

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/379448788>

The Impact of Cytotoxic T-Lymphocyte-Associated Protein 4 (CTLA-4) Genetic Variations on HIV Susceptibility and Progression

Article · April 2024

CITATIONS

20

READS

18

2 authors:



Emmanuel Ifeanyi Obeagu
Kampala International University (KIU)

1,600 PUBLICATIONS 20,558 CITATIONS

SEE PROFILE



Getrude Uzoma Obeagu
Kampala International University (KIU)

514 PUBLICATIONS 9,258 CITATIONS

SEE PROFILE

The Impact of Cytotoxic T-Lymphocyte-Associated Protein 4 (CTLA-4) Genetic Variations on HIV Susceptibility and Progression

*Emmanuel Ifeanyi Obeagu¹ and Getrude Uzoma Obeagu²

¹Department of Medical Laboratory Science, Kampala International University, Uganda

²School of Nursing Science, Kampala International University, Uganda

*Corresponding authour: Emmanuel Ifeanyi Obeagu, [Department of Medical Laboratory Science, Kampala International University, Uganda, emmanuelobeagu@yahoo.com, ORCID: 0000-0002-4538-0161](#)

Abstract

Cytotoxic T-lymphocyte-associated protein 4 (CTLA-4) is a critical immune checkpoint molecule involved in regulating T cell activation and tolerance. Genetic variations in CTLA-4 have been implicated in modulating susceptibility to human immunodeficiency virus (HIV) infection and disease progression. This review explores the impact of CTLA-4 genetic variations on HIV susceptibility, acquisition, transmission, and disease progression, as well as their potential implications for HIV prevention, treatment, and vaccine development. Despite conflicting results in studies across different populations, certain single nucleotide polymorphisms (SNPs) in the CTLA-4 gene have been associated with altered susceptibility to HIV infection. Moreover, CTLA-4 genetic variations have been linked to differences in viral load, CD4+ T cell count, and progression to AIDS in HIV-infected individuals. Mechanistically, these variations may influence immune activation, T cell function, cytokine production, and viral replication. Understanding the role of CTLA-4 genetic variations in HIV pathogenesis could lead to personalized treatment strategies and prognostication. Additionally, strategies targeting CTLA-4 may offer novel approaches for HIV prevention, immunotherapy, and vaccine development. Incorporating genetic information into HIV risk assessment and treatment decision-making may improve clinical outcomes and resource allocation in HIV care settings.

Keywords: *CTLA-4, genetic variations, HIV susceptibility, disease progression, immune response*

Introduction

Citation: Obeagu EI, Obeagu GU. The Impact of Cytotoxic T-Lymphocyte-Associated Protein 4 (CTLA-4) Genetic Variations on HIV Susceptibility and Progression. *Elite Journal of Immunology*, 2024; 2(4): 18-35

Human immunodeficiency virus (HIV) infection remains a significant global health challenge, with millions of new infections reported annually. Host genetic factors play a crucial role in determining individual susceptibility to HIV infection and disease progression. Among these factors, cytotoxic T-lymphocyte-associated protein 4 (CTLA-4) has emerged as a key regulator of immune responses with implications for HIV pathogenesis. CTLA-4 is a critical immune checkpoint molecule that downregulates T cell activation and maintains immune tolerance. Genetic variations in the CTLA-4 gene have been implicated in altering susceptibility to HIV infection and modulating disease progression in infected individuals. Single nucleotide polymorphisms (SNPs) in the CTLA-4 gene, particularly those affecting CTLA-4 expression and function, have been proposed as potential determinants of HIV susceptibility. Understanding the impact of CTLA-4 genetic variations on HIV susceptibility could provide valuable insights into host-pathogen interactions and inform strategies for HIV prevention. In addition to influencing HIV susceptibility, CTLA-4 genetic variations have been implicated in modulating disease progression and clinical outcomes in HIV-infected individuals. Certain CTLA-4 polymorphisms have been associated with differences in viral load, CD4+ T cell count, and progression to acquired immunodeficiency syndrome (AIDS). Elucidating the role of CTLA-4 genetic variations in HIV disease progression may have important implications for prognostication and the development of personalized treatment approaches. The mechanisms underlying the association between CTLA-4 genetic variations and HIV susceptibility and progression are complex and multifactorial. CTLA-4 polymorphisms may impact immune activation, T cell function, cytokine production, and viral replication, ultimately shaping the host immune response to HIV. Further research is needed to elucidate these mechanisms and identify potential therapeutic targets for HIV prevention and treatment.¹⁻⁴⁰

Genetic Variations in CTLA-4 and HIV Susceptibility

While some single nucleotide polymorphisms (SNPs) within the CTLA-4 gene have been linked to altered susceptibility to HIV infection, the findings have been inconsistent across different populations. Variants in CTLA-4, particularly those affecting its expression and function, may modulate T cell activation and immune responses, thereby influencing the susceptibility to HIV acquisition. Several candidate gene studies have explored the role of CTLA-4 genetic variations in HIV susceptibility, focusing on SNPs associated with altered CTLA-4 expression or function. For example, the CTLA-4 exon 1 polymorphism (+49 A/G, rs231775) has been investigated for its potential impact on HIV susceptibility, with conflicting results reported in different populations. Similarly, other CTLA-4 polymorphisms, such as the promoter region SNP -318 C/T (rs5742909), have been studied for their association with HIV acquisition, but the evidence remains inconclusive. The conflicting findings in genetic association studies may be attributed to several factors, including differences in study design, population demographics, and HIV exposure risks. Additionally, the complex interplay between host genetics, viral factors, and environmental influences further complicates the interpretation of genetic associations with HIV susceptibility. Moreover, the functional significance of CTLA-4 genetic variations in modulating immune responses to HIV infection remains incompletely understood and requires further investigation.

Citation: Obeagu EI, Obeagu GU. The Impact of Cytotoxic T-Lymphocyte-Associated Protein 4 (CTLA-4) Genetic Variations on HIV Susceptibility and Progression. *Elite Journal of Immunology*, 2024; 2(4): 18-35

Despite the challenges and inconsistencies in genetic association studies, understanding the role of CTLA-4 genetic variations in HIV susceptibility is of significant interest due to its potential implications for HIV prevention strategies. Elucidating the mechanisms by which CTLA-4 polymorphisms influence susceptibility to HIV infection may inform the development of novel preventive interventions, such as vaccines or immune-based therapies, tailored to individuals at higher risk of HIV acquisition. Therefore, further research efforts are warranted to clarify the contribution of CTLA-4 genetic variations to HIV susceptibility and to translate these findings into clinically relevant strategies for HIV prevention and control.⁴¹⁻⁸⁰

Genetic Variations in CTLA-4 and HIV Disease Progression

In addition to its potential role in HIV susceptibility, genetic variations in cytotoxic T-lymphocyte-associated protein 4 (CTLA-4) have been implicated in modulating disease progression and clinical outcomes in individuals living with HIV. Studies have explored the association between CTLA-4 genetic variations and various markers of HIV disease progression, including viral load, CD4+ T cell count, and progression to acquired immunodeficiency syndrome (AIDS). These investigations have provided insights into the potential impact of CTLA-4 polymorphisms on the natural history of HIV infection. Several candidate gene studies have investigated the association between CTLA-4 genetic variations and HIV disease progression, focusing on polymorphisms known to affect CTLA-4 expression, function, or regulation. For example, the CTLA-4 exon 1 polymorphism (+49 A/G, rs231775) has been examined for its association with HIV viral load and CD4+ T cell count, with conflicting results reported across different cohorts. Similarly, other CTLA-4 polymorphisms, such as the promoter region SNP -318 C/T (rs5742909), have been evaluated for their impact on disease progression, but the findings have been heterogeneous.

