Congress of Free Churches were in favour of reconsideration of the present law regarding abortion in the apparent belief that change in it could lead to a significant decrease in the number of both physically and mentally deformed children. It must be stressed that such decrease could only be obtained by better midwifery, and by deliberately destroying infants late in pregnancy or after they were born. The present tendency is to destroy the foetus between the 16th and 18th week of pregnancy.

It used to be thought that girls under 16 who became pregnant were either raped or "near raped," but some modern opinion encourages promiscuous intercourse amongst teenagers, so that such a view will not last long. Discouragement of this tendency would lessen the clamour for abortion to be done in this group, and would also lessen the somewhat alarming increase in venereal diseases.

The crunch of the problem lies in the fact that the majority of women who want abortion done are married, and this explains the fact that four times as many illegal as legal abortions are done in Copenhagen, notwithstanding the fact that Denmark has for long held a very "liberal" view concerning legal abortion.

Parliament must clearly decide whether they are mainly concerned with preventing the birth of defective children or with accommodating pregnant women. If they intend to move further than they have done in Scandinavia and give "abortion rights" to women they will have to set up special abortion clinics staffed by "committed" gynaecologists. The antipenultimate section of Lord Brain's article smacks of pressure being brought to bear on gynaecologists, of snooping, and of police control, and the thin end of the wedge would inevitably ultimately affect every branch of the profession, and indirectly the general public.

The Lords Spiritual and per chance the Lords Temporal would be less inclined to support such a Bill if they recognized the present freedom enjoyed by British gynaecologists; that its operation would not significantly lessen the numbers of physically and mentally defective children to be born, and neither would it abolish illegal abortions; that the majority of women who want to procure abortion are married; that a long overdue change in the climate of opinion concerning promiscuous premarital intercourse would both lessen the number of unwanted pregnancies and the incidence of venereal disease; and that the operation carries a higher risk than ordinary childbirth. The profession, for its part, must devise simpler and more effective means of birth control and of sterilization, and perhaps be willing to offer the latter to all women who have had two or more children.

Hard cases make bad law, and bad law breeds litigation and dissension, and the "fifth freedom" could easily result in bondage. The amount of crime which has resulted from "legalizing" gambling should perhaps warn us that the solution of this particular problem is best left to evolve with change in public and in professional "climate," rather than be forced on us by hasty legislation stampeded through Parliament by a small but vocal pressure group. We have a particular genius for pragmatism and compromise, and a rigid law might even

lessen the chances of some women having their pregnancies terminated.—I am, etc.,

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REFERENCE

¹ *The Times*, 23 March 1965.

SIR,—I feel myself in broad agreement with the answers given by Mr. Philip Rhodes (2 April, p. 859) to Lord Brain's points, with the exception of his categorical "No" to the question, "Should the fact that a pregnancy is the result of rape be a ground for its legal termination?" He goes on to say, "The establishment of the fact of rape is often impossible. No one factor can be absolute in the decision for or against termination in a given patient." This is true, but the difficulty in establishing the facts is not the question posed. In the Services the establishment of whether or not a wound is self-inflicted is often impossible, but this does not prevent courts martial from hearing all the evidence and giving a verdict. The issue is not ducked because it is difficult.

Rape, a criminal assault upon the person, may be associated with bodily injury resulting in brain, facial, genital, or other damage. These injuries would be treated by neuro-, plastic, gynaecological, or other appropriate surgeons. If, at a later date, a pregnancy is discovered, two questions arise: (1) Was this woman/child raped? (2) If answer "Yes," was this pregnancy the result of said rape? If the answer to both questions is "Yes," my view is that the operation of therapeutic abortion would be a continuation of the treatment already given, and which was designed towards alleviating as much as possible all the then known hurtful consequences of criminal action.

Obtaining the answers to questions (1) and (2) is surrounded with difficulties which are not basically medical. There may be an accused whose defence must not be prejudiced. The alleged rape may have taken place abroad, possibly while the woman/child was in rebel or enemy hands. These are but a few difficulties which come to mind and which are legal problems, not medical.

I feel that an attempt to establish the probable truth should be instituted with as little delay as possible and could best be carried out in private with the help of some such person as a procurator fiscal or coroner.

I put these views forward as a tentative suggestion. I feel that rape *per se* should be a ground for legal abortion, but at the same time it is important that the flood-gates to abuse should not be opened wide.—I am, etc.,

TERENCE G. ROBINSON.

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SIR,—With reference to the present discussion on the proposed changes in abortion law, and in particular to the report by the Royal College of Obstetricians and Gynaecologists (2 April, p. 850), I should like to make the following point:

Even if more liberal measures were introduced, the individual patient may well be faced with a gynaecologist not prepared to perform the operation because of personal moral misgivings.

