

**Research article**

Distribution of T-cells and B-cells in spleen of native duck *Anas platyrhynca* (mallard)

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Abstract:

*This research includes the histological study of the spleen in the native, wild duck *Anas platyrhynca* especially presences and distribution of T-cells and B-cells in the spleen tissue. (10) Healthy birds of duck were used, (5) males and (5) females. This study clarifies that the spleen of a duck consists of two distinct regions: white pulp and red pulp, the white pulp form the major part of the organ, it's a lymphoid tissue that could be differentiated into (2) types: diffuse lymphatic tissue and nodular lymphatic tissue which found as two distinct forms of nodules .the first nodule revealed to be regular and ellipsoidal in shape, small in diameter, surrounded with its eccentric artery by a thick layer of connective tissue capsule and show the low percentage, which is B-cells. The second nodule is irregular and oval in shape, large in diameter, has a thick capsule thinner than the last capsule, without artery inside or outside the nodule, and represented a high percentage so it distributes in almost the spleen, which is T-cells.*

Keywords: T-cells, B-cells, duck

Introduction:

Lymphatic system of birds different from that of mammals in numbers of morphological features that put the birds in median site between mammals and reptile (1), the birds differ by the presence of bursa fabricia and lack of typical lymph nodes (2,3) except water birds like duck and goose which have (2-3) pairs of lymph nodes (4) as cervical, thoracic and lumbar lymph nodes (5). Lymphatic system of birds consist of central components and peripheral components, the central represented by bursa fabricia and thymus which are necessary for the development of immune system, while peripheral include spleen, cecal tonsils and harderian gland in eye in addition to

diffuse nodules in different organs of the body (6). Spleen is the important organ of peripheral component in birds (7), its smaller than the spleen of mammals but has similar role (8), its consist of two types of lymphocytes similar to the cells of bursa fabricia and the cells of thymus (9,10,11) which called bursal type lymphocytes and thymic type lymphocytes. spleen also composed of the largest aggregation of lymphocytes and macrophages in birds body especially in chicken (12). To determine the histological features and differentiated the types of lymph nodules and there distribution in spleen of the duck we designed this study.

Materials and Methods:

Spleen specimens were collected from (10) adult healthy ducks, (5) males and (5) females ,spleen removed after anatomy and the specimens fixed in (10%) formalin for

(48)hours then we prepared the slides by routine histological methods (13): washing and dehydration-specimens washing by tap water for (3) hours, then passed in (70%,



80%,90%,100%) concentration of ethyl alcohol, clearing, infiltration and embedding then staining by (Hematoxyline &Eosine) stain, examination by light microscope by forces (x10,x20x,x40,x60,x100). Histological measurements after correspond with

calibrated stage micrometer (14), measurement the number of the lymph nodules and there percentage, diameter of the nodules. The result analysis statically by Mean (M) and Stander error (SE).

Results:

Histologically, the spleen of the native duck composed of two regions :the white pulp and the red pulp .the largest and most distribution part is the white pulp which is lymphatic tissue differentiated to tow forms; diffuse lymphatic tissue & nodular lymphatic tissue .the diffuse lymphatic tissue found us periarterial, perivenous, periellipsoidal lymphatic tissue and germinal centers. While the nodular lymphatic tissue represented by two distinct types of nodules:

1-Regular& ellipsoidal in shape lymph nodule composed of large lymphocytes surrounded by a thick connective tissue capsule which also surround eccentric artery, this capsule consist of collagen and reticular fibers, figure (1,2).Sometimes there's tow arteries in edge of nodules, this nodules lie in the peripheral sides of the spleen tissue, its

percentage is (26.35%) so it's the lower percentage of nodules of spleen table (1). The diameter of this nodules (3.54 ± 0.44) μ , table 2, this type of nodule is B-lymph nodule (B-cells).

2-Irregular oval in shape lymph nodules composed of small lymphocytes surrounded by thick capsule thicker than the capsule of B- lymph nodule and without any artery inside or outside the nodule, fig (3,4).This nodules form the higher percentage of splenic nodules reach to (73.64%) table(1).While the diameter is (4.23 ± 0.76) μ table (3), this type of nodules is T-lymph nodules (T- cells).from this results we found that T-cells is the largest and higher percentage from B- cells in spleen of native duck.

