9. **Futurology**

An investigation on the mitochondrial functions is an evolving field. Implications of mitochondrial involvement has been increasingly recognized in chronic inflammatory diseases thus also in HIV infection. In the pathogenesis of HIV disease, mitochondrial function and metabolism of immune cells are very crucial.

The following vital functions of mitochondria are not much explored in the settings of HIV infection needs larger focus. They are:

Variation of mtDNA among the T cell subsets.

Implications of oxidative stress in the HIV immunopathogenesis.

Mitochondrial biogenesis.

ATP production.

Mitochondria-specific autophagy – the mitophagy.

Activity of the respiratory enzyme complexes.

Ca2+ buffering capacity and Ca2+ uptake by mitochondria.

Role of mitochondria in pyroptosis.

Mitochondrial membrane potential.

Interventions to modulate the mitochondrial mediated apoptosis.

Understanding the mitochondrial activities are also very essential to reduce the non-AIDS related comorbidities associated with ART and aging.
PBMC mtDNA content, in the present study has shown to vary among the individuals and among the T cell subsets hence further studies to investigate the dynamics of mtDNA is important. Recent studies have reported the existence of mechanisms such as mitophagy, mitochondrial fission and fusion which are to be explored much to understand the mechanisms of mitochondrial biogenesis and its maintenance in a cell. The correlation between mtDNA and CD4 T cell count in the current study is a lead to explore the intricacies of mechanisms involved in CD4 T cell depletion that would open up newer strategies for HIV treatment. Mitochondria being an important organelle involving many metabolic pathways and the respiratory chain we need to further explore the impact of oxidative stress on ATP production in HIV infected patients.

Mitochondria being a hub of various metabolic pathways, identifying the molecular mechanisms involved in the derangement of the metabolic pathways in HIV infection will help in developing novel therapeutics to improve immune activation and also in opening new avenues to treat HIV infection. Recent studies have unraveled the involvement of mitochondria to be associated with the maintenance of macrophage and follicular helper T cells reservoirs there by HIV latency, thus future studies should address the implications of mitochondria in HIV cure research. Strategies to reduce oxidative stress in the HIV infected would pave the way as an adjunct to the current ART.

Thus future prospective studies with larger sample size are warranted for the further understanding of mitochondrial dysfunction in HIV infected individuals.