Leukemia is a progressive, malignant disease of the WBC or RBC blood-forming organs, with neoplastic cells evident in the peripheral blood and bone marrow. Leukemia is generally recognized by diagnosing high numbers of immature (blast) cells in the peripheral blood. Any of the cell lines may be involved, but the most common cell type is the lymphocyte (lymphocytic leukemia). Most cases of leukemia demonstrate elevated numbers of the involved cell type; rarely, the absolute numbers seen are actually decreased from normal.

Since dogs have such a dramatic capacity to elevate leukocyte numbers, it is often difficult to differentiate between leukemia and what is termed a leukemoid reaction – a strong and persistent leukocytosis without the presence of blast cells.

The most common neoplasia of the blood system of dogs is canine malignant lymphoma (lymphosarcoma, lymphocytic leukemia), with a reported incidence of 24:100,000. This is a progressive disease characterized by neoplastic transformation of lymphoid cells. The neoplasia may originate in either solid lymph organs (lymphosarcoma) or in the bone marrow (lymphocytic leukemia). Diagnosis is made, depending on the origin of the disease, by observing many swollen lymph nodes that can be huge, or by finding large numbers of abnormal lymphocytes on a blood film.