Cleveland lawyers were often not present at case conferences, and if they had been, the report concludes, they would have recognised that there was often insufficient evidence for a place of safety order.

Specialist assessment teams should be formed in each district, recommends the report. They should contain an approved doctor, senior social worker, and police officer, and the team should have sufficient authority to coordinate the investigation of cases. Referral to this team would occur particularly where there is a suspicion of sexual abuse on the basis of physical or behavioural signs alone or where there is uncertainty whether abuse has occurred. General practitioners and others should not be put off by the clamour that has surrounded the Cleveland inquiry from referring children whom they suspect have been abused. What is important is that they consult others, and the defence societies agree that if necessary general practitioners should break confidentiality. As well as undergraduate and postgraduate training there is an urgent need for immediate inservice training for medical staff. The Metropolitan Police has already taken this initiative and held courses to approve staff of different disciplines.

Much more research is needed into child sexual abuse and its epidemiology. We need studies of the normal appearance of the genitalia, of the clinical course of abuse, and of the importance of different signs and symptoms. In particular more research is needed on the anal dilatation test and the techniques of interviewing young children.

Despite the brilliant way the investigation has been performed and the speedy implementation of its recommendations, many will still wonder whether the disaster in Cleveland could have been avoided. During the past few years many paediatricians have been worried by the lack of objective research on which they could base sound clinical practice. We badly need a health services research authority with the resources to commission research when the service needs quick and authoritative answers. The results can then be distributed through journals or through the chief medical officers' letter that has proved so effective in education about AIDS.

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1 Butler-Sloss E. *Report of the inquiry into child abuse in Cleveland 1987*. London: HMSO, 1988.
2 Standing Medical Advisory Committee of the Department of Health and Social Security. *Diagnosis of child sexual abuse: guidance for doctors*. London: HMSO, 1988.
3 Standing Nursing and Midwifery Advisory Committee of the Department of Health and Social Security. *Child protection: guidance for senior nurses, health visitors and midwives*. London: HMSO, 1988.
4 Department of Health and Social Security and the Welsh Office. *Working together. A guide to arrangements for inter-agency co-operation for the protection of children from abuse*. London: HMSO, 1988.
5 Soden E. *The investigation of child sexual abuse*. London: HMSO, 1988. (Home Office Circular 52.)
6 Department of Education and Science. *Working together for the protection of children from abuse: procedures within the education service*. London: HMSO, 1988. (Circular No 4/88.)
7 Caffey J. Multiple fractures in the long bones of infants suffering from chronic subdural hematoma. *AJR* 1946;**56**:163-73.
8 Kempe CH, Silverman FN, Steele BF, Droegmueller W, Silver HK. The battered-child syndrome. *JAMA* 1962;**181**:17-24.
9 Kempe RS, Kempe CH. *Sexual abuse of children and adolescents*. New York: Freeman, 1984.
10 Mrazek PB, Lynch M, Bentovim A. Recognition of child sexual abuse in the United Kingdom. In: Mrazek PB, Kempe CH, eds. *Sexually abused children and their families*. London: Pergamon, 1981: chapter 4.
11 Markowe H. The frequency of child sexual abuse in the UK. *Health Trends* 1988;**20**(1):2-6.
12 Hobbs CJ, Wynne JM. Buggery in childhood—a common syndrome of child abuse. *Lancet* 1986;ii:792-6.
13 Leventhal JM, Bentovim A, Elton A, Tranter M, Read L. What to ask when sexual abuse is suspected. *Arch Dis Child* 1987;**62**:1188-93.

Screening for neuroblastoma

Japanese studies suggest that it may save lives

Neuroblastoma is the only childhood cancer for which a population screening test has been suggested. There is uncertainty about the effectiveness and cost of screening, the nature and timing of the test to be used, and methods of ensuring its acceptability. These issues were discussed at a recent meeting organised by the department of child health, University of Newcastle upon Tyne, with financial support from two parents' charities, the Neuroblastoma Society and the North of England Children's Cancer Research Fund. The proceedings will be published in *Medical and Pediatric Oncology*.

