

# PANCYTOPENIA

## (LOW WHITE-BLOOD CELL COUNT, LOW RED-BLOOD CELL COUNT, AND LOW PLATELET COUNT)

### BASICS

#### OVERVIEW

- “Pan-” refers to “all” or “whole;” “cytopenia” is a decrease in number or lack of cells in the circulating blood
- Pancytopenia is the simultaneous development of a low white-blood cell count (known as “leukopenia”), low red-blood cell count, to which the bone marrow does not respond to produce more red-blood cells (known as “nonregenerative anemia”), and low platelet or thrombocyte count (known as “thrombocytopenia”)
- White-blood cells are the cells that protect the body from infection and disease; red-blood cells are the most numerous cells in blood—they carry oxygen to the tissues of the body; “platelets” and “thrombocytes” are names for the normal cell fragments that originate in the bone marrow and travel in the blood as it circulates through the body; platelets act to “plug” tears in the blood vessels and to stop bleeding
- Pancytopenia is not a disease itself, rather it is a laboratory finding that can result from multiple causes

#### SIGNALMENT/DESCRIPTION of ANIMAL

##### *Species*

- Dogs and cats

#### SIGNS/OBSERVED CHANGES in the ANIMAL

- Signs related to underlying cause
- Repeated episodes of fever or frequent or persistent infections from the low white-blood cell count (leukopenia)
- Sluggishness (lethargy) or pale gums and moist tissues of the body (known as “pallor”) from the low red-blood cell count (anemia)
- Tiny, pinpoint bruises (known as “petechial hemorrhage”) or bleeding from the moist tissues of the body (known as “mucosal bleeding”) from the low platelet count (thrombocytopenia)
- Weakness
- Bleeding (for example, blood in the urine [known as “hematuria”]; bleeding from the nose [known as “epistaxis”]; spitting up of blood derived from the lungs due to pulmonary or bronchial hemorrhage [known as “hemoptysis”]; black, tarry stools due to the presence of digested blood [known as “melena”])
- Fever

#### CAUSES

##### *Infectious Diseases*

- Feline leukemia virus (FeLV)
- Feline immunodeficiency virus (FIV)
- Ehrlichiosis, a tick-borne disease
- Feline infectious peritonitis (FIP)
- Canine and feline parvovirus
- Infectious canine hepatitis virus
- Histoplasmosis, a fungal disease
- Accumulation of bacterial toxins in the blood (known as “endotoxemia”) and generalized disease caused by the spread of bacteria in the blood (known as “septicemia” or “blood poisoning”), especially gram-negative organisms or tularemia (“rabbit fever”)

##### *Drugs, Chemicals, and Toxins*

- Estrogen (administration of estrogen-containing medications or secondary to tumors of the testicles [Sertoli cell tumor and interstitial cell tumor])
- Various medications, including phenylbutazone, griseofulvin, methimazole (cats), chloramphenicol, trimethoprim-sulfadiazine, albendazole, captopril, second-generation cephalosporins, and chemotherapeutic drugs (such as azathioprine, doxorubicin, carboplatin, cyclophosphamide, cytosine arabinoside, vinblastine, hydroxyurea)
- Poisons, such as thallium
- Radiation

##### *Proliferative and Infiltrative Diseases*

- Cancer of the blood and/or bone marrow (such as sudden (acute) and long-term (chronic) leukemias or lymphoma)
- Scar tissue build-up in the bone marrow (known as “myelofibrosis”)
- Replacement of the bone marrow by abnormal tissue, such as cancer (known as “myelophthisis”)
- Abnormal hardening of bone (known as “osteosclerosis”)

##### *Immune-mediated Diseases*

- Decreased ability of the bone marrow to produce red-blood cells (known as “aplastic anemia”) or to produce red-blood cells, white-blood cells, and platelets (known as “aplastic pancytopenia”)
- Immune-mediated hemolytic anemia and thrombocytopenia; “immune-mediated hemolytic anemia” is a low red-blood cell count due to the destruction of red-blood cells by the immune system and “immune-mediated thrombocytopenia” is a low platelet count due to the destruction of platelets by the immune system

#### **RISK FACTORS**

- Vary with individual underlying cause

## **TREATMENT**

#### **HEALTH CARE**

- Supportive treatment depends on the clinical situation and includes aggressive antibiotic therapy and blood transfusions
- Treatment of the underlying condition is paramount

#### **MEDICATIONS**

Medications presented in this section are intended to provide general information about possible treatment. The treatment for a particular condition may evolve as medical advances are made; therefore, the medications should not be considered as all inclusive.

- Treatment should be appropriate for the clinical situation (that is, the degree to which each type of blood cell is decreased, presence of fever or infection, and established or suspected specific diagnoses)
- Medications and treatment are directed at the underlying cause
- Medications to increase the blood-cell counts are “recombinant hematopoietic growth factors;” they include “granulocyte colony-stimulating factor” (filgrastim, Neupogen®) to stimulate the production of neutrophils (a type of white-blood cell that fights infection) and “erythropoietin” (epoetin, Epogen®) to stimulate the production of red-blood cells by the bone marrow

## **FOLLOW-UP CARE**

#### **PATIENT MONITORING**

- Daily physical examination, including frequent monitoring of body temperature
- Periodic complete blood count (CBC)—frequency depends on severity of low white-blood cell count, red-blood cell count, and platelet count (cytopenia), age, general physical condition of the patient, and underlying cause

#### **PREVENTIONS AND AVOIDANCE**

- Castration of cryptorchid males; cryptorchid males have one or both testicles located in the abdomen or inguinal area, not in the scrotum
- Vaccination against infectious diseases
- Frequent monitoring of complete blood counts (CBCs) in cancer patients receiving chemotherapy

#### **POSSIBLE COMPLICATIONS**

- Bleeding
- Generalized bacterial infection (known as “sepsis”)

#### **EXPECTED COURSE AND PROGNOSIS**

- Depend on the underlying cause
- Often a guarded prognosis is warranted

## **KEY POINTS**

- Pancytopenia is the simultaneous development of a low white-blood cell count (leukopenia), low red-blood cell count, to which the bone marrow does not respond to produce more red-blood cells (nonregenerative anemia), and low platelet or thrombocyte count (thrombocytopenia)
- Pancytopenia is not a disease itself, rather it is a laboratory finding that can result from multiple causes