

# SKIN HISTOLOGY HANDOUT

## Pathophysiology of Aging Skin

The two most encountered determinants of aging skin are:

**1. Intrinsic or chronological aging** which is natural aging associated with preprogrammed genetic factors and occurring with the passage of time. Conditions common to normal skin aging (intrinsic aging) are:

- Age spots (lentigines)
- Thinning of the skin
- Reduced sebum production
- Wrinkling
- Leathery look or dryness

**2. Extrinsic or photoaging** which is the result of exposure to environmental factors, primarily exposure to sun. Other environmental conditions, such as wind and cold exposure, can also have effects on skin condition over time.

Contributing factors to aging skin are:

- UV exposure
- Smoking
- Pollution
- Stress
- Alcohol consumption
- Extreme diets

Clinical Characteristics of Photoaged (Extrinsic Aged) skin:

- Freckling
- Persistent hyperpigmentation
- Dryness
- Solar elastosis
- Wrinkling: fine surface lines and deep furrows
- Telangiectasia

Notes:

---



---



---



Ultraviolet light affects skin through a series of cellular and molecular events, one of which is the production of enzymes known as metalloproteinases (MMPs), that degrade collagen and other extracellular matrix proteins. The balance of collagen synthesis and breakdown is offset, with greater degradation than production.

Histologically, photoaged skin shows a thickening of the epidermis and stratum corneum. Epidermal pigment is prominent because of an increase in the number of melanosomes in the melanocytes and more dispersion of pigment to keratinocytes.

Notes:

