(2) Application to Mass Screening

a : Congenital diseases

NEONATAL MASS-SCREENING FOR CONGENITAL HYPOTHYROIDISM. H.Inomata and H.Nakajima. Department of Pediatrics,School of Medicine Chiba University. Chiba.

It is generally accepted that early diagnosis and treatment in congenital hypothyroidism(CH) is necessary to prevent irreversible mental deficiency.
Before neonatal thyroid screening was started,approximately 60% of patients with CH whose treatment was initiated before 3 months of age had IQ's higher than 90, whereas approximately 25% of the patients whose therapy was started after 3 months of age had IQ's higher than 90,thus only one third of patients had IQ's higher than 90 in Japan.
In the early 1970,neonatal thyroid screening was started in Canada using RIA method to measure the T4 in the eluate of blood spots from filter paper.In Japan the RIA method was used to measure the TSH.
The incidence of CH in North America,Europe Australia and New Zealand is approximately 1:4-5,000. In Japan,377 patients were detected from 2,984,172 neonates until March 1982,so the incidence was 1:8,000. According to the report in Georgia,USA,the incidence was 1:20,000 in Black and 1:5,000 in White. The difference in the incidence might be due to racial factor.
The follow up study on patients with CH detected by screening was reported by the Research Project Team of the Ministry of Health and Welfare on the Screening of CH in Japan. A total of 299 patients born before March 31,1982(107 males and 192 females)were detected. Among 148 cases,129 cases(87.2%)showed their developmental quotient(DQ) or IQ as more than 90,16 cases 80-89,and 3 cases who were complicated with either Down's syndrome or de Lange's syndrome showed less than 70. Mental development of CH detected by screening is almost normal. This result is certainly very satisfying compared to that obtained before screening. But further studies are necessary for minor neurological abnomalies and behavior problem.
In Chiba prefecture, screening of 255,789 neonates was performed by a parallel assay of TSH and T4. 125 TBG deficiency cases(111 males and 14 females) were detected(1: 2,046). The inheritance was X-chromosome-linked dominant transmission with the single active X hypothesis of Lyon. The incidence of male TBG deficiency was 1:1150. Secondary or tertiary CH could not be detected. About 50% of primary CH detected by TSH screening was not detected by T4 screening.
We obtained atypical cases,transient hyperthyrotropinemia and transient hypothyroidism in very low-birth-weight infant.
At present,there are still several problems which must be solved; nation-wide quality control of screening,development of Enzyme-Immuno-Assay method,evaluation of psychoneurological prognosis and influence of prenatal hypothyroidism in CH detected by neonatal thyroid screening.

NEONATAL MASS-SCREENING FOR CONGENITAL ADRENAL HYPERPLASIA DUE TO 21-HYDROXYLASE DEFICIENCY. K.Shimozawa,J.Yata,Y.Igarashi and M.Irie. Tokyo Med.& Dent. Univ. Tokyo, Toho Univ. Tokyo, Hamamatsu Univ. Hamamatsu.

In order to perform neonatal mass-screening for 21-hydroxylase deficiency(21-OHD), a simplified RIA method to estimate 17-hydroxyprogesterone(17-OHP) was devised, using 3mm disc cut from filter paper blood. We used [1,2,6,7-^{3}H]-17-OHP as a tracer, anti-17-OHP-3-CMO-BSA serum as an antibody and saturated ammonium sulfate to separate the bound from free 17-OHP. A significant correlation was observed between "Disc-17-OHP" values and plasma 17-OHP concentrations , although the former were significantly higher than the latter, which was presumably resulted from the cross-reactivity of the antiserum with 17-OH-pregnenolone-sulfate.
Using this method, a pilot neonatal mass-screening study for 21-OHD has been performed in the West of Shizuoka Prefecture since May 1981. During a period of 29 months, 32,314 neonates were studied. We tentatively decided the 99th-percentile as a recalling point, and about 1.04% were candidates for recall by this criteria. Neonates who responded to recall were evaluated by physical examination, family history for 21-OHD and measurements of plasma electrolytes, 17-OHP and 21-deoxycortisol values as well as concentrations of pregnanetriol and pregnanetriolone in single urine specimen.
As a result, 3 infants were proved to have 21-OHD(2;salt-loser, 1;simplevirilizer). Approximately one half of the candidates were premature or low birth weight infants, and at least 80% had the history of some kinds of problems at delivery or in early neonatal period.
In Sapporo City, neonatal mass-screening for 21-OHD has been also performed since June 1982, and 2 patients with 21-OHD were detected out of 24,775 neonates during 14 months. To sum up the results obtained in Japan so far, the incidences of affected patients with 21-OHD and heterozygotes were calculated to be 1 in 11,418(5/57,089) and 1 in 54, respectively.
Despite of the problems remained to solve, the present study demonstrates the feasibility and importance of neonatal mass-screening program for 21-OHD, and suggests that the incidence of 21-OHD is much greater than previously expected by the case assessment method (1 in 43,764).