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Lymph Reactions Following Bulbus Pressure in Dogs.

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During the course of studies on the lymph of normal dogs under various conditions we have observed that practically every insult is followed by rhythmic changes of organ activity as indicated by the chemistry of the lymph,¹ and the leucocyte count.² We have called attention to the probability of a balance between the peripheral portion of the organism and the splanchnic region,³ the one being more active when the other is at rest. The leucocyte picture in particular gives us most striking evidence of this relation.⁴

Incidental to these observations we have carried out a series of experiments, with uniform technique, to study the lymph changes following bulbus pressure (oculo-cardiac reflex), the pressure being applied with sufficient intensity to perceptibly slow the cardiac rate.

In a chart of such an experiment previously published⁵ we have

¹ Petersen, W. F., Müller, E. F., and Boikan, Wm., *J. Infect. Dis.*, 1927, xli, 405; *Z. f. d. ges. Exp. Med.*, 1928, lx, 336.

² Müller, E. F., and Hoelscher, E., *Klin. Wschr.*, 1929, viii, 1027.

³ Petersen, W. F., and Müller, E. F., *Arch. Int. Med.*, 1927, xl, 575.

⁴ Müller, E. F., and Petersen, W. F., *Klin. Wschr.*, 1926, v, 53.

⁵ Petersen, W. F., and Levinson, S. A., *Arch. Path.* 9, 1930, ii, 405.

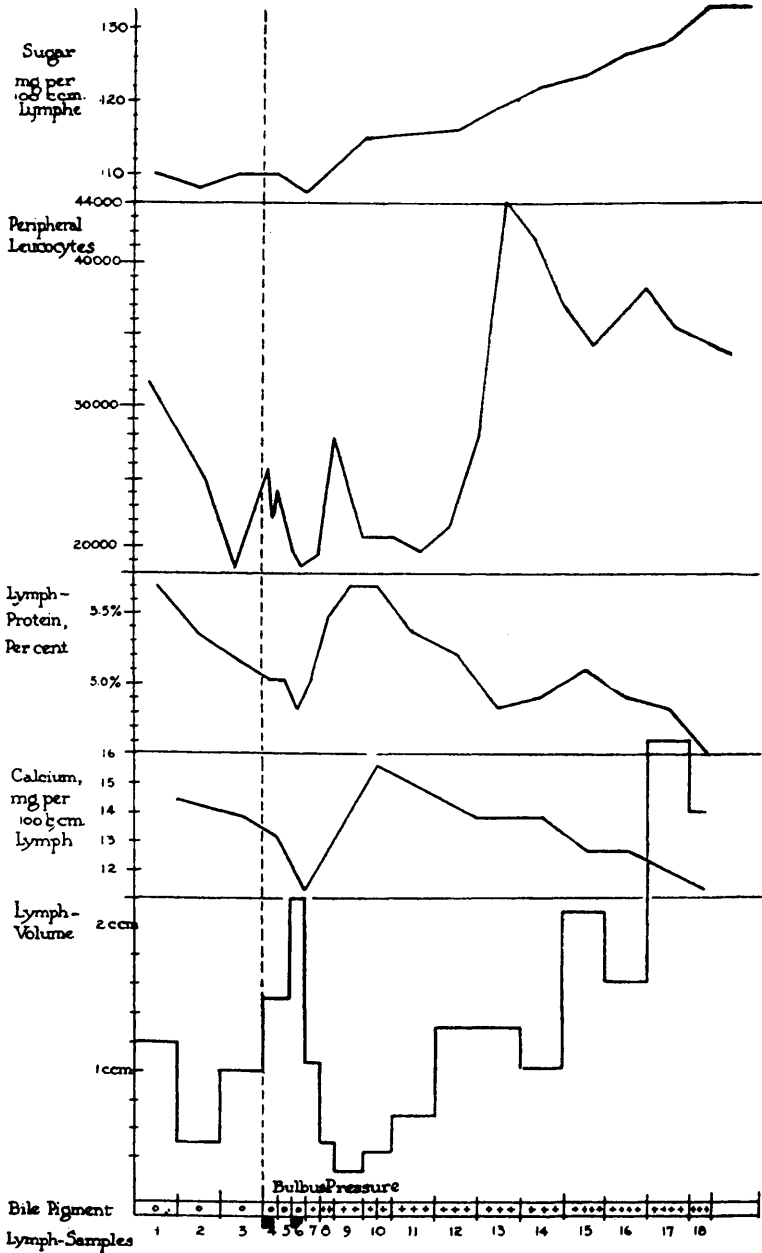


CHART NO. 1.

Lymph changes and peripheral leucocyte count following eye pressure in dogs.

