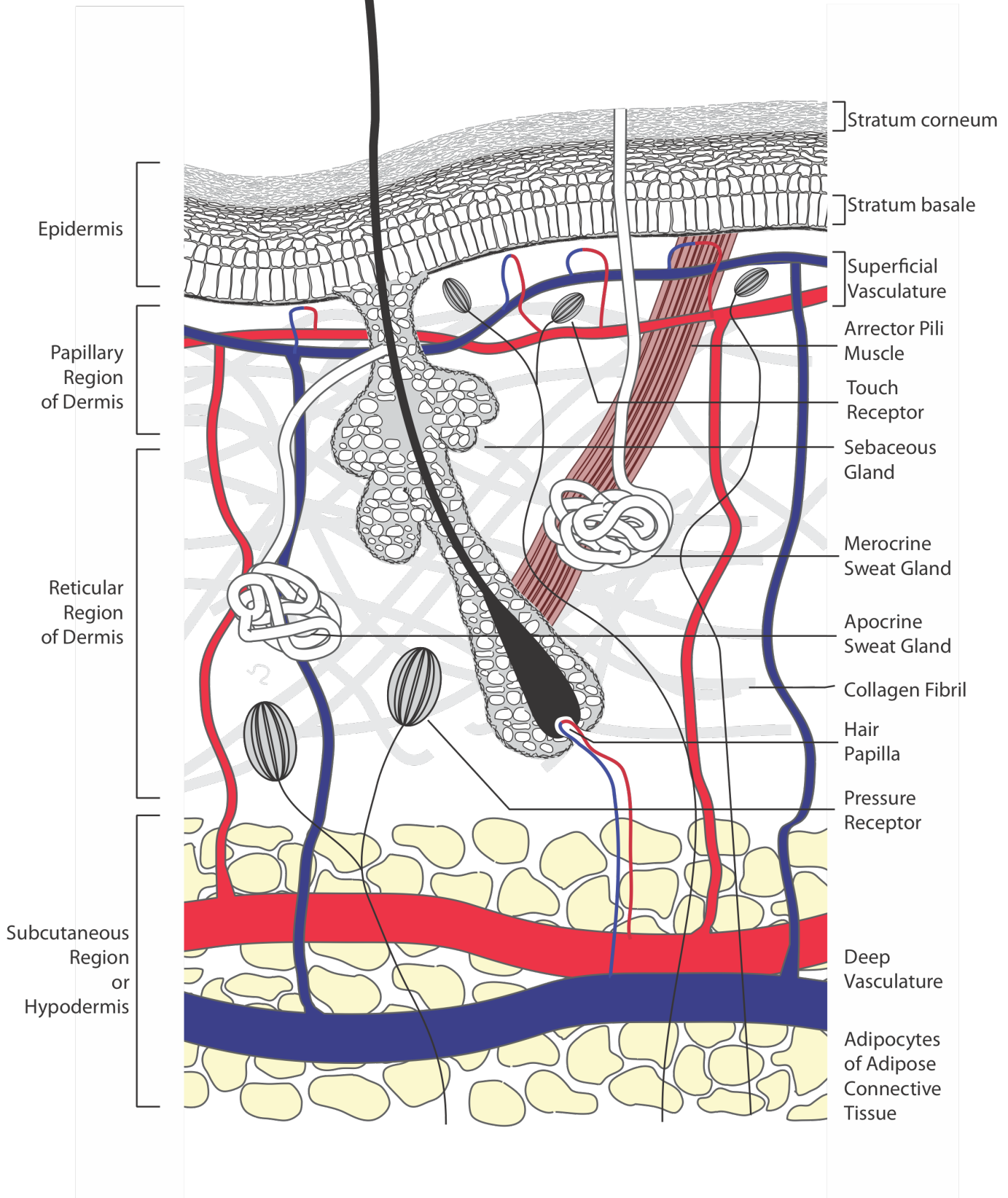


Integumentary System



Have a very clear understanding of the each particular tissue and their unique functions in each layer of the ingetument.

