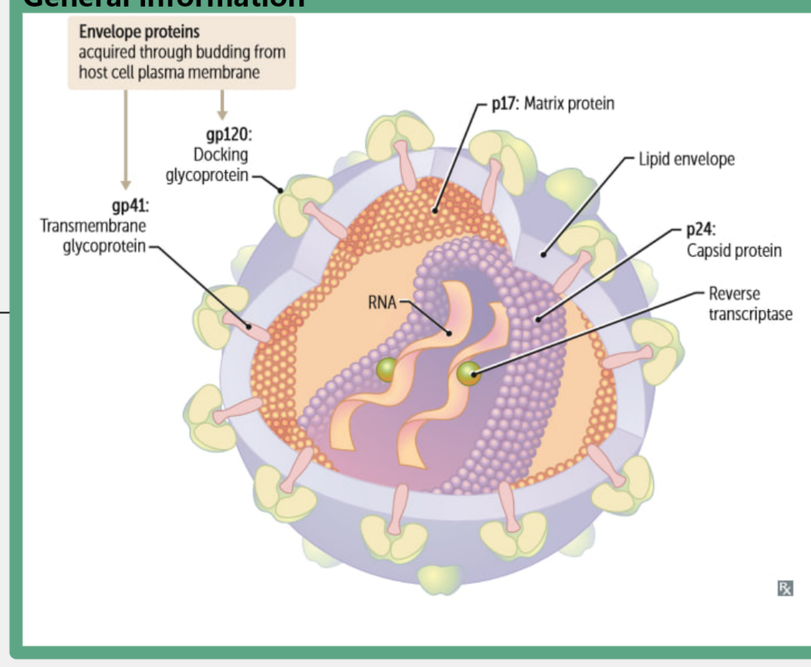
HIV

Classification

RNA-virus — Isocahedral nucleocapsid — Ss(+)-dibloid — Retroviridae (Retroviruses) — HIV

General information



- Diploid genome (2 molecules of RNA)
  - The 3 structural genes (protein coded for):
    1. Env (gp120 and gp41)
       - Formed from cleavage of gp160 to form envelope glycoproteins
       - Gp120—attachment to host CD4+ T cell
       - Gp41 (forty-one)—fusion and entry.
    2. Gag (p24 and p17)—capsid and matrix proteins, respectively
    3. Pol—Reverse transcriptase, Integrase, Protease;
  - Reverse transcriptase synthesizes dsDNA from genomic RNA; dsDNA integrates into host genome.
    - Virus binds CD4 as well as a coreceptor, either CCR5 on macrophages (early infection) or CXCR4 on T cells (late infection). Homozygous CCR5 mutation = immunity. Heterozygous CCR5 mutation = slower course.
- Transmitted via blood, IV drug use, and sexually. Also present in breastmilk.
  - Invades and destroys CD4+ T cells.
    - Highly active anti-retroviral therapy (HAART) consists of three drugs: two nucleoside reverse-transcriptase inhibitors (NRTI) + either a non-nucleoside reverse-transcriptase inhibitor (NNRTI) or protease inhibitor.

Diagnosis

- HIV-1/2 antibodies and p24 antigen combination immunoassay
  - (+) HIV-1/HIV-2 antibody differentiation immunoassay
    - HIV-1 (+), HIV-2 (−): HIV-1 infection
    - HIV-1 (−), HIV-2 (+): HIV-2 infection
    - HIV-1 (+), HIV-2 (+): HIV antibodies detected
    - HIV-1 (−), HIV-2 (−) — HIV-1 NAAT
      - HIV-1 NAAT (+) Acute HIV-1 infection
      - HIV-1 NAAT (−) Negative for HIV-1
  - (−) Negative for HIV-1 and HIV-2 antibodies and p24 Ag

Common disease of HIV-positive adults

Decrease CD4+ cell count then reactivation of past infections (eg, TB, HSV, shingles), dissemination of bacterial infections and fungal infections (eg, coccidioidomycosis), and non-Hodgkin lymphomas

CD4+ cell count < 500/mm3

- Candida albicans
  - Oral thrush
  - Scrapable white plaque, pseudohyphae on microscopy
- EBV
  - Oral hairy leukoplakia
  - Unscrapable white plaque on lateral tongue
- HHV-8
  - Kaposi sarcoma, localized cutaneous disease
  - Perivascular spindle cells invading and forming vascular tumors on histology
- HPV
  - Squamous cell carcinoma at site(s) of sexual contact (most commonly anus, cervix, oropharynx)
- Mycobacterium tuberculosis
  - Increased risk of reactivation of latent TB infection

CD4+ cell count < 200/mm3

- Histoplasma capsulatum
  - Fever, weight loss, fatigue, cough, dyspnea, nausea, vomiting, diarrhea
  - Oval yeast cells within macrophages
- HIV
  - Dementia, HIV-associated nephropathy
  - Cerebral atrophy on neuroimaging
- JC virus (reactivation)
  - Progressive multifocal leukoencephalopathy
  - Nonenhancing areas of demyelination on MRI
- HHV-8
  - Kaposi sarcoma, disseminated disease (pulmonary, GI, lymphatic)
- Pneumocystis jirovecii
  - Kaposi sarcoma, disseminated disease (pulmonary, GI, lymphatic)
  - "Ground-glass" opacities on chest imaging
  - Once CD4 count falls below 200/μL, patients are started on trimethoprim/sulfamethoxazole (TMP/SMX) for Pneumocystis jiroveci pneumonia (PJP) prophylaxis.

CD4+ cell count < 100/mm3

- Bartonella spp
  - Bacillary angiomatosis
  - Multiple red to purple papules or nodules Biopsy with neutrophilic inflammation
- Candida albicans
  - Esophagitis
  - White plaques on endoscopy; yeast and pseudohyphae on biopsy
- CMV
  - Colitis, Retinitis, Esophagitis, Encephalitis, Pneumonitis (CREEP)
  - Linear ulcers on endoscopy, cotton-wool spots on fundoscopy Biopsy reveals cells with intranuclear (owl eye) inclusion bodies
- Cryptosporidium spp
  - Chronic, watery diarrhea
  - Acid-fast oocysts in stool
- Cryptococcus neoformans
  - Meningitis
  - Encapsulated yeast on India ink stain or capsular antigen ⊕
- EBV
  - B-cell lymphoma (eg, non-Hodgkin lymphoma, CNS lymphoma)
  - CNS lymphoma—ring enhancing, may be solitary (vs Toxoplasma)
- Mycobacterium avium–intracellulare, Mycobacterium avium complex
  - Nonspecific systemic symptoms (fever, night sweats, weight loss) or focal lymphadenitis
  - Most common if CD4+ cell count < 50/mm3
- Toxoplasma gondii
  - Brain abscesses
  - Multiple ring-enhancing lesions on MRI
  - Toxoplasmosis comes in with CD4 count under 100. Prophylaxis is TMP/SMX, the same as for PJP, so often times, once TMP/SMX is appropriately commenced at CD4 of 200 for PJP, it's already "two birds with one stone," so we don't have to worry about Toxo prophylaxis later.