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Effect of Carbon Tetrachloride on the Serum Amylase of Dogs.

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Following Somogyi's[1] observations of low serum amylase levels in individuals with liver damage, similar changes were observed at the Research and Educational Hospitals in patients coming to autopsy with varying degrees of hepatic insufficiency. This has stimulated an attempt to produce various types of liver injury experimentally in dogs to determine whether or not the changes in the serum amylase parallel changes in the liver closely enough to justify its use as an index of liver function.

The normal values for serum amylase in dogs are remarkably higher than those seen in humans. The normal readings obtained in these experiments ranged between 1900 and 3600, expressed as milligrams of sugar per 100 cc of serum. Each dog apparently has his own level of normal variations.

In the determination of the serum amylase, 5 cc of 1.5% starch paste was added to 2 cc of 1% sodium chloride solution and 1 cc of 1 to 10 diluted fresh blood serum and incubated at 39°C for 30 minutes. At the end of this time, the diastatic activity is ended by the addition of 1 cc of 5% copper sulfate solution. The proteins are precipitated by the Somogyi copper method. The sugar of the filtrate is determined by the quantitative method of Benedict. The control on the starch alone and the normal blood sugar are deducted, and the diastatic activity is expressed as the amount of reducing sugar in terms of milligrams of dextrose produced by 100 cc of blood serum under the conditions mentioned.

After the normal range for each dog had been determined, they were given varying amounts of carbon tetrachloride by gavage. The same general house diet has been used throughout.

In the first dog, it was noted that doses of 2 to 4 cc could produce a considerable drop in the serum amylase, but that in a day or 2 the level would rise again. After the administration of 38 cc of carbon tetrachloride, the serum amylase had dropped from an average normal of 2400 to a low point of 650. After one week of rest, the serum amylase level had returned to normal. (See Fig. 1.)

The average normal serum amylase in the second animal was 3000.

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[1] Somogyi, M., PROC. SOC. EXP. BIOL. AND MED., 1934, **32**, 538.

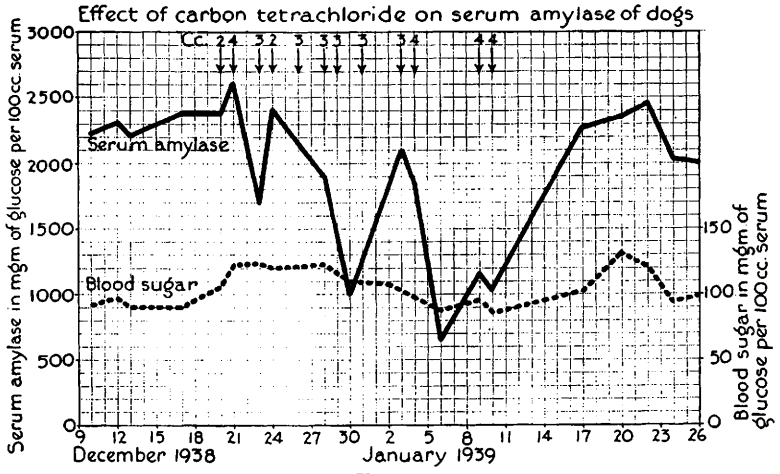

FIG. 1.

The heavy line represents the serum amylase curve, the lighter line the blood sugar curve. After the normal range had been established, carbon tetrachloride was administered in small doses of 2-4 cc every 2 to 3 days.

While the general trend was downward, wide fluctuations occurred. After one week of rest the amylase level was back to normal. These fluctuations and the return to normal may represent the reparative ability of the liver.

The blood sugar was unaffected by the carbon tetrachloride.

Larger doses were used in this dog, a total of 80 cc of carbon tetrachloride being given in 10 cc doses every 3 days. At present, the amylase level in this dog is down to 1200.

In the third dog, still larger doses—20 cc every 3 days—were administered with less striking results. Here too, however, the drop has been considerable, going from an average normal of 1900 to a low at present of 900.

The animals have acquired the ability to regurgitate the larger doses, and now the carbon tetrachloride is being given subcutaneously with better results, though with rather severe local reactions.

The effect of carbon tetrachloride on the livers of dogs has been best demonstrated by Bollman and Mann.[2] As yet, there is no proof that the drop in serum amylase is due to the liver destruction, but if similar results can be obtained by producing liver damage through other means, the evidence should be indicative of a close relationship between the serum amylase and the liver. There was no effect on the blood sugar levels.

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2 Bollman, J. L., and Mann, F. C., *Ann. Int. Med.*, 1931, **5**, 699.