CLXX. NOTE ON THE PHOSPHORIC ESTER CONTENT OF THE RED CELLS AND LIVER, AND THE PHOSPHATASE OF THE KIDNEY IN EXPERIMENTAL OSTEOPOROSIS IN YOUNG RATS.

BY DOROTHY IRENE SKILL AND HERBERT DAVENPORT KAY.

From the Department of Biochemistry, University of Toronto, and the National Institute for Research in Dairying, University of Reading.

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It has been shown [Kay, 1932] that in young rats given a rachitogenic diet (Steenbock 2965, McCollum 3143, or normal diet + 0.5 % beryllium carbonate) the phosphoric ester contents of the red blood cell and of the liver are markedly diminished. Recent experiments, one of which is detailed below, indicate that this effect is not confined to high Ca-low P diets, but may be shown equally on a low Ca-high P diet sufficiently severe to cause typical osteoporosis (demonstrated by X-ray photographs or histological findings). In the experiment shown in Table I several litters of the same age were divided into 5 groups of eight animals each and maintained under similar conditions on the different diets for 21 days before the determinations were made.

Table I.

Each figure is for the pooled blood or tissue from all the eight animals in each group.

Diet	X-ray findings	Inorganic P in plasma mg. P per 100 ml.	Ester-P in 100 ml. of red cells mg. P	Ester-P in 100 g. of liver mg. P	Units phosphatase per 100 g. kidney
Normal stock	Normal	6.4	79	89	28
McCollum, 3143	Rickets + + +	1.6	42	37	19
Steenbock, 2965	Rickets + + +	2.7	42	37	22
High P-low Ca	Osteoporosis	4.9	44	47	15
Steenbock, 2965 + C.L.O.	? Very slight rickets in 1 animal; rest normal	3.0	67	70	26

Table I shows that despite the excess of P in the osteoporosis-producing diet, the cessation or distortion of the normal process of bone growth was accompanied, as in true experimental rickets, by a marked lowering of both the ester-P content of the erythrocytes and liver, and the phosphatase activity of the kidney. In other experiments [Kay, 1932; Kay and Skill, 1934] it has been repeatedly observed that the amount of phosphatase per g. of kidney tissue in rats suffering from experimental rickets (in whatever manner induced), from experimental osteoporosis or from hypervitaminosis D is practically without exception lower than that found in normal litter-mate controls. The reason for this is not clear. It is evident, however, that another tissue must be added to the

list of those (bone, red blood cells, brain, liver) which have already been shown to become biochemically abnormal as the result of a gross imbalance between Ca and P in the diet.

SUMMARY.

In osteoporosis in rats caused by a low Ca-high P diet, despite the high phosphorus intake, the phosphoric ester content of unit volume of red blood cells or of unit weight of liver tissue is diminished. The phosphatase activity of the kidney is also reduced in experimental osteoporosis as in experimental rickets.

REFERENCES.

- Kay (1932). *J. Biol. Chem.* **99**, 85.
Kay and Skill (1934). *Biochem. J.* **28**, 1222.