The mechanisms underlying the association between CTLA-4 genetic variations and HIV disease progression are complex and multifactorial. CTLA-4 polymorphisms may influence immune activation, T cell function, cytokine production, and viral replication, ultimately shaping the host immune response to HIV. Additionally, CTLA-4 genetic variations may interact with other host genetic factors, viral factors, and environmental influences to modulate disease progression in HIV-infected individuals. Despite the intriguing findings from genetic association studies, the clinical significance of CTLA-4 genetic variations in HIV disease progression remains incompletely understood. Conflicting results, small sample sizes, and differences in study populations pose challenges to the interpretation and generalizability of findings across studies. Furthermore, the functional relevance of CTLA-4 polymorphisms in modulating immune responses to HIV infection requires further investigation using complementary approaches, such as functional genomics, cellular assays, and animal models.⁸¹⁻¹²⁰

Mechanisms of Action

The impact of cytotoxic T-lymphocyte-associated protein 4 (CTLA-4) genetic variations on human immunodeficiency virus (HIV) susceptibility and disease progression involves complex molecular

Citation: Obeagu EI, Obeagu GU. The Impact of Cytotoxic T-Lymphocyte-Associated Protein 4 (CTLA-4) Genetic Variations on HIV Susceptibility and Progression. *Elite Journal of Immunology*, 2024; 2(4): 18-35

mechanisms that modulate immune responses and host-virus interactions. CTLA-4, an immune checkpoint molecule predominantly expressed on activated T cells, plays a critical role in regulating T cell activation and tolerance. Genetic variations in CTLA-4, including single nucleotide polymorphisms (SNPs) within the gene, can influence its expression levels, functional activity, and interactions with ligands, thereby shaping the host immune response to HIV. CTLA-4 genetic variations may impact HIV susceptibility by altering the balance between T cell activation and immune tolerance. SNPs within the CTLA-4 gene, such as the +49 A/G polymorphism in exon 1 (rs231775), have been associated with differences in CTLA-4 expression levels and T cell activation thresholds. Higher CTLA-4 expression or enhanced inhibitory activity conferred by certain genetic variants may dampen T cell activation and antiviral immune responses, thereby increasing susceptibility to HIV infection.¹²¹⁻¹³⁰

In HIV-infected individuals, CTLA-4 genetic variations can modulate disease progression by influencing multiple aspects of the host immune response to the virus. CTLA-4 polymorphisms may affect the function and regulatory capacity of regulatory T cells (Tregs), a subset of CD4+ T cells with immunosuppressive properties. Altered Treg function due to CTLA-4 genetic variations may contribute to immune dysregulation, chronic immune activation, and disease progression in HIV-infected individuals. Furthermore, CTLA-4 genetic variations may impact HIV-specific immune responses and viral control. CTLA-4 polymorphisms may influence the magnitude and quality of HIV-specific T cell responses, cytokine production, and viral clearance mechanisms. Variants associated with reduced CTLA-4 expression or impaired inhibitory activity may enhance HIV-specific T cell responses and antiviral immunity, leading to better viral control and slower disease progression. The interplay between CTLA-4 genetic variations and other host genetic factors, viral factors, and environmental influences further complicates the mechanistic understanding of their impact on HIV susceptibility and disease progression. Additionally, the functional significance of CTLA-4 genetic variations may vary depending on the specific genetic background, viral subtype, and stage of HIV infection. Further research using integrative approaches, including functional genomics, immunological assays, and systems biology, is needed to elucidate the precise mechanisms underlying the association between CTLA-4 genetic variations and HIV pathogenesis.¹³¹⁻¹⁴⁶

Implications for HIV Prevention, Treatment, and Vaccine Development

The association between cytotoxic T-lymphocyte-associated protein 4 (CTLA-4) genetic variations and human immunodeficiency virus (HIV) susceptibility and disease progression has significant implications for HIV prevention, treatment, and vaccine development. Understanding the role of CTLA-4 genetic variations in modulating host immune responses to HIV infection may inform strategies to mitigate HIV transmission, improve clinical outcomes, and guide the development of preventive interventions and therapeutic approaches. Knowledge of CTLA-4 genetic variations associated with increased susceptibility to HIV infection could inform targeted prevention strategies, particularly in high-risk populations. Screening individuals for CTLA-4 polymorphisms linked to higher HIV susceptibility may help identify individuals who could

Citation: Obeagu EI, Obeagu GU. The Impact of Cytotoxic T-Lymphocyte-Associated Protein 4 (CTLA-4) Genetic Variations on HIV Susceptibility and Progression. *Elite Journal of Immunology*, 2024; 2(4): 18-35

benefit from intensified HIV prevention efforts, such as pre-exposure prophylaxis (PrEP), behavioral interventions, or access to safer sex education and resources. The identification of CTLA-4 genetic variations associated with HIV disease progression may have implications for treatment decision-making and personalized therapeutic approaches. Individuals with specific CTLA-4 polymorphisms associated with faster disease progression may benefit from earlier initiation of antiretroviral therapy (ART) or more aggressive treatment strategies to prevent disease progression and improve clinical outcomes. Moreover, understanding the impact of CTLA-4 genetic variations on immune responses to HIV infection may guide the development of novel immunotherapies or adjunctive treatments aimed at modulating host immune responses and enhancing viral control.¹⁴⁷⁻¹⁷⁰

CTLA-4 genetic variations may influence immune responses to HIV infection and vaccination, with potential implications for vaccine development and efficacy. Knowledge of CTLA-4 polymorphisms associated with altered immune activation thresholds or impaired antiviral immunity could inform vaccine design strategies to elicit more robust and durable immune responses. Moreover, incorporating genetic information, including CTLA-4 genotypes, into vaccine trials may improve the prediction of vaccine responses and help identify subgroups of individuals more likely to benefit from vaccination. The integration of genetic information, including CTLA-4 genetic variations, into HIV prevention, treatment, and vaccine development efforts represents a key component of precision medicine approaches. By leveraging genetic data to tailor interventions and treatment strategies to individual genetic profiles, precision medicine approaches have the potential to optimize clinical outcomes, minimize adverse effects, and improve resource allocation in HIV care settings.¹⁷¹⁻¹⁷⁷

Conclusion

CTLA-4 genetic variations play a significant role in HIV susceptibility and disease progression, influencing various aspects of the host immune response to HIV. Further research is needed to elucidate the mechanisms underlying the association between CTLA-4 genetic variations and HIV pathogenesis and to translate these findings into clinically relevant interventions. By understanding the impact of CTLA-4 genetic variations on HIV susceptibility and disease progression, we may uncover novel targets for HIV prevention, treatment, and vaccine development, ultimately contributing to the global effort to combat the HIV/AIDS pandemic.

References

References

1. Mann Z, Sengar M, Verma YK, Rajalingam R, Raghav PK. Hematopoietic stem cell factors: their functional role in self-renewal and clinical aspects. *Frontiers in Cell and Developmental Biology*. 2022; 10:664261.

Citation: Obeagu EI, Obeagu GU. The Impact of Cytotoxic T-Lymphocyte-Associated Protein 4 (CTLA-4) Genetic Variations on HIV Susceptibility and Progression. *Elite Journal of Immunology*, 2024; 2(4): 18-35

2. Sezaki M, Hayashi Y, Wang Y, Johansson A, Umemoto T, Takizawa H. Immunomodulation of hematopoietic stem and progenitor cells in inflammation. *Frontiers in immunology*. 2020; 11:585367.
3. Okeke C, Silas U, Okeke C, Chikwendu C. Current trends on hemopoietic stem cells. *Current Stem Cell Research & Therapy*. 2021;16(2):199-208.
4. Lee J, Yoon SR, Choi I, Jung H. Causes and mechanisms of hematopoietic stem cell aging. *International Journal of Molecular Sciences*. 2019;20(6):1272.
5. Govindarajah V, Reynaud D. Tuning of the hematopoietic stem cell compartment in its inflammatory environment. *Current stem cell reports*. 2018; 4:189-200.
6. Abunimye DA, Okafor IM, Okorowo H, Obeagu EI. The role of GATA family transcriptional factors in haematological malignancies: A review. *Medicine*. 2024;103(12): e37487.
7. Obeagu EI, Okoroiwu IL, Azuonwu O. An update on hypoxic regulation of iron homeostasis and bone marrow environment. *Int. J. Curr. Res. Med. Sci*. 2018;4(10):42-8.
8. Obeagu EI, Okoroiwu IL, Obeagu G. Molecular mechanism and systemic response of erythropoietin: A Review. *Int. J. Adv. Res. Biol. Sci*. 2015;2(7):58-62.
9. Ifeanyi OE. Acute Leukaemia: A Sudden Killer to Human Beings. *EC Emergency Medicine and Critical Care*. 2020;4(6):154-67.
10. Obeagu EI, Okwuanaso CB, Edoho SH, Obeagu GU. Under-nutrition among HIV-exposed Uninfected Children: A Review of African Perspective. *Madonna University journal of Medicine and Health Sciences*. 2022;2(3):120-127.
11. Obeagu EI. A Review of Challenges and Coping Strategies Faced by HIV/AIDS Discordant Couples. *Madonna University journal of Medicine and Health Sciences*. 2023 ;3(1):7-12.
<https://madonnauniversity.edu.ng/journals/index.php/medicine/article/view/91>.
12. Obeagu EI, Obeagu GU. An update on premalignant cervical lesions and cervical cancer screening services among HIV positive women. *J Pub Health Nutri*. 2023; 6 (2). 2023; 141:1-2. [links/63e538ed64252375639dd0df/An-update-on-premalignant-cervical-lesions-and-cervical-cancer-screening-services-among-HIV-positive-women.pdf](https://doi.org/10.22192/ijcrms.2017.03.01.004).
13. Ezeoru VC, Enweani IB, Ochiabuto O, Nwachukwu AC, Ogbonna US, Obeagu EI. Prevalence of Malaria with Anaemia and HIV status in women of reproductive age in Onitsha, Nigeria. *Journal of Pharmaceutical Research International*. 2021;33(4):10-19.
14. Omo-Emmanuel UK, Chinedum OK, Obeagu EI. Evaluation of laboratory logistics management information system in HIV/AIDS comprehensive health facilities in Bayelsa State, Nigeria. *Int J Curr Res Med Sci*. 2017;3(1): 21-38.DOI: [10.22192/ijcrms.2017.03.01.004](https://doi.org/10.22192/ijcrms.2017.03.01.004)
15. Obeagu EI, Obeagu GU, Musiimenta E, Bot YS, Hassan AO. Factors contributing to low utilization of HIV counseling and testing services. *Int. J. Curr. Res. Med. Sci*. 2023;9(2): 1-5.DOI: [10.22192/ijcrms.2023.09.02.001](https://doi.org/10.22192/ijcrms.2023.09.02.001)
16. Obeagu EI, Obeagu GU. An update on survival of people living with HIV in Nigeria. *J Pub Health Nutri*. 2022; 5 (6). 2022;129. [links/645b4bfcf3512f1cc5885784/An-update-on-survival-of-people-living-with-HIV-in-Nigeria.pdf](https://doi.org/10.22192/ijcrms.2023.09.02.001).

