

Vita

Candidate's name: Liam Joseph Cann

Universities
Attended: University of New Brunswick (2022)
Bachelors of Science

University of New Brunswick (2025)
Masters of Science, Report

Statistical analysis of bioassay data with dependent replicates

UNIVERSITY OF NEW BRUNSWICK
REPORT DEFENCE AND EXAMINATION

in Partial Fulfillment

of the Requirement for the Degree of
Master of Science

by

Liam J. Cann

in the Department of Mathematics & Statistics

U.N.B., Fredericton, N.B.

**Friday, March 14th, 2025
8:30 a.m.**

Via MS TEAMS

Examining Committee

Dr. Connie Stewart
Dr. Matthew Stephenson
Dr. Dylan Spicker
Dr. Chris Gray
Dr. Viqar Husain

Co-Supervisor
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Abstract

Bioassays play a key role in ensuring that every batch of drug produced is safe and effective for release. They play a critical role in testing the potency of biologic drugs, such as vaccines or monoclonal antibodies. Due to the importance of bioassays in ensuring a safe and effective product, it is critical that the statistical methods used are appropriate. However, it is the current common practice to treat the replicate responses at each dose level as if they are independent despite the fact they are often correlated. In this research, we look at quantitatively assessing the risks of the conventional analysis methods using a simulation study to investigate the impact of correlation on the statistical analysis of bioassays. Specifically, we consider parallelism assessment, model goodness-of-fit, and relative potency estimation. We also make recommendations within the constraints of the current available commercial bioassay analysis software to provide valid statistical inference.