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Virus and Cancer Biology Research Literatures

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Abstract: Cancer is the general name for a group of more than 100 diseases. Although there are many kinds of cancer, all cancers start because abnormal cells grow out of control. Untreated cancers can cause serious illness and death. The body is made up of trillions of living cells. Normal body cells grow, divide, and die in an orderly fashion. During the early years of a person's life, normal cells divide faster to allow the person to grow. After the person becomes an adult, most cells divide only to replace worn-out or dying cells or to repair injuries. This article introduces recent research reports as references in the related studies.
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Key words: cancer; life; research; literature; cell

1. Introduction

Cancer is the general name for a group of more than 100 diseases. Although there are many kinds of cancer, all cancers start because abnormal cells grow out of control. Untreated cancers can cause serious illness and death. The body is made up of trillions of living cells. Normal body cells grow, divide, and die in an orderly fashion. During the early years of a person's life, normal cells divide faster to allow the person to grow. After the person becomes an adult, most cells divide only to replace worn-out or dying cells or to repair injuries.

The following introduces recent reports as references in the related studies.

Baltzell, K. A., et al. (2018). "Bovine leukemia virus linked to breast cancer but not coinfection with human papillomavirus: Case-control study of women in Texas." Cancer **124**(7): 1342-1349.

BACKGROUND: Bovine leukemia virus (BLV) and human papillomavirus (HPV) were previously identified in human breast tissue and have been associated with breast cancer in independent studies. The objective of the current study was to test for the presence of BLV and HPV in the same breast tissue specimens to determine whether the viruses were associated with breast cancer either singly or together. METHODS: Archival formalin-fixed paraffin-embedded breast tissue sections from 216 women were received from The University of Texas MD Anderson Cancer Center along with patient diagnosis. In situ polymerase chain reaction and/or DNA hybridization methods were used to detect targeted DNA segments of BLV and HPV. Standard statistical methods were used to calculate age-adjusted odds ratios, attributable risk, and P values for the trend related to the association between presence of a virus and a diagnosis of breast disease. RESULTS: Women diagnosed with breast cancer were significantly more likely to have BLV DNA in their breast tissue compared with women with benign diagnoses and no history of breast cancer. Women with breast pathology classified as premalignant and no history of breast cancer also were found to have an elevated risk of harboring BLV DNA in their breast tissue. HPV status was not associated with malignancy, premalignant breast disease, or the presence of BLV in the breast tissues. CONCLUSIONS: The data from the current study supported previous findings of a significant association between BLV DNA in breast tissue and a diagnosis of breast cancer, but did not demonstrate oncogenic strains of HPV associated with breast cancer or the presence of BLV DNA in breast tissue. The authors believe the findings of the current study contribute to overall knowledge regarding a possible causal role for viruses in human breast cancer. Cancer 2018;124:1342-9. (c) 2017 American Cancer Society.

Buckley, L., et al. (2016). "Oropharyngeal cancer and human papilloma virus: evolving diagnostic and management paradigms." ANZ J Surg **86**(6): 442-447.

The significant increase in human papilloma virus (HPV)-associated oropharyngeal carcinoma (OPC) over recent years has lead to a surge in research and an improved understanding of the disease. Most patients with HPV-associated OPC present with cystic nodal metastases with a small primary tumour, and respond well to all treatment modalities including primary surgery and primary chemoradiotherapy. Current research is evaluating treatment de-escalation

to reduce long-term treatment-associated morbidities. Transoral robotic surgery (TORS) is particularly relevant as the transoral approach allows small primary tumours to be removed with lower morbidity than traditional surgical approaches. The current American Joint Committee on Cancer staging system for oropharyngeal cancer does not appropriately stratify HPV-associated OPC; hence, alternative risk stratification and staging classifications are being proposed.

Economides, M. P., et al. (2018). "Impact of chronic hepatitis C virus infection on the survival of patients with oropharyngeal cancer." Cancer **124**(5): 960-965.

