

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

وَمَا أَوْفَيْتُمْ مِنَ الْإِلَهِ
الْأَكْبَرِ

كَذَلِكَ قَالَ اللَّهُ الْعَظِيمُ

HORMONAL CONTROL OF SEBACEOUS GLANDS

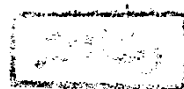
THESIS

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DEDICATED TO MY MAJOR MOTIVATORS:
FATHER, MOTHER AND BROTHERS

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ARABIC SUMMARY

LIST OF ABBREVIATIONS

BGH	Bovine growth hormone.
cm ²	Square centimeter.
cAMP	Cyclic adenosine monophosphate.
DHEA	Dehydroepiandrosterone.
DHEAS	Dehydroepiandrosterone sulfate.
DHP	Dihydroprogesterone.
DHT	Dihydrotestosterone.
DNA	Deoxyribonucleic acid.
GH	Growth hormone.
gm	Gram
GTH	Gonadotrophic hormone.
HCG	Human chorionic gonadotrophins.
hr	Hour.
HSD(3B-,17B-)	Hydroxysteroid dehydrogenase.
I.M.	Intramuscular
mg	Milligram.
mRNA	Messenger ribonucleic acid.
MSH(A -,B-)	Melanocyte stimulating hormone.
NADH	Reduced nicotinamide adenine dinucleotide.
DADPH	Reduced nicotinamide adenine dinucleotide phosphate.
PRL	Prolactin.
SER	Sebum excretion rate.
SHBG	Sex hormone binding globulin.
T	Testosterone.
T4	Thyroxine
TSH	Thyroid stimulating hormone.
v/v	Volume by volume
vs.	Versus.

INTRODUCTION AND AIM OF THE THESIS

INTRODUCTION AND AIM OF THE THESIS

The sebaceous glands are holocrine structures closely related to the hair follicles [Kligman and Shelley, 1958]. They develop in the 4th month of fetal life and at birth are moderately well developed. After birth, the glands involute with surface lipid reaching low levels at approximately 6 months of age [Agache et al., 1980]. The glands remain quite small throughout early childhood but begin to redevelop between the ages of 7 and 8 years as an early manifestation of puberty [Pochi et al., 1977]. Changes in the fatty acid composition of the wax esters in sebum also occur in late childhood and early adolescence [Bazzano et al., 1980]. Sebaceous maturation continues into adolescence, reaching peak development in the late teen. Thereafter, sebum levels remain essentially unchanged until later years, decreasing after menopause in women but not until after the age of 70 in men [Pochi et al., 1979].

The development of the sebaceous gland and the stimulation of sebum synthesis depend principally upon hormonal factors, with the prime direct stimulating effect being an androgenic one [Pochi and Strauss, 1974]. However, a greater controversy has been existed on the effect of hormones on sebaceous gland activity. For example,

on dealing with androgens it is uncertain whether DHT is the only active androgen at the sebaceous cell level, and whether other weak androgens e.g. DHEA act as such or after being converted to T or DHT [Hall et al., 1983].

The aim of the thesis is to review the sebaceous gland concerning to its anatomy, histology, development, methods of assaying its activity, and the effect of different hormones (androgens, estrogens, progesterone, pituitary and thyroid hormones) on its activity.

REVIEW OF LITERATURE

SEBACEOUS GLANDS: ANATOMY, STRUCTURE, CONTROL
AND METHODS OF ASSAYING ITS ACTIVITY

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Anatomy of the sebaceous glands:

The sebaceous glands, wide spread over the human body, vary in number and size in different individuals. There are no glands on the palms, soles, and lower lip. Only few of them are found on the dorsal surface of the hand and foot [Johnsen and Kirk, 1952]. The glands are large and numerous on the midline of the back and largest on the facial disc and forehead, on the external auditory meatus, and on the anogenital surfaces. On the scalp and forehead, cheeks and chin, 400-900 large glands are said to be found in each cm^2 of skin surface. Over the rest of the body there are fewer than 100 glands per cm^2 . Sebaceous glands are most numerous and generally largest on the scalp and face. Oiliness is easily perceived in these regions. On the upper back, the glands may have appreciable size but are considerably less dense, consequently, the surface rarely looks or feels oily. The glands tend to become increasingly smaller and farther apart with increasing distance from the head till on the palms and soles they disappear altogether. The upper back requires special mention for in some persons, the glands are disproportionately larger, in comparison to the face, even though sparsely distributed. In any given individual different regions do not show good size correlations i.e. the glands may be huge on the face and of

quite ordinary size on the back. The reverse situation may also occur. Likewise, some persons with oily face do not have oily scalp and vice versa. The widest cross-sectional area of the facial sebaceous glands, measured planimetrically, was found in acne conglobata when compared to severe or moderate acne [Kligman and Shelley, 1958].

Most sebaceous glands accompany hair follicles and open inside the pilary canals, forming the pilosebaceous canals. Some glands open directly upon the surface of the skin. Such "free" sebaceous glands are found in the palpebrae (meibomian glands), in the buccal mucosa, the vermilion surface of the upper lip, the nipples [Giacometti and Montagna, 1962], the prepuce (Tyson glands), occasionally on the glans penis and on other aberrant sites [Giacometti and Montagna, 1962].

As a rule, the sebaceous gland size varies inversely with the diameter of the follicle with which it is associated, exceptions being the large glands adjoining sturdy follicles of the beard and scalp and the tiny glands attached to the vellus follicles. The very large glands on the forehead, face and particularly around the alae nasi empty into the dilated pilary canals of vellus hair follicles. Three kinds of follicles occur on the face: vellus, sebaceous, and terminal. Sebaceous follicles are more numerous on

the face and more elaborate there than on the back.

Beard follicles on the male face are typical terminal follicles.

The hair is stiff, thick, and long. Its diameter is great enough to occupy almost the entire width of the canal.

Vellus follicles are miniatures of terminal ones with disproportionately large glands. On the face they are about five 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.

Sebaceous follicles have very special characteristics which make them candidates for the development of acne lesions. The canal is deep and cavernous. The pilary unit is tiny and inconspicuous. It produces a wispy hair whose width is less than one-tenth that of the internal diameter of the canal. The sebaceous glands are exceptionally large multilobulated and enter via short ducts into the bottom of the canal. These features: large multilobulated glands, deep cavernous canals and puny hairs give the sebaceous follicles its individuality [Montagna and Parakkai, 1974].

Sebaceous glands are tubulo-acinar glands. Regardless of their size, shape, or position, the morphology