **skin abrasions**.
- The **incubation** period is **4–7 days** and is followed by a leukocyte-associated **viremia**.
- The virus **localizes** in many organs including the **skin** where the virus concentration is highest 10-14 days post-infection.



Sheep Pox

<http://www.sheepandgoat.com/Images/Diseases/soremouthhamp1.jpg>

- The initial clinical signs are **fever, lacrimation, drooling, serous nasal discharge, and hyperesthesia.**
- Skin lesions, which develop 1-2 days later, have a predilection for the **sparsely woolled** areas and typically involve eyelids, cheeks, nostrils, vulva, udder, scrotum, prepuce, ventral surface of the tail, and medial thigh.

– **Goatpox**

- caused by *Goatpox virus*, occurs in North Africa and the Middle East
- The disease has *many parallels with sheeppox, but is generally milder* with a low mortality rate (5%), although generalized eruption with mortality rates approaching 100% may occur.

### Contagious pustular dermatitis

- Contagious pustular dermatitis is a poxviral disease of *sheep and goats*, with incidental infections occurring in humans, camels, cows.
- The disease is caused by *Otf virus*, a *Parapoxvirus* closely related to *Pseudocowpox virus* and *Bovine papular stomatitis virus*.
- Synonyms for contagious pustular dermatitis include contagious ecthyma, orf, infectious labial dermatitis, soremouth, and scabby mouth.
- *affected animals neither suckle nor graze*
- Morbidity may reach 90%, but mortality rarely exceeds 1%
- Contagious pustular dermatitis affects sheep and goats of all breeds.
- *It is predominantly a disease of lambs and kids.*
- Infection is established through cutaneous abrasions
- *Gross lesions usually commence at the commissures of the lips and spread around the lip margins to the muzzle*

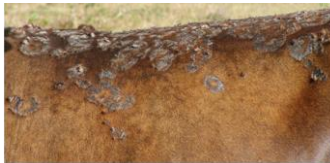
- Lesions mainly confined to the tongue
- The buccal lesions are raised, red or gray foci with a surrounding zone of hyperemia.
- Very rarely, lesions extend to the esophagus, rumen and omasum in the lower alimentary canal, causing ulcerative gastroenteritis, and in lungs and heart.
- Lesions on the limbs are less common than on the lips and tend to involve the coronet, interdigital cleft, and bulb of the heels.
- They may extend, in severe cases, to the knee or hock on the caudal aspect of the leg.
- Lesions of the mammary gland affect the teats and adjacent skin of the udder.
- Lesions may develop in other areas of sparsely woolled skin such as the inner thigh, axilla, and the edge of wounds in recently earmarked lambs, or tail-dock sites.

- The vesicular stage is transient and pustules are flat
- The most significant feature of the gross lesion is the layer of thick brown-gray crust that may be elevated 2-4 mm above the skin surface.
- Depending on the degree of secondary infection, regression is usually complete by 4 weeks.
- Papillomatous growths, resulting from continued epidermal proliferation, sometimes occur.
- *The microscopic lesions of contagious pustular dermatitis are characterized by vacuolation and swelling of keratinocytes in the stratum spinosum,*
  - *reticular degeneration,*
  - *marked epidermal proliferation,*
  - *intraepidermal microabscesses,*
  - *accumulation of scale-crust.*

### BACTERIAL DISEASES OF SKIN

- Cutaneous bacterial infections are typically **pyogenic** and are thus commonly called **pyodermas**.
- *Bacterial skin disease is seen much more frequently in dogs than in any other mammalian species*
- **Dermatophilosis**
  - Dermatophilosis (**cutaneous actinomycosis**, lumpy wool etc.) is an *acute, subacute, or chronic superficial exudative dermatitis caused by the Actinomycete dermatophilus congolensis.*
  - The disease occurs worldwide and has a wide host range
  - *common in the hot humid tropics and subtropics and in areas with heavy prolonged rains.*
  - In hot **monsoon climates**, cattle are the primary animals affected and the disease is endemic in some portions of Africa.

