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LEADING ARTICLES

CLINICAL RESEARCH • PAPERS AND SHORT REPORTS • PRACTICE OBSERVED

MEDICAL PRACTICE

NEWS AND NOTES

SUPPLEMENT

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CORRESPONDENCE

We may shorten letters to the editor unless the authors specifically state that we may not. This is so that we can offer our readers as wide a selection of letters as possible. We receive so many letters each week that we have to omit some of them. Letters must be typed with double spacing between lines and must be signed personally by all their authors, who should include their degrees. Letters critical of a paper may be sent to the authors of the paper so that their reply may appear in the same issue.

Correspondents should present their references in the Vancouver style (see examples in these columns). In particular, the names and initials of all authors must be given unless there are more than six, when only the first three should be given, followed by et al; and the first and last page numbers of articles and chapters should be included.

Risks of ultrasound

SIR,—A further outbreak of references on television to the possible hazards of diagnostic ultrasound prompts me to put the record straight. It is implied that diagnostic ultrasound was launched without consideration of the risks involved. Professor Ian Donald began his classic pioneering work on obstetric ultrasonic diagnosis a short time after I began to use ultrasound on the skull for head injuries and brain tumours.

At that time ultrasound had long been in use in physiotherapy at intensities up to 4 W/cm^2, and it was known that prolonged irradiation at this intensity could cause bone necrosis but only heated soft tissues.[1] The very short pulses with long intervals of rest between meant that the average power was so low that it took a long time before it was possible to measure the radiation pressure. From 1950 onwards an American group was using highly focused ultrasound to make lesions in the brain after craniotomy.[2] They used intensities as high as 1 kW/cm^2.

My earliest work was done on my own head, but I carried out animal experiments using focused ultrasound at Paddington General Hospital from about 1958 and studied in particular the measurement of acoustic power by radiometry. My friend Professor Donald, knowing of my work and dissatisfied with his negative results using diagnostic transducers, wrote asking my opinion on the safety of his work.

The American work had shown that nerve tissue showed loss of function at much lower intensities than other tissues. This was reversible and occurred at intensities that caused insignificant heat rise. The risk that caused anxiety was therefore that of damage to the fetal brain. My work with cat brains was directly comparable with the fetus in utero as the bone was removed and the brain irradiated through saline. A total of 8 W/cm^2 for 10 minutes with a collimated uniform beam caused only superficial necrosis. At 20 W/cm^2 for 10 minutes the necrosis extended to 8 mm depth.

From this and assuming the fetal brain was as near to the skin surface as possible and that there was no bone present I extrapolated to the diagnostic transducer and calculated that the minimum factor of safety was between 10 000 and 100 000 to 1. This naturally was regarded as very reassuring, and I still believe it to be valid. In those days we were using some hundreds of volts to excite our transducers, and nowadays power levels are much lower.

Subsequent research has not shown any other tissue to be more susceptible than nerve tissue. Experiments carried out in vitro are of doubtful validity as focusing may produce local maxima of very high intensity by reflection from glass. This does not occur in vivo.

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1 Gordon D. *Ultrasound as a diagnostic and surgical tool.* Edinburgh: Churchill Livingstone, 1964.
2 Fry WJ, Wulff VJ, Tucker D, Fry FJ. Physical factors involved ultrasonically induced changes in living systems. 1. Identification of natural temperature effects. *J Acoust Soc Am* 1950;**22**:867-76

Failure of the cervical cytology screening programme

SIR,—Dr Jocelyn Chamberlain's leading article on the failures of the cervical cytology screening programme (6 October, p 853) and the four associated papers in the same issue (p 883, p 891, p894, and p 896) raise important matters and highlight deficiencies in our approach to this problem. Various strategies to deal with these inadequacies were proposed to cope with deficiencies in communication among different sectors of the health service, but one simple, inexpensive, and immediate remedy was not discussed—that of a patient held record.

With many different agencies taking smears this could provide a most valuable method of