I should like to question the right of a gynaecologist to refuse to do the work he is employed to do on grounds of moral prejudice. What would be the consequence, I wonder, if a surgeon refused to order blood transfusion on the basis of his beliefs as a Jehovah's Witness?

It is a well-accepted principle of medical ethics that treatment should not depend on race, colour, or creed of patient or doctor. I maintain, therefore, that it is clearly wrong for a person not prepared to perform abortions to follow a profession which requires him to do so.

To the obvious reply that a patient may find another gynaecologist, I say that this is, first, irrelevant to the above argument, and, secondly, that it is not easy for a woman to do this, when in a highly emotional state and with the short time at her disposal.—I am, etc.,

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D. G. WITHERS.

Lasers and Ultrasonics

SIR,—It is reassuring to read (2 April, p. 859) that Mr. H. V. Ingram and others feel that no "neurological symptoms" (*sic*) are produced in rabbit eyes with laser energies of as much as 100 joules. This impression is presumably based on work described in their 1965¹ paper. However, I was not concerned with neurology, and their paper contains no mention of mechanical or ultrasonic effects of laser beams in the eye, contrary to what is stated in the first paragraph of their letter.

I reported (19 March, p. 719) recording mechanical pulses produced in the eye by laser coagulation. These pulses have large amplitudes and complex waveforms with a "fundamental" frequency of the order of 200 Kc./s.; hence the term ultrasonic. These mechanical events are produced only when a lesion is at once visible ophthalmoscopically and travel outwards from the lesion site. This ultrasound is, in fact, a form of shock wave generated by the explosive formation of a lesion. Preliminary results indicate that the amplitude of these wave trains is of the order of 1 g./sq. cm. peak to peak, 12 mm. from the site of origin. It seems to me that the delicate vitreous gel in the region of a lesion is subjected to violent stresses, and further work is being undertaken to see how the vitreous responds to what is undeniably rough treatment. As the long-term effects of vitreal damage have been sadly underestimated in the past, it is only reasonable to be cautious when considering use of lasers in retinal photocoagulation.

One further point arises from the letter. The authors claim that lesion formation is due to electromagnetic disruption, but if this effect occurs it is unimportant. If the temperature around a lesion site during its formation is measured carefully, large temperature changes are recorded. Both Novori *et al.*² and myself³ have shown this, and Ingram⁴ has noted the existence, but not the significance, of Novori's data; his own results (showing negligible temperature rises⁵) were obtained with a measuring system with a response time a thousand times longer than the event he was seeking to measure. Also, as Ingram *et al.*¹ confirm, retinal pigmentation affects the size of lesion produced. It can only do so if lesion formation depends

on the amount of energy absorbed, for this absorbed energy is degraded directly into heat which can then damage retinal tissue. If electromagnetic disruption were a prime force in lesion formation, pigmentation would not affect lesion size.—I am, etc.,

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Low-protein Diet in Leukaemia

SIR,—Dr. B. Halikowski¹ and others (26 February, p. 519) published interesting impressions on their experiment in treating acute leukaemia in childhood on a low protein-purine diet since 1964. Their hypothesis for so doing is described in their article. I have been treating leukaemic children on an even lower protein-purine intake since 1959. This letter records my findings and mentions the rationale that prompted this trial in anticipation of a fuller article to be submitted on this experiment.

The environment of the growing cell is a possible key to its development. If it grows abnormally this will probably have been due to some environmental factor modifying it, presumably during replication. Replicating bacterial and animal cells can undergo directed experimental mutation by the use of specific deoxyribose nucleic acid (D.N.A.).²⁻⁷ If nucleic acids can be made to modify replicating cells experimentally, even in a living animal,⁸ it appears possible that under certain specific abnormal conditions exogenous D.N.A., from sources other than the patient's own tissues could enter the environment of the replicating cells and produce sufficient modification to make them unresponsive to the dictates of that body's needs—that is, a malignant state will arise.

The origin of the leukaemogenic agent could be D.N.A. of viral or of dietetic origin. If the latter, it seems more likely it would originate in animal than in plant tissues.

Similarly the basis of therapy must include modification of the environment of the replicating cell, by reinforcing or attenuating some factor, or by poisoning the environment—for example, by reducing purine¹ or by adding amino-acids.⁹

It was decided therefore to attempt a trial that would deprive the patient of all traces of animal tissues; this would not only remove the hypothetical leukaemogenic D.N.A., but with it any other similar dietetic factor not as yet suspected. It would have the additional therapeutic advantage of reinforcing the antimetabolic drugs by reducing the content in the diet of purines and of folic acid.

