



## Research Article

# Human Papilloma Virus (HPV) - Related Cancers in Human Immunodeficiency Virus - Infected Women with a History of Cervical Dysplasia

Rogg K<sup>1</sup>, Richter MA<sup>2</sup> and Robinson WR<sup>2\*</sup>

<sup>1</sup>University of Rochester School of Medicine, Rochester, New York, USA

<sup>2</sup>Tulane Cancer Center, Tulane University School of Medicine, New Orleans, Louisiana, USA

## Abstract

**Introduction:** Cancer is one of the leading causes of death in people with HIV/AIDS, due to behavioral choices and overlapping risk factors. The purpose of this report is to determine the long-term incidence of HPV-associated cancer in women with pre-invasive cervical neoplasia and compliance with medication and cancer screening recommendations.

**Methods:** HIV-infected women diagnosed with pre-invasive cervical neoplasia and an HPV-associated malignancy between 1995-2008 was identified from an inner-city gynecology clinic. Data collected includes: Demographics, HIV treatment/response, malignancy treatment/response, other healthcare utilization, use of health navigators and compliance.

\*Corresponding author: William R Robinson, Tulane Cancer Center, Tulane University School of Medicine, New Orleans, Louisiana, USA, Tel: +1 5049885217; E-mail: wrobinso@tulane.edu

**Citation:** Rogg K, Richter MA, Robinson WR (2018) Human Papilloma Virus (HPV) - Related Cancers in Human Immunodeficiency Virus - Infected Women with a History of Cervical Dysplasia. J AIDS Clin Res Sex Transm Dis 5: 021.

**Received:** October 31, 2018; **Accepted:** November 20, 2018; **Published:** December 04, 2018

**Copyright:** © 2018 Rogg K, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

**Results:** 71 subjects were identified with HIV infection, cervical dysplasia and at least ten years' follow up. 17/71 (24%) were identified with an HPV-related malignancy. The mean age of those diagnosed with HPV-related malignancy was 39 years. Malignancies included: Cervix-9, Vulva-7, Anal-4, Vagina-3, Urethra/Bladder-2 and Oropharyngeal-3. Eight also had *in situ* neoplasms: Cervix-4, Vulva-3, and Oropharyngeal-1. Four subjects had 3 separate malignancies and two others had 2 malignancies. Compliance with HAART correlated strongly with immunocompetence, response to therapy, use of patient navigators and survival. 60/71 (84.5%) subjects underwent screening mammography, 57/71(80.3%) underwent colonoscopy, and 67/71 (94.3%) underwent Pap smear testing. Compliance with screening compared favorably with the general population and overall survival was similar.

**Discussion/Conclusion:** The long-term incidence and mortality from cancer in women with HIV and cervical dysplasia appears to be comparable to that seen in the general population, with the possible exception of oropharyngeal cancers. Compliance with cancer screening recommendations appears to be higher than in the general population. This suggests that structured primary care programs for HIV-infected women are effective in prevention/early diagnosis of cancer. Standardized screening programs for oropharyngeal cancers should be considered in this population.

## Introduction

Cancer is one of the leading causes of death in people with HIV/AIDS [1,2]. With the introduction of Highly Active Anti-Retroviral Therapy (HAART) in the mid-1990s, the overall incidence and mortality of cancer has decreased in this population, largely due to striking declines in AIDS-defining cancers such as Kaposi sarcoma and Non-Hodgkin lymphoma [3]. However, the incidence of invasive cervical carcinoma, (also an AIDS-defining cancer) has been relatively stable, while a number of non-AIDS defining cancers have increased in incidence (presumably due to the increasing numbers and age of HIV-infected individuals) and now constitute the majority of cancers in this population [4,5]. Factors suspected to contribute to increased cancer incidence in HIV-infected persons include HIV viremia, immune deficiency, oncogenic virus co-infection and lifestyle exposures (e.g., tobacco, alcohol) [6-8]. In particular, among individuals with AIDS, a statistically significant elevated risk of Human Papilloma Virus (HPV) - associated cancers has been reported, with the level of risk strongly correlated with increased levels of immune suppression [9].