BACKGROUND: Although an association between hepatitis C virus (HCV) infection and oropharyngeal cancers (OPCs) has been reported, to the authors' knowledge the clinical significance of this epidemiological finding remains unknown. Therefore, the authors analyzed the oncologic outcomes of HCV-infected patients with OPCs. METHODS: In this retrospective cohort study, all patients with OPCs who were seen at The University of Texas MD Anderson Cancer Center between January 2004 and December 2015 were reviewed. HCV infection was defined as detectable HCV RNA in the serum. Five-year overall survival and progression-free survival rates were compared between patients infected with HCV and those not infected. RESULTS: A total of 161 patients were examined. The majority of the patients were white (141 patients; 88%) and male (132 patients; 82%) and had TNM stage III or IV disease (147 patients; 91%). The OPC involved the tonsils (83 patients; 52%), base of the tongue (67patients; 42%), or the soft palate (11 patients; 7%). The median follow-up after an OPC diagnosis was 3 years (range, 1-13 years). HCV-infected patients (25 patients) and HCV-uninfected patients (136 patients) were comparable with regard to smoking and alcohol status. In multivariate analysis, HCV was associated with increased cancer-specific mortality (hazard ratio, 2.15; 95% confidence interval, 1.08-6.85 [P = .02]) and risk of OPC progression (hazard ratio, 5.42; 95% confidence interval, 2.64-11.14 [P = .0008]) independent of age and cirrhosis status. Antivirals were administered after the diagnosis of OPC in 8 of the 25 HCV-infected patients (32%). HCV-infected patients who received antivirals were found to have better 5-year overall survival (70% vs 12%; P = .005) and progression-free survival (72% vs 19%; P = .005) compared with patients who did not. CONCLUSIONS: The early detection of HCV is important in patients with OPC because this infection may affect their oncologic outcomes. Cancer 2018;124:960-5. (c) 2017 American Cancer Society.

Gu, S., et al. (2022). "Using structural analysis to explore the role of hepatitis B virus mutations in immune escape from liver cancer in Chinese, European and American populations." J Biomol Struct Dyn **40**(4): 1586-1596.

Hepatitis B virus (HBV) infection is an important problem threatening human health. After HBV virus invades human body, it may assemble a complete virus particle in the cytoplasm to trigger the immune reaction, especially the interaction between the HBV virus and the host that mediated by CD8(+) T cell. We collected the sequences of HBV from the HBVdb database, then screened candidate mutation sites in Chinese, European and American populations based on conservation and physicochemical properties. After that we constructed the three-dimensional structure of Major histocompatibility complex class I (MHC I) -peptide complexes, performed molecular docking, run molecular dynamics to compare the binding free energy, stability, and affinity of MHC I-peptide complexes with the aim to estimate the effect of peptide mutation. The specific HBV virus subtypes of the Chinese, European and American population were studied and the candidate mutation sites were used to predict the mutant peptide antigen. Finally, based on physical and chemical properties and peptide antigen prediction scores, 21 HBV mutation sites were selected. Then combined with specific Human lymphocyte antigen (HLA) subtypes, 11 mutations were found to have a significant negative impact on affinity, stability and binding free energy. Overall, our work found important potential mutations, which provide an evaluation of HBV mutations and a clue of it in immunotherapy. Communicated by Ramaswamy H. Sarma.

Hall, S. R., et al. (2019). "American Joint Committee on Cancer eighth edition human papilloma virus positive oropharyngeal cancer staging system: Discordance between clinical and pathological staging systems." Head Neck **41**(8): 2716-2723.

BACKGROUND: The American Joint Committee on Cancer (AJCC) eighth edition introduces a staging system specific for human papilloma virus positive oropharyngeal cancer with separate clinical (AJCC 8c) and pathological (AJCC 8p) criteria. METHODS: In this retrospective cohort study, preoperative imaging and pathology reports were used to stage patients based on the AJCC 8c and AJCC 8p criteria, respectively. The primary endpoint was agreement between AJCC 8c and AJCC 8p. RESULTS: A total of 213 patients met inclusion criteria. Kappa statistics showed poor agreement (kappa = 0.3275) between AJCC 8c and AJCC 8p. In total, 30.3% of patient's preoperative AJCC 8c stage changed based on the postoperative pathologic staging

(AJCC 8p) with 73.4% of those being upstaged. CONCLUSION: These data suggest that disagreement exists between AJCC 8c and AJCC 8p, in part due to the separate clinical and pathological staging criteria. This discrepancy should be considered as the new system is implemented.

Hernandez-Ramirez, R. U., et al. (2020). "Association of Immunosuppression and Human Immunodeficiency Virus (HIV) Viremia With Anal Cancer Risk in Persons Living With HIV in the United States and Canada." Clin Infect Dis **70**(6): 1176-1185.