Further, be able to discuss each tissue function/location relationship while viewing images of the integument.

A. Integumentary System

i. Organ of the Integument

a. Tissues

- Connective Tissues

- * Tissue / Location Relationships

- Epithelial Tissues

- * Tissue Type / Relationships

- Smooth Muscle

- Nervous Tissue

- * Receptor Type / Function Relationships

- Blood

B. Dermatology

2. Functions of the Integument

A. Thermoregulation (**Review from Feedback Handout from first lecture**)

i. Superficial Vasculature

ii. Deep Vasculature

B. Protection from ...

i. Abrasion

ii. UV Radiation

iii. Invasion from pathogens

iv. Desiccation

C. Receives stimuli

i. Receptor Types / Function Relationships

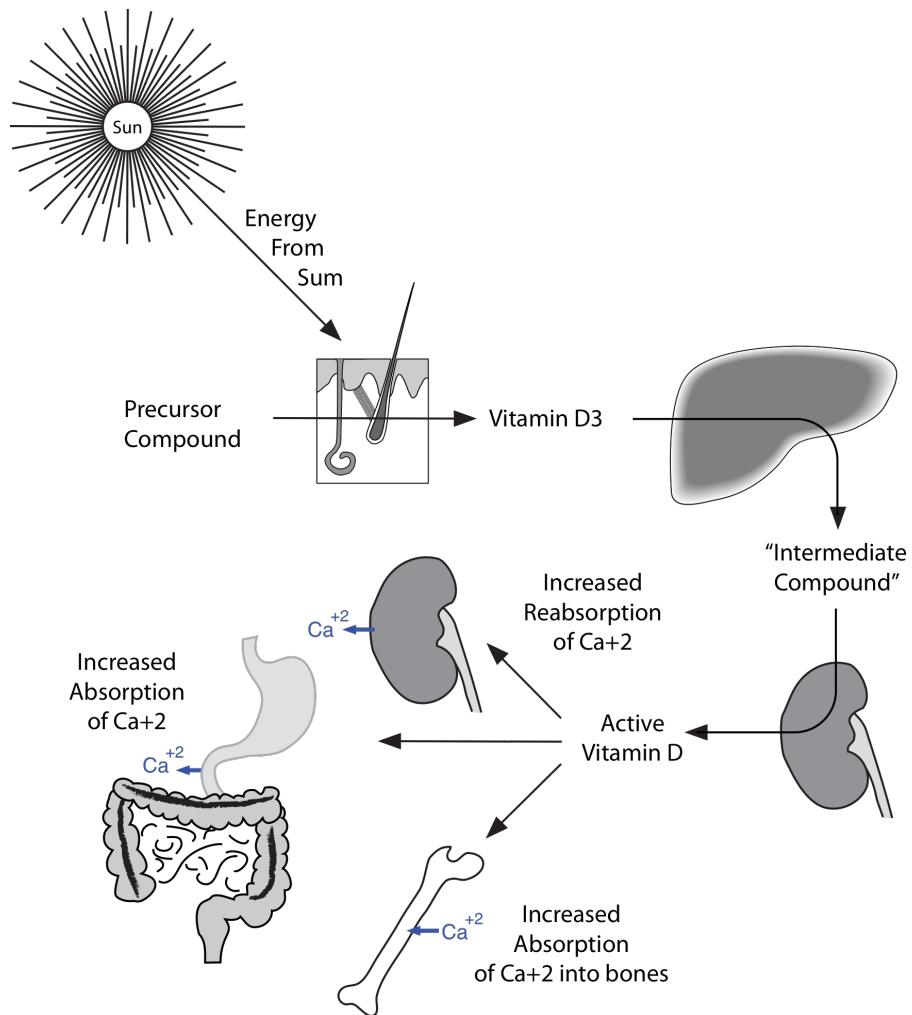
a. Touch Receptor

b. Pressure Receptors

c. Pain Receptors

d. Temperature Receptors

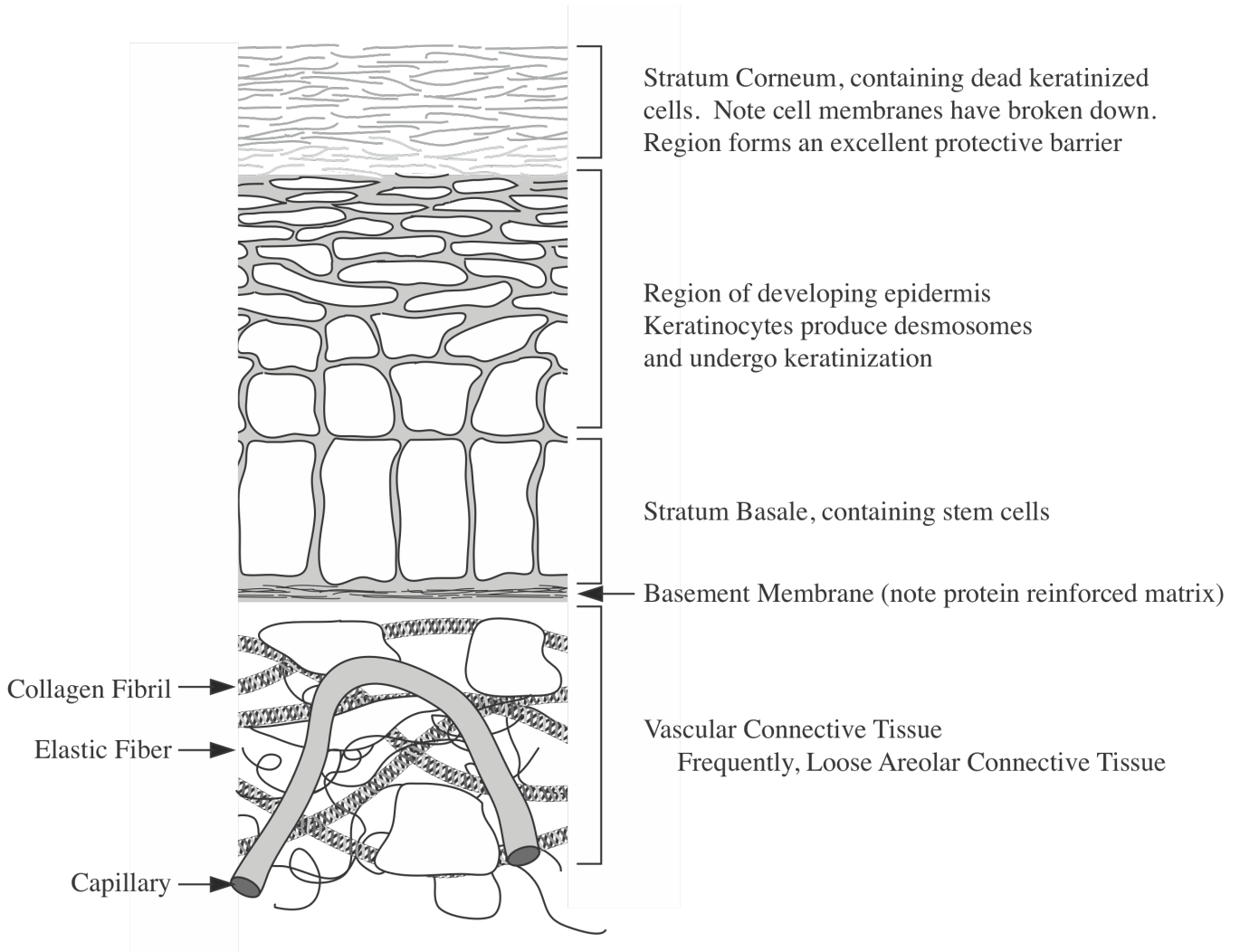
D. Synthesis: Metabolic pathways for vitamin D synthesis



