Sensitivity and specificity of ethyl glucuronide in hair as a marker of chronic heavy alcohol use- preliminary results

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AIMS: to establish the sensitivity (SE) and specificity (SP) of ethyl glucuronide (EtG) concentration in hair as a marker of chronic heavy alcohol use.

METHODS: a group of healthy volunteers (n=10) and of alcoholics at the beginning of an in-patient or an out-patient treatment (n= 14) participated in the study after providing their informed consent. Hair samples (n=22, 3-cm proximal segment) and serum (n=17) were collected and submitted to EtG determination by LC-MS-MS (Morini et al., J Mass Spectrom. 2006, 41: 34-42; LLOQ=3 pg/mg) and to carbohydrate deficient transferrin (CDT) determination using the Dade Behring N Latex CDT Kit, respectively. An anonymous questionnaire was administered to participants (n=22) in order to estimate their ethanol daily intake (EDI) during the 2-week and the 3-month period preceding sample collection. SE and SP of both EtG and N-Latex CDT in detecting EDI higher than 60 g and 80 g were calculated as the proportion of true positives (TP) and true negatives (TN).

RESULTS: an EtG concentration of 30 pg/mg provided high SE (0.82, 9/11 TP) and SP (1.0, 9/9 TN) in discriminating a 3-month EDI>60 g. As expected considering the length of the hair segment analysed, EtG proved to be less specific in discriminating 2-week EDI>60 g (SE=0.89, TP 8/9; SP=0.91; TN 10/11). EtG at 30 pg/mg was less specific in discriminating 3-month EDI>80 g (SE=0.87 TP 7/8; SP=0.83 TN=10/12) and by increasing the EtG threshold to 40 pg/mg SP was improved at the expense of SE (SE=0.67 TP 6/9; SP=0.91 TN 10/11).
N Latex CDT at the threshold proposed by the manufacturer (2.47%) was found to be highly specific but less sensitive than EtG at detecting both 3-month and 2-week EDI>60 g (SE=0.43 TP 3/7; SP=1.0 TN 8/8 for both EDI time periods). By increasing the EDI threshold to 80 g SE improved (SE=0.50 TP 3/6; SP=1.0 TN 9/9). By reducing the threshold to 2.0% SE improved (0.57 and 0.67 at EDI>60 g and 80 g, respectively) and SP decreased (0.75 and 0.78).
EtG (30 pg/mg) confirmed all N Latex CDT positives (2.47%) at both EDI>60 g and >80 g. Good linear correlation was observed between EtG and CDT (R^2=0.68, n=15).

CONCLUSIONS: EtG in hair appears to provide high sensitivity and specificity in detecting chronic heavy drinking. The study is ongoing in order to extend the group of participants and to confirm these results on a higher number of cases.

KEYWORDS: *Alcohol abuse, Ethyl glucuronide, Carbohydrate deficient transferrin, Sensitivity, Specificity*

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