BACKGROUND: People living with human immunodeficiency virus (HIV; PLWH) have a markedly elevated anal cancer risk, largely due to loss of immunoregulatory control of oncogenic human papillomavirus infection. To better understand anal cancer development and prevention, we determined whether recent, past, cumulative, or nadir/peak CD4+ T-cell count (CD4) and/or HIV-1 RNA level (HIV RNA) best predict anal cancer risk. METHODS: We studied 102 777 PLWH during 1996-2014 from 21 cohorts participating in the North American AIDS Cohort Collaboration on Research and Design. Using demographics-adjusted, cohort-stratified Cox models, we assessed associations between anal cancer risk and various time-updated CD4 and HIV RNA measures, including cumulative and nadir/peak measures during prespecified moving time windows. We compared models using the Akaike information criterion. RESULTS: Cumulative and nadir/peak CD4 or HIV RNA measures from approximately 8.5 to 4.5 years in the past were generally better predictors for anal cancer risk than their corresponding more recent measures. However, the best model included CD4 nadir (ie, the lowest CD4) from approximately 8.5 years to 6 months in the past (hazard ratio [HR] for <50 vs >/=500 cells/microL, 13.4; 95% confidence interval [CI], 3.5-51.0) and proportion of time CD4 <200 cells/microL from approximately 8.5 to 4.5 years in the past (a cumulative measure; HR for 100% vs 0%, 3.1; 95% CI, 1.5-6.6). CONCLUSIONS: Our results are consistent with anal cancer promotion by severe, prolonged HIV-induced immunosuppression. Nadir and cumulative CD4 may represent useful markers for identifying PLWH at higher anal cancer risk.

Hwang, J. P., et al. (2017). "Impact of the timing of hepatitis B virus identification and anti-hepatitis B virus therapy initiation on the risk of adverse liver outcomes for patients receiving cancer therapy." Cancer **123**(17): 3367-3376.

BACKGROUND: Data on the incidence of adverse liver outcomes are limited for cancer patients with chronic (hepatitis B surface antigen [HBsAg]-positive/hepatitis B core antibody [anti-HBc]-positive) or past (HBsAg-negative/anti-HBc-positive) hepatitis B virus (HBV) after chemotherapy. This study was aimed at determining the impact of test timing and anti-HBV therapy on adverse liver outcomes in these patients. METHODS: Patients with solid or hematologic malignancies who received chemotherapy between 2004 and 2011 were retrospectively studied. HBV testing and anti-HBV therapy were defined as early at the initiation of cancer therapy and as late after initiation. Outcomes included hepatitis flares, hepatic impairment, liver failure, and death. Time-to-event analysis was used to determine incidence, and multivariate hazard models were used to determine predictors of outcomes. RESULTS: There were 18,688 study patients (80.4% with solid tumors). The prevalence of chronic HBV was 1.1% (52 of 4905), and the prevalence of past HBV was 7.1% (350 of 4905). Among patients with solid tumors, late identification of chronic HBV was associated with a higher risk of hepatitis flare (hazard ratio [HR], 4.02; 95% confidence interval [CI], 1.26-12.86), hepatic impairment (HR, 8.48; 95% CI, 1.86-38.66), liver failure (HR, 9.38; 95% CI, 1.50-58.86), and death (HR, 3.90; 95% CI, 1.19-12.83) in comparison with early identification. Among patients with hematologic malignancies and chronic HBV, the risk of death was 7.8 (95% CI, 1.73-35.27) times higher for persons with late initiation of anti-HBV therapy versus early initiation. Patients with late identification of chronic HBV had late or no anti-HBV therapy. Chronic HBV predicted liver failure in patients with solid or hematologic malignancies, whereas male sex and late identification were predictors for patients with solid tumors. CONCLUSIONS: Early identification correlates with early anti-HBV therapy and reduces the risk of liver failure and death in chronic HBV patients receiving chemotherapy. Cancer 2017;123:3367-76. (c) 2017 American Cancer Society.

Kim, J., et al. (2015). "Virus encoded circulatory miRNAs for early detection of prostate cancer." BMC Urol **15**: 116.

BACKGROUND: Prostate cancer (PCa) is the most commonly diagnosed cancer and kills about 28,000 American men annually. Although progress has been made in understanding the molecular features of different forms of the disease, PCa is considered incurable when it becomes resistant to standard therapies. Prostate specific antigen (PSA) test has been a gold standard of diagnosis for PCa, however, it can result in lead to the unnecessary biopsies and treatment of indolent cancers due to the low specificity. Thus, the limitations of PSA screening for PCa have prompted much focus on strategies how to enhance the accuracy of PSA for distinction between aggressive and indolent cancers. DISCUSSION: Studies of miRNAs in PCa

patients have suggested differentially expressed miRNAs between healthy controls and those with PCa, providing potential biomarker candidates using body fluids including urine and blood. Virus infection has been considered to associate with PCa incidence. Virus infected PCa cells may shed extracellular vesicles and communicate with neighboring cells, which were not infected yet, however, no mechanistic approaches were performed to understand the biology. The miRNAs composition in the shedding extracellular vesicles, and its role in PCa are completely undefined. In the near future, new insights to connect between the viral derived miRNAs and PCa progression might provide an opportunity to diagnose, risk prediction and therapeutic strategies. The goal of this debate article is to provide a short review on miRNAs, virus infection and viral encoded miRNAs in PCa, with a primary focus on circulating miRNAs as potential non-invasive biomarkers for PCa patients.

