

Inulin and PAH clearances were obtained in each of ten unanesthetized dogs on three days to establish control levels. The dogs then received daily intramuscular injections of ACTHAR-gel, 100 mg./M² for ten to twelve days, and the clearances were repeated between the fourth and twelfth day of administration. In twenty-nine determinations, each the average of three periods, the mean changes in function and the range compared to the controls were: C_{in}, +43.7 per cent (+6 per cent to +95 per cent); C_{PAH}, +52.4 per cent (-1 per cent to +117 per cent). Five dogs received riothane (DDD) in daily oral doses of 14.5-200 mg./kg. for seven to sixty-six days. In fourteen determinations the mean changes from control and the range were: C_{in}, -21.5 per cent (+13 per cent to -44 per cent); C_{PAH}, -13.4 per cent (+16 per cent to -30 per cent). While continuing riothane, ACTH administration was repeated. In nineteen determinations the mean changes from control and the range were: C_{in}, -3.2 per cent (+12 per cent to -19 per cent); C_{PAH}, +7.1 per cent (+42 per cent to -16 per cent). Four dogs received riothane (200-300 mg./kg. for seven to fourteen days) and ACTH simultaneously. In ten determinations the mean changes from control and the range were: C_{in}, +16.5 per cent (+54 per cent to -5 per cent); C_{PAH}, +17.7 per cent (+39 per cent to -6 per cent). The animals remained in good health without special care. Autopsies showed no renal damage and varying degrees of adrenal atrophy confined to the inner two zones. Conclusion: Alterations of the level of function of the zonae reticularis and fasciculata affect the GFR and RPF in the dog without appreciably altering the electrolyte balance.

EFFECTS OF ACUTE ALTERATIONS IN CARBOHYDRATE METABOLISM ON THE NET SPLANCHNIC KETONE PRODUCTION IN MAN. *H. T. McPherson, E. E. Werk, F. L. Engel* and J. D. Myers.** Dept. of Medicine, Duke Univ. School of Medicine, Durham, N. C.

Utilizing hepatic venous catheterization, we have previously reported a technic for studying net splanchnic ketone production (NSKP) quantitatively in man before and after the intravenous infusion of sodium octanoate, a known ketone precursor. The present study concerns the effects on NSKP of acute alterations in carbohydrate metabolism in mildly ill

males with non-metabolic illnesses, studied in the postabsorptive state.

Four groups of subjects were studied: (1) the control group receiving octanoate alone; (2) those receiving glucose mixed with octanoate; (3) those receiving glucose + insulin mixed with octanoate; and (4) a group studied three hours after a brief period of hypoglycemia.

Group	Basal	NSKP μm/min./ M ²	During Na Octa- noate
Control (octanoate alone)	34 ± 5.20	158 ± 6.86	+124 ± 7.36
Glucose in octanoate.	35.8 ± 6.60	106.3 ± 22.37	+70.5 ± 18.34
Glucose + insulin in octanoate	36.6 ± 12.06	125 ± 17.14	+88.4 ± 6.07
Three hours after hypoglycemia	160.7 ± 46.0	266.3 ± 43.5	105.6 ± 27.8

In both the glucose and glucose + insulin groups there was a statistically significant reduction in the increment of NSKP expected during octanoate infusion. Three hours after a brief period of hypoglycemia there was a markedly increased basal NSKP; however octanoate infusion induced no greater rise in NSKP than that of the control groups. The relationship of these quantitative findings to the so-called "Somogyi effect" noted clinically will be discussed.

EVALUATION OF RADIOSULFATE AS A MEASURE OF EXTRACELLULAR VOLUME IN EDEMATOUS PATIENTS. *L. L. Madison, H. C. Teng, D. W. Seldin,* A. F. Reid and R. MacDonald.* Depts. of Internal Medicine and Biophysics, Southwestern Medical School of The Univ. of Texas, Dallas, Tex.

To evaluate radiosulfate as a means of measuring extracellular volume in edematous states, three approaches were planned in order to circumvent lack of adequate reference standards: the time of diffusion equilibrium was empirically determined by comparing concen-

trations of S^{35} simultaneously in plasma, edema and ascites for fifteen hours; the validity of calculations of the S^{35} space was tested by comparing theoretic time curves of appearance of S^{35} in edema fluid with experimental curves; decrements in extracellular volume (diuresis or paracentesis) were compared with changes in radiosulfate space in the same subjects. Eleven edematous subjects were studied and eight restudied when edema-free.

