بسم الله الرحمن الرحيم

وما أوتيتم من العلم إلا قليلا

صدق الله العظيم

THE MELANOCYTE

THESIS

Submitted in Partial Fulfilment of
The Master Degree in
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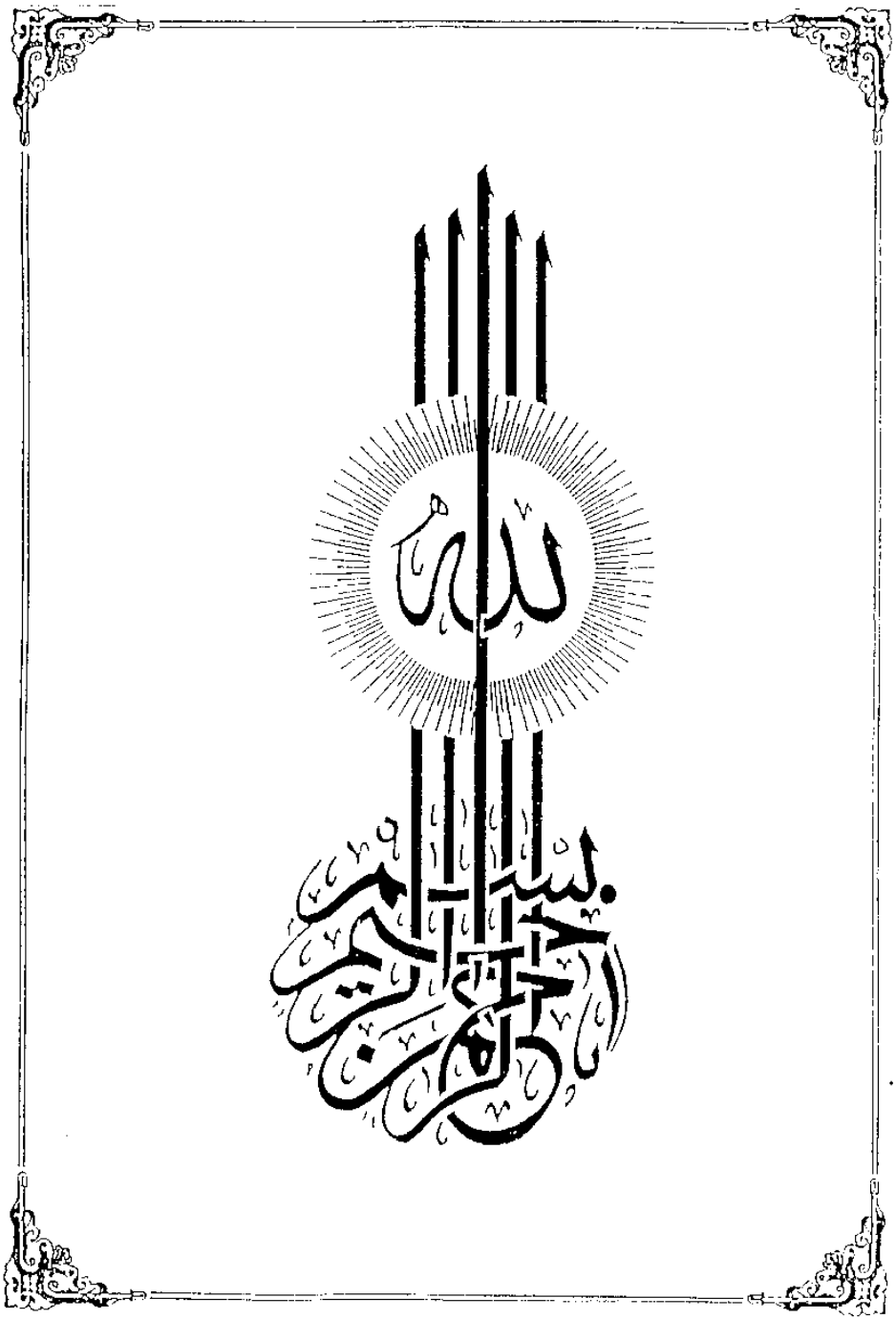

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C O N T E N T S

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INTRODUCTION

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Melanocytes are multidendritic cells derived from the neural crest. They are located at epidermal-dermal junction, around hair bulbs, in the oral cavity, nasal mucosa, pharynx, oesophagus, inner ear, eyes and leptomeninges (Lerner, 1980).

