Active charcoal for GHB intoxication: an in vitro study

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Aim of the study
Since the administration of activated charcoal is not without risks and it is unknown whether a therapeutic dosage of activated charcoal is able to bind GHB, we here examined the adsorption capacity of AC to GHB in an in vitro model.

Background
Intoxications with gamma-hydroxybutyrate (GHB) are occurring more frequently. Even gamma-butyrolactone, which is metabolised in the body to GHB, is sometimes ingested in drug abuse. Although treatment of intoxications with GHB primarily consist of supporting respiratory status, the use of activated charcoal (AC) has been suggested in several guidelines and in literature. However, it has never been demonstrated that GHB binds to AC. Since the rapid absorption of GHB can be delayed under certain conditions e.g. due to interaction with food, interference with absorption could be clinically relevant. We therefore tested adsorption of GHB to AC in an in vitro model.

Methods
A validated in vitro model was used. First, a fixed dose of 800 mg of GHB and 5 grams AC were mixed at 37°C in 100 mL simulated gastric and intestinal fluid, respectively. Subsequently, AC dosages between 156 mg and 5 g were tested for GHB adsorption capacity to obtain an adsorption curve. AC was removed by centrifugation and GHB concentrations were analysed by a validated gas chromatography method.

Results
Binding of GHB to AC was dose-dependent ranging from 75 – 82% of the total administered dose. The mean adsorption of 78 percent using 5 grams of AC, corresponding with the maximum adult dose. Differences in pH 1.2 and 7.2 had a significant effect on the extend of adsorption.

Conclusion
AC holds GHB binding capacity. These features underline its potential for use in GHB detoxification in the first few minutes after unintended ingestion of GHB e.g. in children. In vivo studies are needed to reveal the clinical relevance of GHB adsorption to AC.