And although HIV-associated malignancies have been extensively analyzed and reported, the data on cancers in women, with the exception of invasive cervical cancer, has been relatively limited due to an overall paucity of women in study populations [10]. Further, many of these studies involved populations with multiple additional risk factors for cancer in addition to HIV infection, such as intravenous drug users or men who have sex with men [11]. In contrast to earlier reports, which typically included relatively few HIV-infected women, as well as a relatively short follow-up, the goal of this study is to determine the incidence and outcomes of HPV-related genital and non-genital tract malignancies in HIV-infected women with a

diagnosis of pre-invasive cervical neoplasia (dysplasia) and at least a 10-year follow-up. Further, as screening programs have been shown to be very effective in reducing the incidence of invasive cervical cancer in HIV-infected women, the secondary goal of this study is to evaluate the degree of compliance with cancer screening recommendations in this cohort [12].

## Methods

As part of a facility-based Quality Improvement (QI) program performed as a part of the accreditation process for the American College of Surgeons-Commission on Cancer (ACS-COC), all HIV-infected women diagnosed with an HPV-associated malignancy between 1995-2008 was identified. HIV testing was and is routinely offered to all subjects presenting to the gynecology clinic at this institution and approximately 97% agree to be tested. The data sources included standard medical records from the clinic, tumor registries and clinical research trial records. Data collected includes: Demographics, HIV treatment/response, malignancy treatment/response, other healthcare utilization, use of health navigators and compliance. Of note, data regarding multiple subgroups, such as all subjects who tested positive for HIV and all those with cervical dysplasia was lost in 2005 due to Hurricane Katrina. As a result, specific incidence rates cannot be calculated. The data from the study subjects was recoverable because it was separately reported to the ACS-COC, as described above. The data was analyzed using standard statistical tests, and the study was determined to be exempt from IRB review.

## Results

71 subjects were identified with HIV infection, cervical dysplasia and at least ten years' follow up data from a large, inner-city academic gynecology clinic in New Orleans, Louisiana, out of over 6500 tested. 17/71 (24%) were identified with an HPV-related malignancy. The mean age of those diagnosed with HPV-related malignancy was 39 years and all were African-American. Invasive malignancies included: Cervix-9, Vulva-7, Anal-4, Vagina-3, Urethra/Bladder-2 and Oropharyngeal-3. Eight additional subjects had *in situ* neoplasms which included: Cervix-4, Vulva-3 and Oropharyngeal-1. Four subjects had 3 separate malignancies and two others had 2 malignancies correlated strongly with survival. Compliance with HAART correlated strongly with immunocompetence, (as measured by CD4>200/ $\mu$ L) response to anti-malignancy therapy and survival. Further, compliance correlated strongly with the use of patient advocate/navigators (Table 1).

35/71(49%) participated in federally-sponsored clinical trials, including AIDS Clinical Trial Group (ACTG) 200, ACTG 293, Southwest Oncology Group (SWOG) 8797, Gynecologic Oncology Group (GOG) 154 and GOG 155. 60/71 (84.5%) subjects underwent screening mammography, 57/71(80.3%) underwent colonoscopy and 67/71 (94.3%) underwent Pap smear testing, all in accordance with American Cancer Society (ACS) guidelines. The level of compliance with guideline-based screening compared very favorably with that seen in the general population of New Orleans and Louisiana and overall survival at 5 years was similar [13].

