B.Pharm Semester 1

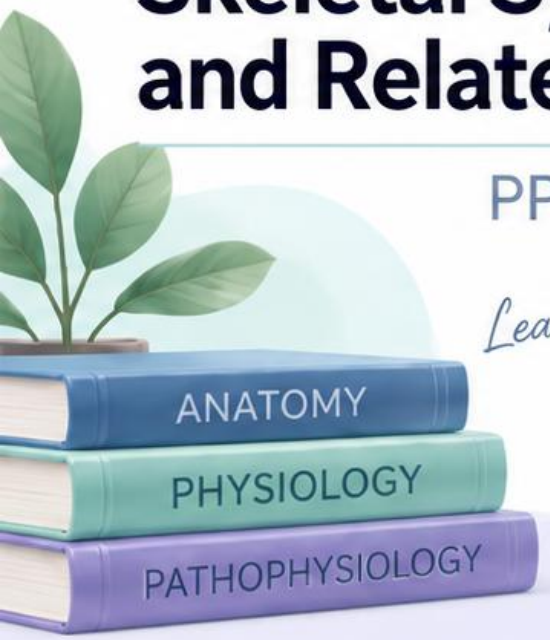
Human Anatomy, Physiology and Pathophysiology I

Unit 02

Integumentary System, Skeletal System, Joints and Related Diseases

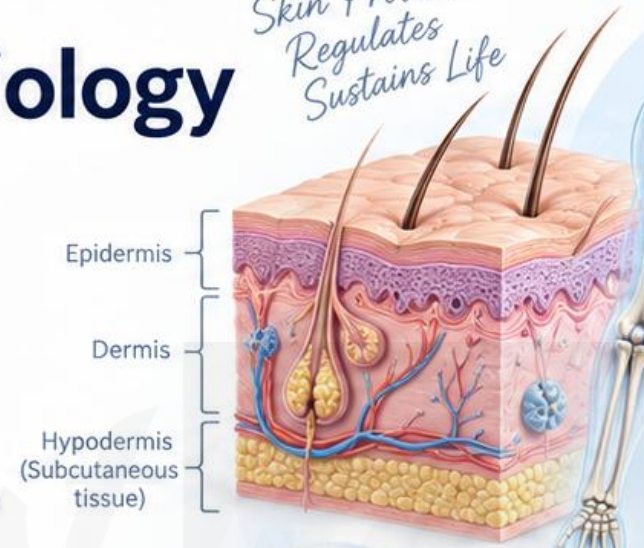
PPT Notes

Learn the Structure Behind Life



SCIENCE FOR A HEALTHIER TOMORROW

Skin Protects Regulates Sustains Life

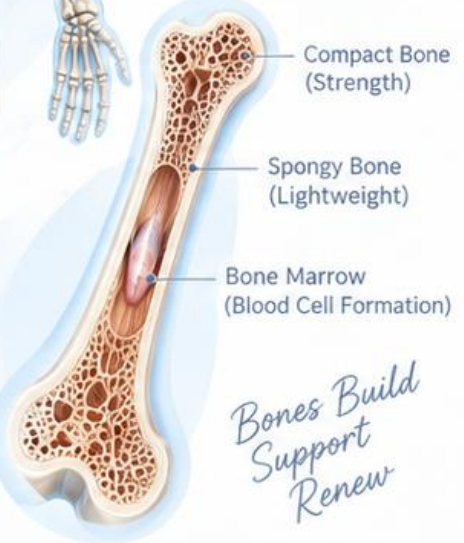




Stronger Bodies Healthier Tomorrows



Joints Connect Movement Makes Life Happen



Bones Build Support Renew

SKIN PROTECTS LIFE

SKELETON & JOINTS HELP US MOVE

HEALTH INSPIRES TOMORROW

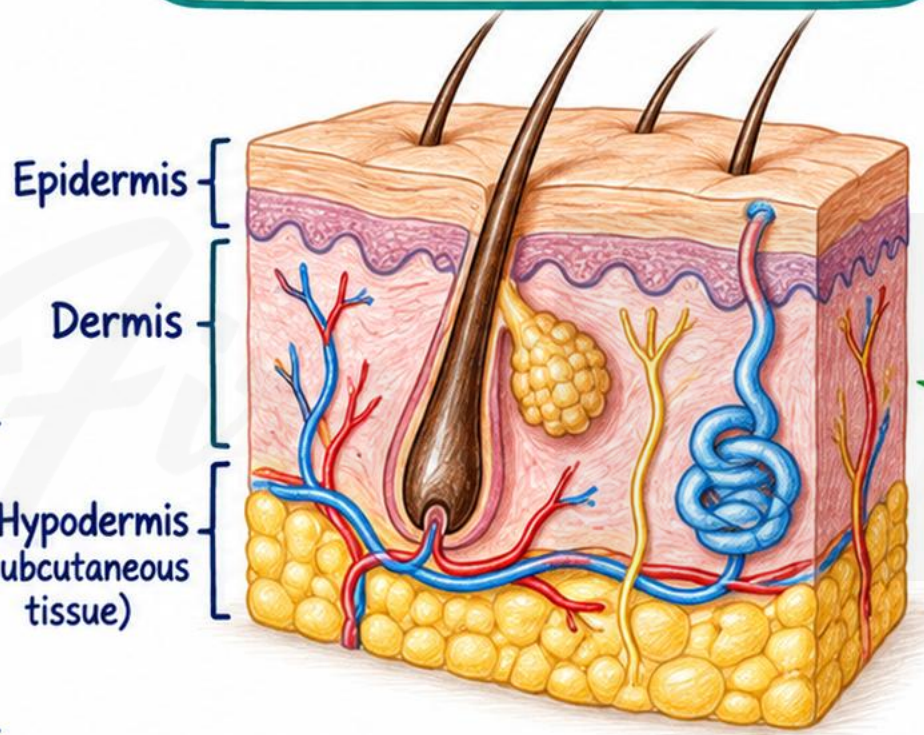
STUDY | UNDERSTAND | APPLY | GROW

INTEGUMENTARY SYSTEM OVERVIEW

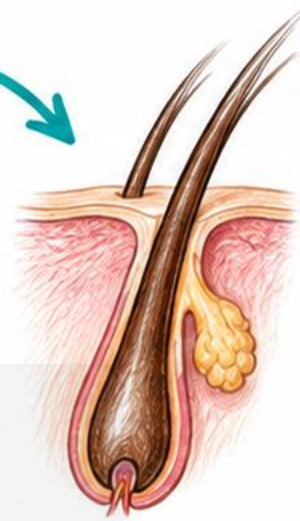
Integumentary System