Results indicate that radiosulfate is a suitable agent for measuring extracellular volume in edematous states for the following reasons: (1) mean time for diffusion equilibrium between plasma and ascitic fluid is 5.5 hours and between plasma and edema fluid is 11.3 hours; (2) mean changes in radiosulfate space from edematous state (24.8 L.) to edema-free state (11.4 L.) compared favorably with decrements in extracellular volume reflected by decreases in weight (13.6 kg.); (3) theoretic (derived from plasma data only) and experimental time curves of appearance of S^{35} into edema fluid were in excellent agreement.

SOME METABOLIC CHARACTERISTICS OF TUBERCULOUS ANIMALS. *S. P. Martin,* R. Green and C. D. Cooper.* Depts. of Medicine and Bacteriology, Duke Univ. School of Medicine, Durham, N. C.

Tissues of animals infected with *Mycobacterium tuberculosis* have a low succinic dehydrogenase activity and this can be restored by a nucleotide from normal tissue. The activity of this nucleotide can be duplicated by coenzyme A which has been treated with nitrous acid. This study deals with other metabolic effects noted in tuberculous animals.

Studies were carried out on the ability of infected animals to acetylate paraaminobenzoic acid. Control and infected guinea pigs were given 1 mg. of paraaminobenzoic acid and urine collected over a twelve-hour period. The free and acetylated derivatives were measured. The degree of acetylation in the control animals was 0.883 ± 0.037 , in the infected animals 0.635 ± 0.075 mg. ($p < 0.02$). Studies were also carried out on non-protein sulfhydryl content of the tissues. The kidneys of infected animals have an elevated non-protein sulfhydryl content. Control values were 77 ± 3 mg. of glutathione per 100 gm. of tissue compared with 107 ± 9 ($p < 0.01$) for the infected animals.

It is suggested that these changes indicate disturbance in metabolism of high energy

compounds and in protein synthesis which may account for part of the clinical picture of this disease.

MIXING IN BIOLOGICAL SYSTEMS. *G. R. Meneely.** Research Laboratory and Radioisotope Unit, Thayer V. A. Hospital, and Dept. of Medicine, Vanderbilt Univ. School of Medicine, Nashville, Tenn.

A differential equation may be derived from the assumptions that the rate of mixing or disappearance of tracer substances is not only proportional to concentration but also inversely proportional to time. The integral of this equation is:

$$\text{Exponential form: } y = C_1 t^{-k}$$

$$\text{Log form: } \log y = -k \log t + \log C_1.$$

Since the tracer is already at a finite dilution when introduced the paradox of divergence of the time integral at zero time is resolved. This formulation or one derivative from it provides extraordinarily closely fitting curves to the most diverse sorts of biological mixing data such as the disappearance of radiopotassium from the blood of rats, of radiosodium from the blood of man, of radiobromine from the blood of the dog, of diiodotyrosine from the blood of the rat, of methenamine mandelate from the blood of man, and of helium mixing in the human lung. By double logarithmic plot it is easy to test whether given data may be fitted and the constants C_1 and k may be evaluated directly.

RELATIONSHIPS BETWEEN HALF-SECOND EXPIRATORY CAPACITY TEST AND LUNG VOLUMES AND INDEXES OF INTRAPULMONARY GAS DISTRIBUTION IN EIGHTY-FIVE PATIENTS WITH VARIOUS PULMONARY DISORDERS. *W. F. Miller, R. L. Johnson, Jr. and Nancy Wu (introduced by D. W. Seldin*).* Dept. of Internal Medicine, Southwestern Medical School of The Univ. of Texas, Dallas, Tex.

By plotting in a quadrantic system pulmonary stroke volume (estimated from vital capacity) and velocity air-flow (estimated from half-second expiratory capacity, 0.5 Sec. EC), precise expressions of the nature and extent of ventilatory insufficiency are obtained. By this method ventilatory defects were characterized as: obstructive (decreased velocity air-flow), restrictive (decreased pulmonary stroke volume), and combined. To examine the significance of ventilatory disturbances revealed by this analysis the anatomic extent of disorders was estimated