HIV Suppresses Cervical Neutrophil Infiltration in Women with Normal or Abnormal Pap Smears

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Abstract

Human immunodeficiency virus (HIV) infection of CD4+ T cells results in a weakened immune system due to decreased white blood cells, particularly multi-lobed neutrophils (neutropenia) and other granulocytes.¹ The purpose of this study was to determine whether a correlation exists between HPV/HIV status and presence of neutrophils. To test this, we used a computer software program (QuPath) to analyze neutrophil infiltration seen in pap smears of both HIV+ and HIV- patients from samples collected in Tanzania from three different sites: Bagamoyo, Chalinze, and Dar es Salaam. The software was used to quantify neutrophils per image based on the size and shape of the nuclei. For each sample, three slide images were taken and the average neutrophil count was determined through QuPath and compared to data about sample HIV and HPV status from a previous study. Results showed that HIV+ patients had significantly lower neutrophil counts, regardless of HPV type and cytology grade based on the Bethesda system. Therefore, we concluded that cervical neutrophil infiltration is suppressed in HIV+ samples for both normal and abnormal pap smears.

Screening Methods

Computational Methods

Images of HIV+/- Pap Smears

Increased Abnormality in HIV+ Samples

Decreased Neutrophil Count in HIV+ Samples

Fig. 1 Sample screening process in Tanzania.  
Fig. 2 HPV detection process.

Fig. 3 Procedure for neutrophil quantification using QuPath software.

Fig. 4  a) HIV- low neutrophil count. Sample 12021A b) HIV- high neutrophil count. Sample 13022C c) HIV+ low neutrophil count. Sample 13001A d) HIV+ high neutrophil count. Sample 12014A e) Cannonball. Sample 13027f) Cannonball. Sample 13036i2

Fig. 5 Distribution of HIV+ and HIV- patients.

Fig. 6 Distribution of HPV types among HIV+/- samples.

Fig. 7 Graph shows cellular abnormality in HIV+/- Samples

Fig. 8 Graph shows normal and abnormal pap smear neutrophil counts in HIV+/- samples.

Conclusion

• HIV suppresses cervical neutrophil infiltration.

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References


References