It would be valuable to know if the actual risks, presented in context with the benefits, would significantly affect the decision-making process.

Worth considerating also is the statement often quoted that: "Even if a certain risk is a mere possibility which ordinarily need not be disclosed, if its occurrence carries serious consequences, as for example paralysis or death, it must be regarded as a material risk requiring disclosure."[1,4] Adding to the controversy is the belief that the remote possibility of death due to general anaesthesia need not be disclosed since it is considered to be "common knowledge"[2,3] (it is, however, doubtful this same logic could be applied to epidurals). While only one respondent felt his patient should understand the possibility of death, 18/42 scored paralysis a 4 or 5. Of these respondents only three discuss it "occasionally," one presents it on a consent form, and one during pre-natal lectures.

We feel an examination of these issues is warranted, and invite comments from other concerned anaesthetists.

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Anaesthetic breathing circuit leak from cracked oxygen analyzer sensor connector

To the Editor:

The oxygen monitor is now considered an essential part of anaesthesia equipment, as a means of detecting and hopefully preventing hypoxic mixture administration. In our department we have used the Foregger 450 Oxygen Monitor for more than five years and have found it well adapted to our needs. However, part of the assembly has been found to present a hazard. The monitor is supplied with a soft black plastic "T" connector where the oxygen sensor is seated for attachment to the fresh gas port of the anaesthetic gas machine. Between cases the sensor is removed from the T piece for calibration with air and then reconnected. This removal and reinsertion has a tendency to cause cracks in the connector (see Figure). The cracks may be hard to detect, for two reasons: the sensor and the T piece are both black and the defect usually appears on the fresh gas port side, and is thus hidden from the view of the anaesthetist. The crack in turn may cause a leak of fresh gas flow sufficient to produce hypercarbia when the monitor is used with a Mapleson D circuit with the sensor mounted on the fresh gas outlet.

We noted two cases in which tachycardia, hypertension and ventricular extra-systoles appeared without apparent cause after 90 minutes of anaes-

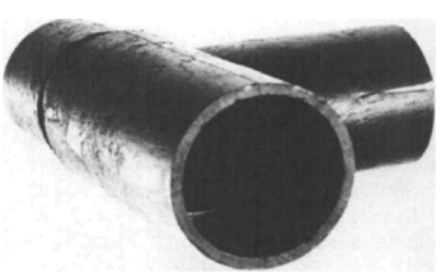

FIGURE Connector with linear crack.

thesia. Blood gases showed $PaCO_2$ well in excess of 60 torr. A check of the anaesthesia circuit demonstrated a large leak around the sensor due to a damaged T connector, causing an inadequate fresh gas inflow to the circuit.[1] All connectors checked subsequently have shown the same defect at one time or another.

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Glycopyrrolate and human plasma cholinesterase

To the Editor:

I read the paper by Zsigmond *et al.*[1] with great interest, as I have been involved in many clinical studies with glycopyrrolate.[2] The extrapolation of their results to speculation about possible prolongation of the effects of succinylcholine or local anaesthetics is too far fetched. The IC_{50} of glycopyrrolate on plasma cholinesterase was shown to be 1.0 mM. With the molecular weight of 398 a 1.0 mM concentration of glycopyrrolate would be equivalent to 0.398 mg or 398 $\mu g \cdot ml^{-1}$.

Commonly used doses of glycopyrrolate in premedication range from 0.2–0.4 mg. Maximum plasma concentrations of glycopyrrolate in volunteers using a sensitive radio-immunoassay technique were about 35 $ng \cdot ml^{-1}$ after 0.4 mg IV (personal communication, C.J. Jones, A.H. Robins Co. Ltd., Horsham, England). Thus the IC_{50} of 1.0 mM demonstrated *in vitro* is over 11,300 times the maximum plasma concentration in man after 0.4 mg glycopyrrolate IV. Such concentrations would not be attained even with relatively larger doses (10–15 $\mu g \cdot kg^{-1}$) of glycopyrrolate used at the time of antagonism of neuromuscular block. Glycopyrrolate has been used in many thousands of cases without any reports of prolonged action of succinylcholine or ester-type local anaesthetics.

The results Dr. Zsigmond and his colleagues have shown may be of academic interest but are of no clinical significance.

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REPLY

Dr. Mirakhur is correct in that the results of our studies have "academic interest," but he can not deny that the findings may also have clinical importance as we succinctly stated that: "Glycopyrrolate and atropine possess low inhibitory effect on human PChE, therefore it is unlikely that PChE in vivo *would be inhibited to an extent that interferes with the hydrolysis of succinylcholine and/or local anaesthetics of the ester-type." Indeed, their experience concurs with our own observations that no clinically recognizable interactions take place between glycopyrrolate and succinylcholine. Nonetheless, only experiments involving the combination of glycopyrrolate with succinylcholine or procaine can scientifically answer this question.*

Contrary to Dr. Mirakhur's claim that we extrapolated the in vitro *inhibitory effects of glycopyrrolate to the clinical effects of succinylcholine and local anaesthetics, we are well aware of the studies of Foldes and Smith.[1] Those studies showed that extrapolation to the* in vivo *anticholinesterase effect from its* in vitro *inhibitory effect is not permissible, since the I_{50} values of other anticholinesterases used in the management of myastenia gravis demonstrated no correlation to their* in vivo *therapeutic effectiveness.*

At the other extreme, hexafluorenium, which markedly inhibits PChE in vitro, *causes a predictable and potent inhibition of the* in vivo *hydrolysis of succinylcholine and is, therefore, employed to prolong its effect for muscle paralysis.[2] Moreover, in anticholinesterase poisoning, the large atropine doses required, e.g., 0.2–1.0 g daily, might lead to a marked* in vivo *PChE inhibition as predicted from its* in vitro *anticholinesterase effect also corroborated by Radic.[3]*

PChE is present as "reserve cholinesterase" in other cholinergic transmission sites.[4] Surprisingly, we find complete inhibition of the reserve cholinesterases by fractions of the I_{50} of several anticholinesterases in the