

Concurrent measurements of arterial and venous blood alcohol concentrations and breath alcohol concentrations using the alcotest 7110 MK III Evidential

KATJA JACHAU, HOLGER WITTIG, DIETER KRAUSE

Institute of Forensic Medicine, Otto-von-Guericke University Magdeburg, Germany

By adopting the Act Amending the Traffic Road Act dated 27 April 1998, the German Bundestag also introduced breath alcohol concentration thresholds as a criterion for traffic offences in Germany. An expert opinion of the Federal Ministry of Health of 1992 reads that, in terms of time, the breath alcohol concentration does not follow the venous blood alcohol concentration but the arterial blood alcohol concentration.

Tests were performed in 5 subjects, who drank 0.5 g ethanol/kg of body weight over a period of 20 minutes. An IV cannula was inserted in the crook of the elbow of one arm, whereas the arteria radialis of other arm was punctured by using the Seldinger technique. Forty minutes following the end of drinking breath alcohol concentrations were measured at intervals of 15 minutes by using the calibrated Alcotest 7110 Evidential MK III. Between two breath alcohol tests concurrent venous and arterial blood samples were drawn from the catheters, discarding the first 5 mL of blood each. A total of 101 concurrent readings were obtained for breath alcohol, blood alcohol and arterial blood concentrations.

The regression equation is $y = 2.10x + 0.03$ ($R^2 = 0.96$) for the correlation between venous blood alcohol concentration and breath alcohol concentration and $y = 2.11x + 0.03$ ($R^2 = 0.95$) for the correlation between arterial blood alcohol concentration and breath alcohol concentration. Hence, the differences are rather minor as is also confirmed by examinations of Jones et. al. However, as measurements started 40 minutes after the end of drinking, the earlier resorption phase was not completely covered. Nonetheless, the expert opinion of the Federal Health Office suggesting that the breath alcohol concentration follows the arterial, instead of the venous, blood alcohol concentration must be considered questionable in terms of a general introduction of breath alcohol concentration measurements in Germany.

KEYWORDS: *Breath alcohol concentration, Arterial blood alcohol concentration, Venous blood alcohol concentration*

Corresponding author: Katja.Jachau@medizin.uni-magdeburg.de