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Effect of Calcium on Cardiac Reactions to Mercury.

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The response of the isolated frog heart to mercury in normal Ringer was first studied by Salant and Kleitman,[1] but as far as we are aware no investigation has been previously reported on the effect of mercury in solutions containing different amounts of calcium. Experiments were therefore carried out with this object in view, Straub's method being used.

After trying different concentrations of mercury, we found that a solution of 1:100,000 in normal Ringer, containing 0.012% calcium chloride, best served the purpose as a basis of comparison. The immediate effect of this amount of mercury was not constant, no changes being observed in most cases, and moderate depression only occurred in some experiments, thus corroborating the observations of Salant and Kleitman, which were made with Simpson's method, modified by his pupil, Livingston. We noticed, however, that in some experiments a gradual decline, especially in the strength of the contractions, occurred, and at the end of one to 3 hours, the amplitude showed a considerable decrease. When the amount of calcium chloride in Ringer's solution was reduced from the normal 0.012 to 0.008 and 0.006% the resistance to mercury was greatly decreased. In a concentration of 1:100,000 (as the chloride) it produced a well marked decrease of the strength of the contractions, the effect setting in after a short latent period, and within 3 or 4 minutes the amplitude was reduced in some experiments 50% or more. The rate was also decreased but to a much smaller extent. Drastic reduction in the strength of the contractions was observed in some of these experiments. The effect occurred almost immediately after the introduction of mercury, the depression increasing rapidly and after one minute the contractions became very feeble. As before, the rate was much less affected than the force of the contractions. The greatly increased toxicity of mercury was practically the same whether the amount of calcium chloride was 0.006 or 0.008%. The same amount of mercuric chloride in Ringer's solution containing 0.015% calcium chloride also caused depression of the heart, but the process was much slower than in the presence of deficient amounts of calcium. The rapid, almost violent, decrease

[1] Salant and Kleitman, *J. Pharmacol. and Exp. Therap.*, 1922, xix, 315.

in the force of the contractions which was sometimes produced by small amounts of mercury and subnormal amounts of calcium never occurred after treatment with the same concentration of mercury when the calcium content was increased beyond 0.012%. The difference in the effect was even more pronounced in the experiments in which the calcium chloride content was increased to 0.02%. In one experiment the heart, though weak, was still contracting 50 minutes after treatment with mercury 1:100,000. The same amount of mercury in the other experiments produced considerable slowing, but no change in the strength of the contractions could be noticed, and at the end of 21 hours feeble beats were still observed. The antagonistic effect of calcium was less pronounced, however, when the concentration of mercuric chloride was increased. Solutions of 1:50,000 were almost equally potent when the amount of calcium chloride was 0.012 or 0.2%. Heart action continued 15 to 20 minutes, and in one experiment with mercury and normal Ringer the heart was still beating 45 minutes after the introduction of mercury. But when the amount of calcium was subnormal mercury 1:50,000 promptly brought the heart to a standstill.

The results presented above justify the conclusion that deficient amounts of calcium greatly increase the resistance of the frog heart to mercury. While excess calcium may be antagonistic to mercury, this is less certain than the injurious effects produced when the heart is exposed to mercury in the presence of subnormal amounts of calcium.

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Vitamin Requirements of Nursing Young. VIII. Effect of Vitamin B* Deficiency on Alkaline Reserve of Blood of Nursing Young of Albino Rat.†

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In order to determine the influence of uncomplicated vitamin B deficiency on the alkaline reserve of the blood of nursing young of

* Unless stated otherwise, vitamin B deficiency refers to the uncomplicated polyneuritis produced by a deficiency of only the antineuritic factor. An abundance of the antipellagric factor was provided by an ample supply of autoclaved yeast in the maternal diet.

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