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Hormonal stress response of laboratory mice to conventional and minimally invasive bleeding techniques

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Abstract

*Conventional bleeding of small laboratory animals is often associated with stress and injuries that can cause haematomas, inflammation and ultimately the death of animals under investigation. Here, we used faecal glucocorticoid metabolites as an indicator of stress imposed on laboratory mice (*Mus musculus domesticus*) when bled in three different ways: puncture of the tail vein following mechanical immobilisation; puncture of the retro-orbital plexus following chemical immobilisation; and a minimally invasive technique using blood-sucking bugs (*Reduviidae, Heteroptera*) without any immobilisation. We hypothesised that blood-sucking bugs provoke a lower hormonal stress response than conventional bleeding techniques because laboratory animals are not handled and because the mechanical stimulus of an insect sting is supposedly weak. Each of the 16 mice was bled using one of the three methods at a time in a random order with seven days of recovery between subsequent bleeding events. To monitor the stress hormones, we determined corticosterone metabolites in faecal samples of mice collected one day before, 8 h after and one day after the bleeding event. Concentrations of faecal glucocorticoid metabolites increased in all three treatment groups compared with baseline values. However, average concentration of stress hormone metabolites after bleeding was higher by a factor of about 1.5 when conventional bleeding techniques were applied than when bugs were used. We conclude that blood-sucking bugs may offer a gentle alternative for obtaining blood samples from small animals such as mice.*

Keywords: *animal welfare, blood samples, corticosterone,* Dipetalogaster maximus, *faecal samples,* Mus musculus