cervical canal and from around the external os is paramount.²⁹

The correlation between cytology and histology—both of which are subjective—leaves much to be desired,^{30,31} yet smear surveillance has worked well to date. Women who have even one abnormal smear³² are at greater risk of having some grade of cervical intraepithelial neoplasia than women who have normal smears. They require rigorous smear surveillance, which will allow at least one third of patients to return to normal and avoid unnecessary treatment. In this study there was no evidence that cases occurred owing to lack of follow up once abnormal cells were recognised.

The main reason for cases occurring is failure to attend for screening. Recognition as a priority in the *Health of the Nation* has given a welcome boost to the screening programme. The now established national network for screening and rescreening will contribute more than any other factor in preventing invasive disease, which is increasing in young women.

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- 1 Registrar General (Scotland). *Annual report*. Edinburgh: HMSO, 1992.
- 2 Department of Public Health Medicine, Grampian Health Board. *Grampian health profile*. Aberdeen: Grampian Health Board, 1990.
- 3 Cancer Research Campaign. *Facts on Cancer* 1990; factsheet No 12.1.
- 4 Macgregor JE, Baird D. Detection of cervical cancer in the general population. *BMJ* 1963;ii:1631-6.
- 5 Lawson J. Cancer of uterine cervix: some factors influencing survival rates. *Journal of Obstetrics and Gynaecology of the British Empire* 1956;64:819-25.
- 6 Cotton RE, Elwood JM, Jones G. Results of delayed follow up of abnormal smears. *BMJ* 1986;292:779-800.
- 7 Smith A. Cervical cytology screening. *BMJ* 1988;296:1670.
- 8 Anderson DJ, Flannelly GM, Kitchener HC, Fisher PM, Mann EMF, Campbell MK, et al. Mild and moderate dyskaryosis: can women be selected for colposcopy on the basis of social criteria? *BMJ* 1992;305:84-7.
- 9 Thompson B, Fraser C, Hewitt A, Skipper D. *Having a first baby: experiences in 1951 and 1985 compared*. Aberdeen: Aberdeen University Press, 1989.
- 10 Thompson B, Fraser C, Anderson D. Some aspects of first sexual relationships in females, with specific reference to those aged under 16. *Health Education Journal* 1993;52:62-7.

- 11 Bethwaite P, Yeong ML, Halloway L, Robson B, Duncan G, Lamb D. The prognosis of adenocarcinoma of the uterine cervix. *Br J Obstet Gynaecol* 1992;99:745-50.
- 12 Cook GA, Draper GJ. Trends in cervical cancer and carcinoma in-situ in Great Britain. *Br J Cancer* 1984;50:367-75.
- 13 Anderson GH, Boyes DA, Benedet JL, Riche JCC, Matisic JP, Suen KC, et al. Organisation and results of cervical cytology screening programme in British Columbia 1955-85. *BMJ* 1988;296:975-8.
- 14 Laara E, Day NE, Hakama M. Trends in mortality from cervical cancer in the Nordic countries: association with organised screening programmes. *Lancet* 1987;ii:1247-9.
- 15 Grampian Health Board. *Annual report*. Aberdeen: Grampian Health Board, 1990:14.
- 16 Cancer Research Campaign. *Facts on Cancer* 1990; factsheet No 12.2.
- 17 Van Wyngaarden WJ, Duncan ID. Rationale for stopping cervical screening in women over 50 years. *BMJ* 1993;306:967-71.
- 18 van Oortmarssen GJ, Habbema JD, van Ballegooijen M. Predicting mortality from cervical cancer after negative smear results. *BMJ* 1992;305:449-51.
- 19 National Coordinating Network. In: Gray M, ed. *Guidelines for clinical practice and programme management*. Oxford: Hall the Printer, 1992.
- 20 Macgregor JE. False negative smears. *Br J Obstet Gynaecol* 1993;100:801-2.
- 21 Jha PKS, Beral V, Peto J, Hack S, Hermon C, Deacon J, et al. Antibodies to human papillomavirus and to other genital infectious agents and invasive cervical cancer risk. *Lancet* 1993;341:1116-8.
- 22 Cuzick J, Terry G, Ho L, Hollingworth T, Anderson M. Human papillomavirus type 16 DNA in cervical smears as a predictor of high-grade cervical cancer. *Lancet* 1992;339:959-60.
- 23 Curling M, Watson JV. Oncogenes in gynaecological cancer. In: Lowe D, Fox H, ed. *Advances in gynaecological pathology*. London: Churchill Livingstone, 1992:62-6.
- 24 Cooper P, Kirby AJ, Spiegelhalter DJ, Whitehead AL, Patterson A. Management of women with cervical smear showing a mild degree of dyskaryosis: a review policy. *Cytopathology* 1992;3:331-9.
- 25 Silcocks PBS, Moss SM. Rapidly progressive cervical cancer: is it a real problem? *Br J Obstet Gynaecol* 1988;95:1111-6.
- 26 Husain OAN, Butler B, Evans DMD, Macgregor JE, Yule R. Quality control in cervical cytology. *J Clin Pathol* 1974;27:935-44.
- 27 Coppleston LW, Brown B. Estimation of the screening error rate from the observed detected rates in repeated cervical cytology. *Am J Obstet Gynecol* 1974;119:953.
- 28 Berkeley AS, Li Volsi VA, Schwartz PE. Advanced squamous cell carcinoma of the cervix with recent normal Papanicolaou tests. *Lancet* 1980;ii:375-6.
- 29 Macgregor JE. What constitutes an adequate cervical smear? *Br J Obstet Gynaecol* 1991;98:6-7.
- 30 Robertson AJ, Anderson JH, Swanson Beck J, Burnett RA, Howatson SR, Lee FD, et al. Observer variability in histopathological reporting of cervical biopsy specimens. *J Clin Pathol* 1989;42:231-8.
- 31 Ismail SM, Colclough AB, Dinnen JS, Eakins D, Evans DMD, Gadwell E, et al. Observer variation in histological diagnosis and grading of cervical intraepithelial neoplasia. *BMJ* 1989;298:707-10.
- 32 Kirby AJ, Spiegelhalter DJ, Day NE, Fenton L, Swanson K, Mann EMF, et al. Conservative treatment of mild/moderate dyskaryosis: long term outcome. *Lancet* 1992;339:828-31.

