© *Journal of the Royal Microscopical Society, Vol. 83, Pt. 3, September 1964. Pages 251–253*

LYMPH NODE STRUCTURE IN *RHINOCEROS UNICORNIS*

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Plate 107 and One Text-figure

(*Received January 16th*, 1964)

SYNOPSIS

The histology of certain of the lymph nodes of the Great Indian rhinoceros (*Rhinoceros unicornis*) is described. Structural differences noted between superficial and deep nodes are tentatively correlated with physiological variations in nodal activity and with the mobility of adjacent structures.

Introduction

In a previous communication (Cave & Aumonier, 1962) dealing with lymph node histology in the Rhinocerotidae, some limited observations were made upon certain deep-seated lymph nodes (renal, epitracheal) of an adult male Great Indian rhinoceros (*Rhinoceros unicornis*). It is now possible to augment the scanty information then provided regarding lymph node structure in this form by reporting the results of histological study of the more superficially situate submandibular nodes of the same animal. As will appear, certain histological differences obtain between the deep and the superficial nodes examined, which may be correlated with both functional activity and topography.

Material and Methods

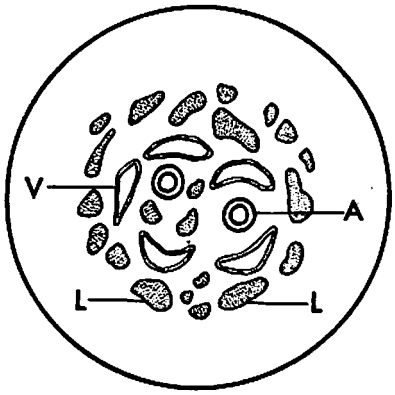
The submandibular nodes of the present specimen of *Rhinoceros unicornis* were dissected out on the left side. They form an elongated group of some 7–8 nodes of different sizes situate beneath the angle of the mandible and disposed around the intermediate portion of the digastric muscle, the anterior members being the smaller. The most anterior of these nodes is 22 mm long and 15 mm broad; the largest node is 65 mm long and 30 mm broad. This latter lies immediately deep to the submandibular salivary gland and simulates a non-existent deep portion thereof.

Two of the smaller members of the submandibular group were excised entire, fixed in formalin and embedded in paraffin wax: the resultant blocks were sectioned at a thickness of 5μ and the sections were stained by haematoxylin and eosin.

Observations

The submandibular node (Pl. 107) is a highly specialized organ. It differs from the corresponding human node in its notably greater vascularity and in its lack of all cortico-medullary differentiation. Its outstanding histological characteristics are its intense

vascularity, its complexity of trabecular pattern and its abundance of intratrabecular lymphatic vessels. The tough node capsule is collagenous and extremely thick, and contains a remarkably large number of intracapsular blood-vessels and lymphatics. The trabeculae (which constitute the node's most striking histological feature) are of relatively enormous thickness (being many times the thickness of the capsule) and are extremely numerous: indeed they form so dense and so irregular a network within the node that in many microscopical fields more trabecular than lymphoid tissue is visible. Under even low-power magnification each trabecula is seen to be longitudinally traversed by a host of blood-vessels and lymphatics. These represent, in the average trabecula, one or more intratrabecular arteries, about twice or thrice that number of intratrabecular veins, together with some 12 to 20 lymphatic vessels which vary widely in size. The preponderance of lymphatic vessels within the trabeculae is an arresting histological feature (text-fig. 1).



Text-fig. 1.—Trabecula in cross section with intratrabecular vascular leash. A=artery; L=lymphatic vessel; V=vein.

The lymphoid tissue of the node is extremely vascular: its cortical and medullary components are not topographically separate but are jumbled inseparably together in somewhat spleen-like fashion. The presence of free erythrocytes in the tissue spaces proclaims the haemolymph nature of this node.

The relatively small marginal sinus is occluded in places by what appears to be coagulated lymph plasma, while in other places capsule and parenchyma come into direct contiguity for no discernible reason. On the other hand, the paratrabecular sinuses are extremely well developed: they are considerably larger than the marginal sinus, which is best preserved where the paratrabecular sinuses unite with it.

A renal node of this same animal is of totally different 'texture'. Intranodal connective tissue is quantitatively less, the trabeculae being both much fewer and finer than those of the submandibular node. The intratrabecular vascular leashes are likewise much less obtrusive. The blood-vessels and lymphatics of the capsule, once they have pierced that structure, run rather within the lymphoid tissue than within the trabeculae, which, being relatively sparse and slender, afford a relatively less efficient mechanical support thereto. Many of the capsular lymphatics open directly into the marginal sinus (as in *Homo*) instead of penetrating deeply into the node as do the corresponding lymphatics of the submandibular node. There is some poor differentiation of the extremely vascular parenchyma into recognizable cortex and medulla and some diffusely arranged secondary nodules are

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[*To face p.* 252]

present. The presence of erythrocytes in the tissue spaces establishes the haemolymph nature of the node.

Discussion

The histological differences just enumerated between the superficially situate submandibular lymph node and the deeply placed juxta-renal node would appear to reflect a difference in physiological activity. The former node (with its fellows) subserves a relatively enormous lymphatic 'catchment area', and deals with the very considerable and continuous lymph flow from the gums, mouth cavity, palate and tongue: the latter node obtains lymph from a physiologically inert and topographically limited retroperitoneal area. The lymphatic vessels reaching the submandibular node are therefore relatively the larger and more numerous and their mechanical support within the node would appear to require a complexity and a robustness of trabeculation not called for by conditions obtaining within the juxta-renal node. Ancillary to the quantitative difference in lymph flow through these particular nodes is the factor of relative mobility: the submandibular node is affected by movements of the tongue and mandible, whereas the juxta-renal node is virtually unaffected by movement.

Habitual movement almost anywhere within the mammalian body evokes a corresponding, localized condensation of connective tissue in protective support of the organs or structures affected by such movement. A sufficient example of this principle is the excessively tough and dense fascial sheath which encloses the submandibular lymph nodes and the submandibular salivary gland. It is not therefore impossible that nodes subject to repeated movement and to the pressure of neighbouring structures should require, in addition to their external protective sheathing of connective tissue, an internal fibrous scaffolding of unusual strength and complexity—such as is manifested by the intense trabeculation of the present *Rhinoceros* submandibular nodes. The suggestion certainly seems to receive support from a study of the lymph nodes of the Asiatic elephant (*Elephas maximus*), wherein the large and continuously active subscapular node, exposed to the pressure of neighbouring muscles, reveals a degree of trabeculation unmatched by the more deeply placed and more protected lymph nodes of the posterior abdominal wall.

REFERENCE

Cave, A. J. E. & Aumonier, F. J. (1962).—Elephant and rhinoceros lymph node histology. *J. R. micr. Soc.*, **80**, 209.

DESCRIPTION OF PLATE 107

Fig. 1.—*Rhinoceros unicornis*, submandibular lymph node. Showing capsule, absence of marginal sinus and the large blood-vessels of the nodal parenchyma. × 100. Haematoxylin and eosin.

Fig. 2.—*Rhinoceros unicornis*, submandibular lymph node. Showing enormously thick branching trabecula and intratrabecular vascular leash. × 100. Haematoxylin and eosin.

Fig. 3.—*Rhinoceros unicornis*, submandibular lymph node. Showing localized meeting of parenchyma and capsule. × 350. Haematoxylin and eosin.

Fig. 4.—*Rhinoceros unicornis*, submandibular lymph node. Showing parenchyma, trabecula and paratrabecular sinus. × 350. Haematoxylin and eosin.