MASS SCREENING SYSTEM FOR NEONATAL CRETINISM BY THYROXINE ASSAY IN DRIED BLOOD SPOT

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It is recently accepted that the mass screening of neonatal cretimism is of social importance because of its high incidence and applicability of replacement therapy. In the present study the mass screening system was developed by primary determination of thyroxine (T_4) level in dried blood spot from neonate.

Dried blood on filter paper disc of 6 mm in diameter was punched and eluted with 200 µl of Barbital buffer containing bovine gamma globulin for 18 hours at 4°c. Fifty ul of anti-T_4 antiserum solution and 250 µl of ^{125}I-T_4 solution were then added to the assay tubes. After 3 hours of incubation at room temperature B/F separation was performed by polyethylene glycol. The radioactivity of the pellet was counted and T_4 level of each disc was computed. The whole procedure was performed using Total System of RIA (Micromedic Co.). The sensitivity of this T_4 assay was 1.0 µg/dl of serum which seems sensitive enough to discriminate the doubtful samples from normal. The level of T_4 in dried blood spot remained constant for at least 9 weeks at room temperature. The close correlation (r=0.98) was observed between the T_4 levels of serum and dried blood spot from the identical patient. The mean and standard deviation of T_4 in serum determined from dried blood spot was 11.5 $\pm$ 3.6 µg/dl in normal neonate.

As primary screening the whole samples are assyed for T_4 level and samples which shows T_4 level lower than M-1.65SD are selected as doubtful samples. The TSH level is then assayed using 2 disc of 1/8" in diameter by radioimmunoassay of polyethylene glycol method. The samples which shows the level of TSH higher then 20 µU/ml are then checked and the neonates are recalled to the clinics. Among 3000 random samples one patient with cretinism was found in our laboratory.

It is suggested that T_4 is of value as the primary index in mass screening of neonatal cretinism.

USEFULNESS OF RADIOISOTOPE METHODS IN IDIOPATHIC HYPOPARATHYROIDISM

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Radioisotope techniques were applied to idiopathic hypoparathyroidism in studying its pathophysiology and in evaluating the response to treatment with active vitamin D analogue, 1αOH D_3.

Clinically established 3 patients were examined. Measurements of Ca regulating hormone were done as below; RIA for calcitonin and parathyroid hormone(PTH), RRA for 1,25 $(OH)_2D$, and U.V. absorptiometry with high pressure liquid chromatography for D_3, 25OH D and 24,25$(OH)_2D$. Bone scintigraphy was done with ^{99m}Tc MDP. Intestinal ^{47}Ca absorption test, and measurement of bone mineral content(BMC) by photon beam absorptiometry were performed prior to and after treatment with 1αOH D_3.

The serum PTH was below the detection limit. The serum calcitonin, D_3 and 24,25$(OH)_2$ D were within normal range. The 1,25$(OH)_2D$, most active form of vitamin D, was below less than 4pg/ml, which was the detection limit. The intestinal absorption rate of Ca was markedly reduced. The uptake of isotope was relatively high in soft tissue, comparing with bone.

After the treatment, the serum Ca, P and intestinal Ca absorption rate returned back to normal, and BMC was decreased, indicating the increased bone activity.

In conclusion

It is speculated that the major pathophysiology of idiopathic hypoparathyroidism is resulted from the deficiency state of 1,25$(OH)_2D$, which is caused by the primary deficiency of PTH in PTH-1,25$(OH)_2D$ system, and that 1αOH D is able to improve the symptoms and signs, and restore the abnormal biochemical findings to normal.

Also it is shown that the radioisotope techniques are useful in studying and evaluating the pathophysiology of idiopathic hypoparathyroidism.