Neuroblastoma affects about one in 6000 to one in 10 000 children under 15 in developed countries.[1] Around a quarter or more of the cases occur in the first year of life, and 80-85% in the first five years. Patients less than 1 year old at diagnosis and those with stage I and II disease have high survival rates. Most patients, however, have stage III and IV disease, and survival rates are lower, though they may now be improving.[2,3] Most patients whose disease is clinically diagnosed (92% in one study[4]) have raised urinary concentrations of one or both of the catecholamine metabolites vanillylmandelic acid and homovanillic acid. The screening test is based on detecting raised concentrations of vanillylmandelic acid and homovanillic acid during the first six months of life. In some of these children the diagnosis of neuroblastoma will be confirmed, and it is assumed that such presymptomatic patients should have a better prognosis and require simpler treatment, with fewer side effects, than if the disease is diagnosed clinically later. On the other hand, some tumours that are diagnosed clinically regress spontaneously, raising the question of whether tumours detected by screening and successfully treated might have regressed before the child developed symptoms. There will also be cases not identified by the test.

At the meeting Dr Takeo Takeda presented data on detection rates and survival for neuroblastoma in Sapporo, Japan, where screening has been carried out since 1981. He compared these data with those from the province of Hokkaido, where there had been no screening. For this and other screening programmes in Japan survival rates seemed to improve after the introduction of screening.[5,6] There are difficulties in interpreting such findings, and it is hoped that further analyses of these extremely important data can be carried out to elucidate further the effects of the screening programme.

Papers on studies in the north of England, Quebec, and Minnesota covered methods of obtaining samples of urine, of increasing public acceptance of the screening programme, and of estimating concentrations of vanillylmandelic acid and homovanillic acid.

There was agreement that it would be premature to offer screening for neuroblastoma as a service. Further research needs to be coordinated and on a large scale. Ideally children should be individually randomly allocated to be screened or not, but it was considered that the practical difficulties of this are so great that it will be necessary instead to make

comparisons between screened and unscreened population groups. This group allocation will be by area of residence. Ultimately the screening programme must be evaluated by its effect on mortality from neuroblastoma, and the screened and control groups should therefore have access to the same diagnostic facilities and treatment policies. The best approach would be to identify several hundred thousand births of children to be screened and a similar number of controls; deaths from neuroblastoma occurring in at least the first six years of life among these birth cohorts, including those among children who move away from their area of birth, should be ascertained. In practice it may be necessary to define the groups as those living in rather than born in an area. Preliminary analyses may be based on an "intermediate endpoint": one effect of screening should be to reduce the number of cases of stage III and IV disease, and comparison of the numbers of such cases in screened and unscreened populations may provide some initial measure of the effect of screening—assuming that a potentially late stage case detected at an earlier stage by screening will have an improved prognosis.

It is important to ensure that results from research programmes using different methods can be combined. For this a standard core of data common to all studies must be collected. Comparisons between screened and unscreened groups carried out within each study may then be combined in a meta-analysis.

Screening research programmes will also present opportunities to study the biology of neuroblastoma. Such studies may be regarded as a spinoff from the main objectives, but they may also be directly relevant to the crucial question of whether tumours discovered by screening would indeed have progressed to clinical neuroblastoma. It seems possible, for instance, that the frequency of various cytogenetic characteristics may differ in patients whose tumours are detected by screening and in those whose tumours are detected clinically.[7 8]