## Discussion

In this cohort, the long-term incidence and mortality from HPV-associated cancers in HIV-infected women with a history of cervical dysplasia was comparable to that seen in women with cervical dysplasia in the general population of this area. This appears to be in contrast with previous reports, which found an increased risk of both AIDS-defining and non-AIDS defining cancers in similar

populations [14]. A possible explanation for these findings include strong compliance with HAART as seen here, which is known to be protective for both AIDS-defining and non-AIDS defining cancers. Another explanation could be the increased level of compliance with cancer screening recommendations in this group. While HIV-infected patients with cervical dysplasia are at risk for HPV-associated cancers, that risk does not seem to exceed that seen in the general population of this area, which has long been among the highest in the US [15,16]. This apparent success in cancer screening is likely due to the work of a well-organized and (relatively) well-funded clinic system for HIV-infected individuals in the New Orleans Metropolitan area. This system has been in existence for over 25 years, makes extensive use of patient advocate/navigators and has been credited with dramatic improvements in multiple health outcomes [17]. This suggests that communities where HIV infection is common will benefit from organized primary care delivery systems, with emphasis on adherence to HAART.

Another possible explanation for the findings reported here is that the baseline characteristics of this group differ from those in prior studies. This study population, while limited in size, was exclusively female and appeared to have both similar levels of personal risk factors and similar demographics to the general population of the area. Prior studies of cancer risks in HIV-infected persons typically comprised a cohort that was predominantly male and included many additional known risk factors for cancer, including high rates of intravenous drug use, alcohol use, smoking and infection with known cancer-causing viruses such as Hepatitis B and C viruses, (HBV and HCV) in addition to HPV [18].

It is well known that HIV-infected women from the pre-HAART era demonstrated an elevated risk for and mortality from cervical abnormalities and dysplasia [19]. A study by Ellerbrock et al., reported that 1 in 5 HIV-infected women without previous evidence of cervical dysplasia developed biopsy-confirmed cervical squamous intraepithelial lesions [20]. In addition, HIV-infected women with a greater level of immune suppression have an increased risk of persistent HPV infection and progression to cervical dysplasia [21]. Interestingly, a separate study showed that the incidence of cervical dysplasia in HPV-negative, cytology-negative HIV-infected women with CD4 counts greater than 500/ $\mu$ L was comparable to that in HIV-negative women [22]. Massad et al., found that while the risk for an abnormal Pap test was greater in HIV-infected women than seronegative women, once an HIV-infected woman develops an abnormality, her risk for high grade cervical dysplasia was only marginally greater than that of seronegative women [23]. Of importance for patient care, another study of HIV seropositive women from 1994-2001 from the same investigators found the risk of invasive cervical cancer to be indistinguishable from that of the general population when the HIV seropositive women were enrolled in a program of cervical cancer screening and prevention [24,25].

An intriguing finding from the current study is that the long-term incidence of oropharyngeal cancers may be higher than expected. This may be partially explained as a reflection of the overall increase in oral HPV infection and oropharyngeal cancers in recent years [26]. However, understanding of the pathophysiology of HPV is incomplete and may differ in the female genital tract compared to the oropharyngeal tract. Consistent with this, a study by Beachler, et al., found an elevated prevalence of oral HPV in HIV-infected persons after controlling for differences in cigarette smoking and sexual behavior [27]. This unexpected number of oropharyngeal cancers in HIV-infected persons suggests that standardized screening programs for oropharyngeal cancers should be considered.

Subjects	Age	Cervix	Vulva	Anal	Vagina	Urethra/ bladder	Oropharyngeal	Cervix IS	Vulva IS	Oro IS	HAART Compliance	CD4>200	Patient navigator	Survival
1	45	x	x				x							27
2	52		x					X			x	x	x	N/A
3	50	x		x			x		x					19
4	34	x	x							x	x	x	x	N/A
5	30			x				X			x	x	x	N/A
6	35	x				X								21
7	37				x			X			x	x	x	N/A
8	51	x	x		x									9
9	29				x						x	x	x	N/A
10	45		x								x	x	x	N/A
11	38	x					x		x		x			13
12	33	x									x	x	x	N/A
13	60			x				X			x	x	x	N/A
14	32	x	x			X					x	x	x	N/A
15	30										x	x	x	N/A
16	36	x		x					x		x	x	x	28
17	28		x											18

