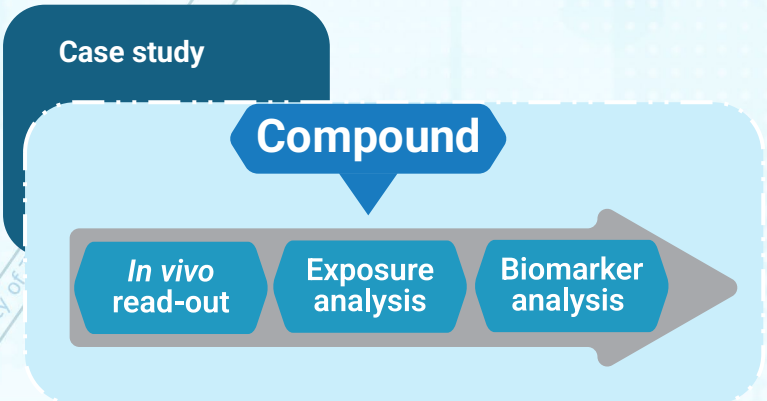
TCG Lifesciences | Chembiotek

Pain Models

We offer specialised preclinical research services focused on rodent pain models, supporting drug discovery and development. Our CRO provides validated inflammatory and neuropathic pain models in mice and rats, with expertise in behavioural assessments, biomarker analysis, and pharmacokinetic evaluation. With a commitment to scientific rigour, ethical standards, and customised study design, we deliver reliable, reproducible data to accelerate your therapeutic pipeline.

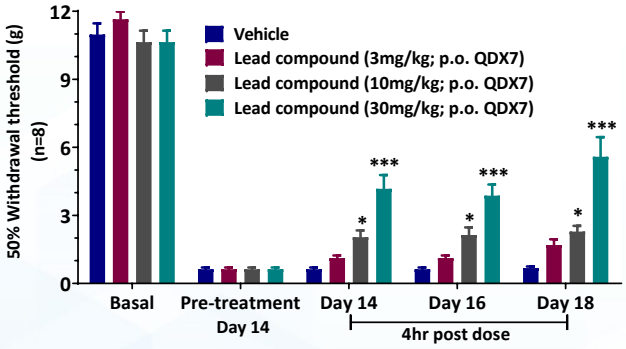
Neuropathic Pain Models

- **Spinal Nerve Ligation (SNL)**
- **Spared Nerve Injury (SNI)**
  The Spared Nerve Injury (SNI) model is a widely used rodent model that closely mimics key features of human neuropathic pain. It involves ligation and transection of two branches of the sciatic nerve (tibial and common peroneal) while sparing the sural nerve. This results in robust and long-lasting symptoms such as mechanical allodynia and thermal hyperalgesia, reflecting clinical signs observed in patients with partial nerve injuries. The model replicates critical pathophysiological mechanisms of neuropathic pain, including peripheral and central sensitisation, ectopic neural activity, and neuroinflammation. Due to its reliability and translational relevance, the SNI model is extensively used to study pain mechanisms and evaluate potential analgesic therapies.

