Garlic's effects on lipopolysaccharide and lipoteichoic acid induced cytokine secretion in J774A.1 cells

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ABSTRACT

The purpose of this project is to compare the effects of garlic on the secretion of tumor necrosis factor-alpha (TNF-α) from macrophages challenged with either lipopolysaccharide (LPS) or lipoteichoic acid (LTA). TNF-α is a pro-inflammatory cytokine and the major cytokine produced by macrophages. LPS is a component of the cell membrane in gram-negative bacteria, while LTA is a component of the cell wall in gram-positive bacteria. To investigate how garlic affects TNF-α secretion from LPS challenged macrophages vs those challenged with LTA, J774A.1 murine macrophages were plated at 1.25*10^5 cells/mL. After incubating the cells for 24h at 37°C with 5% CO2, the conditioned media was replaced with fresh media and the cells were treated with LPS (1 µg/mL) or LTA (0.1-1 µg/mL) in the absence or presence of varying concentrations of garlic. After another 24h incubation, we collected cell supernatant and did an enzyme linked immunosorbent assay (ELISA) to measure the TNF-α secretion. To normalize the data, we also performed a cell protein assay. Our initial results indicate that garlic increases TNF-α secretion in J774A.1 cells in the presence of LPS. We are now investigating if garlic has a similar effect on the macrophages when they are treated with LTA instead of LPS. The importance of our findings is that they could have relevance to emerging research in phytomedicine regarding the potential therapeutic effects of garlic in the prevention and/or treatment of diseases.

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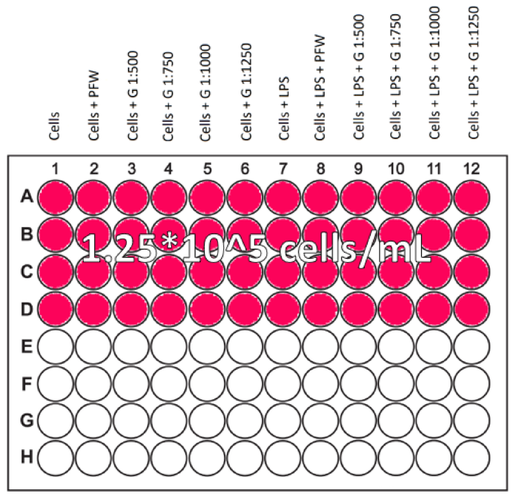
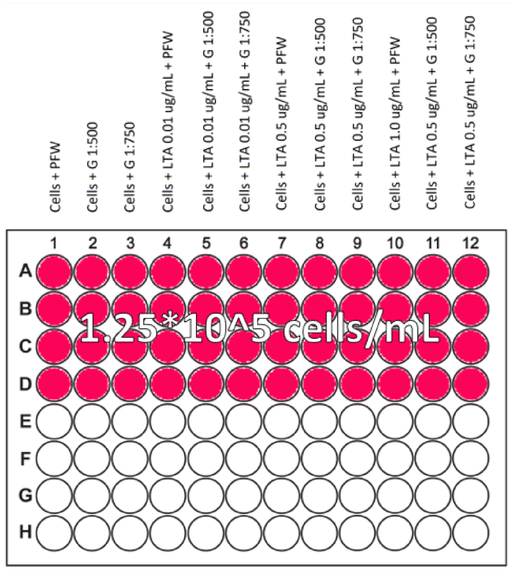
MATERIALS AND METHODS

Plating of J774A.1 murine macrophages with LPS

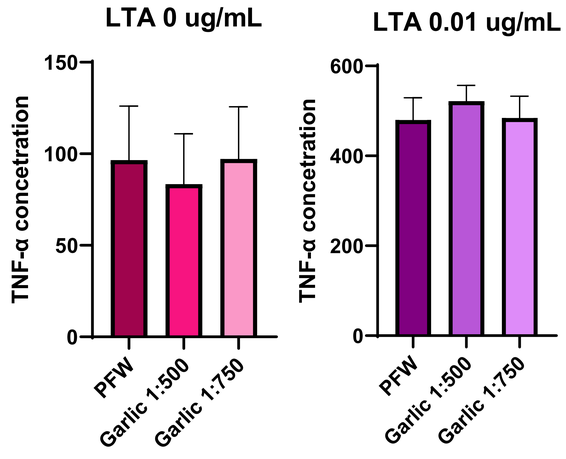


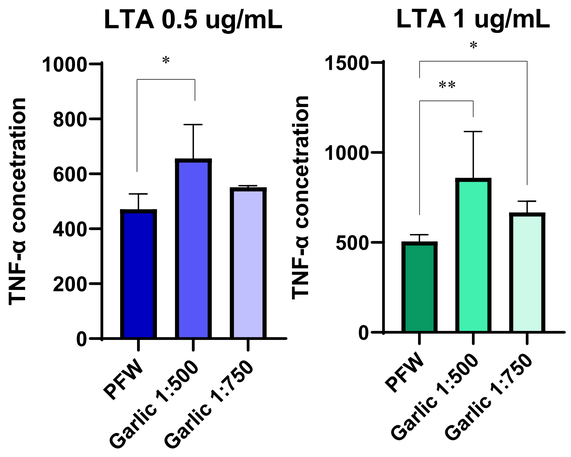
Plating of J774A.1 murine macrophages with LTA



PLATING
↓ 24h incubation
TREATMENT
↓ 24h incubation
ELISA

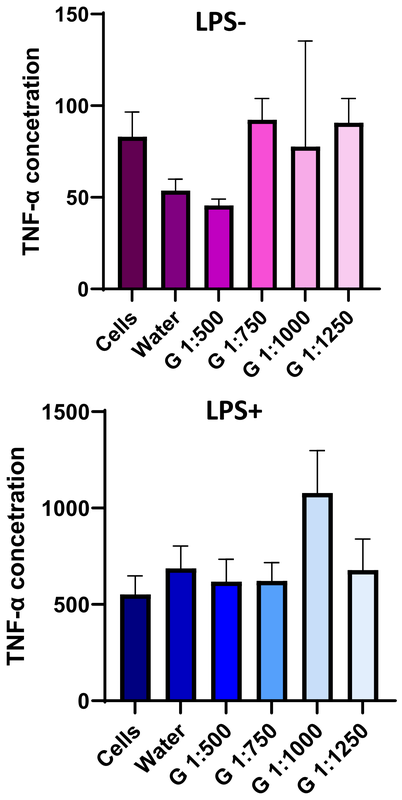
LTA RESULTS





Garlic increases TNF-α secretion in J774A.1 murine macrophages in the presence of LTA. Effect is seen at LTA concentrations of 0.5 and 1.0 µg/mL and increases with higher concentrations of garlic.

LPS RESULTS



Garlic's effects on LPS-induced TNF-α secretion in J774A.1 murine macrophages.

SUMMARY/CONCLUSIONS

- Garlic increases TNF-α secretion in J774A.1 murine macrophages when they are challenged with both LPS and LTA.
- Garlic induces a slight proinflammatory effect in the presence of LPS.
- In the presence of LTA, proinflammatory effect increases with increasing concentrations of LTA.

This research may provide insight to the therapeutic uses of garlic. Further research should be conducted to explore how garlic effects the many different pathways of the proinflammatory response.