THE INTERPRETATION OF BLOOD-ALCOHOL IN TERMS OF TOTS TAKEN

P. K. VAN GENT, M.SC., D.ING., *Division of Chemical Services, Port Elizabeth*

There are still many who do not grasp the meaning of expressions which denote the concentration of alcohol in human blood. Courts of law and lawyers are repeatedly seeking the interpretation of a phrase such as 'per cent, blood-alcohol, weight per volume', which is contained in all affidavits on the chemical analysis of blood taken from potentially drunken persons.

The interpretation of this phrase is often given as the smallest number of 'tots' or 'pints of beer' which could have been taken by the accused. This figure is only an approximation since it does not take unabsorbed alcohol into account. Neither does it account for alcohol already eliminated and due to its wide margin of error it is of limited value only. Nevertheless, it is a figure which conveys a definite meaning,

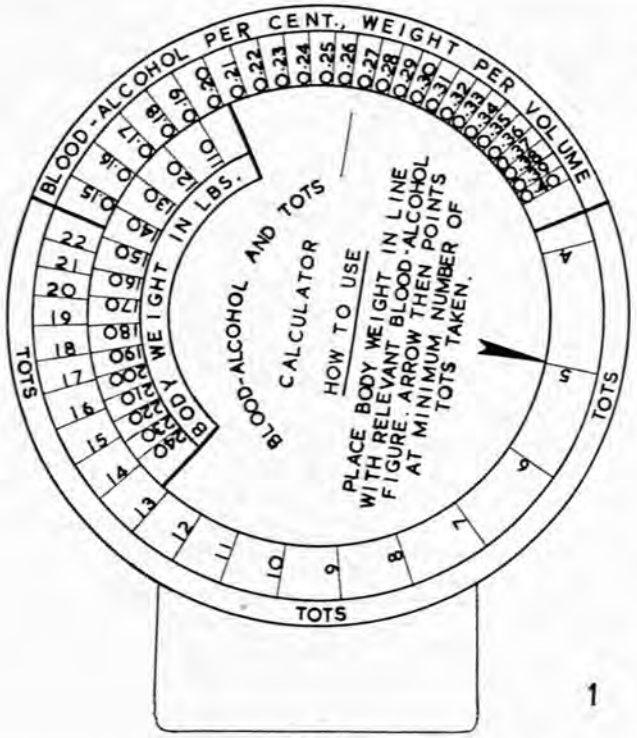

Fig. 1.

particularly to those who are not familiar with the abracadabra of scientific nomenclature. Usually the witness who provides the above explanation will have to carry out a calculation[1,3] or refer to a nomogram[4] or a table.[5,6]

The 'Blood-Alcohol and Tots Calculator', shown in Fig. 1, eliminates the above calculation. It furnishes the required answer at the touch of a finger. Its scales are based on those of the 'Verdix Calculator'.[4] Its indicating arrow is set so that 'r'=0·67. ('r' is the ratio of the concentration of alcohol in the whole blood to that in the body.[7] Clumsily, but broadly correctly, one might also state that it is the ratio between the weight of the soft tissues and that of the body.) In a calculator of a larger size it would of course be possible to sub-divide the 'tots' scale into millilitres or grams alcohol, thereby providing fractional readings between individual tots.

In Fig. I a body weight of 130 lb. has been set in line with 0·16% blood-alcohol, w/v. The arrow points at 5 tots, i.e. 75 ml. alcohol. (1 tot contains approx. 15 ml. alcohol.) The accuracy of this figure can now be checked by various equations of which two are being used:

1. A′ ml. = body weight (lb.) × blood-alcohol %, w/v × 3·6[1,2] where A′ ml. = the volume of alcohol absorbed by the body tissues.

   Thus A′ = 130×0·16×3·6 ml. alcohol
   = 74·28 ml. alcohol.

2. $A = p \times c \times r$
   where A = G. of alcohol absorbed by the body tissues (1 ml. alcohol weighs 0·8 G.);
   p = body weight in Kg. (1 Kg. = 2·204 lb.);
   c = mg. alcohol per G. of blood, i.e. 0·16% blood-alcohol, w/v is 0·16 G. alcohol per 100 ml. blood or 160 mg. alcohol per 100 × 1·056 G. blood (1 ml. blood has an average weight of 1·056 G.);
   r = 0·67.

   Hence $A = \frac{130}{2{\cdot}204} \times \frac{160}{105{\cdot}6} \times 0{\cdot}67$ G. alcohol

   or $A = \frac{130}{2{\cdot}204} \times \frac{160}{105{\cdot}6} \times \frac{0{\cdot}67}{0{\cdot}8}$ ml. alcohol
   = 74·84 ml. alcohol.

The following information will be found valuable when using this calculator:

	% Alcohol by volume	*Measure*	*ml. Alcohol per measure*
Spirits (whisky, brandy, gin)	43	Tot (35·5 ml.)	15
Beer	3·5	Reputed pint (378 ml.)	13
Stout	5		19
Wine (average) ..	14	Bottle (680 ml.)	95

A 'Blood-Alcohol and Tots Calculator' may be obtained, free of charge, from the author, Private Bag 6004, Port Elizabeth.

REFERENCES

1. van Gent, P. K. (1957): S. Afr. Med. J., **31**, 728.
2. *Idem* (1957): *Ibid.*, **31**, 1304.
3. *Idem* (1959); Commercial Law Reporter, October.
4. *Idem* (1959): S. Afr. Med. J., **33**, 391.
5. *Idem* (1957): Commercial Law Reporter, November.
6. Sapeika, N. (1960): J. Forensic Med., 7, No. 2.
7. Gordon, I., Turner, R. and Price, T. W. (1953): *Medical Jurisprudence*, p. 768. Edinburgh: Livingstone.