

live births, a ratio of 1:4. This was equivalent to a total period fertility rate of 1.72 births (less than the population replacement level of 2.2) and a total period abortion rate of 0.44 abortions over a woman's lifetime. Total period fertility rates showed a 1.8-fold variation (1.26 to 2.32) and total period abortion rates a 4.2-fold variation (0.26 to 1.09) between district health authorities. Total period abortion rates were highest in London and possibly showed some movement between districts of women seeking a termination.

On the basis of rates in 1995, a woman in England will have an average of 2.16 pregnancies during her lifetime, of which 0.44 (20.4%) will result in an abortion. Interdistrict variation in the mean number of pregnancies ranged from 1.74 to 3.31, with 13%-44% being aborted (figure). The comparative contribution of fertility and abortion to total period pregnancy rate varied regionally—for example, whereas women in Bradford and Croydon had a similar number of pregnancies (2.37), the ratio of live births to abortions was 2.06:0.31 and 1.72:0.66 respectively. Both total period pregnancy rate (3.31) and total period fertility rate (2.32) were highest in East London and the City District Health Authority, which also had one of the highest total period abortion rates nationally (0.99). In contrast, Camden and Islington had the third lowest total period fertility rate nationally (1.53) and the second highest total period abortion rate (1.04).

About 20% of abortions occur in women under 20, among whom 40% of pregnancies are terminated; the proportion in parts of London and the southeast is half to two thirds.

## Comment

One in five pregnancies in England results in a termination, giving a mean lifetime abortion rate of 0.44 per

woman, which is higher than a decade ago.<sup>1</sup> Most women having abortions are young (under 30), single, and childless.<sup>2</sup> More women (26.9%) are having repeat abortions.<sup>2,3</sup> Not practising safe sexual intercourse is associated with abortion, testing for HIV, and treatment for sexually transmitted diseases.<sup>4</sup> Contraceptive use is associated with social class, and abortion rates rise with deprivation.<sup>4</sup> These factors indicate the need and potential for targeted, preventive interventions.

Globally, illegal abortions are an important cause of morbidity and mortality among women of reproductive age, particularly in developing countries.<sup>5</sup> High fertility and abortion rates in developing countries can be readily explained, but high abortion rates in affluent populations of low fertility with ready access to contraception are less easy to rationalise. Women in all societies need access to safe, legal abortion services. With the Abortion Act 1967, the United Kingdom led other European countries in reforming abortion legislation. As in the Netherlands, there is a need to target the causes of unwanted pregnancy through more effective education and contraceptive services. This will also reduce the costs of abortion and improve sexual health.

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# Embryonic abnormalities at medical termination of pregnancy with mifepristone and misoprostol during first trimester: observational study

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Accurate data on the incidence and nature of embryonic and fetal abnormality during the first trimester and of non-viable pregnancy are needed so that women who have experienced miscarriages can be counselled, and abortion and early prenatal diagnostic services can be improved. New medical techniques for abortion in the first trimester<sup>1</sup> enabled us to collect and analyse data on undamaged first trimester pregnancies.

## Subjects, methods, and results

Between November 1994 and August 1996, 506 healthy women chose medical termination of their pregnancy before nine weeks' gestation in the dedicated day care abortion unit of the Liverpool Women's Hospital. Women attended twice (firstly for oral mifepristone and then for oral misoprostol), and most aborted after receiving misoprostol and while still

in the unit. Altogether, 293 passed products of conception in the day care unit (all within six hours of receiving misoprostol); 223 of these had given informed consent to study of the tissues. Women who were ineligible for study included 76 who had passed products of conception after receiving mifepristone but before readmission to the day care unit for misoprostol and a further 127 who passed products after discharge from the day care abortion unit. In only 10 women did the medical termination of pregnancy fail.