Lee, V. H., et al. (2019). "The addition of pretreatment plasma Epstein-Barr virus DNA into the eighth edition of nasopharyngeal cancer TNM stage classification." Int J Cancer **144**(7): 1713-1722.

The eighth edition of the American Joint Committee on Cancer (AJCC)/Union for International Cancer Control (UICC) stage classification (TNM) for nasopharyngeal carcinoma (NPC) was launched. It remains unknown if incorporation of nonanatomic factors into the stage classification would better predict survival. We prospectively recruited 518 patients with nonmetastatic NPC treated with radical intensity-modulated radiation therapy +/- chemotherapy based on the eighth edition TNM. Recursive partitioning analysis (RPA) incorporating pretreatment plasma Epstein-Barr virus (EBV) DNA derived new stage groups. Multivariable analyses to calculate adjusted hazard ratios (AHRs) derived another set of stage groups. Five-year progression-free survival (PFS), overall survival (OS) and cancer-specific survival (CSS) were: Stage I (PFS 100%, OS 90%, CSS 100%), II (PFS 88%, OS 84%, CSS 95%), III (PFS 84%, OS 84%, CSS 90%) and IVA (PFS 71%, OS 75%, CSS 80%) ($p < 0.001$, $p = 0.066$ and $p = 0.002$, respectively). RPA derived four new stages: RPA-I (T1-T4 N0-N2 & EBV DNA <500 copies per mL; PFS 94%, OS 89%, CSS 96%), RPA-II (T1-T4 N0-N2 & EBV DNA >/=500 copies per mL; PFS 80%, OS 83%, CSS 89%), RPA-III (T1-T2 N3; PFS 64%, OS 83%, CSS 83%) and RPA-IVA (T3-T4 N3; PFS 63%, OS 60% and CSS 68%) (all with $p < 0.001$). AHR using covariate adjustment also yielded a valid classification (I: T1-T2 N0-N2; II: T3-T4 N0-N2 or T1-T2 N3 and III: T3-T4 N3) (all with $p < 0.001$). However, RPA stages better predicted survival for PS and CSS after bootstrapping replications. Our RPA-based stage groups revealed better survival prediction compared to the eighth edition TNM and the AHR stage groups.

Mahale, P., et al. (2017). "Hepatitis C virus infection and the risk of cancer among elderly US adults: A registry-based case-control study." Cancer **123**(7): 1202-1211.

BACKGROUND: Hepatitis C virus (HCV) infection causes hepatocellular carcinoma (HCC) and subtypes of non-Hodgkin lymphoma (NHL). Associations with other cancers are not established. The authors systematically assessed associations between HCV infection and cancers in the US elderly population. METHODS: This was a registry-based case-control study using Surveillance, Epidemiology, and End Results (SEER)-Medicare data in US adults aged >/=66 years. Cases (n = 1,623,538) were patients who had first cancers identified in SEER registries (1993-2011). Controls (n = 200,000) were randomly selected, cancer-free individuals who were frequency-matched to cases on age, sex, race, and calendar year. Associations with HCV (documented by Medicare claims) were determined using logistic regression. RESULTS: HCV prevalence was higher in cases than in controls (0.7% vs 0.5%). HCV was positively associated with cancers of the liver (adjusted odds ratio [aOR] = 31.5; 95% confidence interval [CI], 29.0-34.3), intrahepatic bile duct (aOR, 3.40; 95% CI, 2.52-4.58), extrahepatic bile duct (aOR, 1.90; 95% CI, 1.41-2.57), pancreas (aOR, 1.23; 95% CI, 1.09-1.40), and anus (aOR, 1.97; 95% CI, 1.42-2.73); nonmelanoma nonepithelial skin cancer (aOR, 1.53; 95% CI, 1.15-2.04); myelodysplastic syndrome (aOR, 1.56; 95% CI, 1.33-1.83); and diffuse large B-cell lymphoma (aOR, 1.57; 95% CI, 1.34-1.84). Specific skin cancers associated with HCV were Merkel cell carcinoma (aOR, 1.92; 95% CI, 1.30-2.85) and appendageal skin cancers (aOR, 2.02; 95% CI, 1.29-3.16). Inverse associations were observed with uterine cancer (aOR, 0.64; 95% CI, 0.51-0.80) and prostate cancer (aOR, 0.73; 95% CI, 0.66-0.82). Associations were maintained in sensitivity analyses conducted among individuals without documented alcohol abuse, cirrhosis, or hepatitis B or human immunodeficiency virus infections and after adjustment for socioeconomic status. Associations of HCV with other cancers were not observed. CONCLUSIONS: HCV is associated with increased risk of cancers other than HCC in the US elderly population, notably bile duct cancers and diffuse large B-cell lymphoma. These results support a possible etiologic role for HCV in an expanded group of cancers. Cancer 2017;123:1202-1211. (c) 2016 American Cancer Society.

