Vaccine Prevention for Adults With HIV in the Era of COVID-19

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Financial Relationships With Commercial Entities

Dr. Spach has no financial relationships with commercial entities to disclose. (Updated 05/17/21)

Slide 2 of 53

Learning Objectives

After attending this presentation, learners will be able to:

- Discuss timing of administering COVID-19 vaccines with other vaccines
- Summarize pneumococcal vaccine schedule in persons with HIV
- List recommended options for initial HBV immunization in persons with HIV
- Describe options for persons with HIV who are HBV vaccine non-responders
- Discuss COVID-19 vaccines for persons with HIV

Slide 3 of 53

Special Vaccine Considerations in the Era of COVID-19

Slide 4 of 53

Vaccine Schedule Off Because of COVID-19

- A 36-year-old woman with HIV received her first dose of hepatitis A vaccine with a follow-up dose recommended 6-12 months after the first dose.
- Due to COVID-19 she did not come back for her 2nd scheduled vaccine dose schedule, but now is in clinic—she is now 2 years out from her first dose.

Slide 5 of 53

Polling Question 1

- **What should be recommended regarding her hepatitis A vaccine?**

1. Start over and give 2 doses per the recommended schedule
2. Pick up where you left off and give one dose now
3. No further doses are needed

Slide 6 of 53

Timing of Administering COVID-19 Vaccine with Other Vaccines

- A 51-year-old man with HIV and a CD4 count of 353 cells/mm^3 received his second mRNA COVID-19 vaccine dose **5 days ago**.
- He is feeling fine and is in clinic for a routine visit. He is scheduled to get a dose of pneumococcal vaccine (PPSV-23).

Slide 7 of 53

Polling Question 2

- **Based on current CDC guidance, what should be recommended regarding giving the PPSV-23 vaccine at this clinic visit?**

1. You can give the pneumococcal vaccine at today's visit
2. You must wait at least 14 days after the COVID vaccine
3. You must wait at least 6 weeks after the COVID vaccine

Slide 8 of 53

Centers for Disease Control and Prevention Updated COVID-19 Vaccine Recommendations (May 14, 2021)

- "COVID-19 vaccines and other vaccines may now be administered without regard to timing."
- "This includes simultaneous administration of COVID-19 vaccines and other vaccines on the same day, as well as coadministration within 14 days."

Source: CDC. Interim Clinical Considerations for Use of COVID-19 Vaccines Currently Authorized in the United States. https://www.cdc.gov/vaccines/covid-19/info-by-product/clinical-considerations.html#Coadministration

Slide 9 of 53

Centers for Disease Control and Prevention

Updated COVID-19 Vaccine Recommendations (May 14, 2021)

- **Factors to Consider Regarding Coadministering COVID/Other Vaccines**
  - Is person behind or at risk of becoming behind on recommended vaccines?
  - What is risk of vaccine-preventable disease?
  - What is the reactogenicity profile of the vaccine(s)?

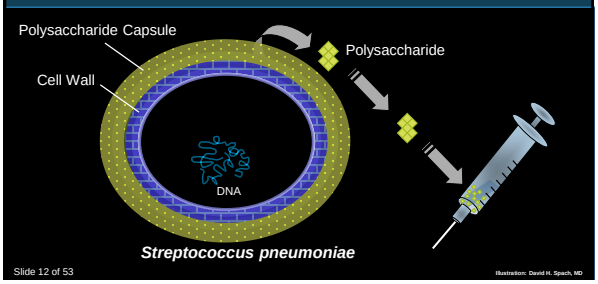
Source: CDC. Interim Clinical Considerations for Use of COVID-19 Vaccines Currently Authorized in the United States. https://www.cdc.gov/vaccines/covid-19/info-by-product/clinical-considerations.html#Coadministration