Citation: Obeagu EI, Obeagu GU. The Impact of Cytotoxic T-Lymphocyte-Associated Protein 4 (CTLA-4) Genetic Variations on HIV Susceptibility and Progression. *Elite Journal of Immunology*, 2024; 2(4): 18-35

17. Offie DC, Obeagu EI, Akueshi C, Njab JE, Ekanem EE, Dike PN, Oguh DN. Facilitators and barriers to retention in HIV care among HIV infected MSM attending Community Health Center Yaba, Lagos Nigeria. *Journal of Pharmaceutical Research International*. 2021;33(52B):10-19.
18. Obeagu EI, Ogbonna US, Nwachukwu AC, Ochiabuto O, Enweani IB, Ezeoru VC. Prevalence of Malaria with Anaemia and HIV status in women of reproductive age in Onitsha, Nigeria. *Journal of Pharmaceutical Research International*. 2021;33(4):10-19.
19. Odo M, Ochei KC, Obeagu EI, Barinaadaa A, Eteng UE, Ikpeme M, Bassey JO, Paul AO. TB Infection Control in TB/HIV Settings in Cross River State, Nigeria: Policy Vs Practice. *Journal of Pharmaceutical Research International*. 2020;32(22):101-119.
20. Obeagu EI, Eze VU, Alaebob EA, Ochei KC. Determination of haematocrit level and iron profile study among persons living with HIV in Umuahia, Abia State, Nigeria. *J BioInnovation*. 2016; 5:464-471. [links/592bb4990f7e9b9979a975cf/DETERMINATION-OF-HAEMATOCRIT-LEVEL-AND-IRON-PROFILE-STUDY-AMONG-PERSONS-LIVING-WITH-HIV-IN-UMUAHIA-ABIA-STATE-NIGERIA.pdf](https://www.academia.edu/download/38320140/Obeagu_Emanuel_Ifeanyi_and_Obeagu_Getrude_Uzoma2.EMMA1.pdf).
21. Ifeanyi OE, Obeagu GU. The values of prothrombin time among HIV positive patients in FMC owerri. *International Journal of Current Microbiology and Applied Sciences*. 2015;4(4):911-916. https://www.academia.edu/download/38320140/Obeagu_Emanuel_Ifeanyi_and_Obeagu_Getrude_Uzoma2.EMMA1.pdf.
22. Izuchukwu IF, Ozims SJ, Agu GC, Obeagu EI, Onu I, Amah H, Nwosu DC, Nwanjo HU, Edward A, Arunsi MO. Knowledge of preventive measures and management of HIV/AIDS victims among parents in Umuna Orlu community of Imo state Nigeria. *Int. J. Adv. Res. Biol. Sci*. 2016;3(10): 55-65.DOI; [10.22192/ijarbs.2016.03.10.009](https://doi.org/10.22192/ijarbs.2016.03.10.009)
23. Chinedu K, Takim AE, Obeagu EI, Chinazor UD, Eloghosa O, Ojong OE, Odunze U. HIV and TB co-infection among patients who used Directly Observed Treatment Short-course centres in Yenagoa, Nigeria. *IOSR J Pharm Biol Sci*. 2017;12(4):70-75. [links/5988ab6d0f7e9b6c8539f73d/HIV-and-TB-co-infection-among-patients-who-used-Directly-Observed-Treatment-Short-course-centres-in-Yenagoa-Nigeria.pdf](https://www.academia.edu/download/38320140/Obeagu_Emanuel_Ifeanyi_and_Obeagu_Getrude_Uzoma2.EMMA1.pdf)
24. Oloro OH, Oke TO, Obeagu EI. Evaluation of Coagulation Profile Patients with Pulmonary Tuberculosis and Human Immunodeficiency Virus in Owo, Ondo State, Nigeria. *Madonna University journal of Medicine and Health Sciences*. 2022;2(3):110-119.
25. Nwosu DC, Obeagu EI, Nkwocha BC, Nwanna CA, Nwanjo HU, Amadike JN, Elendu HN, Ofoedeme CN, Ozims SJ, Nwankpa P. Change in Lipid Peroxidation Marker (MDA) and Non enzymatic Antioxidants (VIT C & E) in HIV Seropositive Children in an Urban Community of Abia State, Nigeria. *J. Bio. Innov*. 2016;5(1):24-30. [links/5ae735e9a6fdcc5b33eb8d6a/CHANGE-IN-LIPID-PEROXIDATION-MARKER-MDAAND-NON-ENZYMATIC-ANTIOXIDANTS-VIT-C-E-IN-HIV-SEROPOSITIVE-CHILDREN-IN-AN-URBAN-COMMUNITY-OF-ABIA-STATE-NIGERIA.pdf](https://www.academia.edu/download/38320140/Obeagu_Emanuel_Ifeanyi_and_Obeagu_Getrude_Uzoma2.EMMA1.pdf).
26. Igwe CM, Obeagu IE, Ogbuabor OA. Clinical characteristics of people living with HIV/AIDS on ART in 2014 at tertiary health institutions in Enugu, Nigeria. *J Pub Health*

Citation: Obeagu EI, Obeagu GU. The Impact of Cytotoxic T-Lymphocyte-Associated Protein 4 (CTLA-4) Genetic Variations on HIV Susceptibility and Progression. *Elite Journal of Immunology*, 2024; 2(4): 18-35

