LETTERS TO THE EDITOR

ESTIMATION OF PULMONARY SHUNT

DEAR SIR,

I wish to comment on the recent paper of Fournier and Major (1981).¹ Firstly they have misquoted Comroe² in the alveolar air equation.

$$P_{A_{O_2}} = P_{I_{O_2}} - P_{A_{CO_2}} \left[\frac{F_{I_{O_2}} (1 - F_{I_{O_2}})}{R} \right]$$

The correct equation is:

$$P_{A_{O_2}} = P_{I_{O_2}} - P_{A_{CO_2}} \left[F_{I_{O_2}} + \frac{1 - F_{I_{O_2}}}{R} \right]$$

The equation in the paper by Fournier and Major is valid only for an $F_{I_{O_2}} = 1.0$ and $R = 1.0$. At an F less than 1.0 use of their equation will lead to considerable error in the calculation of A-a gradient.

Secondly the "Clinical Short-Cut" method of calculating makes the incredible assumption that mixed venous oxygen content ($C\bar{V}_{O_2}$) is 3.5 ml less than the arterial oxygen content (Ca_{O_2}). This assumption may be satisfactory for a patient with a normal cardiac output and normal oxygen consumption but will lead to gross errors in shunt calculation if used for patients with a low cardiac output or increased total body oxygen consumption.

I would suggest that the only reason they were able to obtain a reasonable correlation was that their patients mainly had a normal cardiac output. As an example in patient No. 17 this assumption has resulted in an error of greater than 100 per cent (29.8 per cent by "short cut" method as compared with 13.0 per cent by the more precise method).

To use their "Clinical Short Cut" method in critically ill patients would result in larger inaccuracies in shunt estimation.

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REFERENCES

1. FOURNIER, L. & MAJOR, D. Estimation of Intrapulmonary Shunt. *Anaesth. Soc. J.* 28: 263-267 (1981).
2. COMROE, J.H., FORSTER, R.E., DUBOIS, A.B., BRISCOE, A. & CARLSEN, E. *The Lung*. 2nd ed. Chicago, Year Book Medical Publishers, Inc. p. 125 (1968).

ESTIMATION OF PULMONARY SHUNT (REPLY)

DEAR SIR,

In answer to Doctor Stewart's letter, we must admit that we have misquoted Comroe's alveolar air equation. This equation is so well known that we overlooked this typographical error in our revision.

As for the considerable error introduced when the $F_{I_{O_2}}$ and the R are different than one, we must say that our patients had a $F_{I_{O_2}}$ between 0.21 and 1.0 while their respiratory quotients were measured between 0.4 and 1.0. In spite of this fact the correlation between the measured and estimated A-aDo was 0.98 which is quite acceptable.

It is evident that to use any kind of "short cut" method in clinical practice we have to make certain assumptions if we do not want to or cannot go through the long procedure. The assumption that $C\bar{V}_{O_2}$ is 3.5 ml less than arterial oxygen content (Ca_{O_2}) is not so "incredible" as it may seem. Harrison found this value to give a more representative true shunt calculation in 13 of his 15 patients who had a stable cardiovascular state. We tried this value in our critically ill patients who had an unstable cardiac output measured both by thermodilution and the Fick principle and found a correlation of 0.87 between our "short cut" method and the more precise laboratory procedure.

We do not pretend that this "short cut" method should replace the more accurate laboratory method. However we feel that this kind of calculation will enable the clinician to be in a good position to make a fairly good educated guess on the "shunt" value in his patient.

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MINAXOLONE

DEAR SIR,

Your recent editorial entitled "Clinical Trial - the Minaxolone Story" gave the reader a somewhat one-sided account of the early clinical trials of minaxolone. This water-soluble steroid was introduced into the U.K. in November 1978 as a possible alternative to Althesin. The initial animal studies suggested that minaxolone was two