All specimens were examined macroscopically on the day of termination and fixed in 4% paraformaldehyde. The embryos that appeared structurally abnormal on macroscopic examination were further examined histologically. Strict criteria were used to distinguish structural abnormality from traumatic damage. Agreement among three investigators (GB, SQ, and ESB) was required before a classification was

## Abnormalities in 206 embryos studied

Abnormality	No of embryos
None	121
<b>Non-viable pregnancies</b>	
Anembryonic; intact gestation sacs	33
Ruptured sac (no embryo present)	15
Resorbing*	15
<b>Structural abnormalities</b>	
Neural tube defect:	
Open posterior neuropore	5†
Open anterior neuropore	2†
Encephalocele	3†
Abdominal wall defects‡	6†
Facial cleft	3†
Failure of body axis rotation severely disorganised (no somites)	2†
Hydropic	1
Congested	1
TRAP twins (one without a head)	1
Total No of abnormal embryos	39
Total No of potentially non-viable pregnancies	72

TRAP=twin reversed arterial perfusion.

\*Embryos that were disproportionately small compared with their gestation sac and contained necrotic tissue.

†Including some embryos with multiple abnormalities.

‡Part of the gastrointestinal tract outside the abdominal wall inconsistent with physiological herniation.

determined. Two hundred and six specimens containing products of conception were collected and the findings recorded (table 1).

Patients were aged between 16 and 41 (mean 25) years; the incidence of abnormality was evenly spread across all ages. Forty women were students, 41 were unemployed, and 31 were housewives; the rest were employed in the service industry (39), as health professionals (20), in secretarial posts (16), or in other posts (19).

## Comment

This study found a potential loss rate for embryos with structural abnormalities or other non-viable conditions of 34%, which is higher than the frequently quoted rate of spontaneous miscarriage for "clinical" pregnancies of 15%.<sup>2</sup> However, it is difficult to calculate the true rate of spontaneous miscarriage as many women may miscarry at home without seeking medical help.<sup>3</sup> We collected tissue from 44% of women, and it is impossible to know whether their abnormality rate reflected that of the whole population; however, if anything, it is likely to represent an underestimation as minor abnormalities might not have been detectable at this stage of pregnancy. Also, abnormal pregnancies might be more susceptible to abortion after mifepristone has been administered and thus to abort before misoprostol ingestion (thereby pre-empting inclusion in our study). We have no reason to believe that mifepristone would itself contribute to the structural changes as abortion occurs within only 72 hours of exposure to the drug, whereas the abnormalities must

have occurred much earlier in the gestation. None of the women reported taking any drugs, although recreational drug use may have been a cause of some abnormalities.<sup>4</sup> We anticipate that the incidence of neural tube defects in a population of planned pregnancies would be significantly reduced by the ingestion of folic acid at the time of conception and for the first 12 weeks of pregnancy.<sup>5</sup> These findings highlight the importance of encouraging women to take folate supplements around the time of conception and to avoid potential teratogens. In our study, ultrasound examination would have identified the 48 non-viable pregnancies. These women would not have needed a termination of pregnancy if an accurate diagnosis had been made, thus reducing pressure on abortion services and relieving a burden of guilt among the women.

Our findings are unexpected but on balance probably reflect the true loss rate in pregnancies. To our knowledge, this is the first report of detailed studies of embryonic abnormality after early medical termination of pregnancy.

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Contributors: GB and SQ initiated and coordinated the formulation of the primary study hypothesis; discussed core ideas; and participated in the collection and examination of specimens, the analysis and interpretation of data, and the writing of the paper. GB and SQ will also act as guarantors for the paper. ESB discussed core ideas and participated in the collection and examination of specimens. KH participated in the collection and examination of specimens. CMG discussed the core ideas. JPN agreed the funding for the project, discussed core ideas, and contributed to drafts of the manuscript.

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## Endpiece

### Alternative definitions

*Diaphragm*: A muscular partition separating disorders of the chest from disorders of the of the bowel.

Ambrose Bierce, *The Cynic's Word Book* (1906), subsequently titled *The Devil's Dictionary*

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