

## Product Specification Sheet

### Complete Freund's Adjuvant (CFA) vaccine adjuvant

|  |   |                       |
|--|---|-----------------------|
| <input type="checkbox"/> <b>Cat. # AV-3010-10</b>  | Complete Freund's Adjuvant (CFA) vaccine adjuvant | <b>SIZE:</b> 10 ml    |
| <input type="checkbox"/> <b>Cat. # AV-3010-100</b> | Complete Freund's Adjuvant (CFA) vaccine adjuvant | <b>SIZE:</b> 10x10 ml |

**General Information:** The word '**adjuvant**' is derived from the Latin word '*adjuvare*' which means '**to help**'. Therefore, Immunologic Adjuvants are added to vaccines to stimulate the immune system's response to the target antigen, but do not in themselves confer immunity. Adjuvants act in various ways in presenting an antigen to the immune system. Adjuvants can act as a depot for the antigen, presenting the antigen over a long period of time, thus maximizing the immune response before the body clears the antigen. Examples of depot type adjuvants are oil emulsions. Adjuvants can also act as an irritant which causes the body to recruit and amplify its immune response. A tetanus, diphtheria, and pertussis vaccine, for example, contains minute quantities of toxins/toxoids produced by each of the target bacteria. The body's immune system develops an antitoxin to the bacteria's toxins, not to the aluminum, but would not respond enough without the help of the aluminum adjuvant. Adjuvants have also evolved as substances that can aid in stabilizing formulations of antigens, especially for vaccines administered for animal health.

**Adjuvants** augment the effects of a vaccine by stimulating the immune system to respond to the vaccine more vigorously, and thus providing increased immunity to a particular disease. Adjuvants accomplish this task by mimicking specific sets of evolutionarily conserved molecules, so called PAMPs, which include liposomes, lipopolysaccharide (**LPS**), molecular cages for antigen, components of bacterial cell walls (e.g., **flagellins**), and endocytosed nucleic acids such as double-stranded RNA (**dsRNA**), single-stranded DNA (**ssDNA**), and unmethylated CpG dinucleotide-containing DNA (**ODNs**). Natural proteins such as **ovalbumin** or OVA-peptides and key hole limpet hemocyanins (**KLH**) are also being explored not only serve as carrier protein but also as adjuvants. Because immune systems have evolved to recognize these specific antigenic moieties, the presence of an adjuvant in conjunction with the vaccine can greatly increase the innate immune response to the antigen by augmenting the activities of dendritic cells (DCs), lymphocytes, and macrophages by mimicking a natural infection. Furthermore, because adjuvants are attenuated beyond any function of virulence, they pose little or no independent threat to a host organism.

For human vaccines, aluminum hydroxide (Alum) based adjuvants (Aluminum hydroxide or Alhydrogel; Aluminum phosphate or Adjuvphos) are the only **FDA-approved adjuvants**. Vaccine components that are formulated in Alum are called "Adsorbed Vaccines". The effectiveness of each salt as an adjuvant depends on the characteristics of the specific vaccine and how the manufacturer prepares the vaccine

**Not all vaccines contain Alum** because an adjuvant may not have been needed, was not expected to increase the desired immune response, or was going to cause an imbalance in the immune response. For example, **inactivated Polio Virus (IPV/IPOL)** vaccine, measles, mumps and rubella vaccine (**MMR/MMRI/MMRV**), **Varicella or chickenpox vaccine (Varivax/Proquad/MMRV)**, **Meningococcal conjugate (MCV4/Menomune/Menactra)** vaccine, and **influenza vaccines (Fluzone/Flulaval/Flumist/Fluivirin etc)** do not contain aluminum salts.

### Product Information

Complete Freund's Adjuvant (CFA) consists of heat-killed Mycobacterium tuberculosis in a water-in-oil emulsion. Additionally, CFA has ligands for TLR2, TLR4, and TLR9. Injection of antigen in CFA induces a Th1-dominated response. The mycobacterium in Complete Freund's adjuvant attracts macrophages and other cells to the injection site which enhances the immune response. For this reason, Complete Freund's Adjuvant is used for initial injections and Incomplete Freund's Adjuvant for subsequent boosts. Freund's Adjuvants may be used to produce water-in-oil emulsions of immunogens. Antigens in water-in-oil emulsions stimulate high and long-lasting antibody responses which can be attributed to the slow release of antigen.

**Formulation:** Each mL contains 1 mg of Mycobacterium tuberculosis (H37Ra, ATCC 25177), heat killed and dried, 0.85 mL paraffin oil and 0.15 mL mannide monooleate.

**Appearance:** Clear amber liquid

**pH:** ~6.5

**Binding capacity:** 1 to 10 µg of endotoxin-free ovalbumin at Ph 7.0. Note: Protein binding will vary with protein concentration, buffer and incubation conditions.

**Form:** provided as a ready-to-use ; cell suspension, sterile solution.

**Storage and Stability:** Shipped at room temperature and it should be stored at room temp. DO NOT FREEZE. Stable for 6 months.

**Suggested Usage:** Adsorption of most proteins can be achieved by mixing equal volume of the antigen (preferably in saline) with an equal volume of the adjuvant to form an emulsion. (Ovalbumin/CFA (1:1, v/v was tested). Protein left in the supernatant can be measured by protein assay or specific ELISA.

The amount of protein or conjugated peptide used for the primary immunization can be adjusted depending upon availability and immunogenicity of the antigen.

### Suggested dosage:

Mouse/Rat/G.Pig (50-200 ul gel; IM/SC)

Rabbit (250 ul; SC/IM).

**References:** Lindblad EB., 2000. Freund's Adjuvants. In: Vaccine adjuvants: Preparation Methods and Research Protocols. Humana Press.Totowa, NJ. Coffman rL. et al., 2010. Vaccine adjuvants: putting innate immunity to work. Immunity. 33(4):492-503.

### Related items:

| Catalog#   | ProdDescription  |
|------------|--|
| AV-3015-10 | Incomplete Freund's Adjuvant (IFA) vaccine adjuvant    |
| AV-3020-10 | Squalene (oil-in-water nano emulsion) Vaccine adjuvant |

Complete list is available at:

[http://4adi.com/objects/catalog/product/extras/Vaccine\\_Adjuvants\\_flr.pdf](http://4adi.com/objects/catalog/product/extras/Vaccine_Adjuvants_flr.pdf)

AV-3010-10 140413P

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