- Nutri. 2022; 5 (6). 2022;130. [links/645a166f5762c95ac3817d32/Clinical-characteristics-of-people-living-with-HIV-AIDS-on-ART-in-2014-at-tertiary-health-institutions-in-Enugu.pdf](https://doi.org/10.22192/ijcrms.2017.03.02.005).
27. Ifeanyi OE, Obeagu GU, Ijeoma FO, Chioma UI. The values of activated partial thromboplastin time (APTT) among HIV positive patients in FMC Owerri. *Int J Curr Res Aca Rev.* 2015; 3:139-144. [https://www.academia.edu/download/38320159/Obeagu Emmanuel Ifeanyi3 et al.IJC RAR.pdf](https://www.academia.edu/download/38320159/Obeagu_Emanuel_Ifeanyi3_et_al.IJC_RAR.pdf).
 28. Obiomah CF, Obeagu EI, Ochei KC, Swem CA, Amachukwu BO. Hematological indices of HIV seropositive subjects in Nnamdi Azikiwe University teaching hospital (NAUTH), Nnewi. *Ann Clin Lab Res.* 2018;6(1):1-4. [links/5aa2bb17a6fdccd544b7526e/Haematological-Indices-of-HIV-Seropositive-Subjects-at-Nnamdi-Azikiwe.pdf](https://doi.org/10.22192/ijcrms.2017.03.02.005)
 29. Omo-Emmanuel UK, Ochei KC, Osuala EO, Obeagu EI, Onwuasoanya UF. Impact of prevention of mother to child transmission (PMTCT) of HIV on positivity rate in Kafanchan, Nigeria. *Int. J. Curr. Res. Med. Sci.* 2017;3(2): 28-34.DOI: [10.22192/ijcrms.2017.03.02.005](https://doi.org/10.22192/ijcrms.2017.03.02.005)
 30. Aizaz M, Abbas FA, Abbas A, Tabassum S, Obeagu EI. Alarming rise in HIV cases in Pakistan: Challenges and future recommendations at hand. *Health Science Reports.* 2023;6(8):e1450.
 31. Obeagu EI, Ameorpor F, Scott GY. An update of human immunodeficiency virus infection: Bleeding disorders. *J Pub Health Nutri.* 2023; 6 (1). 2023;139. [links/645b4a6c2edb8e5f094d9bd9/An-update-of-human-immunodeficiency-virus-infection-Bleeding.pdf](https://doi.org/10.22192/ijcrms.2017.03.02.005).
 32. Obeagu EI, Scott GY, Ameorpor F, Ofodile AC, Edoho SH, Ahamefula C. Prevention of New Cases of Human Immunodeficiency Virus: Pragmatic Approaches of Saving Life in Developing Countries. *Madonna University journal of Medicine and Health Sciences.* 2022;2(3):128-134. <https://madonnauniversity.edu.ng/journals/index.php/medicine/article/view/86>.
 33. Walter O, Anaebo QB, Obeagu EI, Okoroiwu IL. Evaluation of Activated Partial Thromboplastin Time and Prothrombin Time in HIV and TB Patients in Owerri Metropolis. *Journal of Pharmaceutical Research International.* 2022:29-34.
 34. Odo M, Ochei KC, Obeagu EI, Barinaadaa A, Eteng EU, Ikpeme M, Bassey JO, Paul AO. Cascade variabilities in TB case finding among people living with HIV and the use of IPT: assessment in three levels of care in cross River State, Nigeria. *Journal of Pharmaceutical Research International.* 2020;32(24):9-18.
 35. Jakheng SP, Obeagu EI. Seroprevalence of human immunodeficiency virus based on demographic and risk factors among pregnant women attending clinics in Zaria Metropolis, Nigeria. *J Pub Health Nutri.* 2022; 5 (8). 2022;137. [links/6317a6b1acd814437f0ad268/Seroprevalence-of-human-immunodeficiency-virus-based-on-demographic-and-risk-factors-among-pregnant-women-attending-clinics-in-Zaria-Metropolis-Nigeria.pdf](https://doi.org/10.22192/ijcrms.2017.03.02.005).

Citation: Obeagu EI, Obeagu GU. The Impact of Cytotoxic T-Lymphocyte-Associated Protein 4 (CTLA-4) Genetic Variations on HIV Susceptibility and Progression. *Elite Journal of Immunology*, 2024; 2(4): 18-35

36. Obeagu EI, Obeagu GU. A Review of knowledge, attitudes and socio-demographic factors associated with non-adherence to antiretroviral therapy among people living with HIV/AIDS. *Int. J. Adv. Res. Biol. Sci.* 2023;10(9):135-142.DOI: [10.22192/ijarbs.2023.10.09.015](https://doi.org/10.22192/ijarbs.2023.10.09.015) [links/6516faa61e2386049de5e828/A-Review-of-knowledge-attitudes-and-socio-demographic-factors-associated-with-non-adherence-to-antiretroviral-therapy-among-people-living-with-HIV-AIDS.pdf](https://www.researchgate.net/publication/371111111/links/6516faa61e2386049de5e828/A-Review-of-knowledge-attitudes-and-socio-demographic-factors-associated-with-non-adherence-to-antiretroviral-therapy-among-people-living-with-HIV-AIDS.pdf)
37. Obeagu EI, Onuoha EC. Tuberculosis among HIV Patients: A review of Prevalence and Associated Factors. *Int. J. Adv. Res. Biol. Sci.* 2023;10(9):128-134.DOI: [10.22192/ijarbs.2023.10.09.014](https://doi.org/10.22192/ijarbs.2023.10.09.014) [links/6516f938b0df2f20a2f8b0e0/Tuberculosis-among-HIV-Patients-A-review-of-Prevalence-and-Associated-Factors.pdf](https://www.researchgate.net/publication/371111111/links/6516f938b0df2f20a2f8b0e0/Tuberculosis-among-HIV-Patients-A-review-of-Prevalence-and-Associated-Factors.pdf).
38. Obeagu EI, Ibeh NC, Nwobodo HA, Ochei KC, Iwegbulam CP. Haematological indices of malaria patients coinfecting with HIV in Umuahia. *Int. J. Curr. Res. Med. Sci.* 2017;3(5):100-104.DOI: [10.22192/ijcrms.2017.03.05.014](https://doi.org/10.22192/ijcrms.2017.03.05.014) https://www.academia.edu/download/54317126/Haematological_indices_of_malaria_patients_coinfected_with_HIV.pdf
39. Jakheng SP, Obeagu EI, Abdullahi IO, Jakheng EW, Chukwueze CM, Eze GC, Essien UC, Madekwe CC, Madekwe CC, Vidya S, Kumar S. Distribution Rate of Chlamydial Infection According to Demographic Factors among Pregnant Women Attending Clinics in Zaria Metropolis, Kaduna State, Nigeria. *South Asian Journal of Research in Microbiology.* 2022;13(2):26-31.
40. Okorie HM, Obeagu Emmanuel I, Okpoli Henry CH, Chukwu Stella N. Comparative study of enzyme linked immunosorbent assay (Elisa) and rapid test screening methods on HIV, Hbsag, Hcv and Syphilis among voluntary donors in. Owerri, Nigeria. *J Clin Commun Med.* 2020;2(3):180-183.DOI: **DOI:** [10.32474/JCCM.2020.02.000137](https://doi.org/10.32474/JCCM.2020.02.000137) [links/5f344530458515b7291bd95f/Comparative-Study-of-Enzyme-Linked-Immunosorbent-Assay-ELISA-and-Rapid-Test-Screening-Methods-on-HIV-HBsAg-HCV-and-Syphilis-among-Voluntary-Donors-in-Owerri-Nigeria.pdf](https://www.researchgate.net/publication/371111111/links/5f344530458515b7291bd95f/Comparative-Study-of-Enzyme-Linked-Immunosorbent-Assay-ELISA-and-Rapid-Test-Screening-Methods-on-HIV-HBsAg-HCV-and-Syphilis-among-Voluntary-Donors-in-Owerri-Nigeria.pdf).
41. Ezugwu UM, Onyenekwe CC, Ukibe NR, Ahaneku JE, Onah CE, Obeagu EI, Emeje PI, Awalu JC, Igbokwe GE. Use of ATP, GTP, ADP and AMP as an Index of Energy Utilization and Storage in HIV Infected Individuals at NAUTH, Nigeria: A Longitudinal, Prospective, Case-Controlled Study. *Journal of Pharmaceutical Research International.* 2021;33(47A):78-84.
42. Emmanuel G, Martin O, Peter OS, Obeagu EI, Daniel K. Factors Influencing Early Neonatal Adverse Outcomes among Women with HIV with Post Dated Pregnancies Delivering at Kampala International University Teaching Hospital, Uganda. *Asian Journal of Pregnancy and Childbirth.* 2023 Jul 29;6(1):203-211. <http://research.sdpublishers.net/id/eprint/2819/>.
43. Igwe MC, Obeagu EI, Ogbuabor AO, Eze GC, Ikpenwa JN, Eze-Stephen PE. Socio-Demographic Variables of People Living with HIV/AIDS Initiated on ART in 2014 at Tertiary Health Institution in Enugu State. *Asian Journal of Research in Infectious Diseases.* 2022;10(4):1-7.