Olszewski, A. J., et al. (2016). "Human immunodeficiency virus-associated lymphomas in the

antiretroviral therapy era: Analysis of the National Cancer Data Base." Cancer **122**(17): 2689-2697.

BACKGROUND: Antiviral therapy has altered the prognosis of patients with human immunodeficiency virus (HIV)-associated non-Hodgkin lymphoma (NHL), but patterns of lymphoma-directed therapy in the community are unknown. METHODS: The authors analyzed the National Cancer Data Base records of 10,769 patients who were diagnosed with HIV-associated lymphoma from 2004 through 2012. Changes in clinical characteristics and chemotherapy delivery over time were evaluated. Factors that were associated with not receiving chemotherapy were studied using multivariable logistic regression, reporting odds ratios (ORs) with 95% confidence intervals (CIs). RESULTS: The proportion of black or Hispanic patients with HIV-associated NHL increased from 41% in 2004 to 55% in 2012 (P < .0001). Chemotherapy was received by 81% of patients with diffuse large B-cell lymphoma, 90% of those with Burkitt lymphoma, 61% of those with primary effusion lymphoma (PEL), and 35% of those with primary central nervous system lymphomas (PCNSL). Between 2004 and 2012, this proportion increased only for patients with PCNSL (P < .00001). Chemotherapy was less likely to be received by patients who were older, black, or without private insurance. It was delivered more frequently in hospitals designated as academic (OR for nonreceipt, 0.68; 95% CI, 0.51-0.92) or in hospitals that had >/=3 HIV-positive cases per year (OR, 0.71; 95% CI, 0.58-0.86). Survival improved in patients with diffuse large B-cell lymphoma (P = .007), Burkitt lymphoma (P = .0002), and PCNSL (P = .019), but not in those with PEL (P = .94). Receipt of chemotherapy in patients with PEL was not associated with better survival. CONCLUSIONS: Disparities in chemotherapy delivery need attention, because a majority of HIV-positive patients with NHL in the United States are now black or Hispanic. Higher volume centers were associated with an increased likelihood of chemotherapy administration. Survival gains in patients with PCNSL parallel an increase in chemotherapy use, supporting its role in therapy. [See Editorial on pages 000-000, this issue.] Cancer 2016. (c) 2016 American Cancer Society. Cancer 2016;122:2689-2697. (c) 2016 American Cancer Society.

Olusola, P., et al. (2019). "Human Papilloma Virus-Associated Cervical Cancer and Health Disparities." Cells **8**(6).

Cervical cancer develops through persistent infection with high-risk human papilloma virus (hrHPV) and is a leading cause of death among women worldwide and in the United States. Periodic surveillance through hrHPV and Pap smear-based testing has remarkably reduced cervical cancer incidence worldwide and in the USA. However, considerable discordance in the occurrence and outcome of cervical cancer in various populations exists. Lack of adequate health insurance appears to act as a major socioeconomic burden for obtaining cervical cancer preventive screening in a timely manner, which results in disparate cervical cancer incidence. On the other hand, cervical cancer is aggressive and often detected in advanced stages, including African American and Hispanic/Latina women. In this context, our knowledge of the underlying molecular mechanism and genetic basis behind the disparate cervical cancer outcome is limited. In this review, we shed light on our current understanding and knowledge of racially disparate outcomes in cervical cancer.

Sano, D., et al. (2018). "The applicability of new TNM classification for humanpapilloma virus-related oropharyngeal cancer in the 8th edition of the AJCC/UICC TNM staging system in Japan: A single-centre study." Auris Nasus Larynx **45**(3): 558-565.

OBJECTIVE: The purpose of this study is to validate the applicability of new TNM classification for human papillomavirus (HPV)-related oropharyngeal cancer (OPC) in the 8th edition of the American Joint Committee on Cancer (AJCC)/Union for International Cancer Control (UICC) TNM staging system in Japan. METHODS: A total of 91 OPC patients treated with radiation-based therapy between November 2001 and July 2015 were analyzed retrospectively in this study. HPV infection status was evaluated using tumor p16 expression. RESULTS: 40 OPC patients (44.0%) had HPV-positive disease in this study. The distribution of disease stage of HPV-positive OPC patients dramatically changed from the 7th edition to the 8th edition of AJCC/UICC TNM classification. However, neither the 8th edition nor the 7th edition of the AJCC/UICC TNM staging system could adequately predict outcomes of HPV-positive OPC patients in our patient series. On the other hand, our multivariate analysis indicated that matted nodes and age >/=63 were independent prognostic factors for progression-free survival. In addition, HPV-positive OPC patients with stage I without matted nodes showed significantly better overall and progression-free survival compared with those with stage I with matted nodes and stages II and III in the 8th edition of the AJCC/UICC TNM staging system (P=0.008, and P=0.043, respectively). CONCLUSION: Our results suggested that matted nodes of HPV-positive OPC patients might be additionally examined to apply the 8th edition of AJCC/UICC TNM classification for more adequate predicting outcomes of HPV-positive OPC patients.

