Pharmacokinetics of propofol in rainbow trout following bath exposure

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Abstract

Propofol, 2,6-diisopropylphenol, seems to be a good candidate as a fish anaesthetic, however, no study regarding propofol influence on fish has yet been reported. The aim of this study was to examine propofol pharmacokinetics in rainbow trout (Oncorhynchus mykiss) following bath exposure. Fish (n = 100) were exposed to an aqueous propofol bath at 12°C and 17°C; propofol concentration in the bath was 10 mg L⁻¹. Plasma concentration-time profiles were determined using LC-MS, and pharmacokinetic parameters were calculated. Propofol was absorbed quickly at both temperatures. Its concentration reached 13.8±2.7 μg mL⁻¹ and 16.1±2.1 μg mL⁻¹ at 12°C and 17°C, respectively, during the first minute of exposure. Blood plasma propofol decreased rapidly to 6.8±0.7 μg mL⁻¹ and 6.3±2.2 μg mL⁻¹ at 12°C and 17°C respectively, during the first 10 minutes of the recovery. The half-life time of propofol was 1.5 h and 1.1 h at 12°C and 17°C, respectively. We found propofol anaesthesia in trout effective and safe. However, it caused a gradual decrease of respiratory rate, and therefore a specific anaesthesia protocol should be developed.

Key words: 2,6-diisopropylphenol, anaesthesia, half-life time, LC-MS analysis, micro liquid-liquid extraction, Oncorhynchus mykiss

Introduction

Anaesthesia is believed to be an indispensible procedure in modern, intensive fish production. It facilitates many breeding operations, reduces stress in fish and thus also reduces potential losses caused by manipulation. It is recommended for any procedure causing pain or stress to fish. Anaesthesia is of particular importance during fish spawning, due to the usually high value and great size of spawners. Many chemicals show anaesthetic properties in fish (Bell 1967, Brown 1988). MS-222 (Baudin 1932), metomidate (Malmstroem et al. 1993, Mattson and Riple 1989, Olsen et al. 1995), etomidate (Amend et al. 1990),...