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Breast feeding and multiple sclerosis

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Several studies indicate that multiple sclerosis might be a rare result of delayed exposure to a common infectious agent,¹ but some authors have suggested a "geographical predisposing factor" that could be associated with the diet in industrialised countries.² We investigated the association between multiple sclerosis and breast feeding in a case-control study.

Patients, methods, and results

Cases and controls were selected from the patients attending the neurological outpatient department of Cardarelli General Hospital, Naples, where neurologists from the Italian association for multiple sclerosis follow up about 300 patients with this disease. Cases were all the patients observed between 1 March and 31 May 1993 who had a definite diagnosis of multiple sclerosis according to the criteria of Poser *et al.*³ Controls were the first patients observed in the same department during the same period who matched the cases in terms of age (plus or minus five years) and sex. Patients who declined to be interviewed or could not provide reliable information about their feeding during infancy were excluded.

The groups were contacted by two interviewers, who were blind to the objectives of the study and interviewed the same number of patients from each group. Whenever possible the mothers of the patients were interviewed, otherwise the patients provided the information, usually quoting their mothers. Relative risk was calculated by odds ratios with confidence intervals by Cornfield's method. Confounding and effect modification were investigated by stratified analysis. Ninety three cases and 93 controls were enrolled in the study. The diagnoses of controls were back pain and sciatic nerve injury (56), hemiparesis (19), polyneuropathies (15), and other (four). The information was provided by the mothers for 56 (60%) cases and 54 (58%) controls.

The table shows characteristics of the groups. The mean (SD) duration of breast feeding was 8.4 (6.9) months for cases and 12.5 (7.5) months for controls

Characteristics of patients with multiple sclerosis according to case-control status

Characteristic	Cases (n=93)	Controls (n=93)	P value
Sex (M/F)	47/46	47/46	
Mean (SD) age (years)	37.7 (9.5)	37.1 (10.2)	
Low birth weight (<2500 g)	3	3	
Type of birth (vaginal/caesarean section)	90/3	92/1	
Social class (I, II, III/IV, V, VI)	14/79	5/88	0.052
No (%) who did not breast feed	13 (14)	8 (8.6)	0.3
No (%) who breast fed:			
For 0-6 months	29 (31)	14 (15)	0.015
For ≥ 7 months	51 (55)	71 (76.4)*	<0.01

*Odds ratio=0.38, 95% confidence interval 0.19 to 0.74; χ^2 for trend $P<0.01$.

($t=-3.9$, $df=184$, $P=0.001$). The distribution of feeding was the same whether data were provided by the mothers or by the patients. Stratified analysis showed that no factor among those we analysed (birth weight, type of delivery, social class, sex, age group, number of other children in the household) confounded or modified the association between feeding and illness.

Comment

Our data indicate that patients with multiple sclerosis were less likely than controls to have been breast fed for a prolonged period of time. Selection bias is unlikely because cases and controls were contacted in the same department and their mothers were all contacted by telephone by the same interviewers. The validity of information on feeding may be a limit of our methods, but there is no reason to suspect a differential recall between cases and controls.

