PsychoGenics
Transforming CNS Discovery

Inflammatory Pain

Complete Freund's Adjuvant Model

The rat complete Freund's adjuvant (CFA) model is a model of subchronic inflammatory pain in which intraplantar injection of CFA (0.1 mg/100 µl) into the left hind paw results in erythema, edema, and pain behaviors. Pain behaviors measured in this model include hind paw mechanical allodynia, and this model is commonly used to evaluate the efficacy of compounds for pain associated with inflammation.

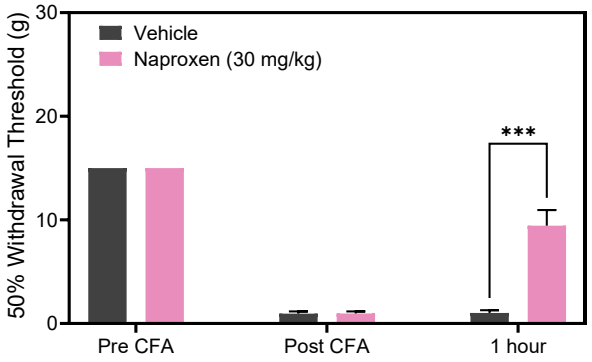

Figure 1: *Intraplantar injection of CFA into the left hind paw produces mechanical allodynia 24 hours post-injection (Post CFA). Administration of naproxen (30 mg/kg) reduces hind paw mechanical allodynia 1- hour post-dosing. Mechanical allodynia is represented as decreased 50% withdrawal thresholds to von Frey filament stimulation. *** p < 0.001, Bonferroni's test; n=10/group*

Carrageenan Model

The rat carrageenan model is a model of acute inflammatory pain in which intraplantar injection of carrageenan (2% /100 µl) into the left hind paw results in erythema, edema, and pain behaviors. Pain behavior measures, including hind paw mechanical allodynia, and inflammation may be assessed by measuring paw volume (i.e. edema). This model is commonly used to evaluate the efficacy of compounds for pain and assess anti-inflammatory activity.

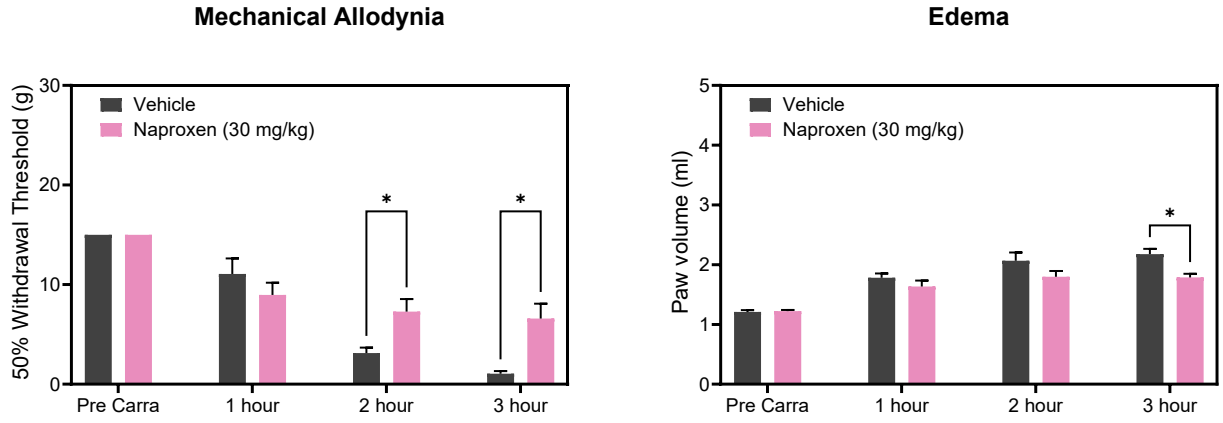

Figure 2: *Intraplantar injection of carrageenan (2%, 100 µl) into the left hind paw produces mechanical allodynia* ***(left)*** *and edema* ***(right)*** *which develops over a period of 3 hours. Mechanical allodynia is represented as decreased 50% withdrawal thresholds to von Frey filament stimulation and edema is represented as increased paw volume measured using a plethysmometer over a period of 3 hours. Administration of naproxen (30 mg/kg, PO) 5 min prior to carrageenan injection reduced the development of mechanical allodynia and edema.* p<0.05; n=10/group*

Formalin Model

The rat/mouse formalin model is a model of inflammatory pain in which intraplantar injection of formalin into the left hind paw results in spontaneous pain behaviors consisting hind paw licking, biting, and flinching. Spontaneous pain behaviors consist of two distinct phases which are believed to reflect activation of peripheral sensory afferents (Phase 1, 0-10 min) and development of central sensitization (Phase 2, 11-40 min). This model is commonly used to evaluate the analgesic efficacy of compounds measuring a non-reflexive pain endpoint.