Slide 10 of 53

Pneumococcal Vaccines

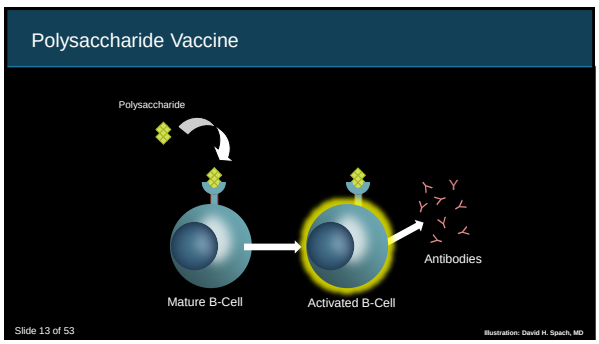
Slide 11 of 53

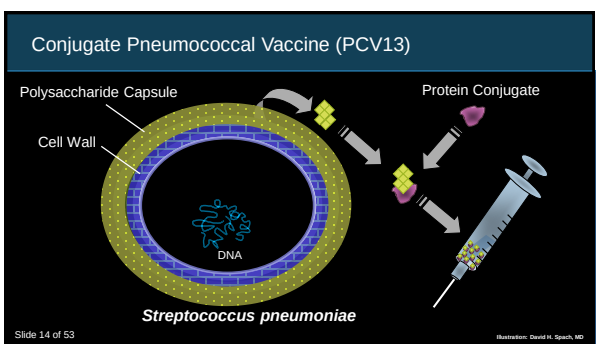
Polysaccharide Pneumococcal Vaccine (PPSV23)

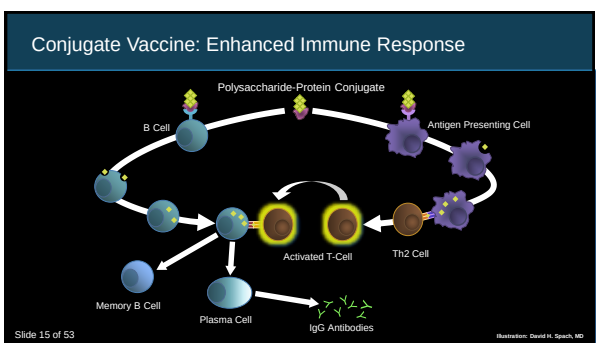


Slide 12 of 53

Illustration: David H. Spach, MD


Polysaccharide Vaccine
Polysaccharide
Antibodies
Mature B-Cell
Activated B-Cell
Slide 13 of 53
Illustration: David H. Spach, MD


Conjugate Pneumococcal Vaccine (PCV13)
Polysaccharide Capsule
Protein Conjugate
Cell Wall
DNA
Streptococcus pneumoniae
Slide 14 of 53
Illustration: David H. Spach, MD


Conjugate Vaccine: Enhanced Immune Response
Polysaccharide-Protein Conjugate
B Cell
Antigen Presenting Cell
Activated T-Cell
Th2 Cell
Memory B Cell
Plasma Cell
IgG Antibodies
Slide 15 of 53
Illustration: David H. Spach, MD

Timing of PCV13 Vaccine

- A 25-year-old man is newly diagnosed with HIV and initial labs show a **CD4 count of 86 cells/mm^3** and HIV RNA 68,540 copies/mL.
- He starts on dolutegravir plus TAF-FTC and returns 3 weeks later.

Slide 16 of 53

Polling Question 3

- **What would you recommend regarding first dose of pneumococcal vaccine series (he has never received pneumococcal vaccine)?**

1. Give PCV13 now
2. Give PPSV23 now
3. Defer and give PCV13 when CD4 ≥100 cells/mm^3
4. Defer and give PCV13 when CD4 ≥200 cells/mm^3

Slide 17 of 53

Adult Opportunistic Infections Guidelines

Pneumococcal Immunization for Persons with HIV

Pneumococcal Vaccine-Naïve Adults

Give Regardless of CD4 cell count

↓

PCV13

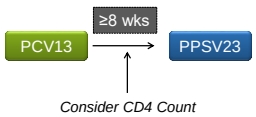
Slide 18 of 53

Source: Opportunistic Infections Guidelines. CAP. October 10, 2019.