Silverberg, M. J., et al. (2021). "Timing of Antiretroviral Therapy Initiation and Risk of Cancer Among Persons Living With Human Immunodeficiency Virus." Clin Infect Dis **72**(11): 1900-1909.

BACKGROUND: Persons living with human immunodeficiency virus (HIV; PLWH) experience a high burden of cancer. It remains unknown which cancer types are reduced in PLWH with earlier initiation of antiretroviral therapy (ART). METHODS: We evaluated AIDS-free, ART-naive PLWH during 1996-2014 from 22 cohorts participating in the North American AIDS Cohort Collaboration on Research and Design. PLWH were followed from first observed CD4 of 350-500 cells/microL (baseline) until incident cancer, death, lost-to-follow-up, or December 2014. Outcomes included 6 cancer groups and 5 individual cancers that were confirmed by chart review or cancer registry linkage. We evaluated the effect of earlier (in the first 6 months after baseline) versus deferred ART initiation on cancer risk. Marginal structural models were used with inverse probability weighting to account for time-dependent confounding and informative right-censoring, with weights informed by subject's age, sex, cohort, baseline year, race/ethnicity, HIV transmission risk, smoking, viral hepatitis, CD4, and AIDS diagnoses. RESULTS: Protective results for earlier ART were found for any cancer (adjusted hazard ratio [HR] 0.57; 95% confidence interval [CI], .37-.86), AIDS-defining cancers (HR 0.23; 95% CI, .11-.49), any virus-related cancer (HR 0.30; 95% CI, .16-.54), Kaposi sarcoma (HR 0.25; 95% CI, .10-.61), and non-Hodgkin lymphoma (HR 0.22; 95% CI, .06-.73). By 15 years, there was also an observed reduced risk with earlier ART for virus-related NADCs (0.6% vs 2.3%; adjusted risk difference -1.6; 95% CI, -2.8, -.5). CONCLUSIONS: Earlier ART initiation has potential to reduce the burden of virus-related cancers in PLWH but not non-AIDS-defining cancers (NADCs) without known or suspected viral etiology.

Staples, J. N., et al. (2018). "An educational intervention to improve human papilloma virus (HPV) and cervical cancer knowledge among African American college students." Gynecol Oncol **149**(1): 101-105.

OBJECTIVES: Misinformation and lack of formal education about cervical cancer may contribute to disparities. The objective of this study was to assess the role of an educational intervention in improving knowledge about Human papilloma virus (HPV) and cervical cancer among African American female college students. METHODS: We completed a total of 5 lectures at 4 different historically Black Colleges in North Carolina, Virginia, and West Virginia. Each 60min lecture reviewed basic female anatomy, HPV pathogenesis, cervical dysplasia, cervical cancer, HPV vaccination and cervical cancer screening. Participants completed pre- and post-lecture surveys assessing knowledge, attitudes and beliefs related to cervical cancer screening, HPV, and the HPV vaccine. RESULTS: A total of 72 students attended the lectures and 57 students completed the surveys. 96% of students reported knowledge of the HPV vaccine, however only 52% reported receiving the vaccine, and 42% completed the 3-shot series. About 77% of students over 21years of age reported having a Pap smear. Of the 16 knowledge-based questions, correct response rates significantly increased (74% v. 91%, p=0.005) with the intervention. At the completion of the intervention, 94% affirmed plans to get regular Pap smears and 87% affirmed plans to get the HPV vaccine. CONCLUSIONS: Primary prevention and early detection are key interventions for reducing disparities in cervical cancer incidence and treatment. Community outreach efforts play an important role in reducing inequities in cancer among high-risk groups. The educational intervention utilized in this study was successful in improving knowledge about HPV and cervical cancer.

Studaway, A., et al. (2017). "Chronic hepatitis C virus infection and neurocognitive function in adult survivors of childhood cancer." Cancer **123**(22): 4498-4505.

