Statistical Analysis of Factors Associated with the Development of IBD and Colon Cancer in Genetically Modified Mice

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The chronic conditions ulcerative colitis and Crohn's disease, both of which involve inflammation of the intestines, are jointly referred to as inflammatory bowel disease (IBD). IBD is typically diagnosed in adolescents and young adults, and untreated cases can progress to the development of severe colitis and cancer. Tumor Necrosis Factor (TNF) is a multifunctional cytokine that is associated with tumor regression. One mechanism for TNF expression is through the receptor TNFR1, and the absence of this receptor is believed to result in increased tumor burden and more invasive disease. However, absence of TNF itself is hypothesized to prevent inflammation and subsequent tumor development. In this study, three genetic strains of mice (controls, TNFR1 knockouts, and TNF knockouts) were each divided into three groups for treatment. The first treatment groups were given the procarcinogen azoxymethane (AOM) and dextran sulfate sodium salt (DSS) to induce both IBD and colon cancer, the second groups were given only AOM, and the third groups were given a combination of probiotic bacterial strains (PBS) and DSS. The study involved three consecutive treatment cycles with subsets of each group sacrificed following each cycle. To assess the effects of both genotype and treatment, we have analyzed the change in weights, severity of colitis as assessed by stool analysis, and formation of neoplastic lesions through linear and logistic mixed-effects models.