Anatomy of Follicles

Acne is a dermatosis that is strictly confined to hair follicles. It cannot be understood without a detailed knowledge of the structure of the pilosebaceous unit.

Three kinds of follicles occur on the face: vellus, sebaceous, and terminal.

Acne occurs in the sebaceous follicles. These are limited to the face, ear lobes, neck, shoulders, upper V-shaped areas of the chest and back, and the lateral parts of the upper arms. It is this above all which determines the distribution of acne to these very regions. Sebaceous follicles are most numerous and largest on the face and are more elaborately structured there than elsewhere. Therefore, acne is chiefly a facial disease, though some of the worst expressions of the disorder occur on the back. It will be instructive to see just how facial follicles differ. Acne in its full expression is peculiarly a disorder of human beings, since comparable sebaceous follicles do not exist in animals.

Terminal Follicles. Beard follicles on the face of men are typical terminal follicles. The hair is stiff, thick and long. Its diameter is wide enough to occupy almost the entire lumen of the canal. Because of its stiffness and its steady growth it can keep the canal free of horny debris, hence acne does not occur in terminal follicles. There is only one exception, as acne inversa originates from terminal follicles. In terminal follicles, sebaceous glands empty their contents into the follicular canal via short ducts. The region above their insertion is called the infundibulum. It is lined by an epithelium which produces sturdy, well-differentiated horny cells similar to those of the adjacent epidermis. Consequently, the horny layer of the infundibulum possesses barrier properties. Substances cannot readily diffuse across this membrane except at the thinnest portion below. The horny cells desquamate continuously and invisibly through the orifice.

Vellus Follicles. These are miniatures of terminal ones with disproportionately large sebaceous glands. On the face, they are about three to four times more numerous than sebaceous follicles and accordingly contribute appreciably to the pool of surface lipids. The hairs and orifices of vellus follicles are very tiny and can scarcely be seen with the naked eye. Vellus follicles are not targets for acne lesions, but are involved in chemical folliculitis and perioral dermatitis.

Sebaceous Follicles. Sebaceous follicles have special characteristics which make them specifically vulnerable to acne. The canal is deep and cavernous. The pilary unit is tiny and inconspicuous. It produces a wispy hair whose width is less than one-fifth to one-tenth that of the internal diameter of the canal. It is virtually lost in the huge lumen. The sebaceous glands are exceptionally large, multilobulated and enter via short ducts into the bottom of the canal. It is the peculiar qualities of the infundibulum which provide insight for understanding the structural events in the pathogenesis of acne. Their terminal portion, for which we have created the term acroinfundibulum, is similar to the infundibulum of terminal follicles, extending downwards about 200 μm. It keratinizes like the contiguous epidermis and functions as a barrier. Below this the epithelium has exceptional properties. We
have called this portion the infrainfundibulum. It makes up the greatest part of the epithelial lining of the sebaceous follicle. It also keratinizes, but produces only a thin, inconsequential horny layer whose cells soon slough. The desquamated corneocytes are fragile and imperfect. Many break open and lose part of their contents. They stain poorly, the cell outlines are ill defined, and they are not well organized, actually in disarray. In consequence, a loose mass of horny detritus occupies the canal. The sturdy laminae of a true stratum corneum are lacking in the infrainfundibulum. The granular layer can barely be made out, being generally one cell layer thick with tiny granules. Unlike normal epidermis, PAS staining discloses glycogen granules in many of the Malpighian cells.

The epithelium of the sebaceous ducts keratinizes in much the same way, producing empty looking, flimsy horny cells which float up into the canal in a stream of sebum. In this way, separate streams of keratinized cells are created which correspond to the number of sebaceous ducts. These are more evident in horizontal sections and help explain some easily overlooked features of the internal structure of comedones. The casing of keratin that contains the sebum has been called the sebolemmal sheath.

The canal itself contains a mixture of sloughed corneocytes and sebum. When frozen or fixed, thick sections are stained for bacteria, a variable number of follicles show masses of gram-positive diphtheroids, which can be visualized histologically only when colonization is very dense. These bacteria-rich follicles comprise sebaceous filaments (seborrheic filaments, follicular casts). When the contents of such follicles are expelled by pressure, cheesy, waxy, whitish, worm-like structures emerge. Culture and smears identify them as virtually pure colonies of Propionibacterium acnes. Sebaceous filaments contain a core of lipid and bacteria encased in a cylinder of coherent horny cells.

References