Adult Opportunistic Infections Guidelines

Pneumococcal Immunization for Persons with HIV

Pneumococcal Vaccine-Naïve Adults



Source: Opportunistic Infections Guidelines. CAP. October 10, 2019.

Adult Opportunistic Infections Guidelines

Timing of Pneumococcal Vaccine-Naïve Adults with HIV

- **Timing of 1st Dose PPSV23 if CD4 ≥200 cells/mm^3**
  - Give ≥8 weeks after PCV13 (**AI**)
- **Timing of 1st Dose PPSV23 if CD4 <200 cells/mm^3**
  - Defer until CD4 ≥200 cells/mm^3 on ART (**BIII**)
  - Give ≥8 weeks after PCV13 (**CIII**)

Source: Opportunistic Infections Guidelines. CAP. October 10, 2019.

Adult Opportunistic Infections Guidelines

Pneumococcal Immunization for Persons with HIV

Pneumococcal Vaccine-Naïve Adults **Age ≥65**



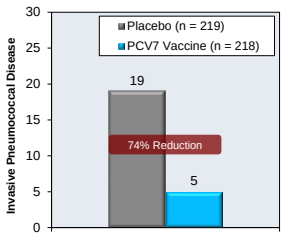
Source: Opportunistic Infections Guidelines. CAP. October 10, 2019.

Randomized Trial of Pneumococcal Conjugate Vaccine 7 (PCV7) in Adults with HIV in Malawi, Africa

Study Design
- Age ≥15 years
- Most enrolled with chronic HIV
- Recent invasive pneumococcal disease
- Median CD4 count = 213 cells/mm^3

Intervention
- Randomized to PCV7 versus placebo
- 2 doses 1 month apart

Primary End Point
- Episodes of recurrent pneumococcal disease with vaccine serotype (or 6a) serotypes



Slide 22 of 53

Source: French N, et al. N Engl J Med. 2010;362:812-22.

Randomized Trial of Pneumococcal Conjugate Vaccine 7 (PCV7) in Adults with HIV Infection in Malawi, Africa

- **Relative Risk per Baseline CD4 Cell Count**
  - Persons with baseline CD4+ count of <200 cells/mm^3 were **7.1 times** as likely to have an invasive pneumococcal event as those with a CD4+ count ≥500 cells/mm^3

Slide 23 of 53

Source: French N, et al. N Engl J Med. 2010;362:812-22.

Hepatitis A Immunization

Slide 24 of 53

Indications for Hepatitis A Vaccine in Persons with HIV

Should all adults with HIV who are not immune to HAV receive HAV vaccine?

Slide 25 of 53

Hepatitis A Vaccine in Persons with HIV

- **ACIP recommends hepatitis A vaccine for ALL persons with HIV ≥1 year of age who are not immune to HAV**

Source: Nelson NP, et al. MMWR, 2020;69:1-38.

Slide 26 of 53

Polling Question 4

- **A 46-year-old man with HIV and a CD4 count of 428 cells/mm^3 completes a 2-dose hepatitis A vaccine series. Should you perform post-vaccination HAV serologic testing?**

1. Yes
2. No

Slide 27 of 53

Hepatitis A Vaccine: Topics

- **ACIP recommends postvaccination serologic testing for all persons with HIV ≥1 month after completing HepA vaccine series.**

  Note: seroconversion (e.g. ≥10 mIU/mL) delayed ≥6 months in some individuals with HIV

Slide 28 of 53

Hepatitis B Immunization

Slide 29 of 53

HHS Opportunistic Infections Guidelines

HBV Screening in Persons with HIV

- **All persons with HIV should be screened for HBV with:**
  - HBsAg
  - Anti-HBs
  - Anti-HBc

Slide 30 of 53

Source: Opportunistic Infections Guidelines. November 13, 2018.