Citation: Obeagu EI, Obeagu GU. The Impact of Cytotoxic T-Lymphocyte-Associated Protein 4 (CTLA-4) Genetic Variations on HIV Susceptibility and Progression. *Elite Journal of Immunology*, 2024; 2(4): 18-35

44. Vincent CC, Obeagu EI, Agu IS, Ukeagu NC, Onyekachi-Chigbu AC. Adherence to Antiretroviral Therapy among HIV/AIDS in Federal Medical Centre, Owerri. *Journal of Pharmaceutical Research International*. 2021;33(57A):360-368.
45. Igwe MC, Obeagu EI, Ogbuabor AO. Analysis of the Factors and Predictors of Adherence to Healthcare of People Living With Hiv/Aids In Tertiary Health Institutions In Enugu State. *Madonna University Journal of Medicine and Health Sciences*. 2022;2(3):42-57. <https://madonnauniversity.edu.ng/journals/index.php/medicine/article/view/75>.
46. Madekwe CC, Madekwe CC, Obeagu EI. Inequality of monitoring in Human Immunodeficiency Virus, Tuberculosis and Malaria: A Review. *Madonna University journal of Medicine and Health Sciences*. 2022;2(3):6-15. <https://madonnauniversity.edu.ng/journals/index.php/medicine/article/view/69>
47. Echendu GE, Vincent CC, Ibebuike J, Asodike M, Naze N, Chinedu EP, Ohale B, Obeagu EI. WEIGHTS OF INFANTS BORN TO HIV INFECTED MOTHERS: A PROSPECTIVE COHORT STUDY IN FEDERAL MEDICAL CENTRE, OWERRI, IMO STATE. *European Journal of Pharmaceutical and Medical Research*, 2023; 10(8): 564-568
48. Nwosu DC, Nwanjo HU, Okolie NJ, Ikeh K, Ajero CM, Dike J, Ojiegbe GC, Oze GO, Obeagu EI, Nnatunanya I, Azuonwu O. BIOCHEMICAL ALTERATIONS IN ADULT HIV PATIENTS ON ANTIRETRQVIRAL THERAPY. *World Journal of Pharmacy and Pharmaceutical Sciences*, 2015; 4(3): 153-160. <links/5a4fd0500f7e9bbc10526b38/BIOCHEMICAL-ALTERATIONS-IN-ADULT-HIV-PATIENTS-ON-ANTIRETRQVIRAL-THERAPY.pdf>.
49. Obeagu EI, Obeagu GU. Effect of CD4 Counts on Coagulation Parameters among HIV Positive Patients in Federal Medical Centre, Owerri, Nigeria. *Int. J. Curr. Res. Biosci. Plant Biol*. 2015;2(4):45-49.
50. Lionberger JM, Stirewalt DL. Gene expression changes in normal haematopoietic cells. *Best Practice & Research Clinical Haematology*. 2009;22(2):249-269.
51. Obeagu EI, Nwosu DC. Adverse drug reactions in HIV/AIDS patients on highly active antiretro viral therapy: a review of prevalence. *Int. J. Curr. Res. Chem. Pharm. Sci*. 2019;6(12):45-8. DOI: [10.22192/ijcreps.2019.06.12.004](https://doi.org/10.22192/ijcreps.2019.06.12.004) <links/650aba1582f01628f0335795/Adverse-drug-reactions-in-HIV-AIDS-patients-on-highly-active-antiretro-viral-therapy-a-review-of-prevalence.pdf>.
52. Obeagu EI, Scott GY, Amekpor F, Obeagu GU. Implications of CD4/CD8 ratios in Human Immunodeficiency Virus infections. *Int. J. Curr. Res. Med. Sci*. 2023;9(2):6-13. DOI: [10.22192/ijcrms.2023.09.02.002](https://doi.org/10.22192/ijcrms.2023.09.02.002) <links/645a4a462edb8e5f094ad37c/Implications-of-CD4-CD8-ratios-in-Human-Immunodeficiency-Virus-infections.pdf>.
53. Obeagu EI, Ochei KC, Okeke EI, Anode AC. Assessment of the level of haemoglobin and erythropoietin in persons living with HIV in Umuahia. *Int. J. Curr. Res. Med. Sci*. 2016;2(4):29-33. <links/5711c47508aebe07c02496b/Assessment-of-the-level-of-haemoglobin-and-erythropoietin-in-persons-living-with-HIV-in-Umuahia.pdf>.
54. Ifeanyi OE, Obeagu GU. The Values of CD4 Count, among HIV Positive Patients in FMC Owerri. *Int. J. Curr. Microbiol. App. Sci*. 2015;4(4):906-910.

Citation: Obeagu EI, Obeagu GU. The Impact of Cytotoxic T-Lymphocyte-Associated Protein 4 (CTLA-4) Genetic Variations on HIV Susceptibility and Progression. *Elite Journal of Immunology*, 2024; 2(4): 18-35

https://www.academia.edu/download/38320134/Obeagu_Emanuel_Ifeanyi_and_Obeagu_Getrude_Uzoma.EMMA2.pdf.

55. Obeagu EI, Okeke EI, Anonde Andrew C. Evaluation of haemoglobin and iron profile study among persons living with HIV in Umuahia, Abia state, Nigeria. *Int. J. Curr. Res. Biol. Med.* 2016;1(2):1-5.
56. Ibebuike JE, Nwokike GI, Nwosu DC, Obeagu EI. A Retrospective Study on Human Immune Deficiency Virus among Pregnant Women Attending Antenatal Clinic in Imo State University Teaching Hospital. *International Journal of Medical Science and Dental Research*, 2018; 1 (2):08-14. <https://www.ijmsdr.org/published%20paper/li1i2/A%20Retrospective%20Study%20on%20Human%20Immune%20Deficiency%20Virus%20among%20Pregnant%20Women%20Attending%20Antenatal%20Clinic%20in%20Imo%20State%20University%20Teaching%20Hospital.pdf>.
57. Obeagu EI, Obarezi TN, Omeh YN, Okoro NK, Eze OB. Assessment of some haematological and biochemical parameters in HIV patients before receiving treatment in Aba, Abia State, Nigeria. *Res J Pharma Biol Chem Sci.* 2014; 5:825-830.
58. Obeagu EI, Obarezi TN, Ogbuabor BN, Anaebo QB, Eze GC. Pattern of total white blood cell and differential count values in HIV positive patients receiving treatment in Federal Teaching Hospital Abakaliki, Ebonyi State, Nigeria. *International Journal of Life Science, Biotechnology and Pharama Research.* 2014; 391:186-189.
59. Obeagu EI. A Review of Challenges and Coping Strategies Faced by HIV/AIDS Discordant Couples. *Madonna University journal of Medicine and Health Sciences.* 2023; 3 (1): 7-12.
60. Oloro OH, Obeagu EI. A Systematic Review on Some Coagulation Profile in HIV Infection. *International Journal of Innovative and Applied Research.* 2022;10(5):1-11.
61. Alvarez F, Fritz JH, Piccirillo CA. Pleiotropic effects of IL-33 on CD4+ T cell differentiation and effector functions. *Frontiers in immunology.* 2019; 10:438556.
62. Chirumbolo S, Bjørklund G, Sboarina A, Vella A. The role of basophils as innate immune regulatory cells in allergy and immunotherapy. *Human vaccines & immunotherapeutics.* 2018;14(4):815-831.
63. Nwosu DC, Obeagu EI, Nkwuocha BC, Nwanne CA, Nwanjo HU, Amadike JN, Ezemma MC, Okpomeshine EA, Ozims SJ, Agu GC. Alterations in superoxide dismutase, vitamins C and E in HIV infected children in Umuahia, Abia state. *International Journal of Advanced Research in Biological Sciences.* 2015;2(11):268-271.
64. Ifeanyi OE, Uzoma OG, Stella EI, Chinedum OK, Abum SC. Vitamin D and insulin resistance in HIV sero positive individuals in Umudike. *Int. J. Curr. Res. Med. Sci.* 2018;4(2):104-108.
65. Ifeanyi OE, Leticia OI, Nwosu D, Chinedum OK. A Review on blood borne viral infections: universal precautions. *Int. J. Adv. Res. Biol. Sci.* 2018;5(6):60-66.
66. Nwovu AI, Ifeanyi OE, Uzoma OG, Nwebonyi NS. Occurrence of Some Blood Borne Viral Infection and Adherence to Universal Precautions among Laboratory Staff in Federal Teaching Hospital Abakaliki Ebonyi State. *Arch Blood Transfus Disord.* 2018;1(2).