Skin + Hair + Nails + Glands

1. SKIN

- Largest organ of the body.
- Three layers:
  - **Epidermis** – outer protective barrier; melanocytes for skin colour & UV protection.
  - **Dermis** – connective tissue with blood vessels, nerves, hair follicles and glands.
  - **Hypodermis** (subcutaneous tissue) – mainly fat; insulation & cushioning.



2. HAIR



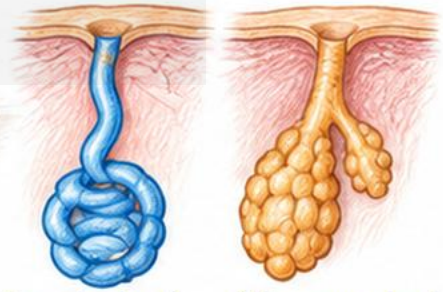
- Made of keratin.
- Provides protection, insulation and sensory input.

3. NAILS



- Keratin structures that protect fingertips and enhance the ability to grasp objects.

4. GLANDS

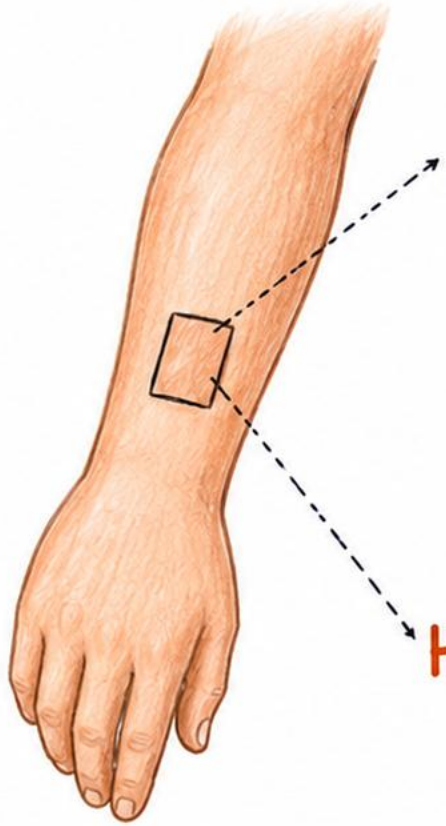


- **Sweat glands** – help in temperature regulation.
- **Sebaceous glands** – secrete sebum (oily substance).