Melanocytes are exocrine cells synthesizing melanin on specialized subcellular organelles called melanosomes. They transfer melanized melanosomes to the surrounding keratinocytes- a cytocrine activity (Masson, 1948).

According to Fitzpatrick et al., (1971) there are four biological processes involved in melanin pigmentation. These are:

1. Formation of melanosomes in melanocytes.
2. Melanization of melanosomes.
3. Secretion of melanosomes into keratinocytes.
4. Transport of melanosomes in Keratinocytes with or without degradiation in lysosome like organelles.

They suggested that any disturbance in these processes will leads to pigmentary disorders either hypopigmentation or hyperpigmentation .

The aim of this thesis is to give an idea about:

1. The structure and ultrastructure of melanocytes.
2. The embryology of melanocytes.
3. The mechanism of melanin formation.
4. The factors that control melanogenesis.
5. The immunological aspect of melanocytes.
6. The different pathological conditions that may arise from any disturbance within them.

EMBRYOLOGY OF MELANOCYTES

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The human pigmentary system develops during the first two months of embryogenesis. The melancoytes of the skin are derived from the neural crest. Then a dorsoventral migration of melanoblasts from the neural crest begins cranially and spreads caudally along the anteroposterior axis, which arise in the spinal portion of the neural crest, migrate to peripheral sites such as the skin, the oral mucosa and the uvea, however, the leptomeninges and its pigment containing cell arise from cephalic portion of the neural crest (Rawles,1948).

The retinal pigment cells do not arise in the neural crest but in the outer layer of the optic cup. They posses tyrosinase activity in embryonic life and form melanosomes which may shield the photoreceptors from scattered light. These melanocytes are of similer epidermal morphology and are vital for nourishment and repair of neural retinal cells (Fitzpatrick et al.,1979; Fitzpatrick et al., 1983 a).

Using light microscopy on sections either treated with impregnation by ammoniated silver nitrate or exposed to the dopa reaction, melanocytes are first seen in the dermis of Negro featus 10 weeks old. By eleventh week the first melanocytes have migrated into the epidermis. Between the twelfth and fourteenth weeks the

number of melamocytes in the epidermis increases greatly. At birth few melanocytes remain in scattered areas of the dermis, especially in the sacral region (Zinnerman and Becker, 1959).

The epidermal melanocytes are already dopa positive and functional only at the time of birth (Glimcher et al., 1973; Rosdahl and Szabo, 1976).

By electron microscopy (E.M.) the melanocytes in the epidermis has been recognised at eight to ten rather than eleventh to fourteenth weeks, as the recognition of melanocytes by (E.M.) is made through identification of melanosomes rather than through the presence of melanin as the melanin deposition on the melanosomes was noted at tenth weeks of age (Sagebiel and Odland, 1970).

STRUCTURE AND ULTRASTRUCTURE OF MELANOCYTES

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The epidermis is composed of two types of cells: keratinocytes and dendritic cells. Only one type of the dendritic cells (The melanocyte) can easily be identified in histologic sections stained with hematoxylin - lesion. The langerhans cell can be identified with histochemical methods and by electron microscopy. The indeterminate cell can be identified only by electron microscopy (Lever et al., 1983).