Citation: Obeagu EI, Obeagu GU. The Impact of Cytotoxic T-Lymphocyte-Associated Protein 4 (CTLA-4) Genetic Variations on HIV Susceptibility and Progression. *Elite Journal of Immunology*, 2024; 2(4): 18-35

67. Chinedu K, Takim AE, Obeagu EI, Chinazor UD, Eloghosa O, Ojong OE, Odunze U. HIV and TB co-infection among patients who used Directly Observed Treatment Short-course centres in Yenagoa, Nigeria. *IOSR J Pharm Biol Sci.* 2017;12(4):70-75.
68. Offie DC, Obeagu EI, Akueshi C, Njab JE, Ekanem EE, Dike PN, Oguh DN. Facilitators and barriers to retention in HIV care among HIV infected MSM attending Community Health Center Yaba, Lagos Nigeria. *Journal of Pharmaceutical Research International.* 2021;33(52B):10-19.
69. Obeagu EI, Obeagu GU, Ede MO, Odo EO, Buhari HA. Translation of HIV/AIDS knowledge into behavior change among secondary school adolescents in Uganda: A review. *Medicine (Baltimore).* 2023;102(49): e36599. doi: 10.1097/MD.00000000000036599. PMID: 38065920; PMCID: PMC10713174.
70. Anyiam AF, Arinze-Anyiam OC, Ironi EA, Obeagu EI. Distribution of ABO and rhesus blood grouping with HIV infection among blood donors in Ekiti State Nigeria. *Medicine (Baltimore).* 2023;102(47): e36342. doi: 10.1097/MD.00000000000036342. PMID: 38013335; PMCID: PMC10681551.
71. Echefu SN, Udosen JE, Akwiwu EC, Akpotuzor JO, Obeagu EI. Effect of Dolutegravir regimen against other regimens on some hematological parameters, CD4 count and viral load of people living with HIV infection in South Eastern Nigeria. *Medicine (Baltimore).* 2023;102(47): e35910. doi: 10.1097/MD.00000000000035910. PMID: 38013350; PMCID: PMC10681510.
72. Opeyemi AA, Obeagu EI. Regulations of malaria in children with human immunodeficiency virus infection: A review. *Medicine (Baltimore).* 2023;102(46): e36166. doi: 10.1097/MD.00000000000036166. PMID: 37986340; PMCID: PMC10659731.
73. Obeagu EI, Obeagu GU, Obiezu J, Ezeonwumelu C, Ogunnaya FU, Ngwoke AO, Emeka-Obi OR,
74. Obeagu EI, Ubosi NI, Uzoma G. Storms and Struggles: Managing HIV Amid Natural Disasters. *Int. J. Curr. Res. Chem. Pharm. Sci.* 2023;10(11):14-25.
75. Obeagu EI, Obeagu GU. Human Immunodeficiency Virus and tuberculosis infection: A review of prevalence of associated factors. *Int. J. Adv. Multidiscip. Res.* 2023;10(10):56-62.
76. Obeagu EI, Obeagu GU. Unmasking the Truth: Addressing Stigma in the Fight Against HIV. *Elite Journal of Public Health.* 2024;2(1):8-22.
77. Obeagu EI, Obeagu GU, Okwuanaso CB. Optimizing Immune Health in HIV Patients through Nutrition: A Review. *Elite Journal of Immunology.* 2024;2(1):14-33.
78. Obeagu EI, Obeagu GU. Utilization of immunological ratios in HIV: Implications for monitoring and therapeutic strategies. *Medicine.* 2024;103(9): e37354.
79. Obeagu EI, Obeagu GU. CD8 Dynamics in HIV Infection: A Synoptic Review. *Elite Journal of Immunology.* 2024;2(1):1-3.
80. Obeagu EI, Obeagu GU. Implications of B Lymphocyte Dysfunction in HIV/AIDS. *Elite Journal of Immunology.* 2024;2(1):34-46.

Citation: Obeagu EI, Obeagu GU. The Impact of Cytotoxic T-Lymphocyte-Associated Protein 4 (CTLA-4) Genetic Variations on HIV Susceptibility and Progression. *Elite Journal of Immunology*, 2024; 2(4): 18-35

81. Obeagu EI, Obeagu GU. Maternal Influence on Infant Immunological Responses to HIV: A Review. *Elite Journal of Laboratory Medicine*. 2024;2(1):46-58.
82. Obeagu EI, Obeagu GU. Understanding B Lymphocyte Functions in HIV Infection: Implications for Immune Dysfunction and Therapeutic Strategies. *Elite Journal of Medicine*. 2024;2(1):35-46.
83. Obeagu EI, Obeagu GU. Platelet-Driven Modulation of HIV: Unraveling Interactions and Implications. *Journal home page: <http://www.journalijar.com>;12(01)*.
84. Obeagu EI, Anyiam AF, Obeagu GU. Managing Hematological Complications in HIV: Erythropoietin Considerations. *Elite Journal of HIV*. 2024;2(1):65-78.
85. Obeagu EI, Obeagu GU, Hauwa BA, Umar AI. Hematocrit Variations in HIV Patients Co-infected with Malaria: A Comprehensive Review. *Journal home page: <http://www.journalijar.com>;12(01)*.
86. ObeaguEI AA, Obeagu GU. Synergistic Effects of Blood Transfusion and HIV in Children Under 5 Years with Severe Malaria: A Review. *Elite Journal of HIV*. 2024;2(1):31-50.
87. Obeagu EI, Anyiam AF, Obeagu GU. Unveiling B Cell Mediated Immunity in HIV Infection: Insights, Challenges, and Potential Therapeutic Avenues. *Elite Journal of HIV*. 2024;2(1):1-5.
88. Obeagu EI, Obeagu GU. Hematocrit Fluctuations in HIV Patients Co-infected with Malaria Parasites: A Comprehensive Review. *Int. J. Curr. Res. Med. Sci*. 2024;10(1):25-36.
89. Obeagu EI, Obeagu GU. Transfusion Therapy in HIV: Risk Mitigation and Benefits for Improved Patient Outcomes. *Sciences*. 2024;4(1):32-7.
90. Obeagu EI, Obeagu GU. Mental Health and Psychosocial Effects of natural disaster on HIV Patients. *Sciences*. 2024;4(1):38-44.
91. Obeagu EI, Obeagu GU. Eosinophil-Associated Changes in Neonatal Thymic T Regulatory Cell Populations in HIV-Infected Pregnancies. *Elite Journal of Health Science*. 2024;2(1):33-42.
92. Obeagu EI, Obeagu GU. Advances in Understanding the Impact of Blood Transfusion on Anemia Resolution in HIV-Positive Children with Severe Malaria: A Comprehensive Review. *Elite Journal of Haematology*. 2024;2(1):26-41.
93. Obeagu EI, Ayogu EE, Obeagu GU. Interactions between Blood Transfusion and Antiretroviral Medications: Implications for Patient Care. *Elite Journal of Medicine*. 2024;2(2):104-15.
94. Obeagu EI, Obeagu GU. Maternal Eosinophilic Responses in HIV-Positive Pregnant Women: Unraveling Immunological Dynamics for Improved Maternal-Fetal Health. *Elite Journal of Immunology*. 2024;2(1):47-64.
95. Obeagu EI, Anyanwu CN, Obeagu GU. Challenges and Considerations in Managing Blood Transfusion for Individuals with HIV. *Elite Journal of HIV*. 2024;2(2):1-7.
96. Obeagu EI, Ubosi NI, Obeagu GU, Akram M. Early Infant Diagnosis: Key to Breaking the Chain of HIV Transmission. *Elite Journal of Public Health*. 2024;2(1):52-61.
97. Obeagu EI, Obeagu GU. Understanding Hematocrit Fluctuations in HIV-Malaria Coinfection for Improved Management. *Elite Journal of Public Health*. 2024;2(1):22-34.

Citation: Obeagu EI, Obeagu GU. The Impact of Cytotoxic T-Lymphocyte-Associated Protein 4 (CTLA-4) Genetic Variations on HIV Susceptibility and Progression. *Elite Journal of Immunology*, 2024; 2(4): 18-35