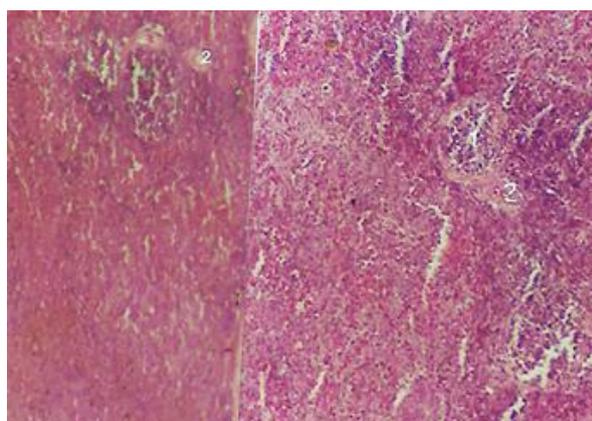


Figure (1): histological section of spleen show: 1- lymphatic nodule type B,2 –nodular artery (H&E stain x250)

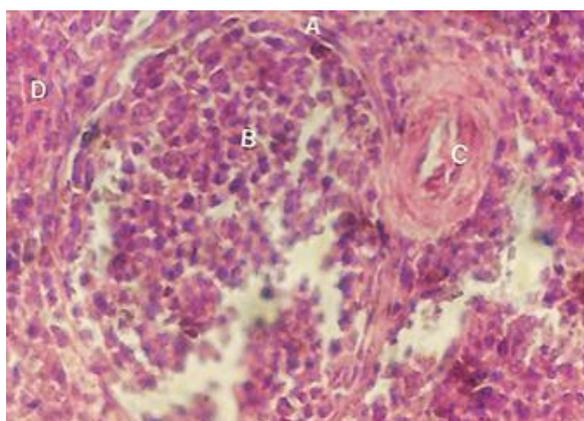


Figure (2): histological section in white pulp of duck spleen show: A-capsule, B- lymphatic nodule type B,C- artery, D- lymphatic cords. (H&E stain, x600)

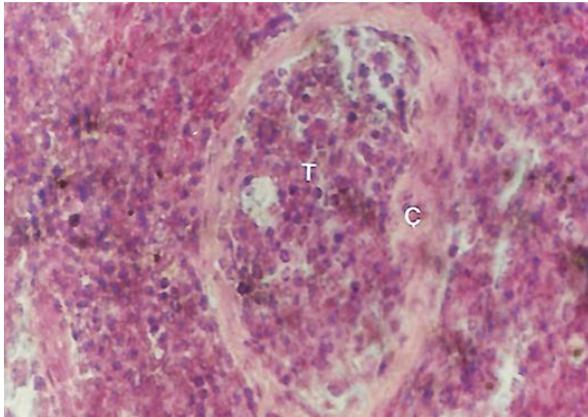


Figure (3): histological section in white pulp of duck spleen show-T-lymphatic nodules type, C- thick capsule.(H&E stain ,x400)

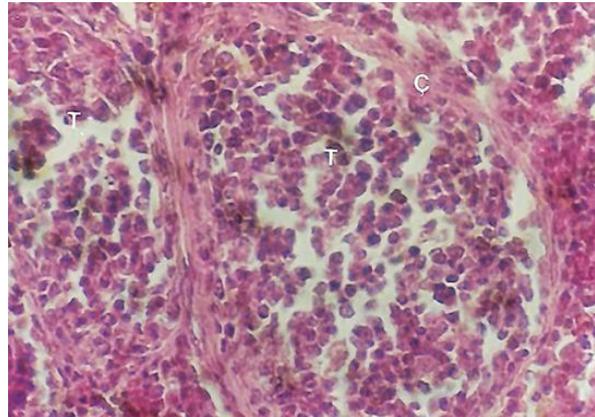


Figure (4): histological section in white pulp of duck spleen show-T-lymphatic nodules type, C- thick capsule.(H&E stain ,x600)