BACKGROUND: Cancer survivors transfused with blood products before reliable screening for hepatitis C virus (HCV) are at risk for infection. This study examined the impact of HCV on neurocognitive function and health-related quality of life (HRQOL) among adult survivors of childhood cancer. METHODS: Neurocognitive testing was conducted for 836 adult survivors of childhood cancer (mean age, 35 years [standard deviation, 7.4 years]; time since diagnosis, 29 years [standard deviation, 6.2 years]) who received blood products before universal HCV screening. No differences were observed between confirmed HCV-seropositive survivors (n = 79) and HCV-seronegative survivors (n = 757) in the primary diagnosis or neurotoxic therapies. Multivariate regression models were used to compare functional outcomes between seropositive and seronegative survivors. RESULTS: Compared with seronegative survivors, seropositive survivors demonstrated lower performance on measures of attention ($P < .001$), processing speed ($P = .008$), long-term verbal memory ($P = .01$), and executive function ($P = .001$). After adjustments for sex, age at diagnosis, and treatment exposures, seropositive survivors had a higher prevalence of impairment in processing speed (prevalence ratio [PR], 1.3; 95% confidence interval [CI], 1.1-1.6) and executive functioning (PR, 1.3; 95% CI, 1.1-1.6). Differences were not associated with the

treatment of HCV or the presence of liver cirrhosis. Seropositive survivors reported worse general HRQOL (PR, 1.6; 95% CI, 1.2-2.1), which was associated with the presence of liver cirrhosis (P = .001). CONCLUSIONS: Survivors of childhood cancer with a history of HCV infection are at risk for neurocognitive impairment and reduced HRQOL beyond the known risks associated with neurotoxic cancer therapies. Cancer 2017;123:4498-505. (c) 2017 American Cancer Society.

Suneja, G., et al. (2016). "Disparities in cancer treatment among patients infected with the human immunodeficiency virus." Cancer **122**(15): 2399-2407.

BACKGROUND: Patients with cancer who are infected with the human immunodeficiency virus (HIV) are less likely to receive cancer treatment compared with HIV-uninfected individuals. However, to the authors' knowledge, the impact of insurance status and comorbidities is unknown. METHODS: Data from the National Cancer Data Base were used to study nonelderly adults diagnosed with several common cancers from 2003 to 2011. Cancer treatment was defined as chemotherapy, surgery, radiotherapy, or any combination during the first course of treatment. Multivariate logistic regression was used to examine associations between HIV status and lack of cancer treatment, and identify predictors for lack of treatment among HIV-infected patients. RESULTS: A total of 10,265 HIV-infected and 2,219,232 HIV-uninfected cases were included. In multivariate analysis, HIV-infected patients with cancer were found to be more likely to lack cancer treatment for cancers of the head and neck (adjusted odds ratio [aOR], 1.48; 95% confidence interval [95% CI], 1.09-2.01), upper gastrointestinal tract (aOR, 2.62; 95% CI, 2.04-3.37), colorectum (aOR, 1.70; 95% CI, 1.17-2.48), lung (aOR, 2.46; 95% CI, 2.19-2.76), breast (aOR, 2.14; 95% CI, 1.16-3.98), cervix (aOR, 2.81; 95% CI, 1.77-4.45), prostate (aOR, 2.16; 95% CI, 1.69-2.76), Hodgkin lymphoma (aOR, 1.92; 95% CI, 1.66-2.22), and diffuse large B-cell lymphoma (aOR, 1.82; 95% CI, 1.65-2.00). Predictors of a lack of cancer treatment among HIV-infected individuals varied by tumor type (solid tumor vs lymphoma), but black race and a lack of private insurance were found to be predictors for both groups. CONCLUSIONS: In the United States, HIV-infected patients with cancer appear to be less likely to receive cancer treatment regardless of insurance and comorbidities. To the authors' knowledge, the current study is the largest study of cancer treatment in HIV-infected patients with cancer in the United States and provides evidence of cancer treatment disparities even after controlling for differences with regard to insurance status and comorbidities. Further work should focus on addressing differential cancer treatment. Cancer 2016;122:2399-2407. (c) 2016 American Cancer Society.

Tatli Dogan, H., et al. (2016). "Retrospective analysis of oncogenic human papilloma virus and Epstein-Barr virus prevalence in Turkish nasopharyngeal cancer patients." Pathol Res Pract **212**(11): 1021-1026.