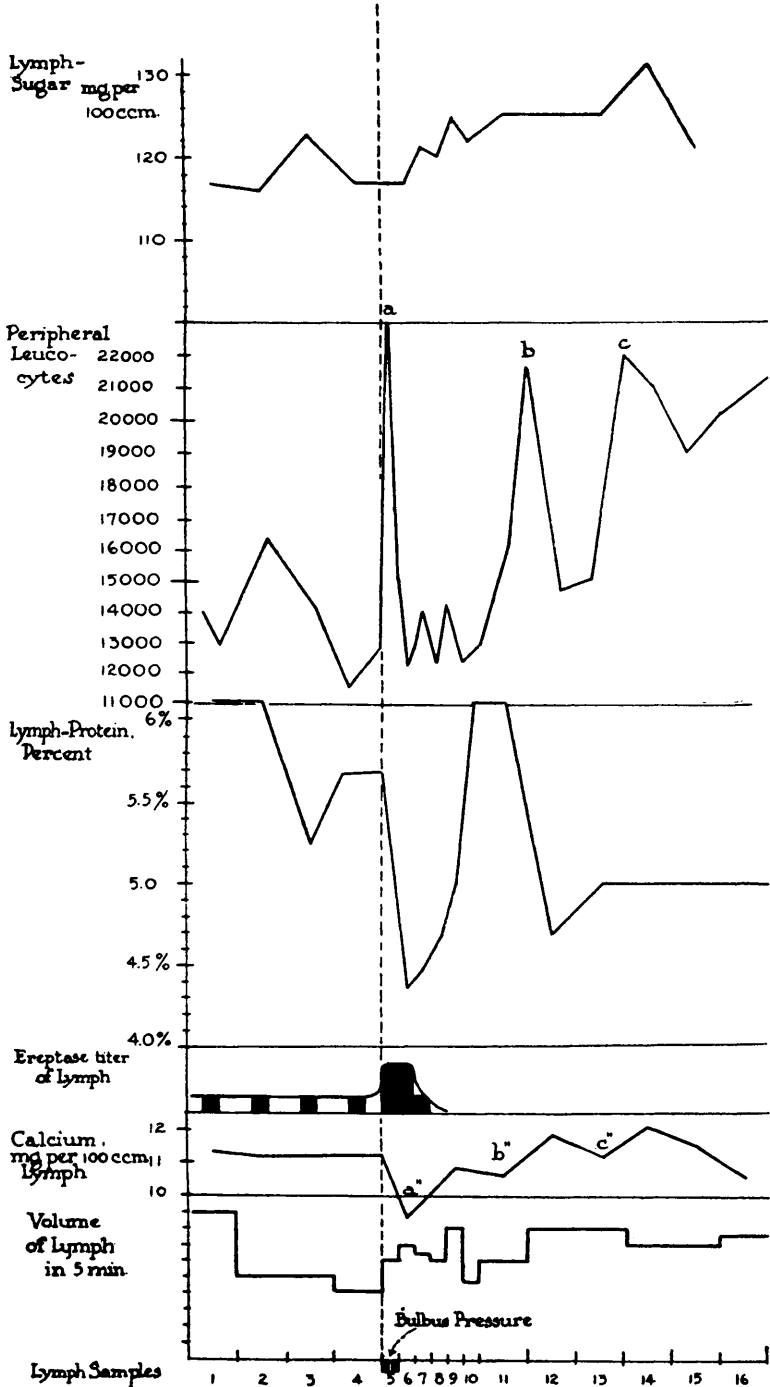


CHART NO. 2.

Lymph changes and peripheral leucocyte count following eye pressure in dogs.

demonstrated the increasing amplitude of autonomic alterations occasionally seen following such bulbus pressure; in this communication we present 2 further graphs to illustrate several additional changes.

Chart No. 1. Normal dog, thoracic duct incannulation under local anesthetic. Bulbus pressure for 4 minutes with repetition after 5 minutes (indicated by black blocks on chart). The reaction of the organism can be divided into 2 periods—one of approximately 75 minutes after the ocular pressure and the second phase following this. During the first phase, the leucocyte count remains relatively low while the lymph protein and lymph calcium increases. With this, bile pigment makes its appearance in the lymph and becomes well marked. In the second period there is a reversal with a peripheral leucocytosis and a diminution of lymph calcium and protein. The bile pigment continues at an unaltered level.

Chart No. 2. In this experiment, bulbus pressure was applied for 2 minutes with repetition for a one minute interval. In this case, an immediate leucocytosis (increased peripheral dilatation) is associated with diminution of lymph calcium (diminished cellular activity). The corresponding waves of peripheral leucocyte count and lymph calcium are indicated by the letters a, b, c, on the chart. It is of interest too, to observe that the lymph erepsin had increased after the bulbus pressure, later seems to disappear entirely.

The oculo-cardiac reflex has been repeatedly studied clinically and Tinel⁶ in particular has pointed out the effect on the leucocyte count in various clinical conditions.

Our experiments give evidence of profound alteration produced by such reflex activity in the internal organs and indicate alterations of the autonomic balance so initiated. Danielopolu⁷ believes that we are dealing not only with impulses that travel over the vagus to the heart but over the sympathetics to the splanchnic region. The alterations of the lymph consisting not only of changes in the protein concentration and calcium level but also of changes in the bile pigment and enzyme content portray periods of activity and depression with associated changes in the peripheral leucocyte count. The alterations which we have found in the lymph cannot be explained wholly on the basis of either voluntary or smooth muscle contraction.

⁶ Tinel, J., *Medicine*, 1923, iv, 463.

⁷ Danielopolu, D., Radovici, A., and Carniol, A., *C. R. Soc. Biol.*, 1922, lxxxvi, 637.