HHS Opportunistic Infections Guidelines

HBV Screening in Persons with HIV

- A 31-year old woman is newly diagnosed with HIV and initial screening labs show a CD4 cell count of 438 cells/mm^3 and:
  - Negative HBsAg
  - Negative Anti-HBs
  - Negative Anti-HBc
- **What HBV vaccine options are recommended in the adult HHS Opportunistic Infections Guidelines?**

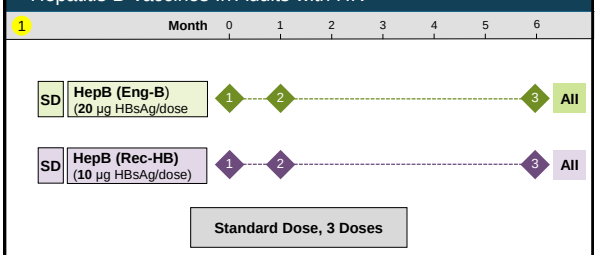
Slide 31 of 53

Source: Opportunistic Infections Guidelines. November 13, 2018.

Adult Opportunistic Infections Guidelines

Hepatitis B Vaccines In Adults with HIV

SD = standard dose



Standard Dose, 3 Doses

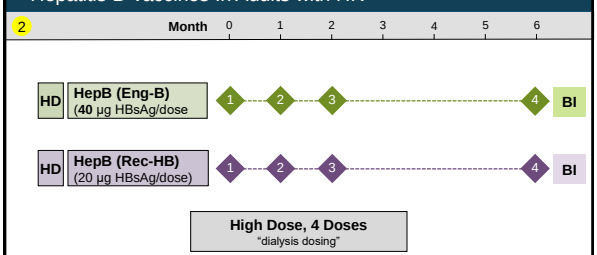
Slide 32 of 53

Source: Opportunistic Infections Guidelines. November 13, 2018.

Adult Opportunistic Infections Guidelines

Hepatitis B Vaccines In Adults with HIV

HD = high dose



High Dose, 4 Doses
"dialysis dosing"

Slide 33 of 53

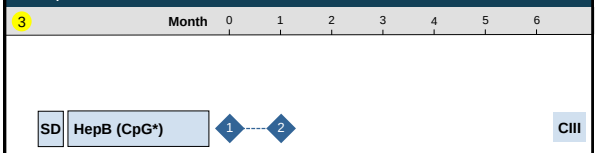
Source: Opportunistic Infections Guidelines. November 13, 2018.

Adult Opportunistic Infections Guidelines

Hepatitis B Vaccines In Adults with HIV

SD = standard dose

3



*CpG = cytosine phosphoguanine oligonucleotide (CpG 1018) adjuvant

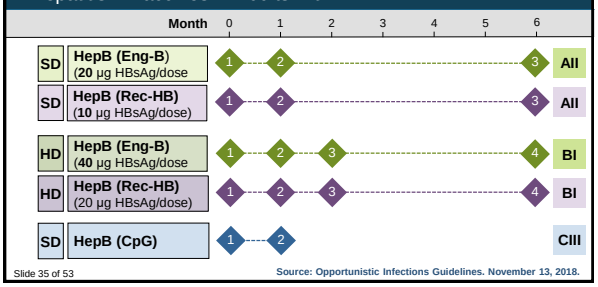
Slide 34 of 53

Source: Opportunistic Infections Guidelines. November 13, 2018.

Adult Opportunistic Infections Guidelines

Hepatitis B Vaccines In Adults with HIV

SD = standard dose
HD = high dose



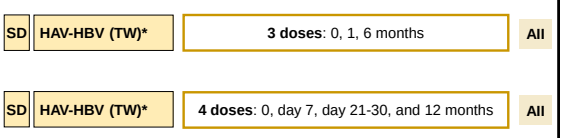
Slide 35 of 53

Source: Opportunistic Infections Guidelines. November 13, 2018.

Adult Opportunistic Infections Guidelines

Combination Hepatitis A and B Vaccine In Adults with HIV

SD = standard dose



*Each 1 mL dose contains 720 ELISA units HAV and 20 µg HBsAg

Slide 36 of 53

Source: Opportunistic Infections Guidelines. November 13, 2018.