98. Obeagu EI, Obeagu GU. The Impact of Erythropoietin on Preeclampsia in HIV-Positive Women: A Review. *Elite Journal of Nursing and Health Science*. 2024;2(1):21-31.
99. Obeagu EI, Obeagu GU. Platelet Distribution Width (PDW) as a Prognostic Marker for Anemia Severity in HIV Patients: A Comprehensive Review. *Journal home page*: <http://www.journalijar.com>;12(01).
100. Obeagu EI, Obeagu GU. Neonatal Outcomes in Children Born to Mothers with Severe Malaria, HIV, and Transfusion History: A Review. *Elite Journal of Nursing and Health Science*. 2024;2(3):38-58.
101. Obeagu EI, Obeagu GU. Assessing Platelet Functionality in HIV Patients Receiving Antiretroviral Therapy: Implications for Risk Assessment. *Elite Journal of HIV*. 2024;2(3):14-26.
102. Obeagu EI, Obeagu GU. Advancements in HIV Prevention: Africa's Trailblazing Initiatives and Breakthroughs. *Elite Journal of Public Health*. 2024;2(1):52-63.
103. Obeagu EI, Obeagu GU. Maternal Influence on Infant Immunological Responses to HIV: A Review. *Elite Journal of Laboratory Medicine*. 2024;2(1):46-58.
104. Obeagu EI, Obeagu GU. Counting Cells, Shaping Fates: CD4/CD8 Ratios in HIV. *Elite Journal of Scientific Research and Review*. 2024;2(1):37-50.
105. Obeagu EI, Anyiam AF, Obeagu GU. Managing Hematological Complications in HIV: Erythropoietin Considerations. *Elite Journal of HIV*. 2024;2(1):65-78.
106. Obeagu EI, Obeagu GU. Immune Modulation in HIV-Positive Neonates: Insights and Implications for Clinical Management. *Elite Journal of Nursing and Health Science*. 2024;2(3):59-72.
107. Obeagu EI, Ayogu EE, Obeagu GU. Impact on Viral Load Dynamics: Understanding the Interplay between Blood Transfusion and Antiretroviral Therapy in HIV Management. *Elite Journal of Nursing and Health Science*. 2024;2(2):5-15.
108. Obeagu EI, Obeagu GU. Understanding B Lymphocyte Functions in HIV Infection: Implications for Immune Dysfunction and Therapeutic Strategies. *Elite Journal of Medicine*. 2024;2(1):35-46.
109. Obeagu EI, Anyanwu CN, Obeagu GU. Challenges and Considerations in Managing Blood Transfusion for Individuals with HIV. *Elite Journal of HIV*. 2024;2(2):1-7.
110. Obeagu EI, Obeagu GU. Understanding ART and Platelet Functionality: Implications for HIV Patients. *Elite Journal of HIV*. 2024;2(2):60-73.
111. Obeagu EI, Obeagu GU. The Role of Blood Transfusion Strategies in HIV Management: Current Insights and Future Directions. *Elite Journal of Medicine*. 2024;2(1):10-22.
112. Obeagu EI, AmaezeAA O, Obeagu GU. B Cell Deficiency and Implications in HIV Pathogenesis: Unraveling the Complex Interplay. *Elite Journal of Nursing and Health Science*. 2024;2(2):33-46.
113. Obeagu EI, Obeagu GU. Eosinophil Dynamics in Pregnancy among Women Living with HIV: A Comprehensive Review. *Int. J. Curr. Res. Med. Sci*. 2024;10(1):11-24.

Citation: Obeagu EI, Obeagu GU. The Impact of Cytotoxic T-Lymphocyte-Associated Protein 4 (CTLA-4) Genetic Variations on HIV Susceptibility and Progression. *Elite Journal of Immunology*, 2024; 2(4): 18-35

114. Obeagu EI, Obeagu GU. Hematocrit Fluctuations in HIV Patients Co-infected with Malaria Parasites: A Comprehensive Review. *Int. J. Curr. Res. Med. Sci.* 2024;10(1):25-36.
115. Obeagu EI, Obeagu GU. Unveiling the Role of Innate Immune Activation in Pediatric HIV: A Review. *Elite Journal of Immunology.* 2024;2(3):33-44.
116. Obeagu EI, Obeagu GU. Harnessing B Cell Responses for Personalized Approaches in HIV Management. *Elite Journal of Immunology.* 2024;2(2):15-28.
117. Obeagu EI, Obeagu GU, Hauwa BA, Umar AI. Neutrophil Dynamics: Unveiling Their Role in HIV Progression within Malaria Patients. *Journal home page: <http://www.journalijar.com>;*12(01).
118. Obeagu EI, Obeagu GU, Hauwa BA, Umar AI. Hematocrit Variations in HIV Patients Co-infected with Malaria: A Comprehensive Review. *Journal home page: <http://www.journalijar.com>;*12(01).
119. Obeagu EI, Igwe MC, Obeagu GU. The Power of Unity: Collective Efforts in Confronting HIV Stigma. *Elite Journal of Public Health.* 2024;2(3):22-36.
120. Obeagu EI, Anyiam AF, Obeagu GU. Managing Anemia in HIV through Blood Transfusions: Clinical Considerations and Innovations. *Elite Journal of HIV.* 2024;2(1):16-30.
121. Obeagu EI, Obeagu GU. Maternal Eosinophilic Responses in HIV-Positive Pregnant Women: Unraveling Immunological Dynamics for Improved Maternal-Fetal Health. *Elite Journal of Immunology.* 2024;2(1):47-64.
122. Obeagu EI, Obeagu GU. Platelet Aberrations in HIV Patients: Assessing Impacts of ART. *Elite Journal of Haematology,* 2024; 2 (3):.10-24.
123. Obeagu EI, Obeagu GU. Hematological Changes Following Blood Transfusion in Young Children with Severe Malaria and HIV: A Critical Review. *Elite Journal of Laboratory Medicine.* 2024;2(1):33-45.
124. Obeagu EI, Anyiam AF, Obeagu GU. Erythropoietin Therapy in HIV-Infected Individuals: A Critical Review. *Elite Journal of HIV.* 2024;2(1):51-64.
125. Obeagu EI, Ubosi NI, Obeagu GU, Obeagu AA. Nutritional Strategies for Enhancing Immune Resilience in HIV: A Review. *Int. J. Curr. Res. Chem. Pharm. Sci.* 2024;11(2):41-51.
126. Obeagu EI, Obeagu GU. The Crucial Role of Erythropoietin in Managing Anemia in HIV: A Review. *Elite Journal of Scientific Research and Review.* 2024;2(1):24-36.
127. Obeagu EI, Obeagu GU. Impact of Maternal Eosinophils on Neonatal Immunity in HIV-Exposed Infants: A Review. *Elite Journal of Immunology.* 2024;2(3):1-8.
128. Obeagu EI, Anyiam AF, Obeagu GU. Unveiling B Cell Mediated Immunity in HIV Infection: Insights, Challenges, and Potential Therapeutic Avenues. *Elite Journal of HIV.* 2024;2(1):1-5.
129. Obeagu EI, Obeagu GU. Anemia and Erythropoietin: Key Players in HIV Disease Progression. *Elite Journal of Haematology,* 2024; 2 (3):.42-57.
130. Obeagu EI, Obeagu GU. Platelet Dysfunction in HIV Patients: Assessing ART Risks. *Elite Journal of Scientific Research and Review.* 2024;2(1):1-6.

Citation: Obeagu EI, Obeagu GU. The Impact of Cytotoxic T-Lymphocyte-Associated Protein 4 (CTLA-4) Genetic Variations on HIV Susceptibility and Progression. *Elite Journal of Immunology,* 2024; 2(4): 18-35

131. Obeagu EI, Ubosi NI, Obeagu GU, Akram M. Early Infant Diagnosis: Key to Breaking the Chain of HIV Transmission. *Elite Journal of Public Health*. 2024;2(1):52-61.
132. Obeagu EI, Obeagu GU. Transfusion Therapy in HIV: Risk Mitigation and Benefits for Improved Patient Outcomes. *Sciences*. 2024;4(1):32-7.
133. Obeagu EI, Obeagu GU. P-Selectin and Immune Activation in HIV: Clinical Implications. *Elite Journal of Health Science*. 2024;2(2):16-29.
134. Obeagu EI, Obeagu GU. Mental Health and Psychosocial Effects of natural disaster on HIV Patients. *Sciences*. 2024;4(1):38-44.
135. Obeagu EI, Obeagu GU. Optimizing Blood Transfusion Protocols for Breast Cancer Patients Living with HIV: A Comprehensive Review. *Elite Journal of Nursing and Health Science*. 2024;2(2):1-7.
136. Obeagu EI, Obeagu GU. Advances in Understanding the Impact of Blood Transfusion on Anemia Resolution in HIV-Positive Children with Severe Malaria: A Comprehensive Review. *Elite Journal of Haematology*. 2024;2(1):26-41.
137. Obeagu EI, Obeagu GU. Transfusion-Related Complications in Children Under 5 with Coexisting HIV and Severe Malaria: A Review. *Int. J. Curr. Res. Chem. Pharm. Sci*. 2024;11(2):9-19.
138. Obeagu EI, Obeagu GU. Impact of Blood Transfusion on Viral Load Dynamics in HIV-Positive Neonates with Severe Malaria: A Review. *Elite Journal of Scientific Research and Review*. 2024;2(1):42-60.
139. Obeagu EI, Ayogu EE, Obeagu GU. Interactions between Blood Transfusion and Antiretroviral Medications: Implications for Patient Care. *Elite Journal of Medicine*. 2024;2(2):104-5.
140. Obeagu EI, Obeagu GU, Odo EO, Igwe MC, Ugwu OP, Alum EU, Racheal P. Combatting Stigma: Essential Steps in Halting HIV Spread. *IAA Journal of Applied Sciences*. 2024;11(1):22-9.
141. Obeagu EI, Obeagu GU. P-Selectin Expression in HIV-Associated Coagulopathy: Implications for Treatment. *Elite Journal of Haematology*, 2024; 2 (3):25-41.
142. Obeagu EI, Obeagu GU. Eosinophil-Associated Changes in Neonatal Thymic T Regulatory Cell Populations in HIV-Infected Pregnancies. *Elite Journal of Health Science*. 2024;2(1):33-42.
143. Obeagu EI, Obeagu GU. Exploring the Role of L-selectin in HIV-related Immune Exhaustion: Insights and Therapeutic Implications. *Elite Journal of HIV*. 2024;2(2):43-59.
144. Obeagu EI. Erythropoietin and the Immune System: Relevance in HIV Management. *Elite Journal of Health Science*. 2024;2(3):23-35.
145. Obeagu EI, Obeagu GU. The Impact of Erythropoietin on Preeclampsia in HIV-Positive Women: A Review. *Elite Journal of Nursing and Health Science*. 2024;2(1):21-31.
146. Obeagu EI, Obeagu GU. Unraveling the Role of Eosinophil Extracellular Traps (EETs) in HIV-Infected Pregnant Women: A Review. *Elite Journal of Nursing and Health Science*. 2024;2(3):84-99.