If the diet should prove helpful the reasons for its success would have to be re-examined. If it failed to assist therapy it would not of course detract from this tenuous but interesting theory of the aetiology of leukaemia.

A diet was planned that strictly excluded all tissues of animal origin. It was in effect a Vegan diet, even the therapeutic agents that were chosen as far as possible excluded items of animal origin. To exclude it from the

field of possible lay exploitation it was given the code name of a diet for the "Exclusion of Exogenous D.N.A." (EDNA).

From 1959 to date, 16 children have been placed on this restricted EDNA diet, and, as stated, a publication will be offered detailing the findings. The results can be tabulated as follows:

Sixteen Cases Treated with Low Protein-purine Diet

Diagnosis	Duration of Disease in Months		
Myeloblastic leukaemia	Case 1	11 months	Died
	" 2	11 "	Survive
	" 3	15 "	"
	" 4	74 "	"
Lymphoblastic leukaemia	Case 5	3 months	Died
	" 6	5 "	"
	" 7	8 "	"
	" 8	14 "	"
	" 9	15 "	"
	" 10	16 "	"
	" 11	22 "	"
	" 12	26 "	"
	" 13	39 "	"
	" 14	41 "	"
	" 15	3 "	Survive
Acute stem cell leukaemia ..	Case 16	9 months	Died

N.B. All the above children in the trial have been on routine treatment with steroids, methotrexate, 6-mercaptopurine, cyclophosphamide, or Vincristin as indicated clinically.

Statistical analysis in this disease is of little assistance unless the results are on a vast series, as it is a disease of extraordinary variations.

My experience and that of Halikowski *et al.*¹ confirm the clinical impression that some protein-purine restriction is apparently helpful. This impression remains to be confirmed on larger series, and along with it will be the need to decide whether temporary restriction during relapses, or prolonged restrictions as I have utilized, are the more desirable.—I am, etc.,

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DON HILSON.

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Intra-amniotic Hypertonic Saline

SIR,—A number of reports of maternal complications following the intra-amniotic injection of hypertonic saline¹⁻³ have appeared since the preparation of our paper (5 February, p. 327). The comments of Drs. A. C. Turnbull and Anne B. M. Anderson (12 March, p. 672) are therefore appropriate. In addition, it is worth emphasizing that the accidental intravenous injection of saline is more likely to occur following attempts to induce abortion by amniocentesis before the 16th week of pregnancy. The rapid increase in liquor volume between the 16th and 20th weeks⁴ makes the technique much easier, and therefore safer, at this time. Dr. D. MacDonald (12 March, p. 672) bases his con-

demnation of the use of intra-amniotic hypertonic solutions on his own case of a maternal death (which we quoted), and a series of abortions from post-war Japan. Wagatsuma admits that many of his 25 collected deaths occurred in poorly equipped institutions without specialist advice. He indicates the cause of death in only 10 cases, and 5 of these were hardly attributable to the method used (tuberculosis and post-partum haemorrhage). These results are probably not applicable to modern hospital practice.

Our assertion that the method was safe obviously needs qualifying, but Dr. MacDonald's criticism, based on supposed intra-uterine infection and prolonged induction-delivery interval, is not valid. There was no proved sepsis in our series. In contrast to vaginal amniotomy, an aseptic technique is possible at amniocentesis, and, if so, there need be no time limit set for the safe evacuation of the uterus. Indeed, the very fact that delivery need not be completed by caesarean section in cases where the onset of labour is delayed makes this the method of choice for terminating pregnancies where the foetus is abnormal.—We are, etc.,

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LEONARD P. HARVEY.

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Vaccination Against Leprosy

SIR,—In challenging my acceptance of the work of Pettit and Rees¹ as establishing the existence of dapsone-resistant strains of *Mycobacterium leprae*, Dr. M. G. Corcos (12 February, p. 423) raises certain issues with which my letter was not concerned, such as the type of action exerted by dapsone on *M. leprae* and the question of the relationship between *M. leprae* and leprosy. I do not intend to discuss these issues in this letter, but would like to explain that I accept the results of Pettit and Rees because they showed that when seven patients who were making no progress on oral dapsone therapy were changed to parenteral treatment for six months under close supervision, three failed to make a bacteriological response. Blood levels showed that the drug was being absorbed. The failure of these patients to respond is adequate proof of resistance to dapsone, but the authors went on to show that bacilli from these three unresponsive patients multiplied freely in footpads of mice receiving 0.1% dapsone in the diet, whereas bacilli from the other four showed no significant multiplication.

I certainly would not accept the results of footpad experiments alone as proof of drug-resistant strains of *M. leprae*, but in this particular experiment such results were subsidiary to a carefully controlled therapeutic test.—I am, etc.,

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