Table (1): Show the numbers of T- lymph nodules and B- lymph nodules & there percentage

Sample No.	T-nodules		B-nodules	
	No.	%	No.	%
1	44	75.861	14	24.129
2	40	47.073	15	25.924
3	47	73.43	17	26.555
4	47	77.04	14	22.948
5	52	73.64	20	25.35
average	46	74.808	16	24.981

Table (2): show the diameter of B-lymph nodules (micrometer μ)

Sample No.	Slide (1)	2	3	4	5	X	SD	SE
1	3.675	7.987	2.793	3.43	3.332.	4.243	2.116	0.945
2	2.156	2.45	4.704	3.185	3.332	3.165	0.989	0.441
3	3.92	2.45	3.283	2.989	2.94	3.116	0.539	0.240
4	2.156	2.744	3.528	3.185	2.891	2.900	0.512	0.228
5	2.45	3.332	3.528	3.185	4.508	3.400	0.740	0.331
6	2.94	7.987	3.283	4.557	2.94	4.341	2.143	0.958
7	2.156	2.744	4.361	3.185	3.332	3.155	0.814	0.363
8	3.675	3.332	4.704	2.989	4.508	3.841	0.741	0.331
9	2.94	3.724	4.704	4.557	2.891	3.763	0.846	0.378
10	3.92	2.744	4.361	3.43	3.332	3.557	0.613	0.273

Note: The average of diameter of B –lymph nodule (3.54±0.44)

X: mean

SD: standard deviation

SE: stander errors



Table (3) show the diameter of T-lymph nodules (micrometer μ)

Sample No.	Slide (1)	2	3	4	5	X	SD	SE
1	3.528	4.018	3.43	4.214	8.82	4.802	2.296	1.014
2	3.43	5.145	5.096	2.842	4.312	4.165	1.015	0.453.
3	2.401	2.842	3.283	2.45	8.33	3.861	2.522	1.127
4	3.283	4.41	3.283	3.038	8.82	4.566	2.436	1.088
5	2.692	3.773	2.597	3.675	9.065	4.361	1.337	0.597
6	2.692	4.018	5.39	2.45	8.33	4.576	2.403	1.075
7	3.43	5.145	5.39	2.842	3.773	4.116	1.105	0.493
8	3.528	2.842	3.43	4.214	9.065	4.615	2.534	1.132
9	3.283	4.41	5.096	3.038	4.312	4.027	0.851	0.380
10	2.401	3.773	2.597	3.675	3.773	3.243	0.684	0.305

Note: The average of diameter of T –lymph nodule (4.233 \pm 0.76)

X: mean

SD: standard deviation

SE: stander errors

Discussion:

Histological exam of duck spleen appeared that it's consist from: white pulp and red pulp with amount of connective tissues and blood vessels, this result. Compatible with (1,12,15,16) in birds ,also with (6,7,17,18,19,20) in chicken, (21) in Red Island chicken ,(22) in Turkey and (23) in bucky ducks, while discompartable with (24) who couldn't distinguished the two regions in dove. The differentiation of lymph nodules correspond with (1) in general birds ,(2) who found splenic corpusles in white pulp of the avian , this result also agree with (7,10,16,17) in chicken which the all found this lymph nodules in white pulp. While (11) found artery inside T- type lymph nodules as well as the artery of B-type lymph nodules in white and gray Elkhorn chickens, which

we didn't noticed its but in B-lymph nodules only . Our results disagree with (25) who found secondary nodules in (4) weeks age chicken, also disagree with (17) who found external lymphatic follicles in chicken which are abnormal related with lymphoid cancer. In the other hands, our results about percentage of the nodules clear that B-lymph nodules about (26.35%), while T-lymph nodules about (73.64%) from the total nodules in spleen, this agree with (11) in Elkhorn chicken, (26,27,28,29) in chicken. while disagree with (30) who mentioned that the both types of nodules have the same percentage in chicken. Regarding to the measurement of the diameter of the two types of the nodules we didn't found any study or references about this subject.

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