

Smallpox and Mpox Vaccine Live, Non-replicating



AHFS Class: 80:12 – Vaccines (tofc-80)

Smallpox and Mpox Vaccine Live, Non-replicating (AHFS DI)

Smallpox and Mpox Vaccine, Live, Non-replicating

Brands: Jynneos®

Introduction

Smallpox and mpox vaccine live, non-replicating is a live, attenuated, non-replicating virus vaccine produced using modified Vaccinia Ankara-Bavarian Nordic (MVA-BN), an attenuated, non-replicating orthopoxvirus.¹

Uses

■ Smallpox

Smallpox and mpox vaccine live, non-replicating (JYNNEOS®) is indicated for prevention of smallpox disease in adults 18 years of age and older determined to be at high risk for smallpox infection.¹

Effectiveness of JYNNEOS against smallpox has been inferred by comparing the immunogenicity of the vaccine to smallpox vaccine live (ACAM2000®) based on a plaque reduction neutralization test (PRNT) using the Western Reserve strain of vaccinia virus and was supported by efficacy data from animal challenge studies.¹

The US Centers for Disease Control and Prevention (CDC) Advisory Committee on Immunization Practices (ACIP) has issued recommendations and clinical considerations for the use of vaccines in preventing smallpox.² Although routine vaccination against smallpox in the US ended in the 1970s, ACIP recommends that certain populations at high risk of occupational exposure to orthopoxviruses be vaccinated.²

There are currently 2 licensed smallpox vaccines in the US (smallpox and mpox [vaccinia] vaccine live [ACAM2000®] and smallpox and mpox vaccine live, non-replicating [JYNNEOS®]).² In the event of a smallpox emergency, ACIP states that ACAM2000 would be made available to persons exposed to smallpox virus or who are at high risk of smallpox infection, depending on the circumstances of the event; specific use of JYNNEOS in a smallpox emergency will be based on risk of exposure and relative contraindications to ACAM2000.² For additional information, consult the CDC website at <https://www.cdc.gov/smallpox/hcp/vaccines/index.html> (<https://www.cdc.gov/smallpox/hcp/vaccines/index.html>)

■ Mpox

Smallpox and mpox vaccine live, non-replicating (JYNNEOS®) is indicated for prevention of mpox disease in adults 18 years of age and older determined to be at high risk for mpox infection.¹

Effectiveness of JYNNEOS against mpox has been inferred from immunogenicity studies and efficacy data from animal challenge studies.¹ Additional data accumulated since the 2022 mpox outbreak in the US support the efficacy and safety of the 2-dose vaccine series in preventing mpox infection.^{5,6,9}

The CDC ACIP has issued recommendations and clinical considerations for the use of vaccines for mpox prevention in the US.⁶ There are 2 vaccines (JYNNEOS and ACAM2000®) currently available.⁶ During the ongoing clade II mpox outbreak that started in the US on May 17, 2022, JYNNEOS has been the main vaccine used in the US.⁶

ACIP currently recommends vaccination with a 2-dose JYNNEOS vaccine series (2 subcutaneous doses administered 28 days apart) for people 18 years of age and older at risk for mpox, in line with the FDA-approved labeling.⁶ In addition, FDA issued an Emergency Use Authorization (EUA) in August 2022 to permit use of the vaccine by *intra*dermal injection for prevention of mpox disease in individuals 18 years of age and older at high risk for mpox, and by subcutaneous injection for prevention of mpox disease in individuals younger than 18 years of age determined to be at high risk of mpox.^{6,8} ACIP also recommends vaccination with JYNNEOS in selected individuals at occupational risk of exposure to orthopoxviruses (as an alternative to ACAM2000) and for post-exposure prophylaxis in certain individuals.⁶ For additional information on ACIP recommendations, consult the CDC website at <https://www.cdc.gov/poxvirus/mpox> (<https://www.cdc.gov/poxvirus/mpox>).

