EFFECTS OF SUPEROXIDE DISMUTASE ON THE GROWTH AND PHAGOSOMAL ESCAPE OF LISTERIA MONOCYTOGENES

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Listeria monocytogenes is a gram-positive bacterium that infects humans via contaminated foods such as raw meats and unpasteurized dairy products. Those more susceptible to infection are immunosuppressed individuals such as the elderly, neonates, and pregnant women. During L. monocytogenes infection, superoxide is produced by phagocytic cells as a means of killing bacteria, however, it also causes tissue damage. In response, superoxide dismutase (SOD) is activated to convert superoxide to hydrogen peroxide which is less toxic to the tissues. There are three types of SODs, SOD 1 which is found in the mitochondria, SOD 2 in the cytoplasm, and SOD 3 or extracellular superoxide dismutase (ecSOD) which is found in the extracellular matrix. Our lab has previously shown that mice with high ecSOD activity are more susceptible to L. monocytogenes infection and have higher bacterial burden in the liver and spleen in comparison to mice with no ecSOD activity. In addition, L. monocytogenes has the ability to produce SOD in the phagosome which can also moderate the concentrations of superoxide and hydrogen peroxide. Past studies have shown that SOD levels increase as L. monocytogenes progresses through the logarithmic phase of growth into the stationary phase. The purpose of these studies is to determine the effects of SOD on the growth and phagosomal escape of L. monocytogenes. To study how SOD could impact the growth of L. monocytogenes, a bacterial growth assay was conducted using recombinant SOD. The data demonstrate no differences in bacterial growth between L. monocytogenes treated with or without SOD. To test the effects of SOD on bacterial phagosomal escape, flow cytometry was used to measure the amount of bacteria that escaped from the phagosome of phagocytic cells. Non-significant differences in the amount of L. monocytogenes that escaped from the phagosome after treatment with SOD were observed. Overall, these data suggested that exogenous SOD does not have a direct effect on L. monocytogenes growth or containment in phagosomes.

Keywords: Superoxide Dismutase, Listeria monocytogenes, phagosome escape

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