Nasopharyngeal carcinoma (NPC) is associated with the Epstein-Barr virus (EBV). Human papilloma virus (HPV) has also been detected in NPC cases. In this retrospective study, we analyze the frequency of EBV and HPV infection in 82 Turkish patients with NPC. A total of 82 were evaluated for EBV and HPV. In situ hybridization (ISH) was performed for EBV. HPV-ISH and P16 immunohistochemistry used to determine the HPV status. Seventy-two of the 82 (87%) NPC patients were EBV-positive. The highest rate of EBV-positivity was found in undifferentiated NPC patients, which accounted for 65 of 68 (95.6%) undifferentiated cases. One of the 82 NPC patients whose tumor was non-keratinizing differentiated, contained HPV. Our data shows that EBV is closely associated with NPC in Turkey. We found lower rates of HPV-positivity in NPC patients than in North American populations. In addition, both EBV and HPV-negativity were more associated with decreased survival than EBV-positive cases.

Tota, J. E., et al. (2018). "Risk of oral tongue cancer among immunocompromised transplant recipients and human immunodeficiency virus-infected individuals in the United States." Cancer **124**(12): 2515-2522.

BACKGROUND: Oral tongue cancer incidence has increased among whites in the United States; however, the cause remains unknown. If an infectious agent is implicated, then elevated risk would be expected among immunosuppressed individuals. METHODS: By using population-based registry linkage information from the US Transplant Cancer Match and human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS) Cancer Match studies, the authors examined the risk of oral tongue squamous cell carcinoma (SCC) among immunocompromised transplantation recipients and HIV-infected individuals. In addition, the risks of oropharyngeal SCC (strongly related to human papillomavirus infection; modestly affected by immunosuppression), other tobacco/alcohol-related oral cavity SCCs (not thought to be infection/immunosuppression-related), and non-Hodgkin lymphoma of oral cavity/pharynx (strongly related to Epstein-Barr virus; profoundly affected by immunosuppression) were evaluated. RESULTS: Compared with the general population, the risk of non-

Hodgkin lymphoma was strongly increased (standardized incidence ratio [SIR] > 8.0). The risk of all SCCs was modestly and similarly elevated among transplantation recipients (SIR range, 2.2-2.7; Pheterogeneity = .2); whereas, among HIV-infected individuals, the risk of oral tongue SCC was higher compared with the risk of other SCCs (SIR, 3.0 vs 1.7 [for oropharyngeal SCCs] and 2.3 [for other oral cavity SCCs]; Pheterogeneity < .001). The risk of SCCs was significantly higher among men, older individuals, and whites; and risk increased with the time since transplantation/AIDS onset. The risk of oral tongue SCC was significantly higher among HIV-infected men who have sex with men compared with the average risk in HIV-infected individuals (adjusted incidence rate ratio = 2.0). CONCLUSIONS: Similar modest increases in the risk of oral tongue and other oral cavity SCCs do not suggest that an infectious agent or exposure profoundly affected by immunosuppression underlies the increase in oral tongue cancer. Cancer 2018;124:2515-22. (c) 2018 American Cancer Society.

Wani, M. A., et al. (2020). "Clinical Profile and Efficacy of Antivirals in Hepatitis B Virus Reactivation, in Patients With Cancer Receiving Chemotherapy." J Clin Exp Hepatol **10**(6): 590-598.

BACKGROUND/PURPOSE: Hepatitis B virus reactivation (HBVR) is common in patients withcancer. The aim of the present study was to find out clinical profile of patients with cancer receiving chemotherapy with HBVR and to study the efficacy of entecavir (ETV) and tenofovir in the treatment of HBVR. METHODS: This is a prospective study in which all consecutive patients with cancer with evidence of HBVR were included. HBVR was defined as: New onset transaminitis with alanine aminotransferase (ALT) >3 times upper limit of normal and >10 fold increase in HBV DNA levels from baseline levels or detection of HBV DNA >/=100,000 IU/ml in patients with no baseline HBV DNA. Patients with HBVR were put on ETV or tenofovir and were closely monitored for efficacy and safety for minimum of 1 year. RESULTS: Of 204 Hepatitis B surface antigen (HBsAg)-positive patients with different cancers, 92 met the inclusion criteria. Of 92, 46 received ETV 0.5 mg/day and 46 received tenofovir disoproxil fumarate (TDF) 300 mg/day. At 6 months, there was 4.7 log reduction in HBV DNA level in the ETV group and 5.2 log reduction in the TDF group (P = 0.029). Proportion of patients with undetectable HBV DNA (75.7% vs 87.5%), ALT normalization (89.2% Vs 87.5%), HBsAg negativity (25% vs 28.1%), and seroconversion (2.8% vs 3.1%) at 1 year were almost similar in both groups with P value > 0.05 for all efficacy end points. There was no HBVR-related mortality in any group. CONCLUSION: Both ETV and tenofovir are very effective in the treatment of HBVR and reduce the liver-related mortality and morbidity in such patients.

The above contents are the collected information from Internet and public resources to offer to the people for the convenient reading and information disseminating and sharing.

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