Dosage and Administration

■ General

Smallpox and mpox vaccine live, non-replicating (JYNNEOS) is available in the following dosage form(s) and strength(s):

One-Vial Presentation: The one-vial presentation contains JYNNEOS in a single vial with a yellow cap and does not require reconstitution before use.¹

Two-Vial Presentation: The two-vial presentation includes a vial with a yellow cap containing Lyophilized Antigen Component and a vial with a blue cap containing Diluent Component.¹ The Lyophilized Antigen Component must be reconstituted with the Diluent Component to form JYNNEOS prior to administration.¹ Administer two doses (0.5 mL each) 4 weeks apart.¹

■ Administration

Administer by subcutaneous injection.¹ The vaccine also has been administered **intradermally [off-label]**† in select situations for active immunization against mpox disease.⁸

Administer two doses (0.5 mL each) 4 weeks apart.¹

Supplied in two different presentations (One-Vial and Two-Vial Presentation).¹ One-Vial Presentation does not require reconstitution before use.¹ Two-Vial Presentation must be reconstituted prior to administration.¹

One-Vial Presentation: allow the vaccine to thaw and reach room temperature before use.¹ Once thawed, the vaccine may be kept at 2–8°C for 4 weeks (protect from light); do not refreeze.¹ Swirl the vial gently before use for at least 30 seconds; withdraw a dose of 0.5 mL into a sterile syringe for injection.¹

Two-Vial Presentation: Reconstitute the Lyophilized Antigen Component with Diluent Component to form the suspension.¹ After reconstitution, the vaccine may be stored at 2–8°C for 12 hours; protect from light during storage.¹

■ Dosage

It is *essential* that the manufacturer's labeling be consulted for more detailed information on dosage and administration of this drug. **Dosage summary:**

Pediatric Patients

Mpox.

In **individuals younger than 18 years of age [off-label]**†, administer 2 doses (0.5 mL each) 4 weeks apart by subcutaneous injection, preferably into the anterolateral thigh for infants less than 1 year of age, or into the upper arm for individuals 1 through 17 years of age.⁸

Adults

Smallpox.

Administer 2 doses (0.5 mL each) 4 weeks apart by subcutaneous injection.¹

Mpox.

Administer 2 doses (0.5 mL each) 4 weeks apart by subcutaneous injection.¹

Cautions

■ Contraindications

None.¹

■ Warnings/Precautions

Severe Allergic Reactions

Appropriate medical treatment must be available to manage possible anaphylactic reactions following administration of smallpox and mpox vaccine live, non-replicating.¹

Individuals who experienced a severe allergic reaction following a previous dose of smallpox and mpox vaccine live or following exposure to any component of the vaccine may be at increased risk for severe allergic reactions to smallpox and mpox vaccine live, non-replicating.¹ The risk for a severe allergic reaction should be weighed against the risk for disease due to smallpox or mpox.¹

Syncope

Syncope (fainting) has been reported following vaccination with smallpox and mpox vaccine live, non-replicating.¹ Procedures should be in place to avoid injury from fainting.¹

Altered Immunocompetence

Immunocompromised individuals, including those receiving immunosuppressive therapy, may have a diminished immune response to smallpox and mpox vaccine live, non-replicating.¹

Limitations of Vaccine Effectiveness

Vaccination with smallpox and mpox vaccine live, non-replicating may not protect all recipients.¹

Specific Populations

Pregnancy.

Available human data on smallpox and mpox vaccine live, non-replicating administered to pregnant women are insufficient to inform vaccine-associated risks in pregnancy.¹ All pregnancies have a risk of birth defect, loss, or other adverse outcomes.¹ In the US general population, the estimated background risk of major birth defects and miscarriage in clinically recognized pregnancies is 2–4% and 15–20%, respectively.¹

The effect of smallpox and mpox vaccine live, non-replicating on embryofetal and postnatal development was evaluated in 4 developmental toxicity studies conducted in female rats and rabbits.¹ These animal studies revealed no evidence of harm to the fetus.¹

Lactation.

