HYDROCORTISONE DECREASES THE PROLIFERATION RATE AND INCREASES ANTIBIOTIC RESISTANCE OF STREPTOCOCCUS PNEUMONIAE
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The ecosystems of microbial species that reside on and within humans play an important role in health and disease. Microbial endocrinology is a transdisciplinary field which bridges neurophysiology and microbiology, focused on understanding the relationship between neuroendocrine responses’ influence on microbial physiology. Such interplay is believed to have a significant impact on human health and disease.

Streptococcus pneumoniae (S. pneumoniae) is a common commensal and opportunistic pathogen of the respiratory tract. S. pneumoniae is the cause of significant mortality rates in the United States and worldwide, particularly among the chronically ill and individuals with poor immune function. Previous studies in our laboratory have demonstrated that corticotrophin-releasing hormone can directly influence the growth and virulence of S. pneumoniae. Researchers have also shown similar effects to norepinephrine.

The purpose of the current study was to examine the effects of hydrocortisone on the growth and antibiotic resistance. We hypothesized that hydrocortisone exposure would increase the growth and antibiotic resistance of S. pneumoniae. Growth curve analysis was performed to determine the effect of various concentrations by which hydrocortisone would influence the growth phase of S. pneumoniae. In addition, antibiotic resistance in the presence of hydrocortisone was determined by minimal inhibitory concentration (MIC) analysis.

The results demonstrated that hydrocortisone significantly decreased S. pneumoniae growth in a concentration-dependent manner. In two independent experiments, S. pneumoniae demonstrated increased resistance against penicillin/streptomycin in the presence of hydrocortisone. Our findings suggest a dichotomous relationship between hydrocortisone influence on growth and antibiotic resistance that may be influential in mediating its pathogenicity.

Keywords: Antibiotic resistance, hydrocortisone, Streptococcus pneumoniae, pathogenesis, microbial endocrinology, minimum inhibitory concentration, microbiota