Background: Life-expectancy among persons living with HIV/AIDS (PLWH) has increased substantially in the era of combined antiretroviral therapy (cART) resulting in increased HIV viral suppression (1) and decreased progression to advanced HIV/AIDS. As PLWH are living longer, cancer epidemiology among this group has evolved, both due to incidental cancers found more commonly in older age, but also due to the propensity for certain malignancies to develop at higher rates in PLWH. Cancer burden among PLWH is likely a product of several factors including persistent immune dysfunction and chronic inflammation despite cART (2), higher rates of risk factors for cancer (3), and higher rates of co-infection with oncogenic viruses (4). PLWH are also reported to be diagnosed with more aggressive and advanced disease stages of cancer (5). Hence, higher cancer-specific mortality compared to individuals without HIV has been noted (5,6). Fast Fact #213 discussed the prognostic principles in adults with HIV or AIDS for many life-threatening complications of HIV infection. This Fast Fact presents survival data for malignancies commonly arising in the setting of HIV/AIDS.

Classification of malignancies in PLWH: Malignancies in PLWH are classified as non-AIDS defining malignancies (NADMs) (7,8) and AIDS-defining malignancies (ADMs). HIV treatment with cART has decreased rates of ADM's, in part due to improved immune function and higher CD4 T-cell count and shifted the burden of malignancy to NADMs.

Prognosis in AIDS-Defining Malignancies (ADM)(9): The overall burden of ADMs is expected to continue to decrease over time, mostly due to decreases in Kaposi’s Sarcoma (KS) and Non-Hodgkins Lymphoma (NHL) with cART treatment (10).

- **HIV-related/epidemic KS:** KS is a grossly violaceous spindle cell tumor, associated with human herpesvirus-8 infection. Risk of HIV-associated KS increases with lower CD4 T-cell count, but remains higher in PLWH compared to the general population (11). Treatment with cART is the mainstay of therapy for limited disease and often results in response within several months (12). Systemic anthracycline based chemotherapy is used for treatment of advanced KS or visceral KS. Immune checkpoint blockers like pembrolizumab may be safe and effective in HIV-associated KS, (13-15). The 5-year survival has been estimated to be 92% for mucocutaneous KS and 82.6% for visceral KS (16).

- **Invasive cervical cancer:** Incidence has not declined in the cART era, though PLWH on cART who are virally suppressed with stable high CD4 count have a lower risk of high-risk human papillomavirus virus (HPV) persistence and high-grade cervical dysplasia (17). Higher mortality, and recurrence rate persists among PLWH compared to those not living with HIV (18,19). Additionally, PLWH who have a cervix may have a 6-fold higher risk of developing cervical cancer compared to those without HIV (20). Cervical cancer has a median survival of 5.1 years and a 10- year survival of 78.5% (21).

- **ADM NHL:** These include Burkitt lymphoma (BL), diffuse large B-cell lymphoma (DLBCL), primary CNS lymphoma (PCNSL), peripheral T-cell lymphoma (PTCL), and follicular lymphoma. In general, 5-year survival rates of all NHL subtypes in HIV infected persons are lower (22) than the general population, in part because PLWH are more likely to be diagnosed at advanced stages of DLBCL (22-24). While the 5-year overall survival rates from a large US cancer registry are estimated to be 41.1% for DLBCL, 47.6% for Burkitt lymphoma, 32.3% for PTCL, and 68% for follicular lymphoma (22), recent evidence has led to following updates regarding 5-year survival rates for specific ADM NHLs:
  - Dose-adjusted treatment for BL may have an improved 5-year overall survival of 87.0% (25-27).
  - Retrospective studies show 5-year survival rates of 48-60% for PCNSL in the cART era (25-27).
  - Survival rates among PLWH with NHLs are substantially lower in Sub-Saharan Africa, a region which accounts for the majority of PLWH in the world. These lower survival rates are likely due to late diagnoses and limitations in healthcare infrastructure (28,29).

Prognosis in Non-AIDS-Defining Malignancies Cancers (NADM): NADMs are now the leading cause of mortality in PLWH in the developed world and account for most HIV-associated malignancies (8). The
most common NADMs with elevated rates among PLWH in the US are lung cancer, anal cancer, liver cancer, oral cavity/ pharyngeal cancers, and Hodgkin’s lymphoma.

- **Non-small cell lung cancer (NSCLC):** Median survival for PLWH is estimated to be 6-12.4 months compared to 20-22.8 months in patients with NSCLC who are not living with HIV (30-33).
- **Anal cancer:** Median disease-free survival was 79.7 months in PLWH compared to 127.9 in persons who are not living with HIV (34,35).
- **Hepatocellular cancer (HCC):** There is marked heterogeneity in survival among PLWH with due to factors such as hepatitis C virus (HCV) and/or hepatitis B virus coinfection, treatment for HCV, cART treatment, and severity of liver disease. One global multi-cohort study suggested a survival range of 3 to 16 months depending on stage at diagnosis and a medial survival of 4 months (36).
- **Hodgkin’s Lymphoma:** PLWH with Hodgkin’s disease experience complete remission rates of 74-89% and overall survival rates at 5-years ranging 76-81% when treated with curative-intent treatment combined with cART (37). While PLWH presented with more aggressive features at diagnosis, there were no differences in response rate to treatment, or disease-free survival (37,38).
- **Head and neck squamous cell carcinoma:** Overall 3-year survival is estimated to be 60% (39). There is conflicting data on whether PLWH and head and neck cancer have worsened survival than the general population (40).

**References**


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Version History: Originally published March 2009. Significant revision occurred in February 2016 by Steven Oppenheim MD. Another significant revision occurred in March 2021 by Faiza Yasin MD MHS, Ronald Chow BMSc, Brinda Emu MD, Trinh Bui Pharm D, and Elizabeth Horn Prsic MD to reflect updates in the literature.

Conflict of Interest: None

Fast Facts and Concepts are edited by Sean Marks MD (Medical College of Wisconsin) and associate editor Drew A Rosielle MD (University of Minnesota Medical School), with the generous support of a volunteer peer-review editorial board, and are made available online by the Palliative Care Network of Wisconsin (PCNOW); the authors of each individual Fast Fact are solely responsible for that Fast Fact's content. The full set of Fast Facts are available at Palliative Care Network of Wisconsin with contact information, and how to reference Fast Facts.

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