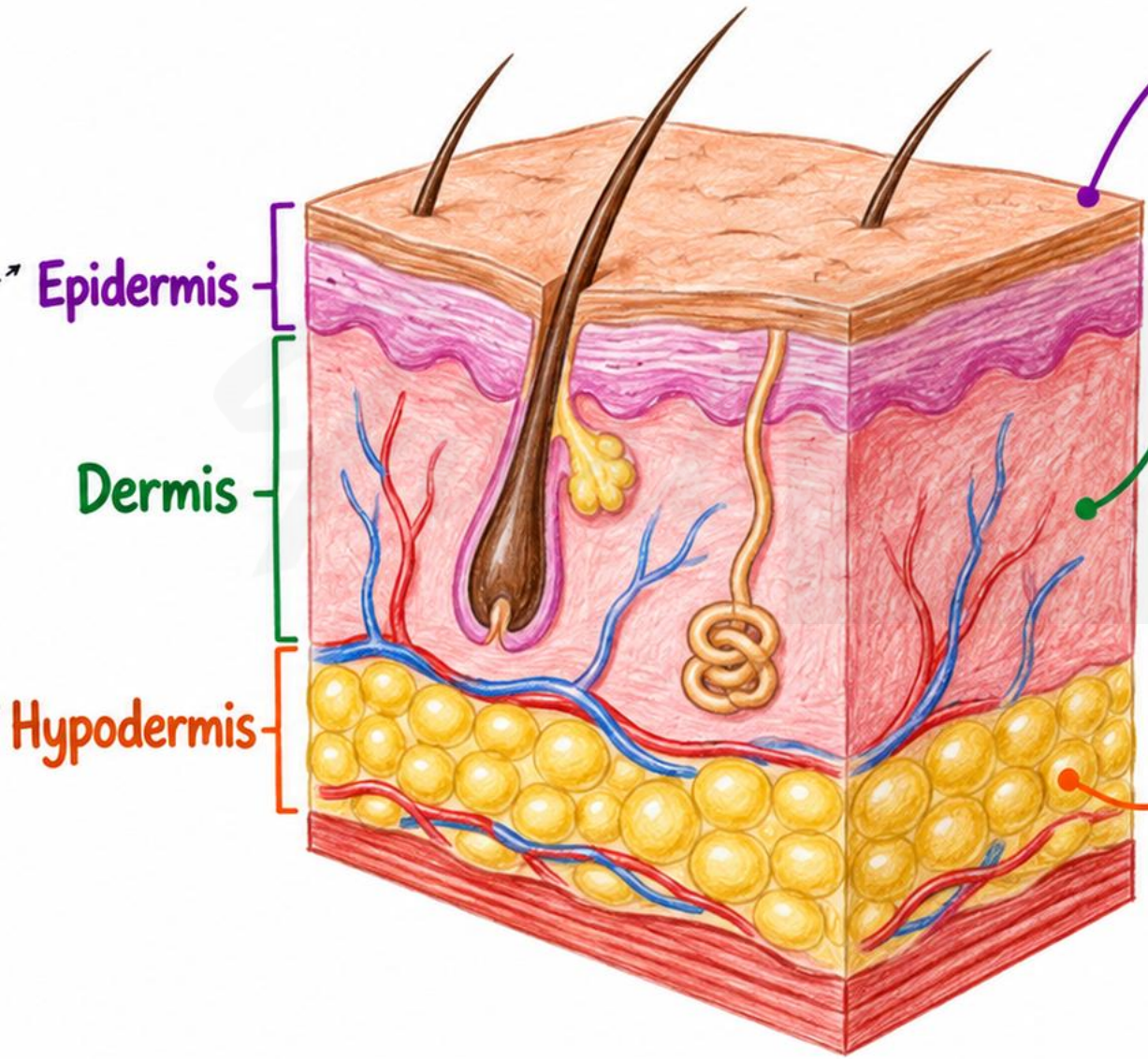
KEY FUNCTIONS

- Protection (barrier)
- Sensation (sensory input)
- Temperature regulation
- Metabolic roles (e.g. vitamin D synthesis)

