

Texas Southern University

MATHEMATICS DEPARTMENT SEMINAR

Statistical Power Analysis of ANOVA with Application to Count Data from
Intestinal Polyp Incidence in $Apc^{Min/+}$ Mice



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2:00 pm – 3:00 pm

Abstract

The second most common cause of cancer-related deaths in the United States is colorectal, with mortality rates being highest among African Americans. Early stages of colorectal cancer may begin as noncancerous polyps, but patients with polyps are often asymptomatic. Polyps can be detected through proper screening using one of several screening tests available to detect both polyps and colorectal cancer. However, a great deal remains to be studied regarding genetic susceptibility factors that predisposes one to this type of cancer. Using mouse models, we found that mice expressing reduced Splicing factor 1 (SF1) levels developed fewer intestinal polyps. SF1 is a widely expressed alternative splicing factor that processes each piece of genetic information to generate different types of messenger RNAs. Statistical tests using mice intestinal polyp data determined that polyp numbers and sizes were not normally distributed. Since the correct application of ANOVA is to normally distributed, continuous data, applying it to binary or count data such as the mice polyp data violates standard normality and equal variances assumptions. Therefore, instead of analyzing results using ANOVA or a t-test, which are both commonly incorrectly applied, we used a nonparametric alternative, the Mann–Whitney test. Furthermore, we performed statistical power analyses of ANOVA to investigate the effects of violating assumptions such as normality. This is collaborative research with Angabin Matin, Ph. D.

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