There are several reasons why prolonged breast feeding may be associated with a decreased risk of multiple sclerosis. Cow's milk contains lower amounts of unsaturated fatty acids, and a different composition of cortex grey matter has been described in bottle fed infants.⁴ This fact could be associated by means of the formation of defective membranes with easier entry of

an infective agent across the blood-brain barrier or with accelerated degradation of myelin itself.² Human milk might actively influence the immune system of the offspring by different mechanisms,⁵ and some features of the immune response among those who have been breast fed for a prolonged period may last for a long time. Alternatively, prolonged breast feeding may be a marker of some unknown socioeconomic characteristic that could be associated with a low risk of illness. The prevalence of prolonged breast feeding in industrialised countries is currently much lower compared with the time when our patients were born. Should our data be confirmed another point would be added to the long list of the benefits of prolonged breast feeding.

- 1 Martyn CN. Childhood infection and adult disease. In: *The childhood environment and adult disease*. Chichester: Wiley, 1991:93-108. (Ciba Foundation Symposia 156.)
- 2 Agranoff BW, Goldberg D. Diet and the geographical distribution of multiple sclerosis. *Lancet* 1974;ii:1061-6.
- 3 Poser CM, Paty DW, Scheinberg L, McDonald WI, Davis FA, Ebers GC, et al. New diagnostic criteria for multiple sclerosis: guidelines for research protocols. *Ann Neurol* 1983;13:227-31.
- 4 Farquharson J, Cockburn F, Patrick WA, Jamieson EC, Logan RW. Infant cerebral cortex phospholipid fatty-acid composition and diet. *Lancet* 1992;340:810-3.
- 5 Hanson LA, Ahlstedt S, Andersson B, Carlsson B, Fallstrom SP, Mellander L, et al. Protective factors in milk and the development of the immune system. *Pediatrics* 1985;75:172-6.

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Management of female prisoners with abnormal cervical cytology

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Women prisoners are at higher risk of developing cervical neoplasia and cervical cancer than is the general population.^{1,2} Her Majesty's Prison Holloway offers all women a health check on admission, which includes screening for sexually transmitted diseases and abnormal cervical cytology. Participation is voluntary. Most of the women in the prison are on remand and stay for short times; a smaller number of sentenced women remain in the prison for longer. The time for treatment and investigation is therefore limited. We studied the reasons for referral of the women with smears suggestive of moderate to severe dyskaryosis, the treatment advised, and the default rate and considered an alternative management.

Subjects, methods, and results

Between June 1986 and March 1991, 270 women with abnormal results on cervical screening were referred for colposcopy, which was done at the prison by a visiting gynaecologist. Treatment was carried out at a nearby hospital on an inpatient or outpatient basis. Often the women were released after court appearances before adequate assessment and treatment, and 64 women were released before attending for colposcopy.

Each of the 206 women who attended for colposcopy had a brief gynaecological history taken, repeat screening if indicated, and a directed punch biopsy or cervical conisation arranged. The biopsy was done to determine the grade of the lesion and the treatment or follow up required. We assessed the cytological specimens to determine the prevalence of abnormal cervical smears in the screened prison population and compared the results with those from general practices in the same area. The prevalence of abnormal cervical smears in the prison population was 133 per 1000

samples, double that in the general practice population. The prevalence of high grade disease—that is, cervical intraepithelial neoplasia grade II or above—was 53.1/1000 in the prison population and 18.5/1000 in general practice ($P<0.0001$; 95% confidence interval 28.4 to 41.0/1000). The prison population was significantly younger (median 27 (range 17-58) years) than the general practice population (median 33.5 (range 17-58) years), which could explain the different incidence of high grade disease ($P<0.0001$) (table).

All 206 women were given management advice. Thirty one were advised to have follow up smear tests alone, 12 smear tests and colposcopy, 50 locally destructive treatment, 101 conisation, and one hysterectomy; 11 were pregnant and were recommended to have follow up after delivery. Only 49 women completely complied with the advice. The main reason cited for failure to attend treatment or follow up was discharge from prison, which accounted for 111 cases.

We re-examined the data to determine the number of women who could have had large loop excision of the transformation zone as both a diagnostic and therapeutic procedure at first presentation as this would have resolved the problem of default. One hundred and fifty one (73%) women were suitable for such treatment based on presenting cytological and colposcopic assessment—that is, the lesion was assessed as grade II or above and was small enough to be removed under local anaesthesia. Forty six (30%) of these women were found to have grade I lesions or less at the final histological examination and thus would

Abnormal cervical smear results in both the prison and general practice population, 1986-91

Smear result	No (%) of women in Holloway Prison	No (%) of women in general practice
Normal	4405 (86.7)	46 055 (93.8)
Cervical intraepithelial neoplasia (grade):		
I	406 (8.0)	2 159 (4.4)
II	157 (3.1)	434 (0.9)
III	93 (1.8)	380 (0.8)
Invasive squamous carcinoma	18 (0.4)	60 (0.1)
Adenocarcinoma	2 (0.04)	33 (0.1)
Total No of smears	5081	49 121