It is not known whether smallpox and mpox vaccine live, non-replicating is distributed in human milk.¹ Data are not available to assess the effects of the vaccine on the breast-fed infant or on milk production/distribution.¹

The developmental and health benefits of breast-feeding should be considered along with the mother's clinical need for smallpox and mpox vaccine live, non-replicating and any potential adverse effects on the breast-fed infant from the vaccine or from the underlying maternal condition.¹ For preventive vaccines, the underlying condition is susceptibility to disease prevented by the vaccine.¹

Pediatric Use.

Safety and effectiveness of smallpox and mpox vaccine live, non-replicating have not been established in individuals younger than 18 years of age.¹ However, the vaccine (JYNNEOS) is available under an FDA Emergency Use Authorization (EUA) for use in the prevention of mpox disease in individuals younger than 18 years of age who are determined to be at high risk of mpox.^{6,8}

Geriatric Use.

Clinical studies of smallpox and mpox vaccine live, non-replicating did not include sufficient numbers of adults 65 years of age and older to determine whether they respond differently than younger individuals.¹

In one clinical study, 42 adults 65–80 years of age previously vaccinated with a smallpox vaccine received at least one dose of smallpox and mpox vaccine live, non-replicating.¹

■ Common Adverse Effects

Healthy adults not previously vaccinated with a smallpox vaccine: Most common (>10%) solicited injection site reactions were pain (85%), redness (61%), swelling (52%), induration (45%), and itching (43%); most common solicited systemic adverse reactions were muscle pain (43%), headache (35%), fatigue (30%), nausea (17%), and chills (10%).¹

Healthy adults previously vaccinated with a smallpox vaccine: Most common (>10%) solicited injection site reactions were redness (81%), pain (80%), induration (70%), swelling (67%), and itching (32%); most common solicited systemic adverse reactions were fatigue (34%), headache (28%), and muscle pain (22%).¹

Adults with HIV infection or atopic dermatitis: Frequencies of solicited local and systemic adverse reactions were generally similar to those observed in healthy adults.¹

Drug Interactions

■ Specific Drugs

It is *essential* that the manufacturer's labeling be consulted for more detailed information on interactions with this drug, including possible dosage adjustments. Interaction highlights:

Actions

■ Mechanism of Action

Smallpox and mpox vaccine live, non-replicating is a live, attenuated, non-replicating virus vaccine that contains a modified vaccinia virus (MVA-BN) and elicits humoral and cellular immune responses to orthopoxviruses.¹ Vaccinia virus, variola virus (causative agent of smallpox), and mpox virus are all orthopoxviruses.²

Smallpox and mpox vaccine live, non-replicating does not contain smallpox (variola) virus and cannot cause smallpox.⁴

Vaccinia neutralizing antibody responses in humans following vaccination with smallpox and mpox vaccine live, non-replicating were evaluated to establish the effectiveness of the vaccine for prevention of smallpox and mpox.¹

Advice to Patients

The following information contains important points for the clinician to discuss with patients during counseling. For more comprehensive monographs suitable for distribution to the patient, please refer to the *AHFS Patient Medication Information* monographs available from MedlinePlus (<https://vsearch.nlm.nih.gov/vivisimo/cgi-bin/query-meta?v:project=medlineplus>) (in English and Spanish; written at a 6th- to 8th-grade reading level).

Inform vaccine recipient of the potential benefits and risks of vaccination with smallpox and mpox vaccine live, non-replicating.¹

Inform vaccine recipient of the importance of completing the 2-dose vaccination series.¹

Advise vaccine recipient to report any adverse events to their healthcare provider or to the Vaccine Adverse Event Reporting System (VAERS) at 800-822-7967 or <https://www.vaers.hhs.gov> (<https://www.vaers.hhs.gov>).¹

Additional Information

AHFS *firstRelease*[™]. For additional information until a more detailed monograph is developed and published, the manufacturer's labeling should be consulted. It is *essential* that the manufacturer's labeling be consulted for more detailed information on usual uses, dosage and administration, cautions, precautions, contraindications, potential drug interactions, laboratory test interferences, and acute toxicity.

