A Gut Feeling: The Effects of Melatonin on the Proliferation of Enterobacter aerogenes, a Key Member of the Human Gut Microbiome

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Enterobacter aerogenes is a Gram-negative, facultative anaerobic bacterium that colonizes the human gastrointestinal tract. Because the pineal neurohormone melatonin is directly produced by enterochromaffin cells in the intestinal epithelium and is secreted into the duodenal lumen, this study investigated the role that melatonin plays in the proliferation of the bacterium E. aerogenes in medium. In this experiment, Enterobacter aerogenes was grown on nutrient broth agar plates with various concentrations of melatonin (0 μM, 1.29 μM, 2.58 μM) for 24 hours in an incubator at 30 degrees Celsius. After the 24-hour incubation period, a manual colony count of the 32 plates was performed. The results indicated that higher concentrations of melatonin in medium caused greater growth of E. aerogenes in a dose-dependent fashion. In a one-tailed t-test comparing the colony count means of the control plates (n = 12) and the 1.29 μM melatonin plates (n = 10), the difference in means was found to be highly statistically significant, with a p-value of 3.9278 x 10-5 ($p < 0.001$). In a one-tailed t-test comparing the colony count means between the 1.29 μM melatonin plates (n = 10) and the 2.58 melatonin μM plates (n = 10), the difference was also found to be statistically significant, albeit less striking, with a p-value of 0.00132 ($p < 0.01$). Thus, the study found that higher concentrations of melatonin in medium caused greater growth of the bacterium E. aerogenes in a dose-dependent fashion.

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