Citation: Obeagu EI, Obeagu GU. The Impact of Cytotoxic T-Lymphocyte-Associated Protein 4 (CTLA-4) Genetic Variations on HIV Susceptibility and Progression. *Elite Journal of Immunology*, 2024; 2(4): 18-35

147. Obeagu EI, Obeagu GU. Hematologic Considerations in Breast Cancer Patients with HIV: Insights into Blood Transfusion Strategies. *Elite Journal of Health Science*. 2024;2(2):20-35.
148. Obeagu EI, Obeagu GU. L-selectin and HIV-Induced Immune Cell Trafficking: Implications for Pathogenesis and Therapeutic Strategies. *Elite Journal of Laboratory Medicine*. 2024;2(2):30-46.
149. Obeagu EI, Obeagu GU. The Intricate Relationship Between Erythropoietin and HIV-Induced Anemia: Unraveling Pathways for Therapeutic Insights. *Int. J. Curr. Res. Chem. Pharm. Sci*. 2024;11(2):30-40.
150. Obeagu EI, Obeagu GU. The Role of L-selectin in Tuberculosis and HIV Coinfection: Implications for Disease Diagnosis and Management. *Elite Journal of Public Health*. 2024;2(1):35-51.
151. Kalu OA, Ukibe NR, Onyenekwe CC, Okoyeagu RC, Nnaemeka WS, Onyenekwe AJ, Ukibe EG, Ukibe BC, Ukibe VE, Obeagu EI. Assessment of Serum Cystatin C, Microalbumin Levels and Egfr in HIV Seropositive Individuals based on Age and Gender in NAUTH, Nnewi, Nigeria. *Elite Journal of Medicine*. 2024;2(3):48-59.
152. Obeagu EI, Obeagu GU. Understanding Immune Cell Trafficking in Tuberculosis-HIV Coinfection: The Role of L-selectin Pathways. *Elite Journal of Immunology*. 2024;2(2):43-59.
153. Obeagu EI, Obeagu GU. Eosinophilic Changes in Placental Tissues of HIV-Positive Pregnant Women: A Review. *Elite Journal of Laboratory Medicine*. 2024;2(1):14-32.
154. Obeagu EI, Obeagu GU. P-Selectin and Platelet Activation in HIV: Implications for Antiviral Therapy. *Elite Journal of Scientific Research and Review*. 2024;2(1):17-41.
155. Obeagu EI, Obeagu GU. Strength in Unity: Building Support Networks for HIV Patients in Uganda. *Elite Journal of Medicine*. 2024;2(1):1-6.
156. Obeagu EI, GU EE. Understanding the Intersection of Highly Active Antiretroviral Therapy and Platelets in HIV Patients: A Review. *Elite Journal of Haematology*, 2024; 2 (3):.111-7.
157. Obeagu EI, Obeagu GU. Anemia in HIV: The Role of Erythropoietin in Disease Progression. *Elite Journal of Haematology*, 2024; 2(4): 51-67
158. Obeagu EI, Obeagu GU. **ART and Platelet Dynamics: Assessing Implications for HIV Patient Care.** *Elite Journal of Haematology*, 2024; 2(4): 68-85
159. Obeagu EI, Obeagu GU. Impact of Breastfeeding on Infant Immune Responses in the Context of HIV. *Elite Journal of Nursing and Health Science*, 2024; 2(4):23-39
160. Obeagu EI, Obeagu GU. HIV-Induced Immune Exhaustion in Neonates: A Review of Mechanisms and Implications. *Elite Journal of Immunology*, 2024; 2(3): 45-61
161. Obeagu EI, Obeagu GU. Immunodeficiency and Immune Reconstitution in Pediatric HIV: Mechanisms, Challenges, and Therapeutic Strategies. *Elite Journal of Immunology*, 2024; 2(3): 62-79
162. Obeagu EI, Obeagu GU. Hematological Consequences of Erythropoietin in HIV: Clinical Implications. *Elite Journal of Haematology*, 2024; 2(4): 86-104

Citation: Obeagu EI, Obeagu GU. The Impact of Cytotoxic T-Lymphocyte-Associated Protein 4 (CTLA-4) Genetic Variations on HIV Susceptibility and Progression. *Elite Journal of Immunology*, 2024; 2(4): 18-35

163. Obeagu EI, Obeagu GU. Anemia in HIV: The Role of Erythropoietin in Disease Progression. *Elite Journal of Haematology*, 2024; 2(4): 51-67
164. Obeagu EI, Obeagu GU. **ART and Platelet Dynamics: Assessing Implications for HIV Patient Care.** *Elite Journal of Haematology*, 2024; 2(4): 68-85
165. Obeagu EI, Obeagu GU. Impact of Breastfeeding on Infant Immune Responses in the Context of HIV. *Elite Journal of Nursing and Health Science*, 2024; 2(4):23-39
166. Obeagu EI, Obeagu GU. HIV-Induced Immune Exhaustion in Neonates: A Review of Mechanisms and Implications. *Elite Journal of Immunology*, 2024; 2(3): 45-61
167. Obeagu EI, Obeagu GU. Immunodeficiency and Immune Reconstitution in Pediatric HIV: Mechanisms, Challenges, and Therapeutic Strategies. *Elite Journal of Immunology*, 2024; 2(3): 62-79
168. Obeagu EI, Obeagu GU. Hematological Consequences of Erythropoietin in HIV: Clinical Implications. *Elite Journal of Haematology*, 2024; 2(4): 86-104
169. Obeagu EI, Obeagu GU. GATA-1 and Hematopoietic Stem Cell Dysfunction in HIV-Related Hematological Malignancies: A Review. *Elite Journal of Haematology*, 2024; 2(4): 105-122
170. Obeagu EI, Obeagu GU. Exploration of Intricate Relationship between GATA-1 and Anemia in HIV. *Elite Journal of Haematology*, 2024; 2(4): 123-140
171. Obeagu EI, Obeagu GU. GATA-1 and Immune Dysregulation in HIV/AIDS: Implications for Therapy. *Elite Journal of HIV*, 2024; 2(3): 69-85
172. Obeagu EI, Obeagu GU. The Role of GATA-1 in Erythropoietin Response and Resistance in HIV/AIDS. *Elite Journal of HIV*, 2024; 2(4): 1-17
173. Obeagu EI, Obeagu GU. Understanding the Role of GATA-1 in T-Cell Development in the Context of HIV Infection. *Elite Journal of HIV*, 2024; 2(4): 18-34
174. Obeagu EI, Obeagu GU. Programmed Cell Death Protein 1 (PD-1) Pathway Modulation in HIV/AIDS: From Bench to Bedside. *Elite Journal of HIV*, 2024; 2(4): 35-53
175. Obeagu EI, Obeagu GU. Programmed Cell Death Protein 1 (PD-1) and Immune Checkpoint Inhibitors in HIV-Related Lymphomas: Current Insights and Future Directions. *Elite Journal of Immunology*, 2024; 2(4): 1-17
176. Obeagu EI, Obeagu, GU. Programmed Cell Death Protein 1 (PD-1) Signaling in HIV-Associated Cardiovascular Disease: Mechanisms and Therapeutic Implications. *Elite Journal of Scientific Research and Review*, 2024; 2(1): 61-77
177. Obeagu EI, Obeagu, GU. Cytotoxic T-Lymphocyte-Associated Protein 4 (CTLA-4) Blockade and HIV-Associated Kaposi Sarcoma: A Promising Therapeutic Strategy. *Elite Journal of Scientific Research and Review*, 2024; 2(1): 78-94

Citation: Obeagu EI, Obeagu GU. The Impact of Cytotoxic T-Lymphocyte-Associated Protein 4 (CTLA-4) Genetic Variations on HIV Susceptibility and Progression. *Elite Journal of Immunology*, 2024; 2(4): 18-35