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A novel thyroid follicular design for detection of the hypo activity of the thyroid gland in camel "Camelus dromedaries" in summer time

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Abstract
This study was designed to find a new histological guide for detection of the thyroid hypo activity of camels. The thyroid tissue was prepared by routine histological techniques and examined under light microscope. The striking result revealed that the organization of the thyroid follicles during the hypoactive summer season provides a special pattern. The results revealed that the shape and size of the thyroid cells and follicles were dynamic. The size of thyroid follicles were increased as directed from the periphery toward the center of the thyroid tissue. This picture was different in hyperactive winter season. The union of the smaller thyroid follicles with each other produces larger medium ones, which in turn united to produce larger giant ones. So that the number of follicles decreases as directed from the periphery to the center. In summer season, the thyroid follicles were lined mostly by low follicular epithelial cells, squamous to low cuboidal. Cuboidal follicular cells were rarely noticed, columnar cells were not observed. Moreover, the thyroid follicles were mostly filled with homogenous colloid. The present study concluded that this design provides firstly a novel histological pattern for detection of the hypo activity of the thyroid gland and in turn, suggested the low metabolism of the body.

Keywords: Histology, camels, thyroid glands, hypoactive, summer

Introduction
Thyroid function is known to be altered by many environmental factors It has been shown that the exposure to high environmental temperatures depresses thyroid activity whereas the exposure to cool temperature increases the thyroid activity [1]. A high percentage of histopathological changes were registered in the thyroid gland of sheep when exposed to high ambient temperature (2 and 3). A marked decline In T3 and T4 in the hottest months (August) in the indigenous cross-breed cattle of both sex and different ages were reported [6]. On the other hand, a higher activity of thyroid gland was noticed in European Bison in warm summer months [7]. The present study was carried out to determine the relationship between hot environment and histological changes in the thyroid gland of camel in Iraq. The aim of this study was to evaluate the response and behavior of thyroid tissue under the effect of hot environment and to find a new design for the low active thyroid gland. that is, the aim of this study was to-evaluate the response and behavior of thyroid tissue against hot environment.

Materials and methods
The present study was carried out on 11 adult dromedary camels from Al-Najaf abattoir in 2016. Immediately after slaughtering, thyroid specimens were collected, fixed by 10% neutral buffered formalin, prepared by routine histological techniques, and stained by hematoxylin and eosin for light microscopy. The research was done in summer season with high temperature reaches more than 50ċ. Immediately after slaughtering, thyroid gland were collected randomly. For microscopically study, samples were fixed in 10% neutral buffer formalin for 1-2 days, dehydrated in ethyl alcohol series of 70% to 100% and embedded in paraffin wax. Sections were Cut at 5-7 um and stained with hematoxylin and eosin for light microscopy. Data was analysed by one way ANOVA (4 and 8).

Results
The present study revealed that the shape and size of the thyroid cells and follicles were not constant. In this pattern the small follicles lies at the periphery, the medium follicles occupies the midway between the periphery and the centre, and the large (giant follicles) lies in the

center of the field (Table 1). The size of the follicular cells increased with the increase in activity of the thyroid gland and the thyroid follicles were increased in size as directed from the periphery toward the center. The thyroid follicles were lined mostly by low follicular epithelial cells, squamous to low cuboidal with elliptical or ovoid nuclei. Cuboidal follicular cells were rarely noticed, columnar cells were not observed. Moreover, the thyroid follicles were mostly filled with colloid In summer time. Most of this colloid was homogenous and thin in consistency. The height of the follicular cells were increased with the increase of the size of the thyroid follicles (table 1 The union of the smaller thyroid follicles with each other produces larger medium ones, which in turn united with each other to produce larger follicles (Figure 1, 2).

