Risk estimations based on data from experimental and epidemiological studies on driving under the influence

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Methods
In DRUID three different methodologies were applied in order to estimate traffic risk for driving under the influence of alcohol, drugs and medicaments. (1) A meta-analysis of experimental alcohol studies was performed in order to establish a reference risk function for performance impairment. In a further substance-specific meta-analysis the effects of medicines (antipsychotics, anxiolytics, hypnotics and sedatives, antidepressants, antihistamines) and illegal drugs (amphetamines, cocaine, cannabis) on driving-relevant performance were quantified and related to the impairment of alcohol. (2) Experiments in DRUID examined the impairing potential of additional substances and their combination with alcohol or sleep deprivation. Within the (3) epidemiological approach the prevalence of drugs was estimated by roadside studies. Hospital studies lead to risk measures for being severely injured or killed in a traffic accident due to previous substance intake.

Unfortunately all three approaches lead to different parameters describing impairment or risk in an incomparable way. Within DRUID a method was developed to compare these different estimations, at least for alcohol, for which all three sources of information is available.

Results:
It is shown that risk measures for different alcohol concentrations calculated from meta-analysis and experiments are in line with epidemiological risk for specific alcohol levels and comparable with former epidemiological risk studies for alcohol (Blomberg, Peck, Moskowitz, Burns, & Fiorentino, 2005; Borkenstein, Crowther, Shumate, W.B., & Zylman, 1974; Krüger, Kazenwadel, & Vollrath, 1995). Therefore it might be assumed that odds ratios calculated from meta-analysis and experiment are a fair estimation of epidemiological risk.
Impairing effects of stimulants could not be verified – neither in the experiments nor in meta-analysis. case-control studies showed no clear results for stimulants. According to experiments and meta-analysis a THC serum concentration of approximately 4 ng/ml seems to show similar impairment as 0.5 g/L alcohol. According to the meta-analysis the risk for medicaments varies of course considerably for different substances even within one substance class and for different doses and concentrations. As a consequence risk values from epidemiology describing the risk for a whole substance group like “benzodiazepines and z-drugs” without knowing the related concentrations must be treated with great care.

Discussion:
The risk in traffic is inherently defined by a combination of the risk of a specific substance and its prevalence in traffic. Regarding this, alcohol is still by far the most risky substance in traffic in Europe.

References:

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