E. Immunity

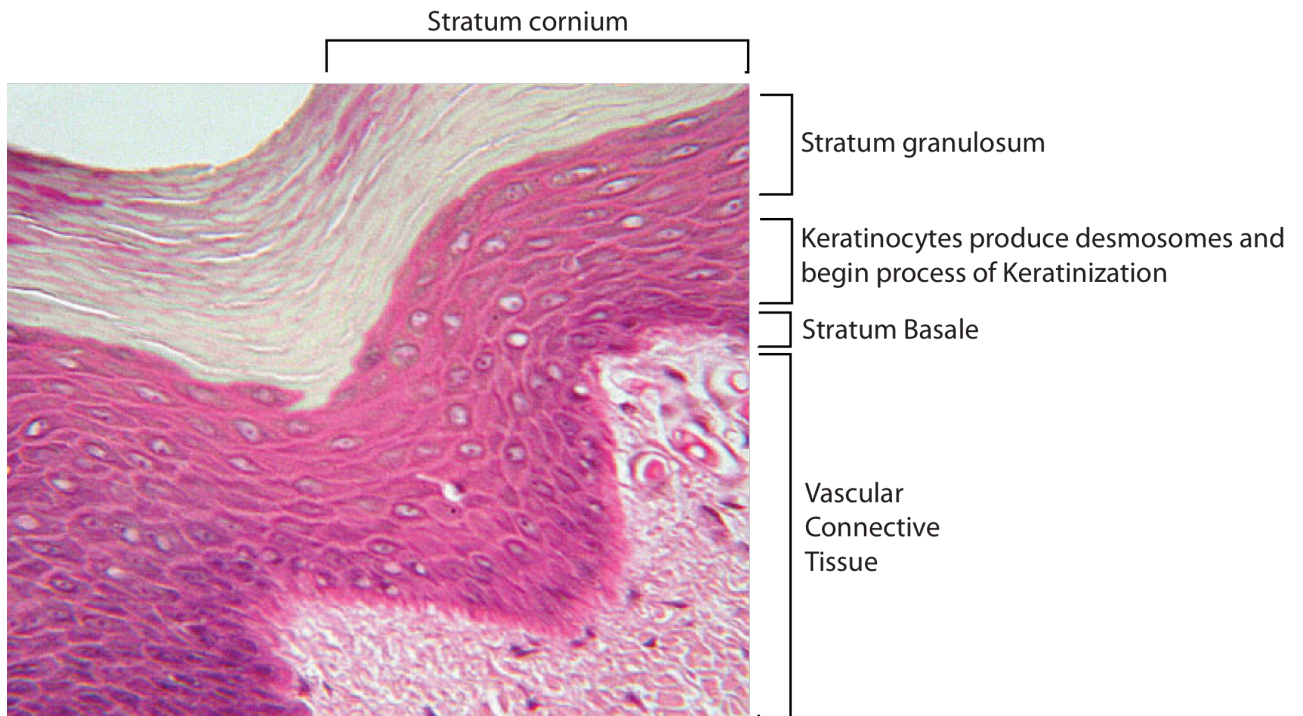
i. Tissue and Related Functions

3. Epidermis (Layer #1) (See diagrams in Text!)



A. General Characteristics

- i. Keratinized Stratified Squamous Epithelium
- ii. Avascular
- iii. Basement Membrane
- iv. Epidermal Ridges (and Dermal Papilla)
 - a. Two Functions



