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## RESEARCH ARTICLE

### Histological Study of the Adrenal gland in Guinea Pig (*Cavia porcellus*)

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#### Abstract

The present work include histological study of adrenal gland of guinea pig (*Cavia porcellus*). The current study was performed on (5 paired) of adrenal glands from five mature (male and female) clinically healthy of guinea. The animals were anaesthetized by the ether after which they were carefully dissected and examined. The result of histologic study demonstrate the parenchyma of the adrenal gland of guinea pig (*Cavia porcellus*) divided into cortex and medulla and ,each one consist of types of the cells responsible for the secretion of hormone .The cortex consists of three layers according to type and arranged of the cells (outer layer, intermediate and inner layer) while the medulla consist of chromaffin and ganglion cells.

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#### Introduction

Guinea pigs (*Cavia porcellus*) are small laboratory animals, which constitutes a small suborder (Hystricomorphic) from the order ofrodentia. This type of rodent were probably first introduced into Europe from south america some 400 years ago (1). There are several reasons why guinea pigs are excellent experimental subjects for physiological and histological studies. Their body weight, size, ease to be handled and they adapt rapidly in laboratory situation (2).

The adrenal glands are paired compound endocrine organ yellow in colored, triangle in shaped located in the crania-medial side of each kidney(3).They are playing important role for secrete many kinds of hormones, chemical substances which help to processes as metabolism, water and electrolyte balance, sexual development ,function of the immune system, and the stress response (4).

The present study was understood histological characterized of the normal adrenal glands in guinea pig, this help to differentiate the abnormal status of adrenal glands.

#### Materials and Methods

##### The Experimental Animals

The material was consisted of (5paired) of adrenal glands from five mature (male and female) clinically healthy of guinea pig. Guinea pigs were collected from a local commercial market of animals in Baghdad city weight between 500g and 700g. The animals were anaesthetized by the ether after which they were carefully dissected and examined.

**Histologic study** Specimens for histology were collected immediately after dissected. The specimens were fixed in 10% formalin for about 24 hours. The samples preserved in 70 % ethyl alcohol dehydrated in graded series of alcohol, cleared in xylene and embedded in paraffin wax as usual. Sections of 4–6  $\mu$  thickness were mounted on clean glass slides and stained with the haematoxylin and eosin (H&E) for general structure.

### **Result**

Histologic study of the adrenal gland of guinea pig observations the adrenal gland is a compact mass, yellowish or pale in color and surrounded by thin developed layer of connective tissue (capsule). Extend from the connective tissue of the capsule trabecular that penetrated the parenchyma of gland fig (1).

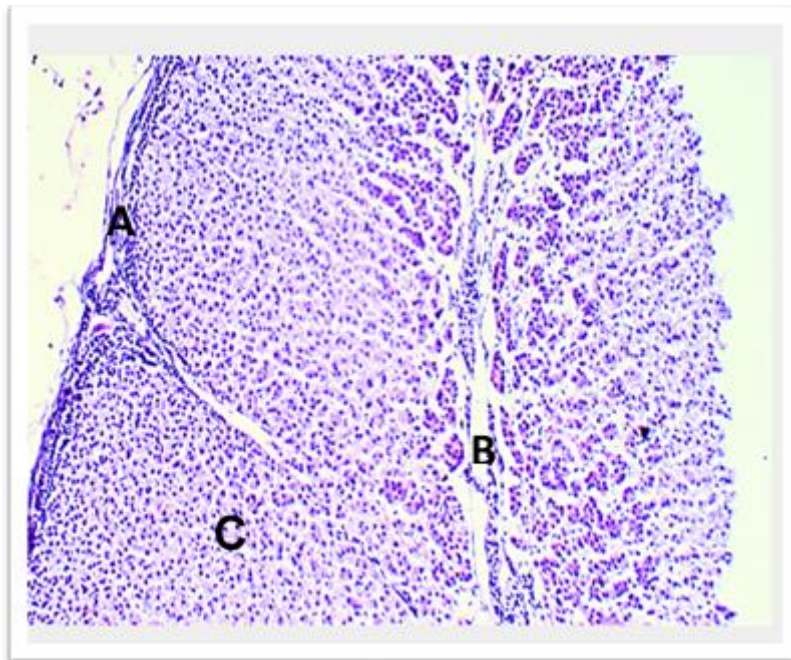
The parenchyma of adrenal gland divided into cortex and medulla fig (2), and each one consist of types of the cells responsible for the secretion of hormone. The cortex consists of three layers according to type and arranged of the cells (outer layer, intermediate and inner layer).

The outer layer or (**glomerulus zone**) consist of columnar cell are arranged in irregular threads adjacent to the capsule. Capillary blood vessels in glomerular zone are not vascularized fig (3).

