

## **Metal Nanoparticles Reduce Intracellular HIV-1 Replication and Stimulate Growth of HIV-1 Infected PBMC**

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### **Background:**

Noble nanoparticles have the potential to be used as therapeutic agents in HIV-1 infection. Noble nanoparticles have higher electron resonance potential than organic drug molecules to arrest HIV and enhance cell growth. Silver nanoparticles have been shown to exhibit promising cytoprotective activities towards HIV-infected T-cells and arrest HIV by blocking gp120-CD4 interaction. Metal nanoparticles are engineered as non toxic and employed as it have unique signal propagation properties. Combined nanoparticles may arrest HIV replication by functionalize with variety of molecules and produce specific signals and proliferate PBMC by inducing cytokines. The aim is to examine the effect of combined nanoparticles on growth and viral replication in HIV-1 infected human PBMC.

### **Methods:**

Combinations of Silver, Tin and Zinc (AgSnZn) nanoparticles were processed as nanomedicine (NM), 28nm in size (less than 25nm is toxic) to treat HIV-1 infected cells in cell culture. PBMC cells were isolated from HIV-1 positive laboratory sample and cultured with RPMI 1640 medium, IL-2, PHA and 10%FCS in 96 well plates at the cell density of  $2.5 \times 10^5$  cells/ml with NM and without NM for 96 hrs. The Immuno Peroxidase Test (IPT), an intracellular viral antigen detection assay to assess intracellular antigen and cell quantification assay (CQA) to quantify cells were employed in both cultures to find intracellular HIV and to assess cell growth. Experiments were repeated ten times.

### **Results:**

The cells quantity in NM treated cultures had more population ( $10 \times 10^5$  cells/ml) than the non treated cells ( $4.5 \times 10^5$  cells/ml), which was 55% ( $p < 0.0001$ , t-test of ten assays) higher shows that NM has induced cell growth. IPT revealed absence of HIV (no golden granules) in cytoplasm of NM treated cells but present in non NM treated cells which indicate the NM has arrested the intracellular HIV ( $p < 0.001$ , Chi-Squared test of ten assays). This results show that the NM can arrest HIV and improve cell count.

### **Conclusion:**

This study has revealed that the NM arrests the intracellular HIV and proliferate PBMC as well. This NM could be considered for therapeutic approach to HIV-1 infected individuals. Further studies are to be carried out to characterize the molecular mechanisms of the effects.