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Effect of Magnesium Sulfate on Serum and Peritoneal Fluid Calcium, Magnesium, Inorganic Phosphorus.*

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Four 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 After 16 hours, 20 cc of blood were withdrawn from the femoral artery and 20 cc of fluid from the peritoneum. Previous observations[1] have revealed that the serum and peritoneal fluid Ca, Mg and P are in equilibrium at this time. Fifty cc of a 25% solution of $MgSO_4$ were injected intramuscularly (3 cases) or subcutaneously (1 case). Blood and fluid samples (20 cc each) were obtained ½, 1, 1½, 2, 3, and 4½ hours after injection of the $MgSO_4$, and were examined for their Mg, Ca and inorganic P content.

Magnesium. The control values for serum Mg were 1.82-2.46 mg %. The maximum values after injection of magnesium ranged from 8.9 (subcutaneous injection) to 16.1 mg %, the peak being reached in 1-2 hours, with a subsequent decline.

The control values for peritoneal fluid Mg were 1.5-1.67 mg %. These increased in each instance, to values of 6.4-12.2 mg %, the peak being reached ½-1½ hours after the peak of serum Mg concentration.

Calcium. The control serum calcium values were 9.45-12.1 mg %. These fell in each instance, to minimum levels of 6.39, 7.0, 7.6 and 8.92 mg %, the last in the animal injected subcutaneously. The maximum drop in serum Ca concentration (2.31-4.5 mg %) occurred ½-3½ hours after the peak of serum Mg concentration.

The control values for peritoneal fluid Ca were 5.94-8.5 mg %. These changed relatively slightly during the experimental period, the range of maximum variation from the control values being +0.63 to −1.2 mg %, the latter occurring in the case in which the serum Ca concentration fell 4.5 mg %.

Inorganic Phosphorus. In 2 of the 3 cases in which this determination was made the serum inorganic P concentration fell from con-

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1 Cantarow, A., Haury, V. G., and Whitbeck, C. G., PROC. SOC. EXP. BIOL. AND MED., 1938, **39**, 15, 18; Cantarow, A., and Haury, V. G., *Am. J. Physiol.*, 1939, **126**, 66.

trol levels of 4.6 and 6.63 mg % to minimum levels of 3.1 and 3.54 mg % respectively, 1 and 1½ hours after the peak of serum Mg concentration had been reached. A similar fall occurred in the peritoneal fluid P concentration in these cases, from control values of 4.4 and 6.36 mg % to minimum values of 3.0 and 3.6 mg %. In the other case there was no significant change in serum or peritoneal fluid P concentration.

Comment. The fall in serum Ca following injection of $MgSO_4$ is in accord with previous observations,[2-5] some of which suggest that the SO_4 ion participates in the production of this effect. Meneghetti[4] reported a simultaneous increase in diffusible Ca (rabbits), a finding not in accord with those reported here. The observed fall in serum inorganic P has also been reported previously,[2, 6] being perhaps also dependent in part on the influence of the SO_4 ion. The simultaneous fall in diffused P (peritoneal fluid), not reported previously, is particularly significant in view of the relatively insignificant alteration in peritoneal fluid Ca concentration. It may be related to the simultaneous increase in the concentration of Mg and perhaps SO_4 in the fluid.

It is of interest that frank tetany (relieved promptly by intravenous injection of calcium glucogalactogluconate) occurred in the 3 animals in which the serum Ca concentration fell below 8 mg % despite the absence of significant alteration in the peritoneal fluid Ca concentration in 2 of these animals. The explanation of this phenomenon is not readily apparent. If, as suggested by previous reports from this laboratory,[1] the peritoneal fluid Ca concentration may be regarded as representative of the concentration of Ca in the tissue fluids, the significance of the latter in hypocalcemic tetany appears to be open to question. It is difficult, too, to understand the occurrence of tetany with relatively slight degrees of hypocalcemia in the presence of such marked increase in the Mg concentration of both serum and peritoneal fluid (and, presumably, tissue fluids).

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2 Brookfield, R. W., *Biochem. J.*, 1934, **28**, 725.

3 Stransky, E., *Arch. exp. Path. u. Pharmakol.*, 1915, **78**, 122.

4 Menenghetti, E., *Biochim. e terap. sper.*, 1927, **14**, 116.

5 Pribyl, E., *Compt. rend. Soc. de Biol.*, 1929, **102**, 258.

6 Schmidt, C. L. A., and Greenberg, D. M., *Physiol. Rev.*, 1935, **15**, 297.