Tricaine (MS-222) is a safe anesthetic compound compared to benzocaine and pentobarbital to induce anesthesia in leopard frogs (*Rana pipiens*)

Yavuz Cakir¹, Stephen M. Strauch²

¹Department of Pathology, University of Alabama, 6025 Vollier Hall, 1670 University Blvd., Birmingham, AL 35294, USA

²Department of Veterinary Biosciences, College of Veterinary Medicine, The Ohio State University, Columbus, OH, 43210, USA

Correspondence: Yavuz Cakir, e-mail: ycakir@pathlab.edu

Abstract:
Tricaine (MS-222) is used commonly for sedation, immobilization, and anesthesia of poikilothermic animals. The anesthetic efficacy of different concentrations of MS-222 was compared to benzocaine and pentobarbital on the physiological changes, heart rate and ECG (electrocardiogram) parameters in the leopard frog, *Rana pipiens*. Loss of righting reflex (RR), loss of pain response (NR = nociceptor response) and recovery time were measured. Heart rate and ECG parameters were also tested before and during anesthesia. The time to loss of RR and NR decreased while recovery time markedly increased with the increasing concentration of MS-222. Benzocaine at 200 mg/l induced a rapid anesthesia, but all frogs needed resuscitation. Pentobarbital at 300 mg/l induced a slow anesthesia, however, all of the frogs also needed resuscitation. All anesthetics at the mentioned concentrations decreased heart rate significantly as well as altered the ECG parameters. All anesthetics prolonged the Q–T interval, and MS-222 at 800 mg/l and benzocaine at 200 mg/l were the most effective anesthetic concentrations in increasing the Q–T interval. Frogs anesthetized by benzocaine and pentobarbital and high concentrations of MS-222 required resuscitation due to hypoxia. Pentobarbital and benzocaine seem to be very effective compounds, but their safety margins are narrow because of ventilatory failure. Therefore, MS-222 at a concentration of 200 mg/l or less is highly recommended for leopard frogs because prolonged recovery, high mortality rate and significant ECG changes are observed with higher concentrations of MS-222.

Key words:
Tricaine, MS-222, safe anesthesia, leopard frog, righting reflex, pentobarbital, benzocaine, heart rate and ECG (electrocardiogram)