COMPUTER-AIDED PREDICTION AND IN-VITRO SCREENING OF ENVELOPE AND NUCLEAR PROTEIN SEGMENTS OF HUMAN IMMUNODEFICIENCY VIRUS TYPE 1 (HIV-1) FOR ALLOGENEIC T-CELL ACTIVATION BY PEPTIDE-LOADED DENDRITIC CELLS

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Introduction
HIV/AIDS is a major public health concern across the globe including the Philippines. HIV patients are given a lifetime dose of combination anti-retroviral therapy (ART) for successful blocking of viral replication and activation, although this have long term side effects that lead to the host’s innate immune response exhaustion and other organ disorders (i.e., liver, kidney and heart). Dendritic cell (DC) vaccines have been shown to be a promising immune-cell therapy that can drive T-cell response and have been utilized at the Lung Center of the Philippines for the management of lung cancer and other types of cancer since 2008. This study aimed to evaluate the utility of DC vaccination for virally-mediated infectious agent like HIV and provide therapeutic support for ART. Prior work in our laboratory using designed antigenic peptides from envelope and nuclear proteins of Ebola virus was demonstrated to have elicited significant interferon gamma response in in-vitro assay using patient-derived blood samples (Heralde et al., 2016).

Methods
Twelve (12) antigenic peptides based on the envelope (gp 41 and gp160) and nuclear (p6, p7, p17, p24, p51, p55 and p66) proteins of HIV-1 were designed using the SYFPEITHI software and synthetic versions of the peptides were ordered commercially. Mature dendritic cells (mDCs) derived from anonymized cancer patients were primed with the 12 synthetic peptides and evaluated for their interferon gamma release upon co-culture with T-cells coming from a healthy anonymized donor.

Results
All of the synthetic peptides elicited elevated IFN-γ release as compared to the control (M = 8.42, SD = 2.61) in vitro. However, among the 12 peptides, peptide “A” (M = 61.90, SD = 55.43) (i.e. gp41, gp160 - derived) elicited the strongest T-cell activation with a mean increase of activity from peptide “A” to the control (0.348, 95% CI [0.419, 0.653], p = 0.013). No other group differences compared to the control was statistically significant.

Conclusion and Future Directions
Synthetic peptides from HIV envelope and nuclear proteins designed using an online epitope prediction software are successfully presented by mDCs and able to activate allogeneic T-cells in vitro. The convenience of using computer-designed synthetic peptides and allogeneic mode of DC presentation allows a safe and convenient platform for clinical evaluation of a promising DC-based vaccine for HIV and other emerging viral infectious agent, which can be the focus of our future study.

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