

# Cytopenias

HIV-infected patients frequently develop hematologic abnormalities. Cytopenias often respond to suppression of HIV with antiretrovirals, treatment of infectious diseases and tumors, discontinuation or dosage reduction of myelosuppressive medications, correction of nutritional deficiencies, and treatment with hematopoietic growth factors or other cytokines.

## I. Thrombocytopenia

- A. Causes of thrombocytopenia include myelosuppression from medications, infections or tumors and increased destruction of cells (disseminated intravascular coagulation, thrombotic thrombocytopenic purpura, immune mediated thrombocytopenia). Platelet counts may respond to anti-HIV therapy with antiretroviral drugs, immunoglobulin therapy, splenectomy, vincristine, prednisone, danazol, or alpha interferon.
- B. Discontinuation of myelosuppressive medications and treatment of infections and tumors may also reduce thrombocytopenia. Plasma exchange has been effective for TTP.

## II. Anemia

- A. Twenty five percent of patients with AIDS develop severe anemia (hemoglobin <8 g/dl). Anemia is caused HIV-related hematopoietic defects and by zidovudine therapy. Milder forms of anemia develop in 50% of all patients with HIV disease (hemoglobin 8-13 g/dl). The frequency and severity of zidovudine-induced anemia increases with higher dosages and with later stages of HIV disease.
- B. Severe anemia often requires dose adjustment of zidovudine and other myelosuppressive therapies. Blood transfusions should be avoided because increased immunosuppression and exposure to possible blood-borne infections often results.
- C. The most common of zidovudine-induced anemia is megaloblastic anemia which corrects with dose adjustment of zidovudine. The less frequent form of anemia is a red cell aplasia, and it usually does not respond to zidovudine reduction.
- D. Recombinant-human EPO (Epoetin) can increase hemoglobin and significantly reduce transfusion requirements. Erythropoietin is recommended for ZDV-induced anemia, or anemia due to other myelosuppressive medications in patients with an endogenous EPO level greater than 500 mU/ml. Iron therapy is also recommended.
- E. Patients with marrow infiltrating opportunistic infections (mycobacterium avium complex) or malignancies (non-Hodgkin's lymphoma) may not respond to EPO. Failure to respond to EPO treatment requires consideration of a bone marrow biopsy. Erythropoietin may be

combined with myeloid hematopoietic growth factors (G-CSF) in patients with both neutropenia and anemia.

### III. Neutropenia

- A. Neutropenia occurs in half of all patients with advanced HIV infection. Causes include myelosuppressive medications, opportunistic infections or neoplasms, HIV-induced myelosuppression, deficient production of myeloid growth-stimulating factors, and depletion of hematopoietic progenitor cells.
- B. Neutropenia may cause an increased incidence of infections, hospitalization, decreased survival, and discontinuation of medications (or use of suboptimal dosages).
- C. **Filgrastim (granulocyte-colony stimulating factor, G-CSF)** can increase neutrophil counts, improve neutrophil function and reverse severe neutropenia. G-CSF corrects neutropenia for long periods of time with induction doses of 1-4 mcg/kg per day, followed by a maintenance dose of 300 mcg 1-7 times per week.
- D. Filgrastim increases the absolute neutrophil count (ANC) reduces the risk of bacterial infections, and increases survival.
- E. **Sargramostim (recombinant granulocyte-macrophage colony-stimulating factor, GM-CSF)** at doses of 0.5-8 mcg/kg/day increases circulating leukocyte numbers including increases in granulocytes, monocytes and eosinophils. The use of GM-CSF with myelosuppressive chemotherapy may allow continued chemotherapy for non-Hodgkin's lymphoma and Kaposi's sarcoma. Use of GM-CSF often allows for continued use of myelosuppressive antibiotics for opportunistic infections (eg, ganciclovir treatment of CMV retinitis).