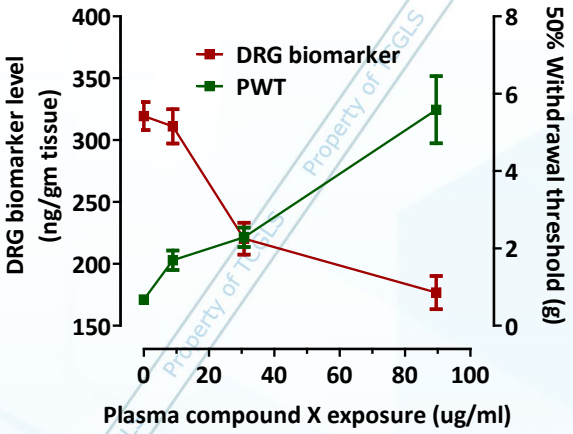


PK-PD_Biomarker

Dose dependent effect of lead compound on SNI-NP in rats



Compound X: Biomarker modulation vs Efficacy



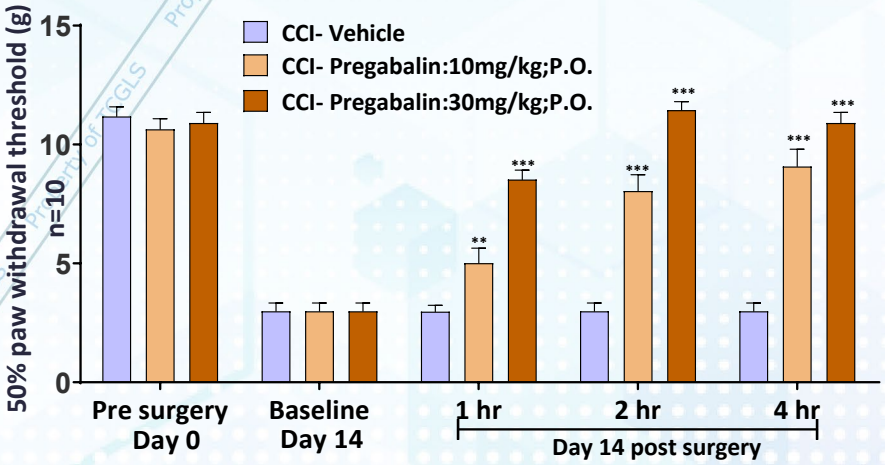
- **Chronic Constriction Injury (CCI)**

The Chronic Constriction Injury (CCI) model is a well-established rodent model of neuropathic pain that mimics aspects of human peripheral nerve injury. It involves loosely tying ligatures around the sciatic nerve, leading to partial nerve damage, inflammation, and disrupted axonal transport. This results in persistent symptoms such as mechanical allodynia, thermal hyperalgesia, and spontaneous pain behaviours, similar to those seen in clinical neuropathic conditions. The CCI model reproduces both peripheral and central sensitisation, making it useful for studying pain mechanisms and evaluating potential analgesics.

Validation results

- Animals: Male Sprague Dawley rats
- Induction: 4-loose ligatures around sciatic nerve
- Endpoint: Mechanical allodynia (von Frey filaments)

Effect of Pregabalin in rat model of CCI induced neuropathic pain



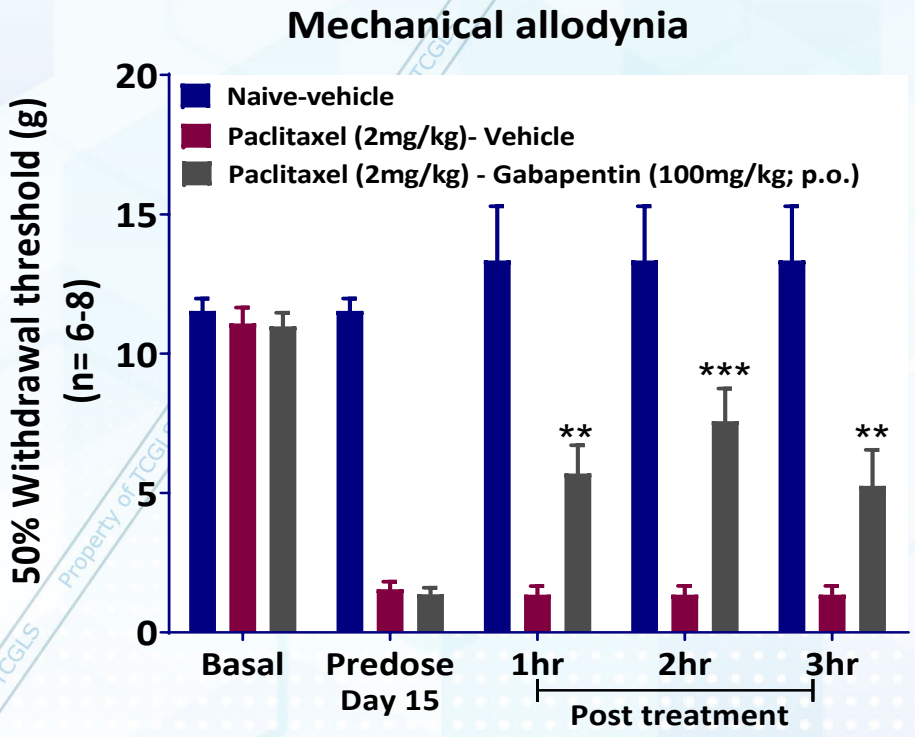
*** p<0.001, ** p<0.01, *** p<0.001 vs Vehicle
Statistical analysis: Two-way ANOVA followed by Bonferroni posttests

- **Partial Sciatic Nerve Ligation (PSNL)**
- **Diabetic Neuropathy**
- **Chemotherapy-Induced Neuropathic Pain**

Chemotherapy-Induced Peripheral Neuropathy (CIPN) is a common side effect of several chemotherapeutic agents, such as paclitaxel, oxaliplatin, and vincristine. Preclinical models of CIPN in rodents replicate key clinical features of human neuropathic pain, including mechanical allodynia, cold hypersensitivity, and numbness or tingling sensations. These models also reflect underlying mechanisms relevant to human CIPN, such as mitochondrial dysfunction, axon degeneration, and neuroinflammation. Given its chronic nature and resistance to conventional analgesics, CIPN models are valuable for studying pain pathophysiology and for developing effective treatments that translate to clinical settings.

