When Probiotics Turn Dangerous: Testing How Escherichia coli Nissle 1917 Produces Genotoxic Colibactin

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The purpose of this study was to examine whether the production of genotoxic colibactin by the probiotic Escherichia coli strain Nissle 1917 (EcN) is influenced by external factors, such as prebiotics and food dyes. The production of colibactin was indirectly assessed based on EcN's toxic effect on model worm survival. The hypothesis was that exposing EcN to a synthetic dye, FD&C Red No. 40, and inulin, a well-known prebiotic fiber, would affect colibactin expression. Inulin has been shown to stimulate colibactin production in vitro. Log-phase cultures of EcN, with and without the dye or inulin, were prepared, OD-normalized, and injected into the hemocoel of Galleria mellonella larvae. The larvae were then incubated at 25 °C and observed over five days to evaluate mortality rates under each condition. Larvae injected with inulin showed the highest mortality rate (42% survived), indicating that worm mortality is associated with colibactin production in these conditions. Larvae injected with Red 40 exhibited the second-highest mortality rate (67% survived) compared to those injected with EcN alone (92% survived). All worms injected with PBS as a negative control survived.

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