Table 1: Diameters of thyroid follicles and height of follicular cells in thyroid of camels

	Diameters of follicles		Height of cells*
	External diameters*	Internal diameters*	
Small follicles (at the periphery)	18.25±0.05c	15.50±0.06c	3.25±0.07c
Medium follicles (in the middle)	29.25±0.18b	23.75±0.05b	5.0±0.08- b
Large follicles (in the centre)	38.5±0.06a	30.75±0.07a	6.5±0.07

• Numbers represent means ± SE.
• Similar small letters represent no significant differences at the same column.
• Different small letters represent differences at level of *(p<001) at the same column.

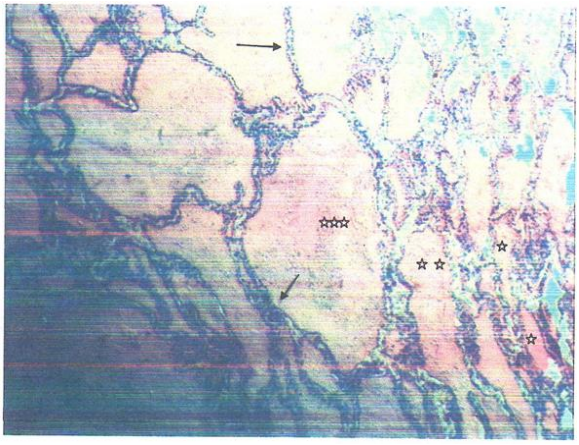

Fig 1: Different sizes thyroid follicles of the camel in hot summer time. One star refers to the small thyroid follicles, two stars refer to medium thyroid follicles, three stars refer to larger giant thyroid follicles. Arrows refer to the low thyroid follicular epithelium. Note the homogenous thyroid colloid that filled the thyroid follicles. H&E stain. X400.

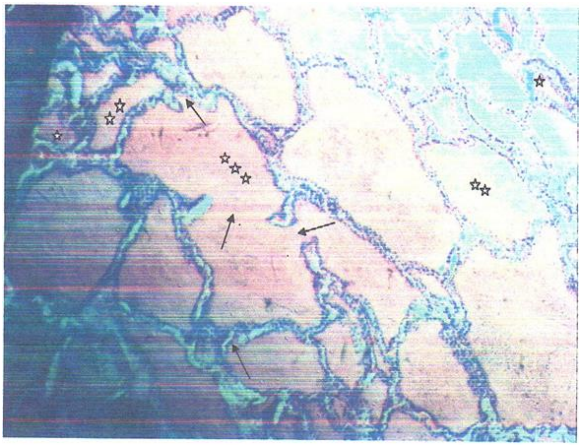

Fig 2: Thyroid gland of the camel in hot summer time showing the process of fusion between thyroid follicles. Smaller thyroid follicles (one star) united to form larger medium ones (two stars), which in turn united to form the largest giant thyroid follicle (three stars). Arrows refer to the gates between many thyroid follicles. H&E stain. x400

Discussion

As directed from the periphery toward the center of the thyroid tissue, the size of the follicles was increased due to the fusion of the smaller follicles to produce larger medium ones, and in turn the fusion of the medium follicles to yield larger giant follicles which is the characteristic form of the low hypo activity of thyroid gland. The current results were partly mimic to that of small ruminants [5] and in cattle [6], who reported that the thyroid activity was elevated in cold seasons, however, the study was in variance with [7] who noticed a characteristic histological signs of higher activity of the thyroid in European Bison in warm months compared with low temperature in cold months. Besides, the lumen of these follicles was mostly filled with the homogenous thyroid colloid [2]. The current study firstly revealed that the organization of the thyroid follicles in hot season provides a special pattern or model, where the largest number of the smallest follicles lies at the periphery of the tissue field, the less number of medium follicles lies midway between the periphery and the centre, and the least number of giant follicles lies in the center.

Conclusion

The present study firstly concluded that the presence of giant thyroid follicles in the center of thyroid tissue could be used as a monitor for diagnosis of the hypo activity of thyroid gland and the low metabolism of the body.

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