- In cattle and sheep, dermatophilosis causes important economic losses by virtue of **decreased meat** and **milk** production, damaged **hides, wool** loss, and devaluation, **infertility** and early culling.
- Severe udder and teat lesions may interfere with suckling by calves and result in decreased growth rate.
- Affected animals are predisposed to secondary infections and cutaneous myiasis.
- *Animals with greater than 50% of body involvement often show weight loss, dehydration, and death.*

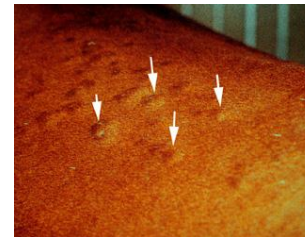


Severe dermatophilosis

[http://entnemdept.ufl.edu/creatures/livestock/ticks/tropical\\_bont\\_tick08.jpg](http://entnemdept.ufl.edu/creatures/livestock/ticks/tropical_bont_tick08.jpg)

### • **Staphylococcal folliculitis and furunculosis**

- *Staphylococcus* spp. are the most common cause of folliculitis in domestic animals.
- Inflammation of the deep portion of hair follicles frequently results in **rupture of the follicular wall (furunculosis)** and extension of infection to the surrounding dermis and panniculus.



<http://www.vetnext.com/images/z/73067877497%20370.gif>

- **Abscesses and cellulitis**

- Abscesses are well-circumscribed accumulations of pus.
- Cellulitis is a severe, deep, suppurative infection
- The lesions are usually painful and overlying skin is often friable, dark, devitalized, and may slough.
- *Staphylococcal* folliculitis and furunculosis are very common in the dog, common in horses, goats, and sheep, and uncommon in cats, cattle, and pigs.
- The earliest skin lesion is a follicular papule with one or several hairs protruding from the center.
- The papule develops into a pustule but these are very fragile, break easily, and are thus very transient.
- Consequently, crusted papules are seen more commonly than are pustules.
- It is characterized by neutrophilic inflammation

- **Actinomycosis and nocardiosis**

- Actinomycosis and nocardiosis are uncommon subacute-to-chronic opportunistic cutaneous, pulmonary, and disseminated infections that develop secondary to wound contamination, inhalation, or ingestion.
- The gross lesions of actinomycosis and nocardiosis are usually indistinguishable.
- They consist of abscesses, cellulitis, ulcerated nodules, draining fistulous tracts, and dense fibrous masses.
- The lesions may contain white, yellow, tan, or gray “sulfur granules.”
- Sulfur granules are more common in actinomycosis than in nocardiosis.

- **Mycobacterial infections**

- infections with saprophytic mycobacteria frequently involve the skin
- Mycobacterial lesions are all characterized by granulomatous or pyogranulomatous dermatitis and/or panniculitis with variable necrosis.

- **Botryomycosis**

- Botryomycosis (bacterial pseudomycosis, bacterial granuloma) is a chronic infection caused by nonfilamentous bacteria that form colonies visible as tissue grains or granules within lesions.
- Clinically and histologically, the condition resembles actinomycotic mycetoma
- Coagulase-positive staphylococci are involved most commonly
- Lesions typically consist of firm, single or multiple nodules that ulcerate and develop draining fistulae

- **Footrot**

- Footrot is a highly contagious bacterial infection of the digits of sheep, cattle, and goats.
- The multistrain, gram-negative, obligate anaerobe *Dichelobacter nodosus* is the causal pathogen.
- Footrot is a major disease in high rainfall areas
- can produce severe lameness because of necrosis of the sensitive laminae and separation of the hoof
- Footrot develops if the dermatitis is subsequently complicated by infection with *D. nodosus*.
- Footrot of cattle and goats is typically a less severe disease but in sheep is severe



foot rot in cattle

<http://www.canadiancattlemen.ca/files/2014/09/Footrot-2-e1412702218599.jpg>

- **Papillomatous digital dermatitis**

- Papillomatous digital dermatitis is a painful, **contagious dermatitis** of the feet of *cattle* that occurs worldwide.
- The condition is also called **footwarts** and **hairy heelwarts** and clinically
- *causes moderate-to-severe lameness* that results in weight loss, decreased milk production, and poor reproductive performance



