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Bioimmunotherapy of tuberculosis: co-treatment with recombinant mouse granulocyte-macrophage colony-stimulating factor and methionine-Enkephalin

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Background: Tuberculosis (TB) is one of the world's deadliest diseases as one third of the world's population is infected with TB. The WHO TB statistics for India for 2017 give an estimated incidence figure of 2.8 million cases of TB. Bioimmunotherapy approach along with the conventional drug therapy can be a new approach to tackle the problems associated with TB treatment. rmGM-CSF can exert its bioimmunotherapeutic effect through three possible mechanisms viz. activation of effector functions of macrophages, regulation of cytokine network and nitric oxide production. m-ENK has been reported to modulate nitrite and TNF-α production, and effector functions of macrophages. Therefore, we postulate that rmGM-CSF and M-ENK co-treatment imparts protection against TB.

Materials & Methods: Here, we have tested the M-ENK and rmGM-CSF combination at different concentration in mouse peritoneal macrophages infected with Mycobacterium tuberculosis (H37Ra) and calculate the % phagocytic by ZN staining and colony forming units.

Results: The different concentration of M-ENK (10^{-7}, 10^{-9} and 10^{-11}M) and rmGM-CSF (50 pg/ml) were tested in mouse peritoneal macrophages *in vitro* and observed the phagocytosis process in experiments. The combined effect of M-ENK and rmGM-CSF at 50 pg/ml and 10^{-9} M dose showed maximum phagocytic activity (70-80 %) using intra-macrophage phagocytic assay on murine macrophages, *in vitro*. The reduction in colony forming units (cfu) was also observed in combined dose combination of the M-ENK and rmGM-CSF at 50 pg/ml and 10^{-9} M dose treatment.

Conclusion: We conclude that Bioimmunotherapy with rmGM-CSF and M-ENKs co-treatment can be a possible alternative to control tuberculosis infection.

Keyword: Bioimmunotherapy, rmGM-CSF and M-ENK (methionine-Enkephalin)

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