**Table 1:** Characteristics of HIV-infected women with cervical dysplasia and at least one HPV-associated malignancy.

IS= *In Situ*; Survival in months; N/A= living at time of this analysis

Compliance with cancer screening recommendations in this study group appeared to be higher than in the general population. Although there is limited data on certain cancers in HIV-infected women, prior studies have indicated benefits of screening these patients for cervical cancer, anal cancer, breast cancer and hepatocellular carcinoma [28]. Currently there is insufficient evidence to recommend lung cancer screening for HIV-infected women without other risk factors such as smoking. Although the incidence of lung cancer is elevated in HIV patients, it has also been reported that they have a greater cumulative pack-year smoking history [29].

## Conclusion

The long-term incidence and mortality from cancer in women with HIV and cervical dysplasia in this small cohort appears to be comparable to that seen in the general population, with the possible exception of oropharyngeal cancers. Compliance with cancer screening recommendations appears to be higher than in the general population. This suggests that structured primary care programs for HIV-infected women are effective in prevention/early diagnosis of cancer. Standardized screening programs for oropharyngeal cancers should be considered in this population.

## References

- Morlat P, Roussillon C, Henard S, Salmon D, Bonnet F, et al. (2014) Causes of death among HIV-infected patients in France in 2010 (national survey): trends since 2000. *AIDS* 28: 1181-1191.
- Trickey A, May MT, Vehreschild J, Obel N, Gill MJ, et al. (2016) Cause-Specific Mortality in HIV-Positive Patients Who Survived Ten Years after Starting Antiretroviral Therapy. *PLoS One* 11: 0160460.
- Park LS, Tate JP, Sigel K, Rimland D, Crothers K, et al. (2016) Time trends in cancer incidence in persons living with HIV/AIDS in the antiretroviral therapy era: 1997-2012. *AIDS* 30: 1795-1806.
- Simard EP, Pfeiffer RM, Engels EA (2011) Cumulative Incidence of Cancer among People with AIDS in the United States. *Cancer* 117: 1089-1096.
- Shiels MS, Pfeiffer RM, Gail MH, Hall HI, Li J, et al. (2011) Cancer burden in the HIV-infected population in the United States. *J Natl Cancer Inst* 103: 753-762.
- Silverberg MJ, Chao C, Leyden WA, Xu L, Horberg MA, et al. (2011) HIV infection, immunodeficiency, viral replication, and the risk of cancer. *Cancer Epidemiol Biomarkers Prev* 20: 2551-2559.
- Riedel DJ, Rositch AF, Redfield RR (2015) Patterns of HIV viremia and viral suppression before diagnosis of non-AIDS-defining cancers in HIV-infected individuals. *Infect Agent Cancer* 10: 38.
- Park LS, Hernández-Ramírez RU, Silverberg MJ, Crothers K, Dubrow R (2016) Prevalence of non-HIV cancer risk factors in persons living with HIV/AIDS: A meta-analysis. *AIDS* 30: 273-291.
- Engels EA, Biggar RJ, Hall HI, Cross H, Crutchfield A, et al. (2008) Cancer risk in people infected with human immunodeficiency virus in the United States. *Int J Cancer* 123: 187-194.
- Chaturvedi AK, Madeleine MM, Biggar RJ, Engels EA (2009) Risk of human papillomavirus-associated cancers among persons with AIDS. *J Natl Cancer Inst* 101: 1120-1130.
- Marcus JL, Chao C, Leyden WA, Xu L, Yu J, et al. (2015) Survival among HIV-infected and HIV-uninfected individuals with common non-AIDS-defining cancers. *Cancer Epidemiol Biomarkers Prev* 24: 1167-1173.
- Abraham AG, D'Souza G, Jing Y, Gange SJ, Sterling TR, et al. (2013) Invasive cervical cancer risk among HIV-infected women: a North American multicohort collaboration prospective study. *J Acquir Immune Defic Syndr* 62: 405-413.
- Louisiana Breast and Cervical Cancer Health Program (2017) Louisiana Breast Cancer Facts. LBCHP, New Orleans, Louisiana, USA
- Crum-Cianflone N, Hullsiek KH, Marconi V, Weintrob A, Ganesan A, et al. (2009) Trends in the incidence of cancers among HIV-infected persons and the impact of antiretroviral therapy: A 20-year cohort study. *AIDS* 23: 41-50.