Approach to Hepatitis B Vaccine Nonresponder

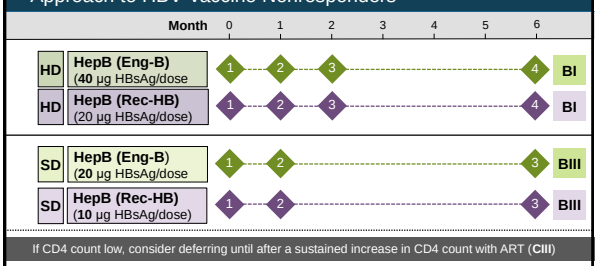
- A 29-year-old man with HIV received 3 standard doses of the Hep B (Eng-B) vaccine. Two months after completing the vaccine anti-HBs is obtained and the level is less than 10 mIU/mL.
- **Based on the HHS OI Guidelines, what do you do recommend when a person with HIV does not respond (anti-HBs <10 mIU/mL) to a standard hepatitis B vaccine series?**

Slide 37 of 53

Adult Opportunistic Infections Guidelines

Approach to HBV Vaccine Nonresponders

SD = standard dose
HD = high dose



If CD4 count low, consider deferring until after a sustained increase in CD4 count with ART (**CIII**)

Slide 38 of 53

Source: Opportunistic Infections Guidelines. November 13, 2018.

Approach to HBV Vaccine Nonresponders

Role of HepB CpG for non-responders?

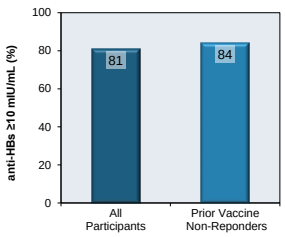
Slide 39 of 53

HepB CpG Seroprotection in People with HIV

Study Design and Population
- Retrospective cohort study
- Adults with HIV (n = 64)
- Median current CD4 = 539 cells/mm^3
- Median nadir CD4 = 283 cells/mm^3

Intervention
- 2 doses of HepB CpG ≥1 month apart

Primary End Point
- HBV seroprotection (≥10 mIU/mL)



Slide 40 of 53

Source: Schnittman SR, et al. J Acquir Immun Defic Syndr. 2021;86:445-9.

B-Enhancement of HBV Vaccination in Persons Living With HIV (BEe-HIVe): Study Design

- **Entry Criteria Group A and B**
  - HIV-1
  - Age 18-70 years
  - On ART & HIV RNA <1,000 copies/mL
  - CD4 >100 cells/mm^3
- **Group A (Vaccine Non-Responders)**
  - Serum Hep B antibody <10 mIU/mL
  - HBV vaccination (>168 days prior)
- **Group B (Vaccine Naïve)**
  - Hep B antibody negative (<45 days)

Slide 41 of 53

Source: ClinicalTrials.gov Identifier NCT04193189

B-Enhancement of HBV Vaccination in Persons Living With HIV (BEe-HIVe): Study Design

- **Entry Criteria Group A and B**
  - HIV-1
  - Age 18-70 years
  - On ART & HIV RNA <1,000 copies/mL
  - CD4 >100 cells/mm^3
- **Group A (Vaccine Non-Responders)**
  - Serum Hep B antibody <10 mIU/mL
  - HBV vaccination (>168 days prior)
- **Group B (Vaccine Naïve)**
  - Hep B antibody negative (<45 days)

Group A: Vaccine Non-Responders	
HepB (CpG)	2 doses: 0, 4 weeks
HepB (CpG)	3 doses: 0, 4, and 24 weeks
HepB (Eng-B)	3 doses: 0, 4, and 24 weeks