SKIN LAYERS



Skin from arm (example)



Epidermis

- Outer layer
- Keratinized epithelial tissue
- Avascular (no blood vessels)
- Main function: **protection**

Dermis

- Middle layer
- Connective tissue (collagen & elastin)
- Rich blood supply
- Houses hair follicles, sweat glands, sebaceous glands and sensory nerves
- Main function: **strength & support**

Hypodermis

- Deepest layer (subcutaneous tissue)
- Loose connective tissue with fat (adipose)
- Well vascularized
- Main function: **insulation, energy storage & cushioning**

LAYERS OF THE EPIDERMIS

Keratinocyte maturation (move upwards)

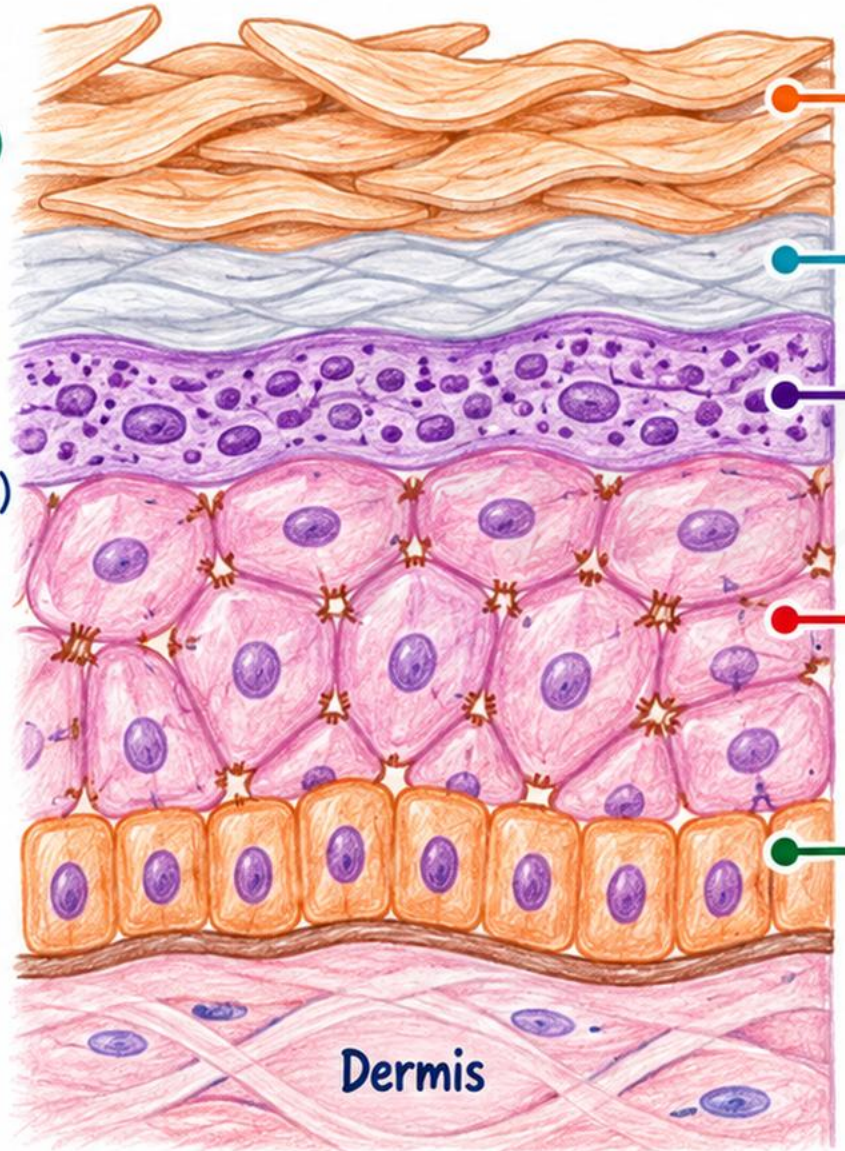
↑ Corneum (dead cells)

↑ Lucidum (only in thick skin)

↑ Granulosum (form barrier)

↑ Spinosum (strength)

↑ Basal cells (divide)



1. Stratum Corneum

- Outermost layer of dead, flattened keratinocytes.
- Tough, protective barrier.

2. Stratum Lucidum

- Thin, clear layer.
- Present only in thick skin (palms and soles).

