the injection of 1/20 mg. of l-epinephrine the pressure rose to 198 systolic and 110 diastolic. The administration of 1 mg. of d-epinephrine produced a rise in systolic pressure to 190 and in the diastolic to 110. The blood pressures returned to the original level within 3 minutes with both substances. With both isomers the duration of the cardiac effect was 5 times that of the pressor reaction.

6950

Iodine Content of Human Skim Milk from Goitrous and Non-goitrous Regions.

R. G. TURNER. (Assisted by M. Z. Weeks.)

From the Department of Medical Research, Detroit College of Medicine and Surgery.

Published figures for the iodine content of cow's and women's milk are not consistent. The foreign investigators[1] report for cow's milk, 1γ-3γ% and for human milk after the fifth lactation day 2γ-4γ%. American investigators[2] find that the percentage in cow's skim milk, calculated on the dry basis, may vary between 14.0γ and 130.0γ%.

This investigation includes a study of the iodine content of the milk from mothers in Detroit, a goitrous region, and from mothers in Boston, a non-goitrous region. The mothers were normal and showed no signs of thyroid hyperplasia. The value of iodine was determined in the milk of mothers at varying intervals during the mature lactation period. The calcium and inorganic soluble phosphates were also determined and compared with the fluctuations found for iodine.

The milk was obtained through the courtesy of the Detroit Mother's Milk Bureau and The Directory for Mother's Milk, Boston. Nine cases were studied from the former and 10 cases from the latter.

Micro methods were used for the determination of calcium, in-

[1] Maurer, E., and Diez, S., *Munch. Med. Woch.*, 1926, **73**, 17; von Fellenberg, T., *Ergebn. Physiol.*, 1926, **25**, 176; Maurer, E., and Ducrue, H., *Munch. Med. Woch.*, 1928, **75**, 249.

[2] McClendon, F., Remington, R. C., and von Kolnitz, H., *J. Am. Chem. Soc.*, 1930, **52**, 541; 1931, **53**, 1245.

organic soluble phosphates, and iodine. Samples of one ounce were received and a 10 cc. portion of this was needed for the micro-iodine estimation, as described by the author.[3, 4] The calcium and inorganic soluble phosphates were determined on the trichloracetic acid filtrates from 2 cc. of skimmed milk. Calcium was estimated by the method of Clark,[5] the inorganic soluble phosphates by the method of Benedict and Theis.[6] The results represent analyses of 295 samples of milk.

The average iodine content of human skim milk may vary among women and at different times during the lactation period from 6.0γ to 23.0γ%. The average is 12.4γ. There is a marked variation in individuals. The average iodine value is higher throughout the lactation period in a goitrous region than in the non-goitrous region, averaging 14.5γ and 12.4γ%, respectively. The percentage difference is greatest in the early months of lactation approaching the same level after the eighth month with a percentage difference of only 2.9 in the tenth lactation month. The monthly averages of all cases are plotted in Chart 1. Omitting case 5, Detroit, (used iodized salt daily) the iodine curve more closely resembles that of the Boston group, but the average value continually remains higher.

The calcium and inorganic soluble phosphate curves run parallel for each group investigated. The milk from the Detroit mothers is more concentrated in both these constituents during the early months of lactation. The values for both drop continually to the fourth month where they reach approximately the same level as the Boston group, then gradually fall below this level. In general the results show that the iodine content of human milk follows the trend found for calcium and phosphorus, decreasing in concentration after the third or fourth lactation month to the end of the mature lactation period.

These findings represent a compensatory action on the part of the physiological mechanism of the mother from the goitrous region to supply a greater amount of iodine to the child than is naturally supplied in the milk of mothers from a non-goitrous region. Else[7] states that if the thyroid gland of a mother is not secreting enough thyroxin during pregnancy a demand is thrown upon the child's gland to function. This causes a secretion of colloid which results

[3] Turner, R. G., *J. Biol. Chem.*, 1931, **88**, 497.

[4] Turner, R. G., and Weeks, M. Z., *J. Am. Chem. Soc.*, 1933, **55**, 254.

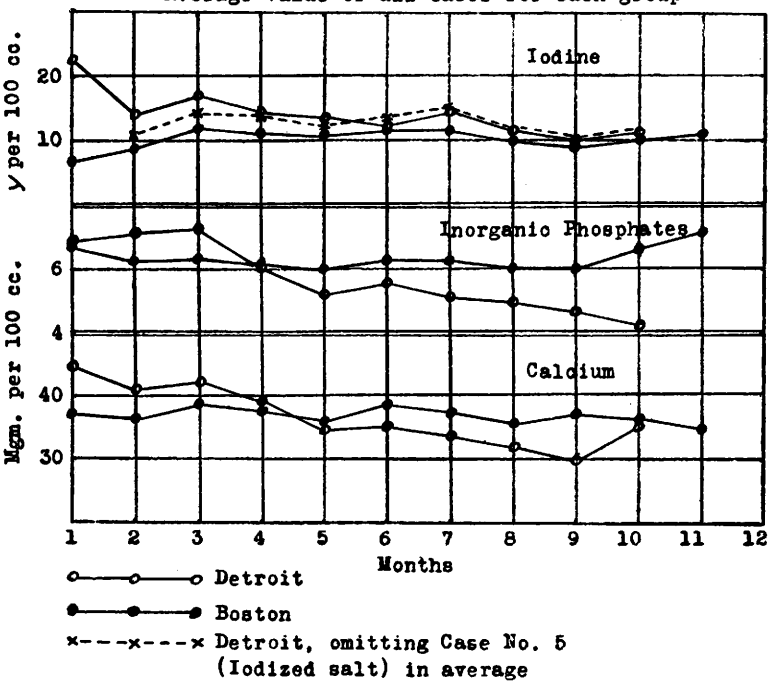
[5] Clark, G. W., *J. Biol. Chem.*, 1921, **44**, 487.

[6] Benedict, S. R., and Theis, R. C., *J. Biol. Chem.*, 1924, **61**, 63.

[7] Else, J. E., *Bull. Assn. Study Intern. Secret.*, 1929, **13**, 40.

Chart 1. Iodine, Inorganic Phosphates, and Calcium

Average value of all cases for each group



in a colloid goiter. If enough iodine is not supplied in the mother's milk, this same demand may be made upon the lactating infant's gland. The perfectly normal thyroid gland receiving sufficient amount of iodine will not develop goiter. Thus the theory of the compensating act of the mother to provide more iodine for an infant born in a non-goitrous region is reasonable as well as justified by the actual findings in this research. This further shows that the natural prevention of goiter in an individual born with a normal thyroid is largely that of supplying a greater amount of iodine in its diet.