15. Wu XC, Maniscalco L, Zhang L, Yi Y, Lefante C, et al. (2018) Cancer Incidence in Louisiana by Census Tract, 2006-2014. LSU Health Sciences Center, New Orleans, USA.
16. Silverberg MJ, Chao C, Leyden WA, Xu L, Tang B, et al. (2009) HIV infection and the risk of cancers with and without a known infectious cause. *AIDS* 23: 2337-2345.
17. Clark RA, Mirabelli R, Shafe J, Broyles S, Besch L, et al. (2007) The New Orleans HIV outpatient program patient experience with Hurricane Katrina. *J La State Med Soc* 159: 276.
18. Simard EP, Pfeiffer RM, Engels EA (2010) Spectrum of cancer risk late after AIDS onset in the United States. *Arch Intern Med* 170: 1337-1345.
19. Adler DH, Wallace M, Bennie T, Abar B, Meiring TL, et al. (2016) Cumulative Impact of HIV and Multiple Concurrent Human Papillomavirus Infections on the Risk of Cervical Dysplasia. *Adv Virol* 2016: 7310894.
20. Ellerbrock TV, Chiasson MA, Bush TJ, Sun XW, Sawo D, et al. (2000) Incidence of cervical squamous intraepithelial lesions in HIV-Infected women. *JAMA* 283: 1031-1037.
21. Strickler HD, Burk RD, Fazzari M, Anastos K, Minkoff H, et al. (2005) Natural history and possible reactivation of human papillomavirus in human immunodeficiency virus-positive women. *J Natl Cancer Inst* 97: 577-586.
22. Harris TG, Burk RD, Palefsky JM, Massad LS, Bang JY, et al. (2005) Incidence of cervical squamous intraepithelial lesions associated with HIV serostatus, CD4 cell counts, and human papillomavirus test results. *JAMA* 293: 1471-1476.
23. Massad LS, Pierce CB, Minkoff H, Watts DH, Darragh TM, et al. (2014) Long term cumulative incidence of cervical intraepithelial neoplasia grade 3 or worse after abnormal cytology: impact of HIV infection. *Int J Cancer* 134: 1854-1861.
24. Massad LS, Seaberg EC, Watts DH, Hessol NA, Melnick S, et al. (2004) Low incidence of invasive cervical cancer among HIV-infected US women in a prevention program. *AIDS* 18: 109-113.
25. Robinson WR, Freeman D (2002) Improved outcome of cervical neoplasia in HIV-infected women in the era of highly active antiretroviral therapy. *AIDS Patient Care STDS* 16: 61-65.
26. Pytynia KB, Dahlstrom KR, Sturgis EM (2014) Epidemiology of HPV-associated oropharyngeal cancer. *Oral Oncol* 50: 380-386.
27. Beachler DC, Weber KM, Margolick JB, Strickler HD, Cranston RD, et al. (2012) Risk factors for oral infection among a high prevalence population of HIV-positive and at-risk HIV-negative adults. *Cancer Epidemiol Biomarkers Prev* 21: 122-133.
28. Sigel K, Dubrow R, Silverberg M, Crothers K, Braithwaite S, et al. (2011) Cancer Screening in Patients Infected with HIV. *Curr HIV/AIDS Rep* 8: 142-152.
29. Tyerman Z, Abouafia DM (2012) Review of screening guidelines for non-AIDS-defining malignancies: Evoking issues in the era of highly active antiretroviral therapy. *AIDS Rev* 14: 3-16.





