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HIV reservoirs in semen at the time of Primary infection

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Background: Primary-HIV-Infection (PHI) is a high-risk period for viral transmission. The objective of this work was to study blood and seminal reservoir virological markers and the impact of early treatment in patients with Primary HIV Infection.

Methods: Patients from the ANRS-147-OPTIPRIM randomized trial received two years of early-cART The 21 patients who also accepted to provide semen samples were recruited in this HIV reservoir substudy. Blood and seminal samples were collected at inclusion and month 24; total cell-associated-HIV-DNA and HIV-RNA were quantified in blood and in semen cells and seminal plasma (Biocentric, Bandol, France). Spearman correlation tests were performed.

Results: Twenty-one patients were enrolled (median age: 36 years, time from estimated date of infection: 33 days), 20 were symptomatic and 8 presented during acute infection (WB ≤1 Ab). At enrollment, median CD4 T-cell count was 465 cells/mm3 [min-max: 163-1116]; blood-HIV-RNA was correlated with CD4 count (r=-0.54, p=0.017), CD4/CD8 ratio (r=-0.61, p=0.005). Median HIV-RNA was significantly higher in blood (5.39 log10 cp/mL [4.07-7.00]) than semen samples (4.22 log10 cp/mL [2.57-6.27]) and no correlation was observed between HIV-RNA in blood and semen. We found significant correlations between semen-HIV-RNA and CD4+T cells (r= -0.54 p=0.018), CD8+T cells (r= -0.54, p=0.018). Blood-HIV-DNA was 3.59 log10 cp/106PBMC [2.78-4.5] and did not correlate with semen-HIV-DNA (10 /19 had detectable HIV-DNA in semen).

Among 8 patients presenting acute infection, semen-HIV-RNA was correlated with blood-HIV-RNA (r=0.81, p=0.015), CD4 count (r=-0.98, p< 0.0001), CD4/CD8 ratio (r=-0.85, p=0.0075).

At M24, blood-and semen HIV-RNA levels became < threshold of detection. All positive semen-HIV-DNA decreased to undetectable level in all but one patient who reported use of recreational drugs at that time point (which might explain this positive result).

Conclusions: This is the first evidence of HIV-reservoir cells in semen of patients with acute infection, showing that levels are linked with the immunosuppression severity. Infected cells in semen represent a factor associated with an increased risk of HIV transmission via cell to cell transmission. Early treatment allows purging viral particles but also infected cells to limit viral transmission.