coids in the serum were measured in the 18 hospitalized children with diabetes, and were normal. These same 18 children showed normal changes in free serum corticoid levels following administration of ACTH (10 mg. per square meter of body surface area, given intravenously) or cortisone (60 mg. per square meter of body surface area, given orally). Klein and his colleagues therefore believe that the elevated levels of free corticoids in the serums of their diabetic patients are not due to any abnormalities in the metabolic utilization or breakdown of adrenal corticoids once these have been released into the blood stream.

The authors select three possible interpretations of their own data for brief discussion: (1) An increase in adrenocortical activity (primary, or secondary to hypothalamico-pituitary activity) may be a primary part of diabetes mellitus in the young patient; similar investigations of serum corticoid levels in prediabetic children would help to establish or disprove this concept. (2) The increased availability of acetyl-coenzyme A, and its concurrent diminished utilization by other tissues of diabetic patients (*Nutrition Reviews* **13,** *74 (1955)*), may lead to overproduction of steroid hormones by the adrenal cortex; the lack of correlation of corticoid level with cholesterol content of the serum argues against this interpretation. (3) The inference can be drawn that a child with diabetes who has elevation of adrenocorticoid concentration in his serum is under constant stress because of his diabetes and its treatment.

The correlation of serum corticoid levels in diabetic children with criteria ordinarily used to estimate the "degree of control" of the diabetes, *i.e.*, urinary reducing substances and acetone, and evidences of acidosis, suggests to the authors that children in poor control are under constant stress. However, they also consider an alternative possibility that poor control may be the result of more severe disease rather than of the therapeutic program prescribed or the faithfulness with which the regimen is carried out by the patient and his family.

The studies which have been summarized strongly suggest that adrenocortical steroids exert important effects in the metabolism of carbohydrates. Furthermore, the derangement of normal carbohydrate metabolism described clinically as diabetes mellitus is characterized not only by an insufficiency of endogenous insulin, but also by hypersecretion of the adrenal cortices, at least in children with the disease. Adrenocortical hyperactivity is even further increased during the response to hypoinsulinism described clinically as diabetic acidosis. The ease with which the clinician can "regulate" the diabetes of an individual patient by means of dietary and insulin therapy may be governed, at least in part, by the adrenocortical functional status of the patient. Onset of vascular degenerative changes in patients with diabetes may relate to the severity of the general endocrine imbalance present, as a part of which adrenocortical hyperactivity may prove to be at least as important as hypoinsulinism or dietary abnormalities. Additional studies which utilize methods similar to those employed by McArthur and her co-workers and by Klein and his colleagues should help to clarify the role of adrenal corticosteroids in normal carbohydrate metabolism, and also should improve the ability of clinicians to treat physiologically the most common of all diseases due to endocrine imbalance, diabetes mellitus.

METABOLIC EFFECTS OF DIHYDROTACHYSTEROL

In order to delineate the actions of dihydrotachysterol (antitetanic preparation No. 10; A.T. 10) on calcium and phosphorus metabolism, P. D. Saville and co-workers (*Clin. Sci.* **14,** *489 (1955)*) have studied metabolic balance in 6 patients with resistant

rickets. The serum calcium was normal in these patients, but the serum phosphorus was 3.0 mg. per cent or less. This value is quite low when it is compared to the normal value of 4.5 to 5.0 mg. per cent in the growing child.

A.T. 10 was given in doses of 1.25 mg. to 10 mg. daily. In all cases this resulted in a rapid decrease in fecal calcium and phosphorus. In 4 of the patients there was no change in urinary calcium or phosphorus, so that a considerable positive balance was achieved. In one patient with healing rickets, urinary calcium and phosphorus excretion increased so that the net positive balance was small, and in one other patient excessive urinary loss of calcium and phosphorus led to negative balances.

Following the initial period of study with A.T. 10, 1 g. of phosphorus (as sodium acid phosphate) was added to the regimen. This led to a rise in serum phosphorus to levels of 5 mg. per cent, a slight drop in serum calcium and a marked decrease in urine calcium. In no case did the addition of sodium phosphate increase the fecal calcium, so that calcium balance became more positive in every instance.

These authors review previous pertinent experimental data and suggest that the effects of A.T. 10 and vitamin D are, in part, dependent upon the status of bone metabolism. Thus, in the calcium-depleted subject, calciferol will increase intestinal absorption of calcium and phosphorus while increasing renal tubular reabsorption of phosphate. In the normal individual, however, calciferol increases the urinary loss of phosphorus without altering the serum levels, so that renal tubular reabsorption must have decreased. Previous comparative studies of A.T. 10 and calciferol ignored this point. The authors conclude that A.T. 10 and vitamin D are alike in their effect upon calcium and phosphorus metabolism.

The treatment of resistant rickets with vitamin D has not been satisfactory, although positive calcium balance may be attained. Usually, despite these measures, the serum phosphorus remains below 4 mg. per cent. If the childhood level of serum phosphorus of 5 mg. per cent is necessary for optimal bone growth, then measures to achieve this would be of practical importance.

The studies reported here demonstrate conclusively that the addition of phosphorus to the diet increases the positive calcium balance and raises the serum phosphorus. Thus, the antirachitic effect of A.T. 10 was increased by this measure. As the effects of A.T. 10 or vitamin D cannot be increased by raising the dose because of higher urinary excretion of calcium, this addition of phosphorus to the diet constitutes a valuable measure in the treatment of resistant rickets.

PHOSPHATE TRANSFER IN THE DIGESTIVE TRACT

An exchange of minerals between the gastrointestinal contents and the blood has long been recognized as a normal physiologic process. Such an exchange provides an appropriate buffer for digestive secretions and probably also serves in other important ways to facilitate normal functioning of the digestive system. Secreted phosphorus (endogenous phosphorus) in intestinal contents in the rat was estimated to be equal to or exceeded by that supplied by the feed, in studies conducted many years ago with the use of an inert material (ferric oxide) as a reference or tracer substance (O. Bergeim, *J. Biol. Chem.* **70,** *51 (1926)*). This so-called "internal circulation of phosphorus" has recently been studied in swine by the use of radioactive phosphorus (P^{32}) as a reference substance (A. H. Smith, M. Kleiber, A. L. Black, and J. R. Luick, *J. Nutrition* **57,** *497 (1955)*).

Swine 2, 4 and 8 months of age, representing 5, 20 and 50 per cent of mature body weight respectively, received a single in-