by Shaffer and Somogyi,[2] using the modified reagent No. 50 and the modified procedure suggested by Somogyi.[3] Table I contains the results of these analyses.

Summary. While individual hearts show wide variations in the comparative contents of glycogen in the several parts, averages for the 12 hearts studied indicate that in a large series these differences would not be great. In general, the left atrium and the right ventricle show slightly higher percentages than do the remaining parts of the heart. Whether this greater content would hold for a larger series and possible structural or functional significance of such differences are matters entirely speculative in nature.

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Effect of Parathyroid Hormone on Diffusion of Calcium, Magnesium and Phosphorus into the Peritoneum. I.

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Eight adult dogs were given intraperitoneal injections of 2.5% dextrose and 0.9% NaCl solution in the dosage of 100 cc per kg. After 16 hours, 20 cc of blood were withdrawn from the femoral artery and 20 cc of fluid from the peritoneum. Five hundred units of parathyroid hormone* were then injected intramuscularly. Similar blood and fluid samples were obtained hourly for 8 hours and were examined for Ca, Mg and inorganic P content.

Magnesium. The control values for serum Mg were 2.1-3.26 mg %. In 6 cases parathyroid administration was followed by a fall in serum Mg, the maximum decrease being 0.35-0.8 mg % at 1-6 hours, with a tendency to return to normal at 3-8 hours. In one case the serum Mg increased (0.3 mg). No significant change occurred in one case.

The control values for peritoneal fluid Mg were 1.75-2.0 mg %. These increased in each instance, the maximum increase being 0.17-1.02 mg %, the peak occurring at 5-8 hours. The control ratio of fluid to serum Mg was 57-87%, the mean being 75%. This ratio rose in each case, the maximum rise being 12-46% at 5-7 hours.

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[2] Shaffer, Phillip A., and Somogyi, Michael, *J. Biol. Chem.*, 1933, **100**, 695.

[3] Somogyi, Michael, *J. Biol. Chem.*, 1937, **117**, 771.

* Aided by a grant from Parke, Davis and Co.

The relatively slight changes in serum Mg after parathyroid hormone administration are in accord with previous reports.[1, 2, 3] However, these described a primary increase in serum Mg followed by a decrease, whereas the opposite occurred in the majority of animals in the present series. The most consistent change was an increase in the amount of diffused Mg, suggesting that the parathyroid hormone increases the diffusibility of serum Mg.

Inorganic P. Control values for serum P were 3.1-5.4 mg %. These fell in every case after parathyroid administration, the maximum decrease being 0.6-1.1 mg. The lowest values occurred at 1 hour in one case, at 3 hours in 3, at 4 hours in 2 and at 5 and 6 hours in one case each, with a subsequent rise in each instance.

The control values for peritoneal fluid P were 2.6-5.0 mg %. These fell in 5 cases, the maximum decrease being 0.6-1.2 mg %. The lowest values occurred at 4 hours in 2 cases and at 6 hours in 3, with a subsequent rise. In 2 cases the fluid P increased progressively, the maximum rise being 0.8 mg and 1.7 mg %, at 7 and 6 hours respectively. No significant change occurred in one case. The control ratio of peritoneal fluid to serum P was 83-95%. This increased in 6 cases, the maximum rise being 10-19% at 2-5 hours, with a subsequent fall. It decreased in 2 cases, the maximum fall being 11 and 12%, at 6 and 4 hours, with a subsequent rise.

The changes in serum P are in accord with previous reports. The fact that the serum and fluid P concentrations diminished practically simultaneously in 5 cases suggests the existence of a rather continuous diffusion equilibrium between the fluid and blood plasma. The establishment of this point would be of great importance in connection with the interpretation of the concentrations of Ca, Mg and P in the fluid as indicative of the level of the diffusible fractions of these elements in the plasma.

Calcium. The control serum calcium values were 9.8-11.2 mg %. The maximum increase was 1.8-2.7 mg, the peak occurring at 5-6 hours with a subsequent slight decline. The control values for peritoneal fluid Ca were 5.1-7.0 mg %. This rose in each case, the maximum increase being 1.7-2.7 mg %, the peak occurring at 8 hours in 7 cases and at 6 hours in one case.

The control ratios of fluid to serum Ca were 52-69%, the mean being 61%. No significant change occurred in the ratio for about 5 hours; it then increased to a maximum of 63-86% at 8 hours (end of experimental period). The degree of increase was 11-24%.

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1 Scholtz, H. G., *Arch. exp. Path. u. Pharmakol.*, 1931, **159**, 233.

2 Greenberg, D. M., and Mackey, M. A., *J. Biol. Chem.*, 1932, **98**, 765.

3 Bulger, H. A., and Gausmann, F., *J. Clin. Invest.*, 1933, **12**, 1135.

In only one case was the period of increasing calcemia accompanied by an increased fluid-serum Ca ratio. In 5 cases the ratio had returned to the control level after 24 hours, as had the fluid and serum Ca concentrations. The protein concentration of the peritoneal fluid remained practically constant throughout the experimental period (0.25-0.6%).

The question arises as to whether the concentration of Ca in the peritoneal fluid is representative of the level of the diffusible fraction of serum Ca at any particular time. Such an assumption presupposes the existence of a constant and rapidly established equilibrium between the plasma and fluid. No evidence is available bearing directly on this point. However, certain related observations are possibly of significance in this connection. In 4 animals, 50 cc of fluid were injected intraperitoneally instead of 100 cc. The findings were essentially the same as presented above. In other experiments, increase and decrease of the serum Ca were accompanied by corresponding changes in the fluid Ca, suggesting a rapid establishment of equilibrium between the two media. This is also suggested by the findings with regard to changes in P, as noted above.

There is evidence, therefore, that the equilibrium between the serum and peritoneal fluid Ca is established rapidly in the face of moderate changes in the concentration of this element in the serum. If the fluid Ca concentration may be regarded as representing the level of diffusible serum Ca, it appears that parathyroid hypercalcemia, under the conditions of the experiment, is due to a proportional increase in diffusible and nondiffusible fractions of serum calcium. This is in accord with findings obtained in artificial membrane experiments. It appears, however, that the increase in the diffusible fraction persists or continues for some hours after the nondiffusible fraction has begun to diminish, the normal ratio being restored before 24 hours. Whether or not the peritoneal fluid Ca is truly representative of the level of diffusible serum Ca, it seems logical to assume that it does represent the level of Ca in the tissue fluids throughout the body, *i. e.*, "diffused" Ca. These findings may, therefore, give more exact information regarding the physiologic effect of the parathyroid hormone than can be obtained by serum Ca determinations or studies of serum Ca diffusibility by artificial membrane methods.