Case study

- Animals: Male Sprague Dawley rats
- Induction: Intraperitoneal injection of Paclitaxel (2 mg/kg) on days 0, 2, 4 and 6
- Endpoint: Mechanical allodynia (von Frey filaments)



*** p<0.001, ** p<0.01 vs Vehicle
Statistical analysis: Two-way ANOVA followed by Bonferroni posttests

TCG Lifesciences | Chembiotek

Inflammatory Pain Models

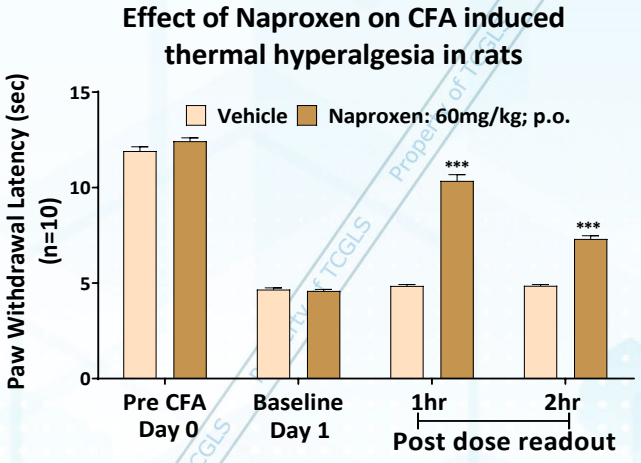
- **UV Burn-Induced Hyperalgesia**
- **Complete Freund's Adjuvant (CFA)-Induced Hyperalgesia**

The Complete Freund's Adjuvant (CFA)-induced hyperalgesia model is a widely used rodent model of inflammatory pain. It involves injecting CFA, an immune-stimulating agent, typically into the hind paw, leading to localised inflammation, swelling, and sustained thermal and mechanical hyperalgesia. This model mimics key features of human inflammatory pain conditions, such as arthritis and tissue injury. It induces robust peripheral sensitisation and contributes to central sensitisation, making it valuable for studying the mechanisms of inflammation-induced pain and for testing anti-inflammatory and analgesic therapies.

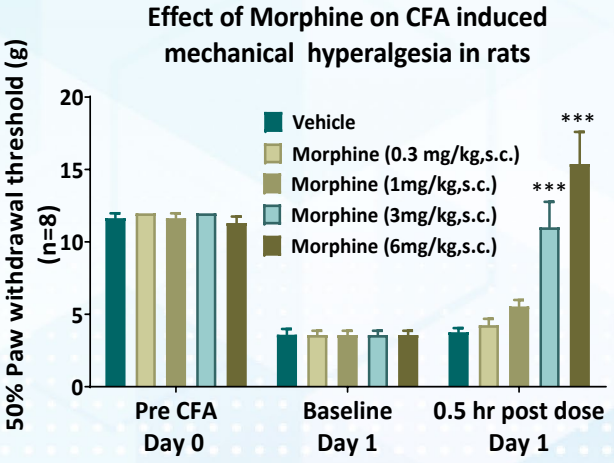
Validation results

- Animals: Male Sprague Dawley rats
- Induction: Sub-plantar injection of Complete Freund's Adjuvant (50/100µl of 1mg/ml)
- Endpoint: PWL in response to radiant heat / PWT (von Frey filaments / PWF (Randall Selitto)