The intermediate layer or (**fasciculate zone**) consist of large columns polyhedral cells with the centrally light nuclei. These cells arranged in irregular straight cords toward the medulla and appeared foamy in shape fig (4).

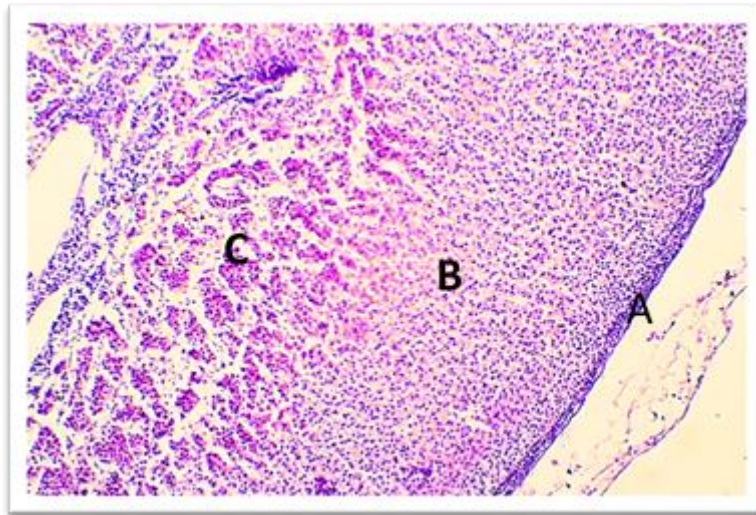
The inner layer or (**reticularis zone**) smaller than other two zones of cortex also the cells are arranged in irregular group in different directions form anastomosing with one another fig (5).

The medulla of adrenal gland is usually covered and internace by the cortex, the border that separated between the cortex and the medulla is not clear. The most cells that form the medulla are large, polygonal and have elliptical nucleus, this cell called (chromaffin cell). The chromaffin cell are arranged in small irregular group fig (6). In addition, medulla contains round or polygonal cell have prominent nuclei called ganglion cells separated by sinusoids from chromaffin cell



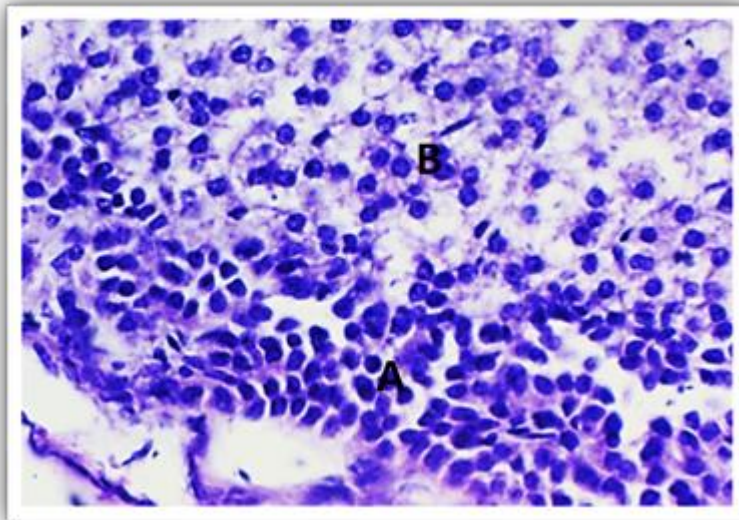
**Fig (1) Transvers section in adrenal gland stain (H&E  $\times$  100)**

