MR 2690

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MAIN SUBJECT HEADING:

AN	HU	AT	IH	M
ANALYTICS	HUMAN EFFECTS	ANIMAL TOXICITY	WORKPLACE PRACTICES-ENGINEERING CONTROLS	MISCELLANEOUS

SECONDARY SUBJECT HEADINGS: AN HU AT IH M

Physical/Chemical Properties

Review

Animal Toxicology

Non-occupational Human Exposure

Occupational Exposure

Epidemiology

Standards

Manufacturing

Uses

Reactions

Sampling/Analytical Methods

Reported Ambient Levels

Measured Methods

Work Practices

Engineering Controls

Biological Monitoring

Methods of Analysis

Treatment

Transportation/Handling/Storage/Labelling

Not Relevant

MR 2690

POLLUTION IN OUR OPERATING-THEATRES

SIR,—Dr Mehta and Mr Burton (March 27, p. 695) are concerned that the studies I cited (Feb. 28, p. 478) about pollution causing abortion, congenital abnormalities, and cancer among operating-theatre staff did not indicate a dose-response relationship. Since all the studies were in man and were based upon retrospective surveys this omission is to be expected—although this omission does not invalidate the argument that chronic exposure to small doses of pollutants is a health hazard. Precise scientific data of this nature will be impossible to obtain on a large scale from humans. However, in animals all the major inhalational anæsthetics have been found to produce either abortions or congenital abnormalities. Many of the experiments[1-3] used higher concentrations than those reported in pollution studies, but all that this achieves is an increase in yield. Perhaps of greater significance was the observation[2] that the apparent conception-rate fell with increasing concentrations of nitrous oxide even though the gas was at the normal pollution levels. Equally in the same study intrauterine death with resorption of the products of conception had occurred much earlier in pregnancy with the higher (but still low) concentrations of nitrous oxide.

Dr Mehta and Mr Burton in considering the American survey[4] on pollution seem to overlook socioeconomic factors. Clearly there are many causes of abortion, and a major factor is the circumstances of living; this effect is to be found both in the exposed groups and the controls in that report. Among social peers all the groups of operating-theatre staff had a higher abortion-rate than their non-exposed peers.

The Finnish report[5] also contains an important piece of information missing from all the other reports. This is that there is a significant proportion of babies born underweight among the anæsthetists than among the other groups—although the scrub nurses also had an excess of underweight babies. This effect may be predicted after any general poison that has been inhaled during pregnancy, the same happens with carbon monoxide. Your correspondents also make play of the fact that the intensive-care nurses had a similar abortion-rate to the anæsthetic nurses. But many patients in an intensive-care ward have received anæsthetics and are continuing to emit anæsthetic vapours into the unit. Furthermore, in many intensive-care units the nursing staff are encouraged to go into the operating-theatre and assist in the anæsthesia when their units are slack. So such a group can hardly be considered as non-exposed.

Your correspondents are very anxious to invoke stress as the cause of all our troubles. Unfortunately there is little evidence that there exists an excess of the other stress diseases among anæsthetists. Peptic ulceration, perforation, ulcerative colitis, ischæmic heart-disease, and so on, are not unduly prevalent among anæsthetists. Many of our colleagues would not regard pædiatrics as a pleasant stress-free sinecure, yet this is the peer group with whom anæsthetists are usually compared. Similarly being a casualty nurse can hardly be regarded as having a stress-free ocupation.

Accepting stress as the principal ætiological factor in the ill health of our staff and their children may be emotionally satisfying—"it is not my fault and I can't do anything about it"—but this attitude carries with it a grave peril that more of our children will be born deformed consequent upon failure, to take anti-pollution control measures should the stress hypothesis be wrong. Is that risk justified?

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1. Smith, B. E., Gaub, M. L., Moya, F. [illegible] 26, [illegible]
2. Fink, B. R., Shepard, T. H., Blandau, R. J. Nature, 196[illegible], 214, 146.
3. Corbett, T. H., Cornell, R. G., Endres, J. L., Millard, R. I. [illegible] 39, [illegible]
4. [illegible] 41, [illegible]
5. [illegible] 33, [illegible]

RADIOFREQUENCY IN THE OPERATING-THEATRE

SIR,—If exposure to trace quantities of anæsthetics is the first common factor which could influence the wellbeing of operating-theatre personnel, then exposure to low-level non-ionising electromagnetic radiation in the form of radiofrequency (R.F.) is the second. On Oct. 1, 1926, Dr Harvey Cushing used high-frequency currents supplied by a spark-gap generator designed by Dr W. T. Bovie,[1] and since then surgeons throughout the world have found R.F. energy to be invaluable for cutting and hæmostasis. Mixtures of continuous waves and damped transient waves are provided from a valve oscillator (continuous) and a spark-gap generator (damped). Typically these electrosurgical units are capable of 250 W output. Insulated but unscreened leads convey the R.F. energy to and from the patient. The surgeon applies current through a pencil or forceps electrode where an arc occurs to produce thermal and diathermy heating of the tissue or bleeding-point for cutting or coagulation.

Using antennæ and R.F. measuring equipment with calibration traceable to the U.S. National Bureau of Standards, we have measured power-flux densities in excess of 150 mW/cm² at the point of application and along the active lead. Power-spectrum analysis shows R.F. energy up to 1 GHz (1000 MHz). Maximum energy is concentrated below 100 MHz and peaks at 2·4 MHz in the Bovie electrosurgical units widely used in North America. Recommended maximum R.F. exposure levels in the United States are currently 10 mW/cm² for 6 min and 1mW h/cm². The Soviet Union and Eastern European countries have much lower levels.

The surgeon and patient are most exposed because the active electrode is manipulated by the surgeon and the radiating lead is draped over the patient. Urologists doing transurethral resections are especially exposed since the radiating active lead enters the cystoscope near the eye. Opacities of the lens are a known hazard from R.F. heating of the eye.

The effects of R.F. energy on biological systems are only beginning to be appreciated,[2-4] and since it is unlikely that the use of R.F. currents in surgery can be dispensed with, better design and shielding of medical devices emitting R.F. energy seems urgently indicated.

For use 5 cm from active lead we used a radiation hazard meter (model 2, General Microwave Corporation, Farmingdale, N.Y.). Equipment used 2 m from active lead was AIL tech model 707 spectrum analyser (AIL Divison, Cutler-Hammer, Inc., Deer Park, N.Y.), a 1 m vertical antenna (Singer Co. Metrics Division, Bridgeport, Connecticut), and a log spiral antenna (Electro Mechanics Co., Austin, Texas).

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PERIPHERAL WHITE-BLOOD-CELL CULTURE AND LEUKÆMIC RELAPSE

SIR,—We were very interested to read Goldman and Sultan's review of the clinical application of bone-marrow culture.[1] We too have experience of the usefulness of this technique in assessing prognosis and in confirming the completeness of remission in childhood leukæmia. The similar technique utilising peripheral white blood-cells (W.B.C.) was

1. Cushing, H. Surgery Gynec. Obstet. 1928, 47, p. 751.
2. Biological Effects of Nonionizing Radiation; edited by P. E. Tyler. Ann. N.Y. Acad. Sci. 1975, 247.
3. [illegible] S. E. Hlth Phys. 1973, 25, 167.
4. [illegible] I.E.E.E. Trans. Microwave Theory Tech. 1971, MTT-19, 1[illegible]
5. Goldman, J. M., Sultan, C. Lancet, 1975, ii, 696.