Group B: Vaccine Naive	
HepB (CpG)	3 doses: 0, 4, and 24 weeks

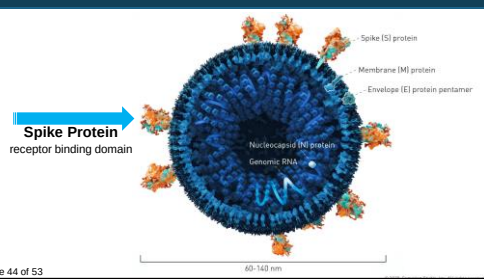
Slide 42 of 53

Source: ClinicalTrials.gov Identifier NCT04193189

COVID-19 Vaccines in Persons with HIV

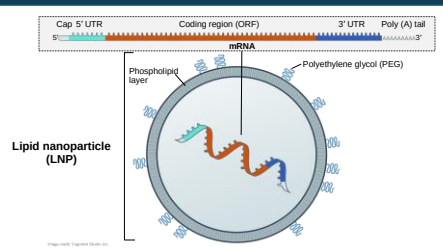
Slide 43 of 53

SARS-COV-2



Slide 44 of 53

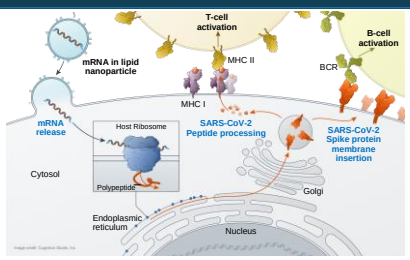
COVID-19 mRNA Vaccines



Slide 45 of 53

Illustration: Cognition Studio and David H. Spach, MD

COVID-19 mRNA Vaccines

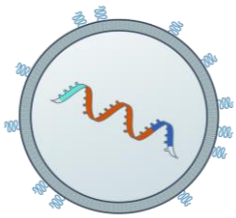


Slide 46 of 53

Illustration : Cognition Studio and David H. Spach, MD

COVID-19 mRNA Vaccines

- **mRNA-1273 (Moderna)**
  - mRNA vaccine / 2 doses
  - For persons age ≥18 years
  - Efficacy: 94%
- **BNT-162b2 (Pfizer)**
  - mRNA vaccine / 2 doses
  - For persons age ≥12 years
  - Efficacy: 95%

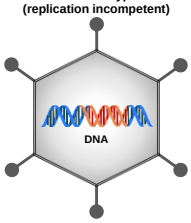


Slide 47 of 53

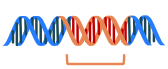
Illustration: Cognition Studio and David H. Spach, MD

Viral Vector Vaccine

Adenovirus type 26 (replication incompetent)



DNA



Gene for SARS-CoV-2 spike protein

Replicating genes deleted

Slide 48 of 53

Illustration: David H. Spach, MD

Adenovirus Vector Vaccine

- **JNJ-78436735/Ad26.COV2.S (Johnson and Johnson)**
  - Viral vector vaccine / 1dose
  - For persons age ≥18 years
  - Efficacy 66-72%

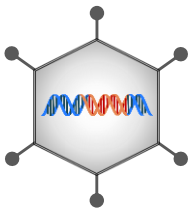


Illustration: Cognition Studio and David H. Spach, MD

Slide 49 of 53

Limited COVID-19 Vaccine Data in Persons with HIV

- **Persons with HIV Enrolled in COVID-19 Vaccine Trials**
  - m1273 (*Moderna*): **0.6%** of participants
  - BNT-162b2 (*Pfizer*): **0.5%** of participants
  - Ad26 (*Johnson and Johnson*) Trials: **2.8%** of participants
  - ChAdOx1 (*Astra Zeneca*): **<1%** of participants
  - NVX-CoV2373 (*Novavax*): **6.0%** of participants

Slide 50 of 53

Published Data on COVID-19 Vaccine Data in Persons with HIV

- **Reddy JA, et al. AIDS: May 14, 2021 (Hopkins)**
  - 12 persons with HIV given 2 doses mRNA vaccine (from trials)
  - Safe and all developed SARS-CoV02 receptor binding domain antibodies
  - Lower antibody responses with CD4 <200 cells/mm^3
- **Frater J, et al. Lancet *Preprint* April 19, 2021 (Oxford)**
  - 54 persons with HIV given 2 doses ChadOx1 vaccine (from trials)
  - Safe and immune responses similar to persons without HIV
- **Madhi S, et al. Research Square *Preprint* March 17, 2021**
  - 52 persons with HIV (Africa) given 2 doses ChAdOx1 (from trials)
  - Safe and immune responses similar to persons without HIV

Slide 51 of 53


Question-and-Answer Session