B. Layers of the Epidermis

i. Stratum Basale

- Desmosomes

ii. Stratum Corneum

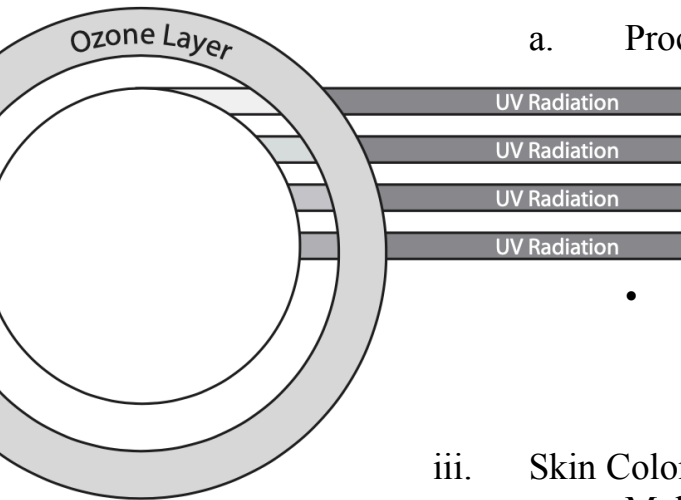
C. Cell Types and Desmosomes

i. Keratinocyte

- Desmosomes

- Keratinization

ii. Melanocyte



a. Process of Melanin Production

- Melanosomes

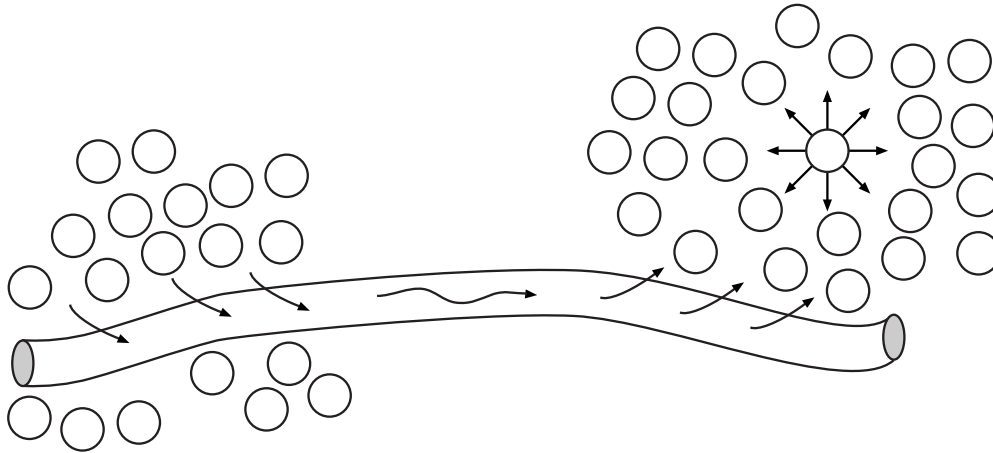
iii. Skin Color and Photoprotection of Keratinocytes (See Handout)

a. Melanin

- Melanin production processes
 - * Review of Transcription, translation ETC ETC
- Melanocyte
 - * Dendrites (“branches”)
- Melanosome
- Mechanisms of Melanin uptake by keratinocytes
 - * Receptor Mediated Endocytosis
 - * Exocytosis followed by phagocytosis
- Perinuclear Protection of Chromatin
- Cell Signaling Control Mechanism by Keratinocytes
- Function

D. Chemical Messengers Defined

- Hormone
- Growth Factor (or colony stimulating factor)



i. Epidermal Growth Factor

3. Dermis

- Irregular Dense Connective Tissue

A. Regions of Dermis

i. Papillary Region

- Dermal Papillae
- Corpuscles of Touch
- Superficial Vasculature Functions

ii. Reticular Region

- Corpuscles of Pressure

- B. General Characteristics of the Dermis
 - i. Fibers
 - ii. Vascular
 - iii. Muscle
 - iv. Nerve Fibers
 - v. Hair Follicles
 - vi. Sweat Glands
 - vii. Sebaceous Glands

