PUZZLE
1131 – BASIC SCIENCES - ANATOMY
UNIT V – CENTRAL NERVOUS SYSTEM, SKIN AND LIVER

Anatomy of Skin Logic Puzzle: Layer and Structure Function Matching

Scenario: **Total marks: 10 marks**

A dermatology resident is evaluating a patient with a mixed skin injury from thermal burn and chemical exposure. Key skin structures include epidermis, dermis, subcutaneous tissue (hypodermis), stratum corneum, melanocytes, hair follicles, sweat glands, sebaceous glands, Meissner's corpuscles, and Pacinian corpuscles. The injury affects barrier function and sensation, and the resident must match each structure to its primary layer, function, cell type/contents, and regeneration capacity. Only one function per structure, ensuring hierarchical skin architecture logic.

Clues:

1. Epidermis is avascular stratified squamous epithelium; renews every 28 days via keratinocyte mitosis in stratum basale; outermost barrier against pathogens/water loss.
2. Stratum corneum is the epidermis's outermost keratinized layer; dead corneocytes filled with keratin provide waterproofing; continuously shed (desquamation).
3. Melanocytes in basal epidermis produce melanin for UV protection/pigmentation; ratio ~1:10 keratinocytes; transferred via melanosomes.
4. Dermis is vascular connective tissue with collagen/elastin; provides strength/elasticity; contains blood vessels, nerves, and adnexal structures.
5. Hair follicles span epidermis-dermis-hypodermis; produce keratinized hair shaft; arrector pili muscles cause goosebumps; stem cells enable regeneration.
6. Sweat (eccrine) glands in dermis produce watery secretion for thermoregulation; coiled ducts open to skin surface; sympathetic cholinergic innervation.
7. Sebaceous glands (holocrine) in dermis secrete sebum via lipid-rich holocrine secretion; associated with hair follicles; lubricate/protect against drying.
8. Meissner's corpuscles are superficial dermal mechanoreceptors for light touch/vibration; encapsulated nerve endings; abundant in fingertips/glans.
9. Pacinian corpuscles are deep dermal/subcutaneous mechanoreceptors for deep pressure/vibration; onion-like lamellae; fewer, larger than Meissner's.
10. The injury destroys epidermis/dermis barrier (clue 1+4) but spares hypodermis; adnexal structures (hair/sweat/sebaceous) enable reepithelialization from surviving dermal appendages.

Question: Match each skin structure to its layer, primary function, histological features, and role in injury response, and identify which structures are most critical for skin regeneration post-injury.

Rubrics

Criterion	**Points**
Key Elements	2 pts
Logical Steps	4 pts
Correct Solution	2 pts
Biological Insight	2 pts
Total	**10 pts**