# IMPACT OF VIRAL ADAPTATION DURING EARLY HIV INFECTION ON DISEASE OUTCOME

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**Background:** HIV has been shown to adapt to an individual's anti-HIV immune response via the selection of random mutations resulting in escape from immune pressures. To properly understand HIV adaptation, it is crucial to characterise the host-viral interaction during early infection, as events during this phase strongly influence disease progression and outcome. Previous research has shown that the level of viral adaptation is correlated with disease outcome in chronic patients. This study examined the level of viral adaptation during acute and early HIV infection, and its effect on clinical measures of disease outcome.

**Methods:** HIV deep sequencing of *gag*, *pol* and *nef* was utilised for 11 semi-controllers with longitudinal timepoints during early infection [median $CD4^+$ count 731(493.5-933.5) cells/$mm^3$; median viral load 3288(1506.5-19599.5) copies/mL] and 13 acutely-infected typical progressors [median $CD4^+$ count 260(225-484) cells/$mm^3$; median viral load $10^6$($7.6x10^5$-$10^6$) copies/mL]. Autologous adaptation (adaptation to the recipient host HLA alleles) and circulating adaptation (adaptation to all HLA alleles excluding host HLA alleles) values were calculated with an online tool and analysed using mixed effect regression.

**Results:** The level of autologous adaptation increases, whilst circulating adaptation decreases over the median 19.5 (11-34.8) months for the longitudinal early infection subjects. Across the subjects, *nef* adapts within the first weeks of infection, whereas *gag* and *pol* adaptations occur over a longer period.

**Conclusion:** These results highlight that identifying key adaptations that occur in early and acute HIV infection may provide key targets for vaccine design.

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