

## Complete Freund's adjuvant (CFA)

<b>Cat. No.:</b>	HY-153808	
<b>CAS No.:</b>	9007-81-2	
<b>Target:</b>	Toll-like Receptor (TLR)	
<b>Pathway:</b>	Immunology/Inflammation	Complete Freund's adjuvant (CFA)
<b>Storage:</b>	4°C, protect from light * In solvent : -80°C, 6 months; -20°C, 1 month (protect from light)	

### BIOLOGICAL ACTIVITY

<b>Description</b>	<p>Complete Freund's adjuvant (CFA) is an immunoadjuvant emulsified with antigen by its discoverer Jules T. Freund to enhance an animal's immune response to an antigen. Complete Freund's adjuvant (CFA) is also an inducer of the Th1 immune response and a ligand of TLRs. Complete Freund's adjuvant (CFA) contains heat-killed inactive tuberculosis bacilli and consists of a paraffin oil-in-water emulsion. Complete Freund's adjuvant (CFA) stimulates a strong and durable immune response and can be used to induce persistent inflammatory pain models in mice, experimental autoimmune myocarditis (EAM) models, and more. Incomplete Freund's adjuvant (IFA) (HY-153808A) is another type of Freund's Adjuvant that stimulates a weaker immune response<sup>[1][2]</sup>.</p>
<b>In Vitro</b>	<p>Complete Freund's adjuvant (CFA) contains numerous microbial TLR ligands (such as TLRs 2, 4, and 9), is a potent inducer of a Th1-type immune response<sup>[1]</sup>.</p> <p>MCE has not independently confirmed the accuracy of these methods. They are for reference only.</p>
<b>In Vivo</b>	<p>Complete Freund's adjuvant (CFA) can be used in animal modeling to establish a mouse model of persistent inflammatory pain.</p> <p>Complete Freund's adjuvant (CFA) can elicit a robust antibody response to T-cell-dependent antigens in TLR-deficient mice, which is a T-cell-dependent, antigen-specific antibody response<sup>[1]</sup>.</p> <p>Complete Freund's adjuvant (CFA) emulsified with Myosin or Myocarditogenic peptide, then subcutaneously injected (two injections with 7 days apart) into A/J, BALB/c, and IL6KO BALB/c male mice to induce experimental autoimmune myocarditis (EAM) mouse model<sup>[1]</sup>.</p> <p>Complete Freund's adjuvant (CFA) widely involves in modeling immunization-induced animal models such as collagen-induced arthritis (CIA), experimental autoimmune encephalomyelitis (EAE), experimental autoimmune thyroiditis (EAT), experimental autoimmune uveitis (EAU), and EAM<sup>[1]</sup>.</p> <p>Complete Freund's adjuvant (CFA) plus Thyroglobulin to induce thyroiditis, whereas Incomplete Freund's adjuvant (IFA) (HY-153808A) serves as a sufficient adjuvant for thyroid lesions<sup>[1]</sup>.</p> <p>Complete Freund's adjuvant (CFA) is injected into the plantar area of the hind paw of C57BL/6J mice to induce inflammatory pain mouse model<sup>[2]</sup>.</p> <p>Complete Freund's adjuvant (CFA) injection on the side contralateral results optogenetic inhibition of ventral pallidum (VP) cholinergic (ChAT) system neurons, and significantly reduces the number of c-Fos-positive neurons in the VP on the photo-inhibited side<sup>[2]</sup>.</p> <p>Complete Freund's adjuvant (CFA) has low plasma clearance (22%) in normal rats<sup>[4]</sup>.</p>

## 1. Induction of Experimental Autoimmune Myocarditis (EAM)<sup>[1]</sup>

### Background

Complete Freund's adjuvant (CFA) induces myocarditis by activating the immune system and enhancing the antigen-specific immune response.

### Specific Modeling Methods

Mice: A/J, BALB/c, and IL6KO BALB/c • male • 6-8-week-old

Administration: 5mg/ml • s.c. • twice dose

### Note

(1) On day 0, all mice additionally received 500 ng of pertussis toxin (i.p.)

(2) On days 0 and 7, mice received subcutaneous injections peptide emulsified in CFA supplemented with 5 mg/mL of *Mycobacterium tuberculosis*, strain H37Ra.

### Modeling Indicators

Histological analysis: Myocarditis severity was assessed by histology and relative heart weight.

Molecular changes: Test serum levels of total IgG, IgG1, IgG2a, IgG2b, IL-1b and IL6.

Correlated Product(s): Incomplete Freund's adjuvant (IFA) (HY-153808A)

Opposite Product(s):

## 2. Induction of Neuropathic Pain<sup>[2][3]</sup>

### Background

Complete Freund's adjuvant (CFA) releases inflammatory mediators TNF- $\alpha$  and IL-6 in body which can activate peripheral nerve endings and act on pain nerve endings, resulting in neuropathic pain<sup>[2][3]</sup>.

### Specific Modeling Methods

Mice: C57BL/6J • male • 8-week-old

Administration: 20  $\mu$ l • s.c. • single dose

### Note

(1) Inject Complete Freund's Adjuvant (CFA) without dilution into the plantar area of the hind paw.

(2) Tests PWT and PWL for both hind paws corresponding to before and 24, 48, 72 h after CFA injection.

### Modeling Indicators

Behavior Observation: Detect paw withdrawal threshold (PWT) and paw withdrawal latency (PWL).

Correlated Product(s): Galantamine (HY-76299)

Opposite Product(s): Mecamylamine (HY-B1395A)

MCE has not independently confirmed the accuracy of these methods. They are for reference only.

Animal Model:	A/J, BALB/c, and IL6KO BALB/c male mice <sup>[1]</sup>
Dosage:	
Administration:	Subcutaneous Injectionon (sc); injected at days 0 and 7. EAM severity was analyzed by histology on day 21 (Repeated administration of CFA to animals can cause multiple injection-site effects, the most often observed are on site granulomas and pain)
Result:	Increased the relative proportion of CD11b+F4/80-monocytes and CD11b+Gr1+ granulocytes. Expanded monocytes in the heart and in the spleen and those monocytes in the spleen make less IL-10 as well as more IL-6.

## REFERENCES

[1]. Fontes JA, et al. Complete Freund's adjuvant induces experimental autoimmune myocarditis by enhancing IL-6 production during initiation of the immune response. *Immun Inflamm Dis*. 2017 Jun;5(2):163-176.

[2]. Ji YW, et al. Plasticity in ventral pallidal cholinergic neuron-derived circuits contributes to comorbid chronic pain-like and depression-like behaviour in male mice. *Nat Commun*. 2023 Apr 17;14(1):2182.

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[3]. Sun T, et al. Gastrodin relieved complete Freund's adjuvant-induced spontaneous pain by inhibiting inflammatory response. *Int Immunopharmacol.* 2016 Dec;41:66-73.

[4]. Projean D, et al. Use of Freund's Complete Adjuvant (FCA) in inflammatory pain models: consequences on the metabolism and pharmacokinetics of the non-peptidic delta receptor agonist SNC80 in the rat. *Xenobiotica.* 2007 Aug;37(8):870-83.

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**Caution: Product has not been fully validated for medical applications. For research use only.**

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