Preparations

Smallpox and mpox vaccine live, non-replicating (JYNNEOS) is stored in the US Strategic National Stockpile (SNS).² The SNS ensures that certain drugs and medical supplies are readily available to prevent or treat specific diseases, including during public health emergencies, and is managed by the US Department of Health and Human Services (HHS) Office of the Assistant Secretary for Preparedness and Response (ASPR).³

Excipients in commercially available drug preparations may have clinically important effects in some individuals; consult specific product labeling for details.

Smallpox and Mpox Vaccine, Live, Non-replicating (<https://www.accessdata.fda.gov/scripts/cder/ndc/default.cfm?sugg=NonProprietaryName&ApptName=Smallpox+and+Mpox+Vaccine%2C+Live%2C+Non-replicating&collapse=1>)

Parenteral

Kit, for subcutaneous use

0.5 × 10⁸ to 3.95 × 10⁸ infectious units of MVA-BN live virus per 0.5 mL after reconstitution

Jynneos[®] (*Two-vial presentation includes a vial with a yellow cap containing Lyophilized Antigen Component and a vial with a blue cap containing Diluent Component*), Bavarian Nordic A/S (<https://www.accessdata.fda.gov/scripts/cder/ndc/default.cfm?sugg=LabelerName&ApptName=Bavarian+Nordic+A%2FS&collapse=1>)

Smallpox and Mpox Vaccine, Live, Non-replicating (<https://www.accessdata.fda.gov/scripts/cder/ndc/default.cfm?sugg=NonProprietaryName&ApptName=Smallpox+and+Mpox+Vaccine%2C+Live%2C+Non-replicating&collapse=1>)

Parenteral

Suspension, for subcutaneous use

0.5 × 10⁸ to 3.95 × 10⁸ infectious units of MVA-BN live virus per 0.5 mL

Jynneos[®] (*One vial presentation includes a single vial with a yellow cap*), Bavarian Nordic A/S (<https://www.accessdata.fda.gov/scripts/cder/ndc/default.cfm?sugg=LabelerName&ApptName=Bavarian+Nordic+A%2FS&collapse=1>)

Related Resources

AHFS Patient Medication Information (<https://vsearch.nlm.nih.gov/vivisimo/cgi-bin/query-meta?v:project=medlineplus&query=Smallpox%20and%20Mpox%20Vaccine%20Live,%20Non-replicating>) and other related patient health topics (MedlinePlus)

ASHP Drug Shortages Resource Center (<https://www.ashp.org/Drug-Shortages>)

CCRIS (<https://toxnet.nlm.nih.gov/cgi-bin/sis/search2/r?dbs+ccris:%22Smallpox%20and%20Mpox%20Vaccine%20Live,%20Non-replicating%22>) (Chemical Carcinogenesis Research Information System)

ChemID *plus* (<https://chem.nlm.nih.gov/chemidplus/name/Smallpox%20and%20Mpox%20Vaccine%20Live,%20Non-replicating>)

Biochemical Data Summary (http://www.drugbank.ca/uneearth/q?utf8=%E2%9C%93&query=Smallpox%20and%20Mpox%20Vaccine%20Live,%20Non-replicating&searcher=drugs&approved=1&vet_approved=1&nutraceutical=1&illicit=1&withdrawn=1&investigational=1&button=) (US and Canada)

Clinical Trials (<https://www.clinicaltrials.gov/ct/search?submit=Search&term=Smallpox%20and%20Mpox%20Vaccine%20Live,%20Non-replicating>)

DailyMed (<https://dailymed.nlm.nih.gov/dailymed/search.cfm?query=Smallpox%20and%20Mpox%20Vaccine%20Live,%20Non-replicating>) (drug labels)

