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Response of the Coyote to Endotoxin. (32068)

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The coyote *(Canis latrans)* is a shaggy, dog-like animal, somewhat smaller than a Collie dog, with erect pointed ears and bushy, drooping tail. Its taxonomy, habitat, and general characteristics have been described in detail(1,2). Pathophysiological studies contrasting its responses with those of the dog *(Canis familiaris)* appear to be lacking in the literature. Recent research has described the various responses of dogs to endotoxin(3,4,5) as well as other species; including cats, bears, monkeys, rabbits and chickens(4,6-11). Dogs respond to a lethal injection of endotoxin with portal hypertension leading to a marked drop in venous return and systemic arterial pressure(4), followed by generalized splanchnic congestion, hemorrhage, edema, acidosis, and hemoconcentration. Notable species differences have been observed in dogs and monkeys and are primarily concerned with responses of the hepatosplanchnic bed(6,9). It was thought to be of interest to study the response of the coyote to endotoxin in terms of its resistance, hemodynamic alterations, and histopathology.

Materials and methods. Experiments were carried out on 9 adult coyotes obtained from the Oklahoma City Zoo. Animals were of either sex, weighing between 8.2 and 12.1 kg. They were intravenously anesthetized with 30 mg/kg sodium pentobarbitol. *E. coli* endotoxin obtained from Difco (Detroit, Mich.) was administered to all animals after obtaining control measurements. Four animals were used for survival studies. An LD_{80} dose, recently established in dogs in this laboratory, was 0.4 mg/kg; however, the first coyote survived a 2 mg/kg injection. The remaining 3 animals received 4 mg/kg; one animal died within 24 hours and the remaining, within 3 days. This latter dose was administered to 5 other coyotes and a variety of parameters were measured. Systemic arterial pressure was obtained by advancing a polyethelene catheter from the femoral artery into the aorta, connecting it to a Statham pressure transducer, and recording pressures on a Sanborn direct writing recorder. Portal vein pressure was measured by advancing a catheter from a splenic vein to the main portal vessel following a laparotomy. Hematocrit, pH, and heart rate were periodically recorded after endotoxin. Liver function was evaluated by a colorimetric method for the determination of serum glutamic oxalacetic and glutamic pyruvic transaminase (SGOT)(12). Sigma reagents were used in a procedure specifically outlined by the Sigma Technical Bulletin (Sigma Chemical Co., St. Louis, Mo.). Blood urea nitrogen (BUN) determinations were carried out by the automatic autoanalyzer diacetyl method(13). Gross and histological observations were made on animals in the latter group in which blood pressures were followed for 4 hours.

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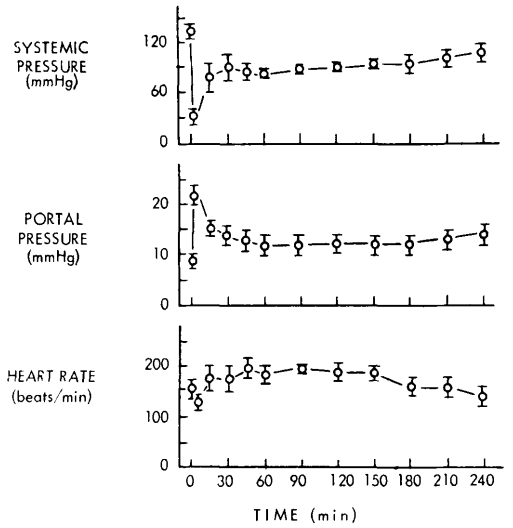

FIG. 1. Effect of endotoxin on systemic arterial pressure, portal vein pressure and heart rate (each value represents means ± SE of 5 coyotes).

Results. Results from these studies are shown in accompanying Figures: A marked drop in mean systemic arterial pressure and a concomitant rise in portal vein pressure occurs within 2 minutes after endotoxin. Arterial pressure shows a recovery toward control values during the 4-hour period after endotoxin administration. Portal vein pressure declines toward, but never reached, control values during this period. Heart rate remains above control during most of the observed period (Fig. 1). The hematocrit significantly rises after endotoxin while pH remains relatively constant (Fig. 2). SGOT and BUN values shown in Fig. 3 indicate a progressive increase in SGOT (decrease in liver function) and constant BUN values suggest normal renal activity. Gross and histological examination of the sacrificed coyotes shown in the above figures revealed relatively normal hearts, stomachs, and lungs. Livers, kidneys, and adrenals were congested, while necrosis was seen in the intestine, and edema observed in the gall bladder.

