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Hypergammaglobulinemia in Mink.* (26795)

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Lesions found in mink affected with Aleutian disease resemble many of those described for such diseases as periarteritis nodosa, lupus erythematosus, and other associated diseases of man. Certain of the gross and microscopic lesions of Aleutian disease have been described by Hartsough and Gorham (1), and Helmboldt and Jungherr(2). Obel (3), in describing a similar condition of mink in Sweden, has pointed out that this may be a form of plasma cell myeloma, since one of the prominent changes is plasma cell proliferation. Recently Page(4) found that affected mink have an accompanying hypergammaglobulinemia. This report is concerned with the determination and comparison of serum protein values of normal and Aleutian disease affected mink using zone electrophoresis.

Materials and methods. Blood samples were taken from normal and affected mink on 2 ranches which had a history of the disease. In addition, blood samples were collected from a ranch where the disease had never occurred and the animals were in good health. The blood was collected from 18 normal and 18 affected mink by heart puncture while the animals were under ether anesthesia. Immediately after collection of the blood samples, the mink were sacrificed and complete necropsies performed. Animals were designated normal or affected on the basis of history, clinical signs, and post-morten lesions. Serum was removed from blood samples and stored at –26°C until electrophoretic determinations were made.

All the mink in the affected group were homozygous for the Aleutian gene as defined by Shackelford(5). The control mink, which had no evidence of disease, included 11 animals which were homozygous for the Aleutian gene and 7 which were not homozygous for this gene.

Samples of serum from normal and affected mink were subjected to electrophoresis at room temperature on filter paper (S and S 2043-A mgl) in veronal buffer (ionic strength 0.075 and pH 8.6) for 16 hours at a constant current of 0.104 milliamp/cm width. Spinco Model R paper electrophoresis apparatus was used.† The sample size was 0.006 ml of serum.

At the end of 16 hours, the paper strips were heated at 125°C for 30 minutes, fixed and stained in a 1% methanolic bromphenol blue solution(6). Prior to scanning in a Spinco Model RB Analytrol integrating densitometer, the dried strips were exposed to ammonium hydroxide vapor. A B-5 cam and 500 mμ interference filters with a 1.5 mm slit width were used. Total serum proteins were determined by the biuret method(7).

Results. Results of the electrophoretic de-

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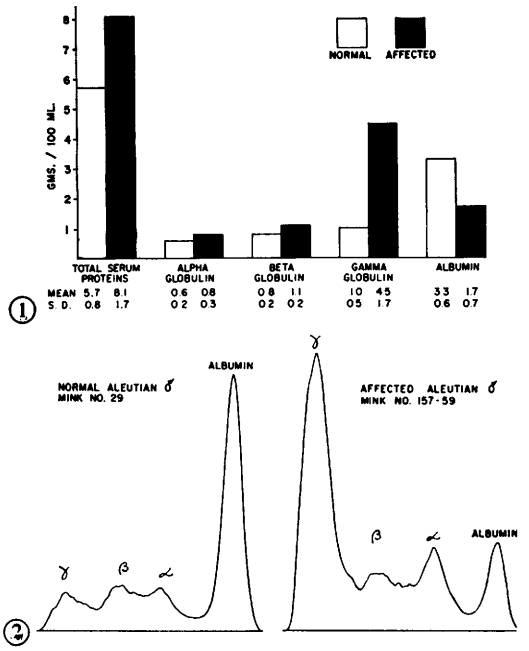

FIG. 1. The mean serum protein values of normal and Aleutian disease affected mink.

FIG. 2. Zone electrophoresis or normal and affected Aleutian mink serum.

terminations are summarized in Fig. 1. Total serum proteins and gamma globulin showed an absolute increase and the albumin showed an absolute decrease in the affected group. The differences in these fractions were highly significant using the "t" test. Examples of individual normal and abnormal patterns are shown in Fig. 2. Mink which appeared clinically healthy but later proved to have lesions consistent with this disease also showed abnormalities in the serum proteins. No animals which were normal at necropsy exhibited hypergammaglobulinemia. Normal mink observed in this experiment, regardless of genotype, had relatively the same serum protein levels.

Discussion. There were distinct differences in electrophoretic patterns and quantitative values of the serum proteins, especially gamma globulins, of mink affected by Aleutian disease when compared with those of healthy animals.

In preliminary trials to reproduce the disease experimentally, the authors have injected mink which were homozygous for the Aleutian gene as well as mink which were not homozygous for the gene with a formalinized tissue suspension. The source of tissue was a homozygous Aleutian mink which had lesions of the disease. Hypergammaglobulinemia as well as lesions consistent with Aleutian disease were produced in those animals which were homozygous for the Aleutian gene.

Mink with the naturally occurring disease have proteinurea and protein casts in the renal tubules. The result would be the loss of serum protein. Even though there is such a loss, total serum protein values in the diseased mink are raised. Therefore, there must be sufficiently increased serum protein production to compensate for the loss and yet raise the total amount of protein in the serum.

The finding of hypergammaglobulinemia in mink with plasmacytosis and vasculitis stimulates speculation that there may be similar pathogenetic factors in Aleutian disease of mink and such conditions as polyarteritis, lupus erythematosis, and other connective tissue diseases of man.

Summary. The electrophoretic patterns of normal and Aleutian disease affected mink have been determined. The serum from diseased animals had increased total serum proteins, increased gamma globulin, and decreased albumin.

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