---



---



---



---



---



---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

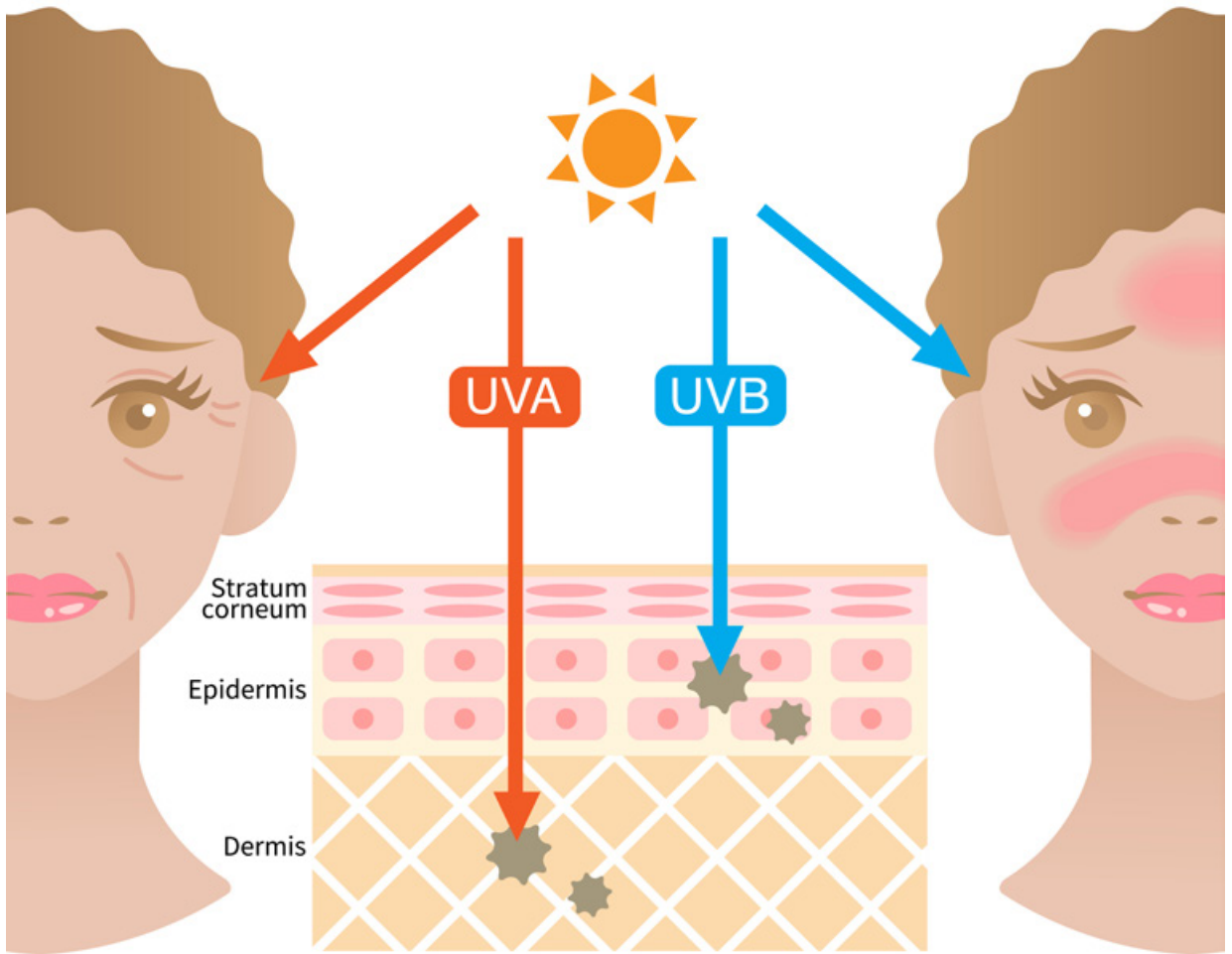
---

## Common Conditions Of Skin Aging

Skin Condition	Clinical Description	Clinical Presentation
<b>Solar Lentigines</b> (Hyperpigmentation)	<p>Synonyms: Lentigo senilis, liver spot, old age spot, senile freckle</p> <p>Tan to dark brown or black macules due to exposure to ultraviolet (UV) radiation</p> <p>Found in 90% of the Caucasian population older than 60 years, and their incidence increases with advancing age</p> <p>They can also be found in younger individuals after acute or chronic sun exposure</p> <p>Seen in all Fitzpatrick Skin Types, most common in I-II</p> <p>May darken in the summer with sun exposure and may fade in winter months-though will not disappear</p>	
<b>Melasma</b> (Hyperpigmentation)	<p>Synonym: Chloasma specific to hormonal pregnancy changes</p> <p>Seen primarily in women (at least 90% of patients)</p> <p>Increased prevalence in individuals who are Hispanic, Asian or of African descent</p> <p>Most common location is the face, followed by the forearm</p> <p>Symmetric patches of hyperpigmentation with irregular borders due to increased melanin</p>	
<b>Telangiectasia</b>	<p>Abnormal, small, persistently dilated blood vessels visible in the skin</p> <p>Generally presents itself with photo-damage</p> <p>Typically seen in adult women</p> <p>Commonly seen with Erythema (reddening in skin)</p>	
<b>Actinic Keratosis</b>	<p>Also known as solar keratosis</p> <p>Most frequent in skin types I-III</p> <p>Rough, reddish spot measuring 2-6 millimeters in size</p> <p>Often with flaky yellow or whitish scale on top</p> <p>Premalignant and may develop into a squamous cell carcinoma</p>	
<b>Skin Cancer</b>	<p>Basal Cell Carcinoma</p> <p>Squamous Cell Carcinoma</p>	
<b>Dermatitis</b>	<p>Eczema</p>	

### Effects of Ultraviolet Radiation (UV) on Skin

Up to 90% of the visible changes in aging skin are a result of sun exposure, regardless of ethnicity. The harmful effects of UV rays on skin are multiple, cumulative, and correlated with skin cancer. There are two types of UV rays. UVA rays penetrate deeply into the skin and contribute significantly to premature skin aging. UVB rays penetrate the skin surface and are the primary cause of sunburn.



Notes:

---

---

---

---

---

---

---

---

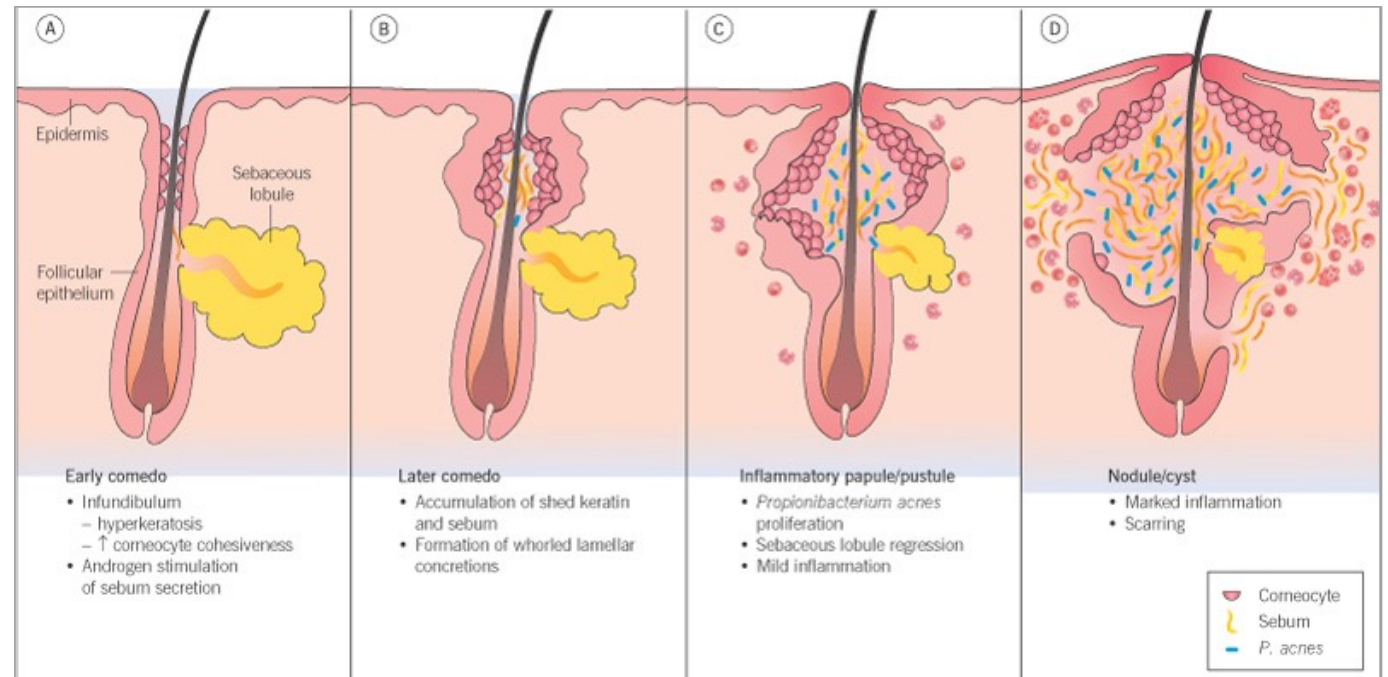
### Acne

95% of people develop acne at some point during their lives.<sup>1</sup> Acne is the most frequent diagnosis made by dermatologists. People of all ethnic backgrounds develop acne. During adolescence, boys are more likely to have acne than girls, and their symptoms are generally more severe. During adulthood acne is slightly more prevalent among women. Absolute or relative increases in androgen levels have been implicated in excessive sebum production in both adolescent and mature-onset acne in males and females.<sup>2,3</sup>

Clinical acne is characterized by external skin eruptions, or lesions, that occur around sebaceous follicles. Areas with the greatest concentration of pilosebaceous units are most affected. Symptoms include skin lesions of varying severity. Lesions can be divided into two general categories: non-inflammatory (**comedones**) and inflammatory lesions.

Acne is a multifactorial, chronic, inflammatory disease of the pilosebaceous unit and involves at least four essential processes:

- Abnormal sloughing of follicular keratinocytes in the pilosebaceous duct – leading to **microcomedone** formation
- Increased sebum production
- Presence and increased activity of *Cutibacterium acnes* in the sebum
- Inflammation



Notes:

---

---

---

---

### Forms of Acne

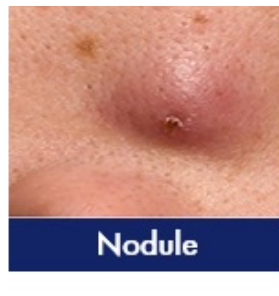
- Open and or closed comedones
- Inflammatory lesions known as papules and pustules
  - Papules are small, solid, pinkish/reddish lesions between 1 and 5 mm in diameter
  - Pustules are small, inflamed pus-filled lesions on the skin's surface
- Inflammatory acne can often result in scarring
  - Trapped sebum and bacteria stay below the skin surface = whitehead
  - Pore opens to the skin's surface and sebum, containing melanin, oxidizes and turns brown/black color = blackhead



**Blackhead:**  
Open Comedone



**Pustule:**  
Contains pus



**Nodule**



**Whitehead: Closed**  
Comedone



**Papule:**  
Red/inflamed



**Cystic**

### Various Skin Classifications:

**Comedonal Acne or Noninflammatory:** Open and/or closed comedos with few signs of inflammatory acne. Abnormal keratinization of the sebaceous follicle plays a large role in comedo formation, with the key factor being adhesion of keratinized cells. The normal follicular duct becomes obstructed by excess sebum and cell buildup creating a microcomedo. These enlarge to become larger, non-inflammatory lesions and comedones. Topical keratolytic treatments are often used because they reduce keratinocyte adhesiveness to follicular cells.

**Inflammatory Acne:** Inflammatory lesions known as papules and pustules, along with comedonal lesions. Papules are small, solid, pinkish/reddish lesions between 2 and 5 mm in diameter. Pustules are small, inflamed pus-filled lesions on the skin's surface. Inflammatory acne can often result in scarring. Systemic antibiotics and topical treatments are often used in combination.

**Nodular or Cystic Acne (also nodulocystic acne):** Deep, inflamed nodules and cysts within the dermis, often with abscesses. Nodular acne includes raised, and solid inflammatory lesions that are larger than 5 mm in diameter. Topical treatments alone are generally not effective for nodular or cystic acne, which is often treated with systemic antibiotics.

It is important to remember that acne is a multifactorial disease process and that the two most important features of the process are the abnormal growth and shedding of keratinocytes and increased sebum production. These work together to form the primary lesion of acne, the microcomedo.