Langerhans cells:

The Langerhans cells are seen in histologic sections stained with haematoxylin-eosin as high level clear cells in the suprabasal epidermis. They resemble melanocytes, being completely surrounded by keratinocytes and they are more difficult to distinguish from keratinocytes than melanocytes. Langerhans cells stain well with gold chloride stain which is specific for langerhans cells. Also there are several enzyme histochemical stains that can be used for identifying langerhans cells and differentiating then from melanocytes as adenosine triphosphatase and aminopeptidase. On electron microscopic examination langerhans cells show a markedly folded nucleus and no tonofilaments or desmosomes, melanosomes are only rarly found in them within lysosomes. They also contain langerhans granules (Lever et al., 1983).

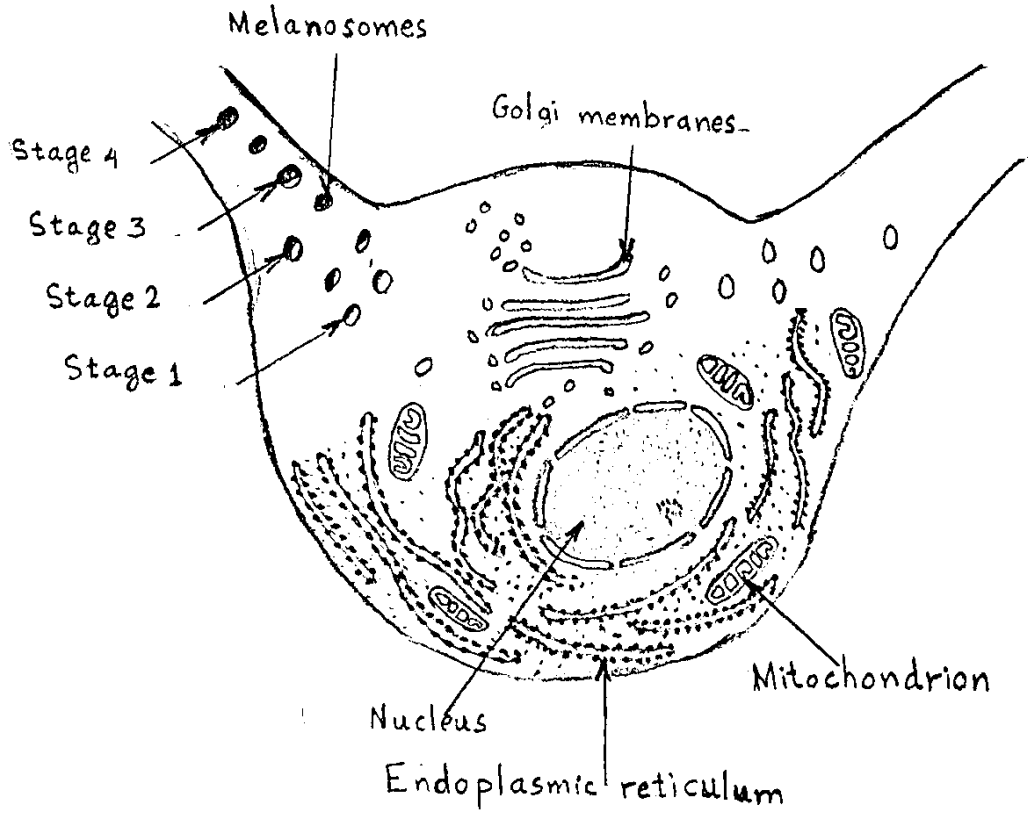
Indeterminate cells:

The indeterminate cells can be identified only by electron microscopy and are characterized by the absence of both melanosomes and Langerhans granules. It is thought that such cells could differentiate into either melanocytes or langerhans cells but now it has been established that they are related to Langerhans cells (Lever et al., 1983).

The melanocytes:

The melanocytes in sections stained with hematoxylin and eosin appear as clear cells having a small-darkly staining nucleus and a clear cytoplasm as the result of shrinkage. They are found wedged between the basal cells of the epidermis (Lever et al., 1983).

As a rule, melanocytes stain blackish with Bloch's dopa reaction because they contain the melanogenic enzyme which changes the colourless dopa of the staining solution through oxidation into dopa-melanin at sites at which the enzyme is located (Lever 1983).



The fine structure of a melanocyte