DART (<https://toxnet.nlm.nih.gov/cgi-bin/sis/search2/r?dbs+dart:%22Smallpox%20and%20Mpox%20Vaccine%20Live,%20Non-replicating%22>) (Developmental and Reproductive Toxicology Database)

Drugs@FDA (<https://www.accessdata.fda.gov/scripts/cder/drugsatfda/index.cfm?fuseaction=Search.SearchAction&SearchType=BasicSearch&SearchTerm=Smallpox%20and%20Mpox%20Vaccine%20Live,%20Non-replicating>) (approval information)

European Medicines Agency (https://www.ema.europa.eu/en/search/search?search_api_views_fulltext=Smallpox%20and%20Mpox%20Vaccine%20Live,%20Non-replicating)

FDA National Drug Code Directory (<https://www.accessdata.fda.gov/scripts/cder/ndc/default.cfm?sugg=NonProprietaryName&ApptName=Smallpox%20and%20Mpox%20Vaccine%20Live,%20Non-replicating&collapse=1>)

FDA Recalls, Market Withdrawals, and Safety Alerts (<https://www.fda.gov/Safety/Recalls/default.htm>)

HSDB (<https://toxnet.nlm.nih.gov/cgi-bin/sis/search2/r?dbs+hsdb:%22Smallpox%20and%20Mpox%20Vaccine%20Live,%20Non-replicating%22>) (Hazardous Substances Data Bank)

Inxight Drugs (<https://drugs.ncats.io/substances?q=%22Smallpox%20and%20Mpox%20Vaccine%20Live,%20Non-replicating%22>) (National Center for Advancing Translational Sciences)

LactMed (drug effects on breastfeeding) (<https://toxnet.nlm.nih.gov/cgi-bin/sis/search2/r?>)

db+actmed:@or+%28@na+%22Smallpox%20and%20Mpx%20Vaccine%20Live,%20Non-replicating%22+%29)

New Drug Approvals (<https://ahfs.ashp.org/drug-assignments.aspx>)

Orange Book (<https://www.accessdata.fda.gov/scripts/cder/ob/default.cfm?panel=0&drugname=Smallpox%20and%20Mpx%20Vaccine%20Live,%20Non-replicating>) (therapeutic equivalence)

PharmGKB (<https://www.pharmgkb.org/search?connections&gaSearch=Smallpox%20and%20Mpx%20Vaccine%20Live,%20Non-replicating&query=Smallpox%20and%20Mpx%20Vaccine%20Live,%20Non-replicating&type=chemical>) (Pharmacogenomic data from PharmGKB)

Pillbox (*beta*) (https://pillbox.nlm.nih.gov/pillimage/search_results.php?submit=Search&splid=&getingredient=Smallpox%20and%20Mpx%20Vaccine%20Live,%20Non-replicating) (drug identification and images)

PubMed (<https://www.ncbi.nlm.nih.gov/pubmed?DB=pubmed&term=Smallpox%20and%20Mpx%20Vaccine%20Live,%20Non-replicating%5BAll+Fields%5D>) (scientific journals)

Safety-related Labeling Changes (<https://www.accessdata.fda.gov/scripts/cder/safetylabelingchanges>) (FDA/CDER)

ToxLine (<https://toxnet.nlm.nih.gov/cgi-bin/sis/search2/r?db+toxline:%22Smallpox%20and%20Mpx%20Vaccine%20Live,%20Non-replicating%22>) (Toxicology Literature Online)

† Use is not currently included in the labeling approved by the US Food and Drug Administration.

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About ASHP

ASHP represents pharmacists who serve as patient care providers in acute and ambulatory settings. The organization's nearly 55,000 members include pharmacists, student pharmacists, and pharmacy technicians. For more than 75 years, ASHP has been at the forefront of efforts to improve medication use and enhance patient safety. For more information about the wide array of ASHP activities and the many ways in which pharmacists advance healthcare, visit ASHP's website (<https://www.ashp.org>), or its consumer website (<https://www.safemedication.com>).

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