

## MORPHOLOGICAL CHANGES IN THE SPLEEN OF A RAT CAUSED BY DEHYDRATION

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The spleen of the rat is invariably inseparable with that of the human. The study investigates the various morphological changes that will occur in the spleen of the rat when it is subjected to dehydration for a variable period. The study was conducted and its objectives are stated below;

To understand the basic anatomy of the spleen of the rat and its relationship with that of human.

To understand the concept of how essential water is for the functions of these organs, vis-à-vis, how they change their structures and forms when the organism is deprived of water for a certain period.

To investigate the electronic microscopic morphological changes that occur in dehydrated rats, and the influence of water loss from the splenic compartment, we studied sixteenth (16) rats which were put into four (4) groups. The first group of rats (4), were subjected to a minimum of 3 days of dehydration, the second group (4) were moderately starved for water for 6 days, the third group (4) were severely dehydrated for 9 days. The rats were killed and their spleens were taken immediately for histologic and electron microscopic studies. At the end of the experimental study, the spleen of the rat which measures in average: body weight (g)  $226.3 \pm 6.36$ , splenic weight (g)  $0.48 \pm 0.05$ , was found to be drastically reduced. The central vein and trabecula were also collapsed.

For histologic studies, the dehydrated rats were fixed in neutral formalin solution, embedded in paraffine and stained with hematoxylin and eosin. The fixation for electron microscopy was 1 % osmic acid solution (pH 7.4, verona I buffer). The tissue was fixed in the solution for 2 hours at 4°C. This was cut into sections and stained. Observation of those preparations was made by electron microscope "PEM 106". Normal spleens of two rats from the fourth group were used as control sample.

After total body dehydration, the changes observed in the lymphocytes of the rat spleens can chronologically be divided into two groups. The first group is the one to show the macroscopic changes, and the second one is the remarkable morphological reduction in both white and red pulps which occurs in 6 and 9 days post-dehydration. The spleen becomes extremely smaller and weight is conversely reduced. The lymphocytes in the follicles disappear almost completely and small numbers of non-differentiated cells remain only around the central arteries. In the pulp cord, myeloid cell components almost disappear and shrunken reticular cells are seen in the entire spleen. It is very conceivable that the parenchyma of the spleen is mainly composed of water, because, the changes of the nucleus and mitochondria not only remain as they are, but also become conspicuous as the time goes. In addition, the infoldings and pinocytotic vesicles in the reticular cells indicate that this cell type is playing an active role during the liquid transportation. The shrunken reticular cells become more conspicuous. The venous sinuses become also less prominent in the pulp cord, and the myeloid elements of the cord decrease markedly in numbers. As noted in the rats that were dehydrated for 6 days, the central artery is placed eccentrically in the nodule. The marginal zone is almost not seen any longer. Histologically, the number of the intact lymphocytes has much decreased in those rats that were dehydrated for 9 days. Instead of them, the shrunken reticular cells become more conspicuous. The venous sinuses become also less prominent in the pulp cord, and the myeloid elements of the cord decrease markedly in numbers.

Electron microscopically changes in the follicles are the same nature with the findings of 6 days after dehydration group, but are more marked in degree. The venous sinuses, trabecula and trabecula veins of the red pulp are all being collapsed at this moment. In the white pulps as well, the germinal center as it was wider becomes more constricted and the central artery almost found in the middle but progressively narrowed.

Water is an essential component in the normal function of a living organism. Under the electron microscope, the cross section of the dehydrated spleen was compared with the well hydrated spleen, and there were certain changes noted. The marginal zone of the dehydrated spleen was slightly reduced in its tissue organization. In the red pulps, the cells became cone-shaped which suggest less activity of venous sinuses. The trabecular vein in the red pulp becomes seemingly extended with concurrent decrease in diameter. In the white pulps, the central artery also shows remarkable decrease in diameter. The reduced diameter within cells is thought to affect the normal function of the pulps in lymphatic production.

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