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1 Parkin DM, Stiller CA, Draper GJ, Bieber A, Terracini B, Young JL, eds. *International childhood cancer incidence*. Lyons: International Agency for Research on Cancer (in press). (IARC Scientific Publications, No 87.)
2 Pritchard J, Kiely E, Rogers DW, *et al*. Long-term survival after advanced neuroblastoma. *N Engl J Med* 1987;**317**:1026-7.
3 Philip T, Bernard JL, Zucker JM, *et al*. High-dose chemoradiotherapy with bone marrow transplantation as consolidation treatment in neuroblastoma: an unselected group of stage IV patients over 1 year of age. *J Clin Oncol* 1987;5:266-71.
4 Tuchman M, Ramnaraine MLR, Woods WG, Krivit W. Three years of experience with random urinary homovanillic and vanillylmandelic acid levels in the diagnosis of neuroblastoma. *Pediatrics* 1987;**79**:203-5.
5 Nishi M, Miyake H, Takeda T, *et al*. Effects of the mass screening of neuroblastoma in Sapporo city. *Cancer* 1987;**60**:433-6.
6 Sawada T, Sugimoto T, Tanaka T, *et al*. Number and cure rate of neuroblastoma cases detected by the mass screening program in Japan: future aspects. *Med Pediatr Oncol* 1987;**15**:14-7.
7 Kaneko Y, Maseki N, Salurai M, *et al*. Chromosomes and screening for neuroblastoma. *Lancet* 1988;i:174-5.
8 Hayashi Y, Inaba T, Hanada R, Yamamoto K. Chromosome findings and prognosis in 15 patients with neuroblastoma found by VMA mass screening. *J Pediatr* 1988;**112**:567-71.

Radiation and mental retardation

Severe retardation may result from exposure during pregnancy

It has been known for 50 years that mental retardation in children may follow exposure to high doses of ionising radiation in the uterus.[1] Such retardation was detected after prenatal radiation from the atomic bombs[2] and followed fetal doses in Hiroshima estimated to be 500-1000 mGy (50-100 rad) or more.[3] The increased incidence of retardation resulted mainly when the radiation exposure had occurred between the eighth and the 15th week after conception—that is, from the 10th to the 17th week after the first day of the last menstrual period.[4] Retardation was also caused, although with a lower risk for each unit dose, between the 16th and the 25th week after conception. Exposures earlier than eight or later than 25 weeks caused no detectable increase. The eighth to 15th week is the time when most cortical neurones become located within the cortex.[5 6]

The dosimetric data suggested a linear relation between risk of severe mental retardation and dose between the eighth and 15th weeks. A severely mentally retarded person was defined as "one who cannot form simple sentences, perform simple arithmetical calculations or care for himself or herself, or [who] was or is institutionalised or unmanageable."[6] The risk of severe mental retardation was one in 2500 for each milligray (one in 250 for each rad).[6] There was no evidence of a threshold below which there was no effect, but a threshold of 100 mGy (10 rad) could not be excluded.[6] For the time between the 16th and 25th week after conception the risk was about one in 10 000 for each milligray (one in 1000 for each rad); the dose effect relation was curvilinear and consistent with there being a threshold.

A separate review of intelligence tests on these children tends to confirm that the time of greatest sensitivity was between the eighth and 15th weeks after conception and the time of lesser sensitivity between the 16th and 25th weeks.[6 7] There were no changes in those exposed before the eighth week or after the 25th week.[6 7]

A report recently published by the Radiation Effects Research Foundation in Hiroshima updates the information on the induction of mental changes in the light of the revised and more detailed estimate of doses of radiation received by those exposed at Hiroshima and Nagasaki.[8] The estimated risks are little changed. The likelihood of a threshold for exposure during the 16th to 25th week is confirmed—at 700 mGy (with a lower 95% confidence interval of 200 mGy). For the more sensitive time between the eighth to 15th weeks a linear model with no threshold still gives a statistically adequate fit to the data. Now, however, if linear models are tested without the constraint of postulating a threshold of zero, fits are obtained indicating substantial thresholds below which mental retardation would not result. When data on all children are included the maximum likelihood threshold value averages about 250 mGy on the different criteria tested (with mean 95% confidence intervals of 0 and 550 mGy). Or if the analyses exclude five children with conditions that themselves sometimes cause mental retardation a threshold of about 400 mGy is indicated (with mean 95% confidence intervals of 150 and 600 mGy).

Such thresholds would effectively ensure that severe mental retardation would not result from any present environmental exposures of the public, only from severe accidents. Nor would it result from current occupational exposures, in