- 4. Subcutaneous Layer (or region) of the Integument (also, Hypodermis)
 - A. Tissues
 - i. Adipose Connective Tissue

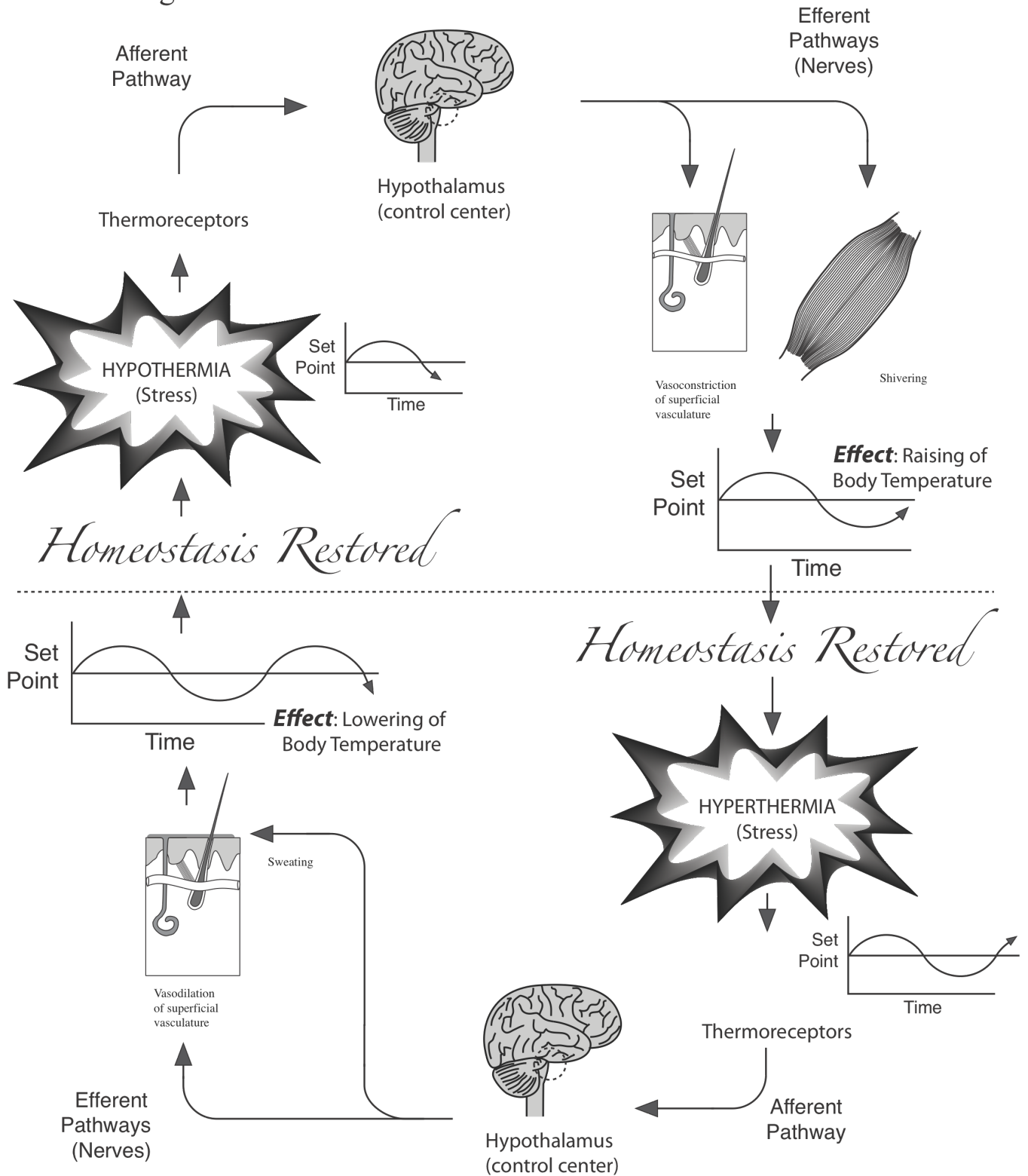
 - ii. Loose Areolar Connective Tissue

 - B. Functions
 - i. Vascular Protection

 - ii. Adhesion

 - iii. Thermoregulation

Example of a Negative Feedback System:
Thermoregulation



5. Accessory Structures

A. Hair

- i. Hair follicle
- ii. Shaft
- iii. Arrector Pili Muscles
- iv. Sebaceous Glands
- v. Functions

Nails

- i. Nail Bed
- ii. Lunula
- iii. Functions

B. Aging and Hair

- i. Hair Color
 - a. Gray Hair
 - b. White Hair
- ii. Balding
 - a. Genetic Predisposition
 - b. Testosterone

C. Skin Glands

i. Sebaceous Glands (Oil glands)

- Holocrine Types
- Sebum

ii. Merocrine Sweat Glands

- Tubular

iii. Apocrine Sweat Gland

iii. Other Integumentary Glands

- a. Ceruminous Glands
- b. Mammary Glands

Homeostasis of Temperature Body – review in text

6. **Wound Healing** (ESSAY ALERT !! The outline below is partial. Take good notes and see text for all important details).

A. Hemostasis and Stabilization of Wound

- i. An initial break in keratinized stratified squamous epithelia damages blood vessels in the papillary region on dermis and inserts microorganisms, debris, endospores, etc.
- ii. Reflexive vasoconstriction reduces blood flow
- iii. Disruption of Endothelia allows platelets to come in contact with collagen fibers and inducing fibrin clot formation. Platelets also secrete serotonin which maintains vasoconstriction

- iv. Clot isolates bacteria, and other debris, as well as further reducing blood loss

B. Inflammatory Response

- i. Mast cells and Basophils secrete histamine
- ii. Histamine induces inflammation characterized first by vasodilation of undamaged blood vessels
- iii. Vasodilated vessels become porous allowing nutrients, oxygen, and other resources to enter the damaged area.