A- Capsule B- Trabecular C- Cortex



**Fig (2) Transvers section in adrenal gland stain (H&E×100)**

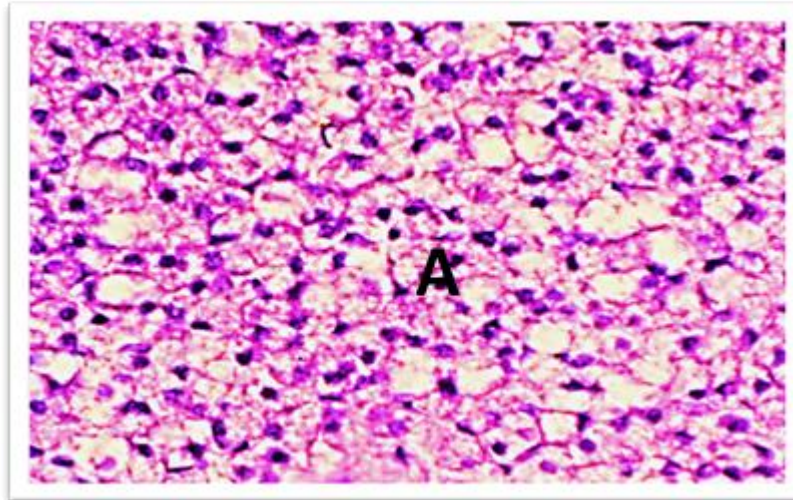
A- Capsule B- Cortex C- Medulla



**Fig (3) Transvers section in cortex of adrenal gland stain (H&E×400)**

A-Glomerulus zone B- Fasciculate zone

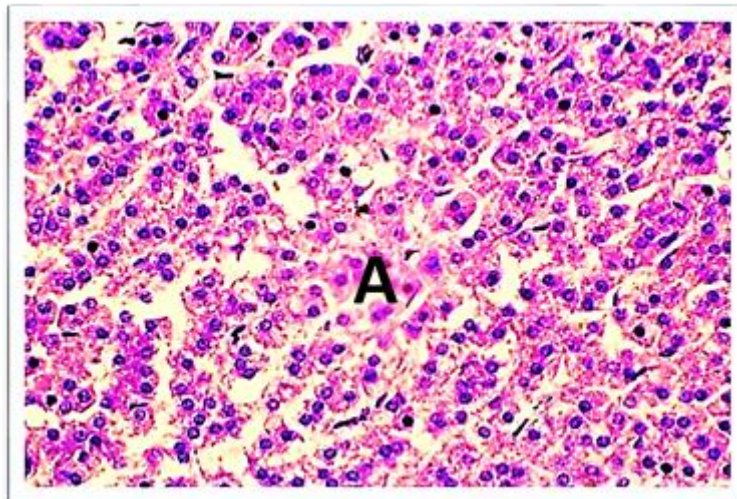




**Fig (4) Transvers section in cortex of adrenal gland (fasciculate zone)**

**Stain (H&E×400)**

A- large columns polyhedral



**Fig (5) Transvers section in cortex of adrenal gland (reticulariszone)**

**Stain (H&E×400)**

A - irregular group of columnar cell

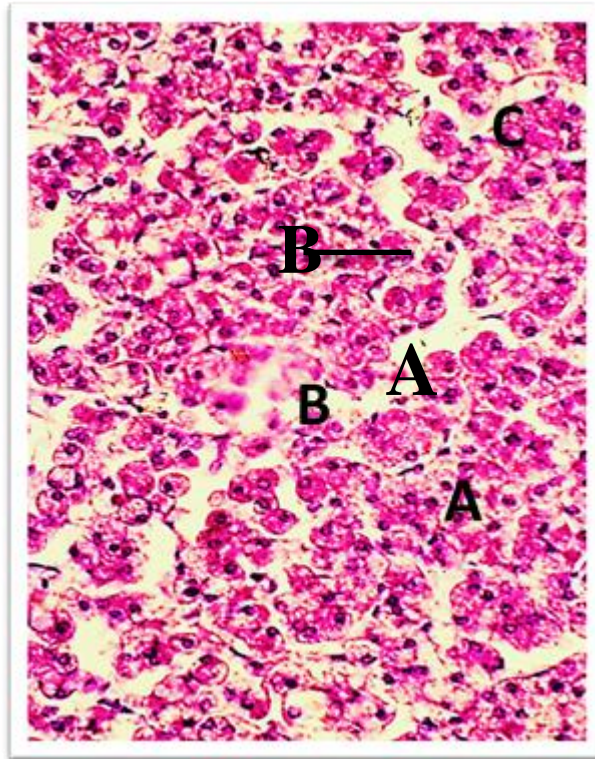


Fig (6) Transvers section in medulla zone stain (H&E×400)

A -Chromaffin cell B-sinusoids C- ganglion cell

### Discussion

Histologic study declares adrenal gland is a compact mass surrounded by developed layer of connective tissue capsule. Extend from the connective tissue of the capsule trabecular which penetrated the parenchyma of gland, this result confirmed for the study of (5) in domestic mammals and (6) in *Stenella attenuata*.

In addition, the results of this study showed the cortex consists of three layers (glomerulus, (fasciculate and reticularis) zone according to type, arranged of the cells and secretion of hormone, that is agreement with the (6, 7, 8, 9, 10 and 11) while disagreed with the (12) the cortex in the mouse consists of two layer. The intermediate layer or (fasciculate zone) appeared foamy in shape because presence of numerous lipid vacuoles, the present observations is consistence with that observation of (5, 13, 14 and 15) in human. Also the results of this study showed the border which separated between the cortex and the medulla is not clear because higher interning between the cortex and the medulla, the values in this study were also similar to (5,15,16). The histologic study of adrenal gland declares the medulla contain two type of the cell (chromaffin and ganglion) cells, Similar observations are found by (17, 18) in mice, (19) in rabbit, (20) in rat and (21) in hamster.

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