<http://www.hoofhealth.ca/Section5/Lesion%20ID/img/D2a.png>

## FUNGAL DISEASES OF SKIN

- **Candidiasis**

- *Candidiasis (candidosis, monilliasis, thrush) is a rare opportunistic infection of skin, mucocutaneous junctions, external ear canal, and the claw bed*
- Infections have been described in *dogs, cats, pigs, horses, and goats*
- The lesion may begin as **papules, pustules, and vesicles** which evolve into characteristic sharply delineated **ulcers** with **erythematous borders**
- *Yeasts, pseudohyphae, and hyphae may be numerous in the lesion*



<http://www.alliswellpet.com/wp-content/uploads/2013/05/red-paw.jpg>

- **Dermatophytosis ("ringworm")**

- *is a superficial fungal infection generally confined to the keratin layers of the skin, hair, and nails.*
- In **rare** instances, **deeper** tissues are involved.
- The infection is caused by a group of fungi that are capable of using keratin as a source of nutrients
- In general, the infection has no effect on growth rate or other measures of productivity, but economic losses may result from **hide damage**
- The infection is caused by fungi of the genera *Microsporum*, *Trichophyton*, and *Epidermophyton*
- **Young animals** appear to be more susceptible to infection than adults
- Transmission of dermatophytosis occurs by **direct contact**
- **Hair fragments** containing *infectious arthrospores* are the most **effective means of transmission**

- Dermatophytosis is *common in cattle* and is most prevalent in calves
- In calves, lesions occur on the *neck, head, ears, and pelvic area* most commonly
- Lesions consist of *circular areas of alopecia with variable crusting or scaling*.
- In very severe cases, loss of condition and decreased milk production or weight gain may result



[http://caifology.com/sites/default/files/imagecache/370x260\\_slideshow/feature-photo/ringworm.jpg](http://caifology.com/sites/default/files/imagecache/370x260_slideshow/feature-photo/ringworm.jpg)

- **Sporotrichosis**

- Sporotrichosis is an *uncommon chronic infection usually limited to skin and subcutaneous tissue caused by the opportunist fungal pathogen Sporothrix schenckii*.
- Microscopically, sporotrichosis is usually a *nodular to diffuse pyogranulomatous or granulomatous inflammatory reaction involving the dermis and subcutaneous fat*
- Sporotrichosis is considered a *zoonotic disease*



[http://img.webmd.com/dtmcms/livewebmd/consumer\\_assets/site\\_images/articles/health\\_tools/cat\\_skin\\_problems\\_slideshow/cornell\\_photo\\_of\\_feline\\_sporotrichosis.jpg](http://img.webmd.com/dtmcms/livewebmd/consumer_assets/site_images/articles/health_tools/cat_skin_problems_slideshow/cornell_photo_of_feline_sporotrichosis.jpg)

## PROTOZOAL DISEASES OF SKIN

- **Leishmaniasis**

- Members of the *L. donovani* complex cause most infections.
- This *intracellular parasite* of the mononuclear-phagocytic system is *transmitted to animals and man by blood sucking sandflies*.
- *susceptibility* is associated with a *Th2-type* of immune response.
- The *skin* is one of the main organs affected in systemic leishmaniasis in **dogs**.
- Gross lesions may be *alopecic, ulcerative, nodular* or *pustular*
- **Nodules** are most common on the *ears, eyelids, and face* but can be anywhere on the body
- Histologically, *the more common lesions consist of hyperkeratotic, nodular to diffuse superficial and deep, granulomatous dermatitis*



<http://www.e-artemis.gr/wp-content/uploads/2003/05/leishmania2.jpeg>