3. Stratum Granulosum

- Keratinocytes begin to die.
- Forms a waterproof barrier.

4. Stratum Spinosum

- Provides strength and flexibility to the skin.

5. Stratum Basale

- Deepest layer where new skin cells are produced.
- Contains melanocytes (produce melanin for skin color and UV protection).

DERMIS AND SKIN APPENDAGES

1. PAPILLARY DERMIS

- Superficial layer
- Loose connective tissue
- Contains small blood vessels and nerve endings

2. RETICULAR DERMIS

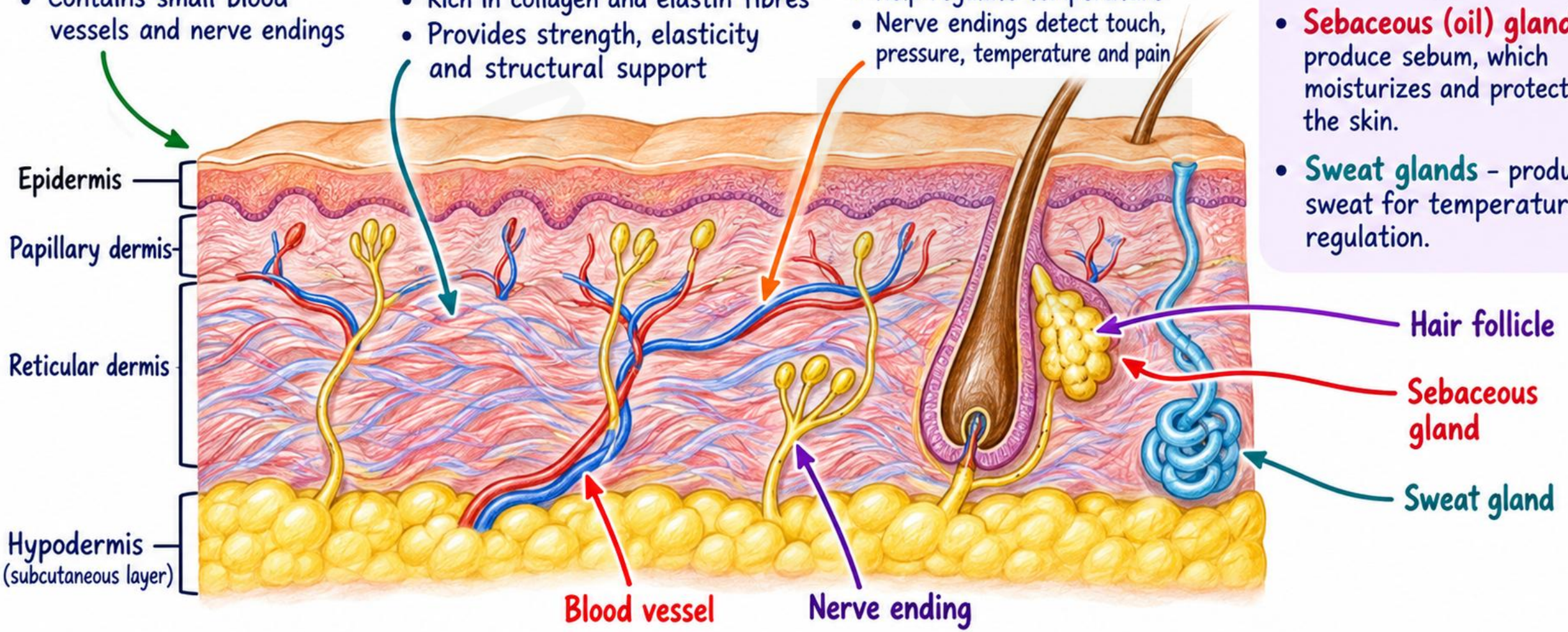
- Deeper, thicker layer
- Dense irregular connective tissue
- Rich in collagen and elastin fibres
- Provides strength, elasticity and structural support

3. BLOOD VESSELS & NERVES

- Blood vessels supply nutrients and oxygen to the skin
- Help regulate temperature
- Nerve endings detect touch, pressure, temperature and pain

4. SKIN APPENDAGES

- **Hair follicles** – sites from which hair grows.
- **Sebaceous (oil) glands** – produce sebum, which moisturizes and protects the skin.
- **Sweat glands** – produce sweat for temperature regulation.



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