

## 179 (2139)

**The influence of nutrition during the pre-experimental period on the development of rickets in rats.**

By ALFRED F. HESS, M. WEINSTOCK and E. TOLSTOI.

[*From the Department of Pathology, College of Physicians and Surgeons, New York City.*]

Whether or not rickets develops on standard "rickets-producing" dietaries may depend on the stock of rats which is used. In our experiments rats from six different sources were tested. It was found that four of these stocks regularly developed rickets when fed from the age of four to eight weeks on the Sherman-Pappenheimer diet; one stock developed rickets but showed a definite tendency to spontaneous calcification of the bones, and one absolutely failed to develop rickets. This refractory group comprised 50 rats four weeks of age. They failed to develop rickets either on the low phosphorus and high calcium diet (No. 84) or on the low calcium and high phosphorus diet (No. 85 C). On the dietary employed by McCollum and his associates, which contains 3 per cent. of calcium carbonate, rachitic lesions developed in some animals but not in others. It is evident, therefore, that the term "rickets-producing dietary" cannot be applied unreservedly but rather in relation to definite stocks of animals.

The divergence in susceptibility is, to some extent, associated with a variability in the percentage of inorganic phosphate of the blood. There is, however, no strict parallelism in this respect. The blood of rats four weeks of age has been found to vary in this constituent from 6.5 mg. to 12.0 mg. per cent.; the calcium has ranged from 6.1 mg. to 8.2 mg. per cent.. The refractory rats had the highest percentage of inorganic phosphate in the blood.

The resistance of this stock is not to be attributed mainly to peculiarity of strain or breed but to previous diet, for it was overcome by modification of the dietary. Pregnant rats of this strain were obtained and fed the stock laboratory dietary as soon as they had given birth to young and throughout the lactating period. At the end of four weeks the young were placed on the

low phosphorus "rickets-producing" diet. It was found that these rats were not refractory but developed rickets to the same extent as the five other stocks that had been tested. Evidently the alteration of the diet during the first four weeks of life was the determining feature. It will be noted that the diet throughout pregnancy was unchanged.

After about the tenth day of life young rats not only suckle but consume supplementary food. The acquired susceptibility may, therefore, have resulted from an inadequacy of the food consumed directly by the young, and not from an inadequacy of the mother's milk. Experiments seem to confirm this point of view. For example, a mother rat which was given 20 drops of cod liver oil daily in addition to our laboratory diet, gave birth to young which were not refractory to rickets. This would lead us to believe that it is difficult to furnish the young with an adequate amount of protective substance through the mother's milk. It seems certain that in young rats the character of the food during the first four weeks of life is of decisive importance regarding their later susceptibility to rickets. This probably indicates that protective anti-rachitic substances can be stored in the body. A discussion of the constitution of the various dietaries used in these tests is deferred until further experiments are carried out.

### 180 (2140)

#### The various forms of phosphoric acid in the blood. Findings in rickets.

By T. F. ZUCKER and MARGARET GUTMAN.

*[From the Department of Pathology of the College of Physicians and Surgeons and the Chemical Laboratory of the Pediatrics Service, First Medical Division, Bellevue Hospital, New York City.]*

It is well known, that in rickets the inorganic phosphate in the blood is low. We have shown previously that in rachitic as well as in normal blood the inorganic phosphate is the same in the cells and in the plasma, and we have also given evidence