Journal of Anesthesia & Clinical Care  
Journal of Addiction & Addictive Disorders  
Advances in Microbiology Research  
Advances in Industrial Biotechnology  
Journal of Agronomy & Agricultural Science  
Journal of AIDS Clinical Research & STDs  
Journal of Alcoholism, Drug Abuse & Substance Dependence  
Journal of Allergy Disorders & Therapy  
Journal of Alternative, Complementary & Integrative Medicine  
Journal of Alzheimer's & Neurodegenerative Diseases  
Journal of Angiology & Vascular Surgery  
Journal of Animal Research & Veterinary Science  
Archives of Zoological Studies  
Archives of Urology  
Journal of Atmospheric & Earth-Sciences  
Journal of Aquaculture & Fisheries  
Journal of Biotech Research & Biochemistry  
Journal of Brain & Neuroscience Research  
Journal of Cancer Biology & Treatment  
Journal of Cardiology & Neurocardiovascular Diseases  
Journal of Cell Biology & Cell Metabolism  
Journal of Clinical Dermatology & Therapy  
Journal of Clinical Immunology & Immunotherapy  
Journal of Clinical Studies & Medical Case Reports  
Journal of Community Medicine & Public Health Care  
Current Trends: Medical & Biological Engineering  
Journal of Cytology & Tissue Biology  
Journal of Dentistry: Oral Health & Cosmesis  
Journal of Diabetes & Metabolic Disorders  
Journal of Dairy Research & Technology  
Journal of Emergency Medicine Trauma & Surgical Care  
Journal of Environmental Science: Current Research  
Journal of Food Science & Nutrition  
Journal of Forensic, Legal & Investigative Sciences  
Journal of Gastroenterology & Hepatology Research  
Journal of Gerontology & Geriatric Medicine  
Journal of Genetics & Genomic Sciences  
Journal of Hematology, Blood Transfusion & Disorders  
Journal of Human Endocrinology  
Journal of Hospice & Palliative Medical Care  
Journal of Internal Medicine & Primary Healthcare  
Journal of Infectious & Non Infectious Diseases  
Journal of Light & Laser: Current Trends  
Journal of Modern Chemical Sciences  
Journal of Medicine: Study & Research  
Journal of Nanotechnology: Nanomedicine & Nanobiotechnology  
Journal of Neonatology & Clinical Pediatrics  
Journal of Nephrology & Renal Therapy  
Journal of Non Invasive Vascular Investigation  
Journal of Nuclear Medicine, Radiology & Radiation Therapy  
Journal of Obesity & Weight Loss  
Journal of Orthopedic Research & Physiotherapy  
Journal of Otolaryngology, Head & Neck Surgery  
Journal of Protein Research & Bioinformatics  
Journal of Pathology Clinical & Medical Research  
Journal of Pharmacology, Pharmaceutics & Pharmacovigilance  
Journal of Physical Medicine, Rehabilitation & Disabilities  
Journal of Plant Science: Current Research  
Journal of Psychiatry, Depression & Anxiety  
Journal of Pulmonary Medicine & Respiratory Research  
Journal of Practical & Professional Nursing  
Journal of Reproductive Medicine, Gynaecology & Obstetrics  
Journal of Stem Cells Research, Development & Therapy  
Journal of Surgery: Current Trends & Innovations  
Journal of Toxicology: Current Research  
Journal of Translational Science and Research  
Trends in Anatomy & Physiology  
Journal of Vaccines Research & Vaccination  
Journal of Virology & Antivirals

Submit Your Manuscript: <http://www.heraldopenaccess.us/Online-Submission.php>