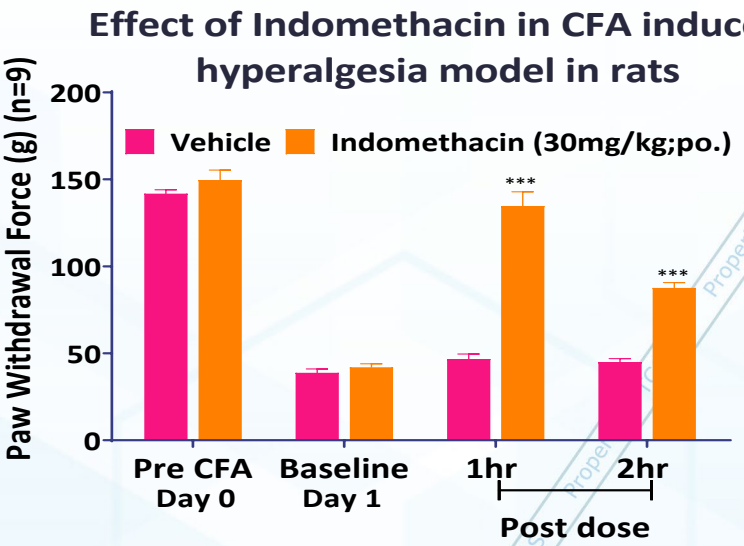
Thermal hyperalgesia (Hargreaves)



Mechanical hyperalgesia (von Frey)



Mechanical hyperalgesia (Randall Selitto)



*** p<0.001 vs Vehicle
Statistical analysis: Two-way ANOVA followed by Bonferroni posttests

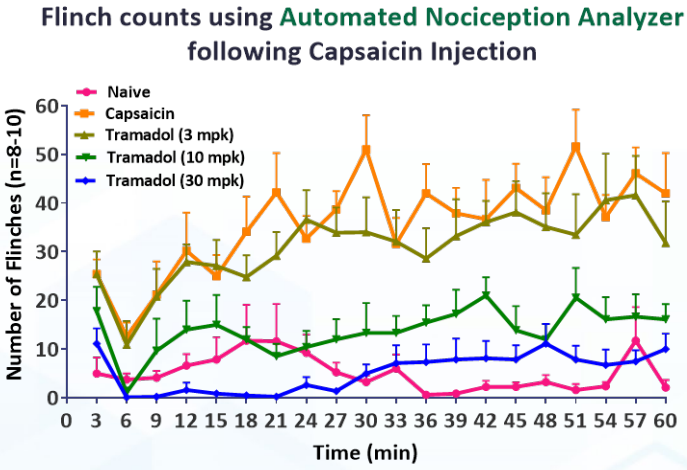
- **MMT/MIA-Induced Osteoarthritis Pain**
- **Capsaicin-Induced Pain**

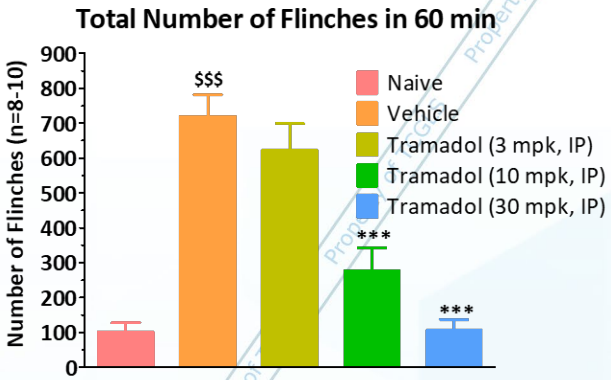
Capsaicin-induced pain in rats is a widely used model for studying nociception and inflammatory pain. When capsaicin, the active component in chili peppers, is injected (typically subcutaneously or intradermally), it activates transient receptor potential vanilloid 1 (TRPV1) receptor on sensory neurons. This activation leads to a burning pain sensation, neurogenic inflammation, and hypersensitivity in the affected area. The model mimics aspects of human pain conditions and is valuable for evaluating the efficacy of analgesic and anti-inflammatory drugs, as well as understanding pain mechanisms at molecular and behavioural levels.

Validation results

- Animals: Male Sprague Dawley rats
- Induction: Capsaicin injection in hind paw
- Endpoint: Flinch count using Automated Nociception Analyzer (UCSD)

TCG Lifesciences | CHEMBIOTEK





*** p<0.001 vs Vehicle & $$$ p<0.001 vs Naïve

*** p<0.001 vs Vehicle
Statistical analysis: Two-way ANOVA followed by Bonferroni posttests

- **Postoperative Pain**
- **Formalin-Induced Pain**

Key Features

1. Validated neuropathic and inflammatory pain models in mice and rats
2. Expertise in behavioural assessments, biomarker analysis, and PK evaluation
3. Customised study designs ensuring reproducible, high-quality data

Our pain models enable early proof-of-concept evaluation, mechanism-of-action studies, and dose optimisation, supporting informed progression to clinical candidate selection.