Most patients have a combination of inflammatory and noninflammatory acne, with one type or the other predominating. When choosing acne therapies, it is important to address all contributing factors.

Because full blown acne is an inflammatory process, there may be other disease states "overlapping" with a diagnosis of acne and contributing to the inflammatory process.

- Rosacea
- Perioral dermatitis
- Folliculitis

### Bacterial Growth and Inflammation

Follicles normally contain bacteria, particularly **Cutibacterium acnes (C.acnes)**. This microorganism uses sebum as a source of nutrition and breaks it down into free fatty acids, which irritate the walls of the follicle. If sebum and dead cells block the follicle opening, an overgrowth of P. acnes occurs, producing further irritation. An inflammatory response occurs, which causes white blood cells to respond to the site of injury. A papule is formed first. Continued blockage results in an inflammatory pustule. The follicular wall of the pustule may break at the surface of the skin, expelling material externally. But if the pustule does not break at the surface, the mix of sebum, bacteria, skin cells, and pus continues to collect, spreading deep into the dermis. This continued progression of inflammation marks the transition from mild to moderate acne to potentially severe forms of acne.

**C.acnes:** C.acnes bacteria is an anaerobic bacteria (cannot survive in the presence of oxygen) that breaks down sebum into free fatty acids. A key contributor to acne.

### Skin Thickness

Skin thickness can be categorized into:  
Thin  
Medium  
Thick

Distinctions between each type are not clear-cut and must be made by clinical examination of firmness, tightness, bulkiness and the ease by which the skin can be wrinkled by facial expressions. Skin thickness on the face depends on the location: cheeks are thicker compared with the rest of the face, the forehead varies, the jaw line is thinner than the cheeks and the eyelids are thin. Skin thickness is not related to the fullness of appearance which results from the thickness of the subcutaneous fat layer.

### Notes:

---



---



---



---

### Skin Types

It is important to direct efforts to maintain healthy-looking skin toward a specific skin type, as skin types vary among individuals, and the nature and condition of the skin dictate what procedures or therapies will balance the natural physiology of a given skin type. Skin Classifications can be used to guide practitioners with:

- Strength and duration of skin conditioning
- Selection of a procedure and its depth
- Predictability of procedure results
- Suitability of skin for a repeated procedure
- The chance of complication (color change and scarring)

The three basic skin types are normal/combination, dry, and oily/acne prone. Basic skin type is determined by the degree of oiliness or dryness of the skin.

**Oily/Acne Prone** skin tends to “shine” with excess oil secretions and has a coarse texture. This is especially true of the “**T-zone**” or the area of the forehead, nose and chin. Pores tend to be larger and thus, collect debris leading to blackhead formation. Oily skin tends to attract dirt, so frequent washing is recommended. Alcohol-based toners are recommended to help dry the skin. Water-based moisturizers and make-up are suggested rather than oil-based products.

Reduced sebum is not the only reason for dry skin. Low glycosaminoglycan content can manifest clinically as dry skin. People with oily skin tend to have medium or thick skin.

**Dry** skin occurs when insufficient sebum or oil is secreted. Skin texture is rough and may be flaky with a dull appearance. Dry skin is more prone to wrinkles with age. Dry skin lacks elasticity and can be extremely sensitive to the sun, wind, and cold temperatures. For a person with dry skin, use of oily moisturizers containing occlusive components is required. Alcohol-based toners should be avoided.

**Normal/Combination** skin can be a mixture of either dry and oily or normal and oily skin types. Typically, with combination skin, the cheeks and neck are normal to dry and the T-zone, (forehead, nose and chin) are oily.

**Notes:**

---

---

---

---

---

---

---

---

### Fitzpatrick Skin Type System

In 1975, Thomas B. Fitzpatrick, MD, PhD, of Harvard Medical School, developed a classification system for skin typing.

This system was based on a person's response to sun exposure in terms of the degree of burning and tanning the individual experienced. Today, this classification is used to aid physicians and aestheticians in determining the safest and most effective topical products as well as laser types and settings to employ for successful removal of hair, wrinkles, veins, sunspots, and scars.

						
	<b>TYPE I</b>	<b>TYPE II</b>	<b>TYPE III</b>	<b>TYPE IV</b>	<b>TYPE V</b>	<b>TYPE VI</b>
<b>BEFORE SUN</b>	Ivory	Fair or pale	Fair to beige, with golden undertones	Olive or light brown	Dark brown	Deeply pigmented dark brown to darkest brown
<b>AFTER SUN</b>	Always freckles, always burns/peels, never tans	Usually freckles, often burns/peels, rarely tans	Might freckle, burns on occasion, sometimes tans	Doesn't really freckle, burns rarely, often tans	Rarely freckles, almost never burns, always tans	Never freckles, never burns, always tans

**Notes:**

---

---

---

---

---

---

---

---



