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## **Reply to the comments of J.G.Wigmore and M.R. Pelletier on the manuscript entitled “Concentration dependency of the BAC/BrAC (blood alcohol concentration / breath alcohol concentration) conversion factor during the linear elimination phase”**

Published online: 13 August 2004  
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The answer to the question of whether the relevance of the results shown is restricted to Germany is a definite “no”. In the first place, the work described is pure research and investigates the concentration dependency of the relationship of BAC to BrAC, i.e. the conversion factor Q during the linear elimination phase. These results showed that Q is neither a constant, nor proportional to concentration, but inversely proportional to alcohol concentration. The way the BAC values are calculated from the measured serum concentrations does not influence this relationship, nor does the fact that the BAC values are expressed with the measuring unit wt/wt. Naturally, the numeric value of Q alters when influenced by the factors mentioned; this can, however, be calculated accordingly and adapted to a particular nation. However, the effects will be the same when expressed as a percentage.

These effects amount to a deviation of approximately 6.5% when the Q for BrAC of 0.25 mg/l is compared to that of 0.55 mg/l. In the lower concentration range, the deviation increases steeply due to the hyperbolic function. In the concentration range in the transition from zero to

first order elimination kinetics figures as high as 30% and more can be observed, not only 6–10%. However, only the concentration level which delimits the national legal limit is essential for traffic law regulations. Even if one assumes the slightest deviations, it is the task of the scientist to determine the degree of the deviation. It is, however, the task of the legislator to decide whether a deviation of a certain size is acceptable.

The conversion of BrAC using Henry’s law to an equivalent value at a breath temperature of 34°C is mandatory in Germany in order to increase the precision of the recording instruments. Without this correction, the individual and situation-dependent range of variation is larger and hence the results are less accurate. In general it does not seem useful to give preference to the less precise measurement results over the more precise one. In principle, the transferability of the results to BrAC measurements without taking breath temperature into consideration is thereby not touched. One must just bear in mind that the deviations mentioned above might become even larger.

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