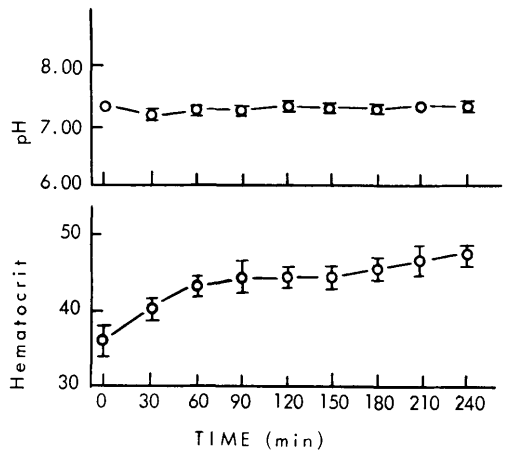

FIG. 2. Effect of endotoxin on pH and hematocrit (each value represents means ± SE of 5 coyotes).

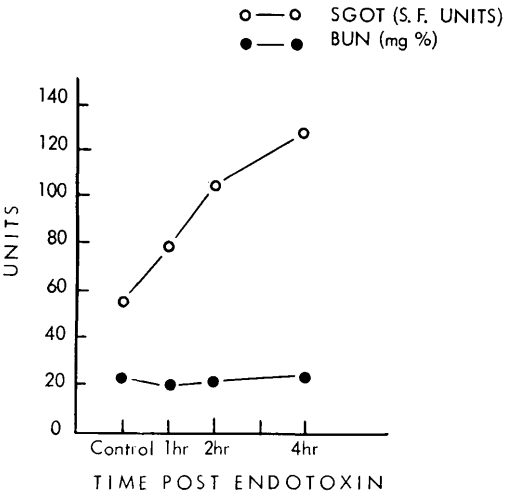

FIG. 3. Effect of endotoxin on SGOT and BUN tests in coyotes (mean values, 9 animals, zero time; 5 animals, 1-2-4 hours).

Discussion. Results from this study reveal the coyote to be more resistant to endotoxin than its domestic counterpart(3,4,5), in terms of better survival ability, more rapid restoration of arterial blood pressure, diminished degrees of hypotension and bradycardia(4,5), improved acid-base balance and lessened splanchnic congestion after endotoxin. The liver appears to be the primary "target organ" of endotoxin in this species in regard to hemodynamic, histological, and functional abnormalities. Although renal congestion was elicited by endotoxin, renal function appeared to be uninterrupted during the acute phase of shock. Maintained cordiopulmonary and renal functions after endotoxin may have provided a better basis for survivability to endotoxin.

Summary. Responses of the coyote to *E. coli* endotoxin have been studied in animals intravenously anesthetized with sodium pen-

tobarbital. Major results reveal portal hypertension concomitant with systemic hypotension; hemoconcentration; depressed liver function; hepatic, renal and adrenal congestion; intestinal necrosis and gall bladder edema. The liver appears to be the primary "target organ" of endotoxin in regard to hemodynamic, histological, and functional abnormalities. The coyote is more resistant to endotoxin than its domestic counterpart in terms of changes in hemodynamics and survival ability.

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Effect of Dietary Factors on Prothrombin Response to Acenocoumarin in Guinea Pigs.* (32069)

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The influence of dietary factors and gastrointestinal disturbances on the prothrombin response to coumarin anticoagulants has often been reported(1). Relatively short periods of starvation can induce significant exaggerations in the response to these agents (2). Whether this effect is a function of low caloric intake, or an acute deficiency in a specific nutritional component is not known. The present study compares the effects of a balanced diet, starvation and diets free from carbohydrate or protein on the prothrombin response to the anticoagulant, acenocoumarin, in guinea pigs. The data indicate that modest amounts of dietary protein will prevent the exaggerated response resulting from short periods of starvation, whereas an equivalent amount of carbohydrate will not.

Methods. Non-albino male guinea pigs weighing 250-350 g were fed Rockland Guinea Pig diet (Tekland Inc., Monmouth, Ill.) supplemented with lettuce and water *ad libitum* until initiation of the experiment. Each animal consumed 25 to 40 g per day. On experimental days 1 through 3, feeding was confined to the pattern described below. Special mixes were prepared by General Biochemicals, Chagrin Falls, Ohio, and contained 15% nonnutritive fiber, 7.3% corn oil, and 9.3% salts, vitamins, and minerals. The carbohydrate mix included 15.0% corn starch, 10.3% sucrose, and 42.8% glucose, while the protein mix included 68.1% casein. Diets were fed by hand in the form of 10 capsules (Parke, Davis No. 3) twice a day, each containing 200 mg of pulverized food (total of 4 g per day) and was regularly observed to be

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