No explanation is offered at this time for the serological difference between the strains of virus from the 2 parts of the country. The clinical disease appears to be similar in both regions except that in the east its course is more rapid. The importance at present of the difference between the 2 strains lies in its bearing upon the preparation of immunizing agents or therapeutic sera.

7067 P

Swelling of Gelatin in a Series of Human Blood Sera.

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During the past thirty-five years, there has been considerable speculation as to the rôle played in pathology by abnormal increases and decreases in the state of swelling or water holding power of tissues.[1]

The resultant swelling tendency exerted upon tissue by plasma, or the lymph derived therefrom, is necessarily a function of the concentrations of a number of the plasma constituents. The writers believed that it would be desirable to have some single test available for this resultant tendency, and that such a test might be afforded by observation of the effect of plasma or serum upon some standard swelling material such as gelatin.

Small squares of Eastman Kodak Company's "ash-free" gelatin, weighing about .05 gm., were placed in Ringer-Tyrode solution (glucose omitted) and allowed to swell for 40 hours at about 10° C. The solution contained sodium bicarbonate, and was kept in contact with alveolar air. The pH was maintained within the range pH 7.2-pH 7.6. The percentage swelling of the squares was determined from a comparison of their swollen and original dry weights. It was of the order of 11 times in all cases, and, in any one series, the maximum difference between values was about 2 parts per hundred.

Blocks of gelatin were thus provided in a standard state of swelling. It was hoped that this state would be such that the blocks would swell further in some sera and shrink in others. This proved to be the case.

[1] Ludlum, S. DeW., Taft, A. E., and Nugent, R. L., *Arch. Neurol. Psychiat.*, 1930, **23**, 1121.

In a series of 22 normal and pathological sera, the one showing the greatest swelling tendency caused a standard block to swell 5.1% further, and the one showing the least swelling tendency caused a 1.2% shrinkage. A standard block, as described above, was immersed in each serum for 20 hours in the ice chest, after which any change in weight was noted. The pH of each serum was adjusted by saturation with alveolar air and controlled between the limits pH 7.2-pH 7.8 throughout. Duplicate experiments indicated an unavoidable experimental variation of less than one percent.

The foregoing results indicated that, in a series of sera, the resultant swelling tendencies with regard to standard gelatin blocks may be measured and clearly differentiated. It next became of interest to determine the composition variable or variables primarily responsible for the swelling variations observed.

Series of synthetic solutions were prepared based upon Ringer-Tyrode solution containing 5% egg albumin and adjusted to pH 7.4-pH 7.6. In each series, the concentration of one factor was varied so as to include the maximum range of variation of this factor in pathological sera, and the effect of this variation upon the swelling of standard gelatin blocks was observed.

Preliminary experiments had shown that such variation of the calcium, potassium, glucose and urea concentrations caused swelling effects quite insufficient to account for the differences observed with the sera. Variation from pH 7 to pH 8 caused a maximum swelling difference of about one percent. Varying the total salt content from one-half the normal physiological value to one and a half times this value caused a swelling increase of only about 2%.

However, when the albumin content was varied from 2.5 to 10.0%, there was a clear cut swelling decrease about 8.0%, amply sufficient to account for the maximum difference of 6.3% observed with the series of sera, in which abnormal, widely variant protein contents were known to be present.

The foregoing experiments gave a strong indication that variation in the total protein contents were primarily responsible for the swelling differences observed with the series of sera. Refractive index data were available for the sera and were used as rough measures of their total protein content.[2] A comparison showed a definite increase in swelling tendency with decrease in refractive index, in entire agreement with the findings in the synthetic solution experiments.

[2] Beltz, L., and Kaufman, E., *Z. Klin. Med.*, 1925, **101**, 409.

The first conclusion is that sera may be conveniently arranged in the order of their resultant swelling tendencies with respect to standard blocks of gelatin. The second is that the serum composition variable of primary importance in determining this resultant swelling tendency in any case is the total protein level. This effect of the protein level of the swelling solution upon the state of swelling of gelatin is predictable on the basis of recent findings of Northrop and Kunitz.[3]

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Observations on Coronary Occlusion.* II. Electrocardiographic Changes.

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In the course of experiments designed to study the effects of coronary artery ligation in dogs[1] it has been interesting to observe rather varied electrocardiographic changes and at this time a brief note is presented to describe some of the characteristic features observed.

Seventeen dogs were used. Under amytal anesthesia, with respirations maintained by positive pressure, the pericardium was exposed by a subperiosteal resection of the anterior portion of the fourth rib on the left. The anterior descending branch of the left coronary artery was ligated 1.5 cm. from its origin. Using conventional limb leads, electrocardiographic tracings were taken at hourly intervals for the first 12 hours, again at 24 hours, at daily intervals for the next week, and at weekly intervals thereafter. In each instance a control tracing was taken before the operation was begun, the animal being under full amytal anesthesia at the time. Two dogs served as controls. The operative procedures were duplicated in every detail except the actual tying of the ligatures about the coronary artery.

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[3] Northrop, J. H., and Kunitz, M., *J. Phys. Chem.*, 1931, **35**, 162.

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[1] Sutherland, F. A., Dial, D., and Harris, B. R., PROC. SOC. EXP. BIOL. AND MED., 1933, **30**, 1430.