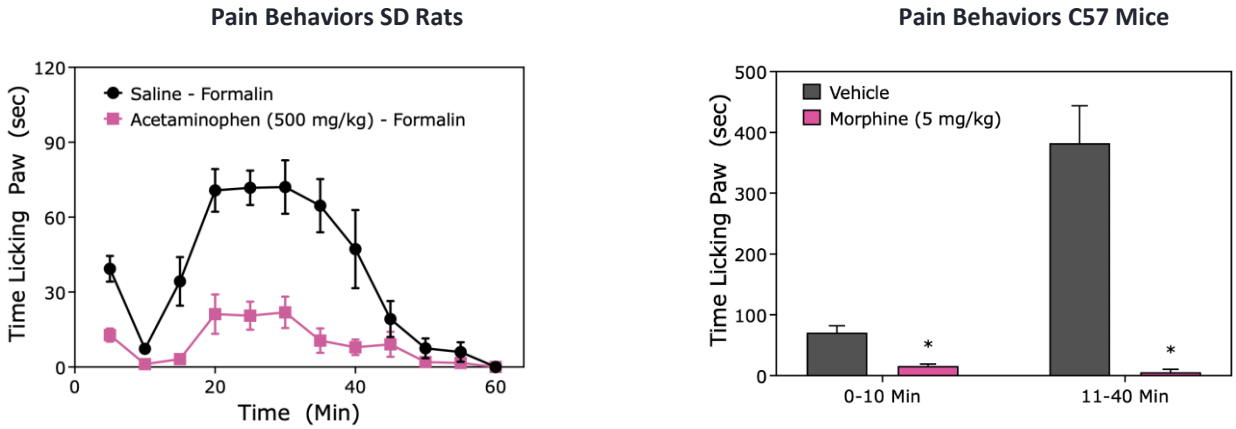

Figure 3: (left) *Formalin injection into the hind paw of SD rats produces spontaneous pain behaviors in two distinct phases recorded as time spent licking the hind paw. Administration of acetaminophen (500 mg/kg) prior to formalin injection inhibited spontaneous pain behaviors in Phase 1 (0-10 min) and Phase 2 (11-40 min).* ***(right)*** *Formalin injection into the hind paw of C57 mice produces spontaneous pain behaviors in two distinct phases which are inhibited by administration of morphine (5 mg/kg) prior to formalin injection. * p< 0.05; n=10/group*

UVB Radiation Model

The rat UVB radiation model is a model of inflammatory pain in which UVB irradiation of the plantar surface of the hind paw results in erythema and pain behaviors measured as hypersensitivity to a noxious heat stimulus. The UVB radiation model has been characterized in both rats and human subjects, making this a useful translational pharmacodynamic pain model to evaluate analgesic effects of test agents preclinically.

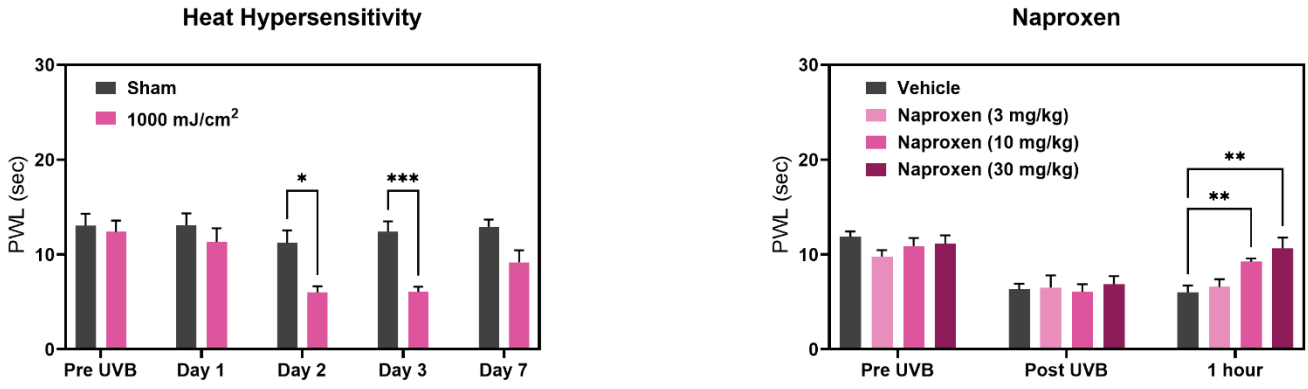

Figure 3: (left) *Development of left hind paw heat hypersensitivity following UVB irradiation of the left hind paw (1000 mJ/cm^2). Heat hypersensitivity was measured using the Hargreaves test.* ***(right)*** *Administration of naproxen (3 – 30 mg/kg, PO) dose-dependently reduced hind paw heat hypersensitivity 1- hour post-dosing. ** p< 0.01; n=8-10/group*