G154 Effects of Ketamine on the Development of *Chrysomya Megacephala* (F.) (Diptera: *Calliphoridae*)

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After attending this presentation, attendees will gain the knowledge about how the presence of ketamine affects the development of larvae of necrophagous flies feeding on cadavers.

This presentation will impact the forensic science community by showing forensic entomologists and forensic pathologists the effects of ketamine, a drug commonly used as an anesthetic, on the development of larvae of the forensically important fly *Chrysomya megacephala* (Diptera: *Calliphoridae*). The understanding of the larval growth pattern of necrophagous flies feeding on cadavers in the presence of certain drugs could lead to a more reliable estimation of postmortem interval in drug-related deaths.

It is widely accepted that the presence of certain drugs or poisons can affect the development of larvae of necrophagous flies feeding on cadavers. These effects should be taken into consideration in estimation of the Postmortem Interval (PMI) of drug-related deaths. In recent years, it has been reported that many drugs and poisons within cadavers can affect the developmental duration of larvae or pupal stages of necrophagous flies, and then affect the accuracy of the PMI estimation. Ketamine, first synthesized in 1962, is an NMDA receptor antagonist and a derivative of Phencyclidine (PCP). Ketamine hydrochloride is used in intravenous anesthesia in clinical practice to replace PCP. Illicit drug abuse has risen to epidemic levels over the last decade in China because of the implementation of its open-door policies. Abuse of ketamine has recently gained popularity in China and an increased trend of deaths due to ketamine intoxication has been noted during the past decade in central China. It is not known if the effects of ketamine on the development of necrophagous flies have been reported.

This study investigated effects of ketamine, a drug commonly used as anesthetic, on the development of larvae of the forensically important fly *Chrysomya megacephala* (Diptera: *Calliphoridae*). Larvae of the *C. Megacephala* were divided equally into four groups and were reared on artificial diets containing different concentrations of ketamine: 0.25µg/g, 50µg/g and 100µg/g in an environmental chamber. Samples were collected every 12 hours. The body lengths, weights of each larva, and developmental durations of each stage were observed and measured. This study demonstrated that ketamine, low temperature, and their synergistic action significantly suppressed the larval growth of *C. megacephala* ($P<0.001$). The inhibiting effects of ketamine on the growth of larvae by length and weight were most significant before the larvae achieved their maximum length and weight when compared with a control group ($P<0.001$), especially in the 25µg/g ketamine-treated group at a temperature of 24°C. The time that the larvae achieved the maximum lengths and weights were significantly delayed in the ketamine-treated groups when compared with the control group ($P<0.05$), which resulted in prolonged duration of larval and prepupal stages while shortening the duration of pupal stages especially at low temperature. No significant differences were observed on the larval maximum length and weight between the control group and the ketamine-fed groups at the same temperature. No linear correlations were discovered between ketamine concentration and growth rate of larval body length and weight. In the deaths of suspected ketamine intoxication, the delayed growth effect should be taken into account when using regression against larval weight or length to estimate PMI.

In conclusion, ketamine can significantly delay larval development of *C. megacephala*. Knowledge of the effects of ketamine on larval development of *C. megacephala* can be useful in the estimation of PMI in suspected ketamine-related deaths. Further research is needed to observe the effects of ketamine on the development of more species of necrophagous flies as different species may have different responses to the same drug.

Forensic Entomology, Ketamine, Chrysomya Megacephala

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