- iv. Oxygen inhibits anaerobic bacteria. Of particular importance here is *Clostridium tetani*, the causative agent of tetanus
- v. Wound stabilization is furthered by Neutrophils attracted by chemoattractants. The Neutrophils marginate, diapedesis, and move by positive chemotaxis towards wound for the purpose of phagocytosing microorganisms and damaged tissue.
- vi. Neutrophils secrete Pyrogen which elevates local temperature for further inhibition of bacterial growth. Should a serious infection occur, pyrogen will raise the set-point in the hypothalamus resulting a fever. Heat inhibits microbial growth and stimulates immune activity.

- vii. Monocytes marginate and diapedes. Once in interstitium, monocyte differentiates into very large and highly phagocytic macrophages

C. Proliferation and Injury Resolution

- i. By now a scab will have been formed that protects the area of healing and regeneration of tissues.
- ii. Stem cells within stratum basalis proliferate for the restoration of keratinized stratified squamous epithelium and repair of the stratum corneum.
- iii. Blood vessels begin to grow for purposes of restoration of normal blood flow in the area of the wound
- iv. Fibroblasts migrate into the damaged area and secrete collagen “precursor molecules for the restoration of collagen fibrils. This “knitting together of the wound” results in the restoration of Irregular Dense Connective Tissue of dermis.
- v. Epidermis (keratinized stratified squamous epithelium) is restored
- vi. Eosinophils digest old clot material by enzyme plasminogen.

D. Maturation: Final Stages

- i. Normal blood flow restored
- ii. Bacterial and damaged tissue removed
- iii. Irregularly placed collagen leaves scar
- iv. The scab falls off.
- v. With time the scar fades and the new collagen begins to resemble surrounding collagen