



## POSTER PRESENTATION

## Open Access

# Heme oxygenase-1 reverses HIV-1 Tat activity: prospects for AIDS prevention

ME Cueno\*, K Imai, K Ochiai

From AIDS Vaccine 2012

Boston, MA, USA. 9-12 September 2012

## Background

Heme oxygenase-1 (HO-1) is a HEME regulator and plays a role in ameliorating HIV-1 infection. In particular, HO-1 inhibits Tat-dependent activation of HIV-1 LTR promoter inhibiting viral gene expression. This suggests that increasing HO-1 activity in HIV-infected cells can reverse Tat action which may contribute to AIDS prevention. However, the correlation between HO-1 and HIV-1 Tat has not been fully elucidated. In order to fully understand how increasing HO-1 activity reverses Tat action and result into the prevention of HIV infection, the mechanism behind the correlation between HIV-1 Tat and HO-1 should first be established.

## Methods

Throughout the study we made use of Jurkat T cells (control) and Jurkat-Tat T cells. Whole cell extracts were obtained and mitochondrial extracts were isolated separately. HO-1, HEME, superoxide dismutase (SOD), catalase and hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>) levels were measured using commercially available assays. Immunoassays confirmed both the presence of Tat and NADPH oxidase activity via the HEME-activated gp91phox.

## Results

We found that in Tat-expressing cells, HO-1 and SOD amounts were decreased, HEME and H<sub>2</sub>O<sub>2</sub> levels were increased and catalase concentration was unchanged. In addition, we observed an accumulation of gp91phox and H<sub>2</sub>O<sub>2</sub> amounts. We suspect that Tat activity in Jurkat T cells lead to the following sequence of events: (1) decrease in HO-1 and SOD activities; (2) low SOD amounts leaves catalase amounts unchanged; (3) low HO-1 levels allows HEME to accumulate; (4) high amounts of HEME favors the accumulation of the

gp91phox subunit which subsequently increases NADPH oxidase activity; and (5) ultimately leads to H<sub>2</sub>O<sub>2</sub> accumulation. We hypothesize that by increasing HO-1, as previously reported, HIV-1 infection was ameliorated ascribable to a reversal in Tat activity.

## Conclusion

HIV-1 Tat lowers HO-1 activity which consequentially leads to H<sub>2</sub>O<sub>2</sub> accumulation. We suspect, based on a previous report, that increasing HO-1 ameliorated HIV-1 infection by reversing Tat activity.

Published: 13 September 2012

doi:10.1186/1742-4690-9-S2-P221

Cite this article as: Cueno *et al.*: Heme oxygenase-1 reverses HIV-1 Tat activity: prospects for AIDS prevention. *Retrovirology* 2012 **9**(Suppl 2):P221.

### Submit your next manuscript to BioMed Central and take full advantage of:

- Convenient online submission
- Thorough peer review
- No space constraints or color figure charges
- Immediate publication on acceptance
- Inclusion in PubMed, CAS, Scopus and Google Scholar
- Research which is freely available for redistribution

Submit your manuscript at  
[www.biomedcentral.com/submit](http://www.biomedcentral.com/submit)

Nihon University School of Dentistry, Tokyo, Japan