

Kansas Agricultural Experiment Station Research Reports

Volume 0
Issue 1 *Cattleman's Day (1993-2014)*

Article 839

1990

Leukotoxin production by *Fusobacterium necrophorum* biotypes

Z. Tan

M. M. Chengappa

Tiruvoor G. Nagaraja

Follow this and additional works at: <https://newprairiepress.org/kaesrr>



Part of the [Other Animal Sciences Commons](#)

Recommended Citation

Tan, Z.; Chengappa, M. M.; and Nagaraja, Tiruvoor G. (1990) "Leukotoxin production by *Fusobacterium necrophorum* biotypes," *Kansas Agricultural Experiment Station Research Reports*: Vol. 0: Iss. 1. <https://doi.org/10.4148/2378-5977.2242>

This report is brought to you for free and open access by New Prairie Press. It has been accepted for inclusion in Kansas Agricultural Experiment Station Research Reports by an authorized administrator of New Prairie Press. Copyright 1990 the Author(s). Contents of this publication may be freely reproduced for educational purposes. All other rights reserved. Brand names appearing in this publication are for product identification purposes only. No endorsement is intended, nor is criticism implied of similar products not mentioned. K-State Research and Extension is an equal opportunity provider and employer.



K**S****U**

LEUKOTOXIN PRODUCTION BY *FUSOBACTERIUM NECROPHORUM* BIOTYPES

Z. Tan, T. G. Nagaraja,
and M. M. Chengappa¹

Summary

Fusobacterium necrophorum biotypes A and B were grown anaerobically to detect their leukotoxin production. Both biotypes exerted the highest leukotoxic effect on bovine leukocytes in the late logarithmic and early stationary growth phases. Biotype A produced more leukotoxin than biotype B throughout all phases of bacterial growth. Results are consistent with the findings that biotype A is more virulent than biotype B.

(Key Words: Leukotoxin, *F. necrophorum*, Biotype, Growth Phase, Liver Abscesses.)

Introduction

Liver abscesses in feedlot cattle result in condemnation of over three million livers annually. The principal causative agent is *F. necrophorum*, a normal inhabitant of the rumen. This bacterium secretes leukotoxin, a substance that kills leukocytes and suppresses the body defense functions, allowing the establishment of the bacterium in the liver. Therefore, leukotoxin may be an important factor contributing to the pathogenesis of liver abscesses in cattle.

Two biotypes of *F. necrophorum* have been described. Biotype A is found most frequently in liver abscesses. Biotype B, which predominates in ruminal contents, is also isolated from liver abscesses. However, it is usually found in mixed infections and is considered less pathogenic than biotype A. We determined leukotoxin production of both biotypes in different growth phases.

Experimental Procedures

F. necrophorum biotypes A 25 and B 35 were isolated previously from liver abscesses collected at a packing plant. Bacteria were grown aerobically in brain heart infusion (BHI) broth. Samples were collected at 0, 2, 4, 6, 8, 10, 12, 30, and 45 hr for measurements of growth (colony counts) and for assay of leukotoxin production.

Culture supernatants prepared by centrifugation were used for leukotoxin assay. Polymorphonuclear neutrophil (PMN) leukocytes were isolated from cattle blood and labeled with ⁵¹Cr-sodium chromate. Labeled cell suspensions were mixed with culture supernatants,

¹KSU Department of Laboratory Medicine.

incubated for 2 hr, and centrifuged. Supernatants were harvested by an automatic supernatant collection system. The release of radioactivity into the supernatant, indicating leukotoxicity (percentage of cell lysis), was measured in a gamma counter.

Results and Discussion

The leukotoxicities of biotypes A and B at different stages of growth are shown in Figure 12.1. Both biotypes A and B showed the same trend of toxin production in relation to bacterial growth. The percentage of toxicity increased with increasing bacterial growth, was highest at the late logarithmic and early stationary growth phases, and then began to decline. Leukotoxicity completely disappeared after 30 hr incubation, implying that bacteria possibly secreted proteolytic enzyme(s) that destroyed the toxin.

Biotype A produced more leukotoxin than biotype B at both the logarithmic and stationary growth phases. This may be one of the reasons why biotype A is more virulent and more frequently encountered in liver abscesses.

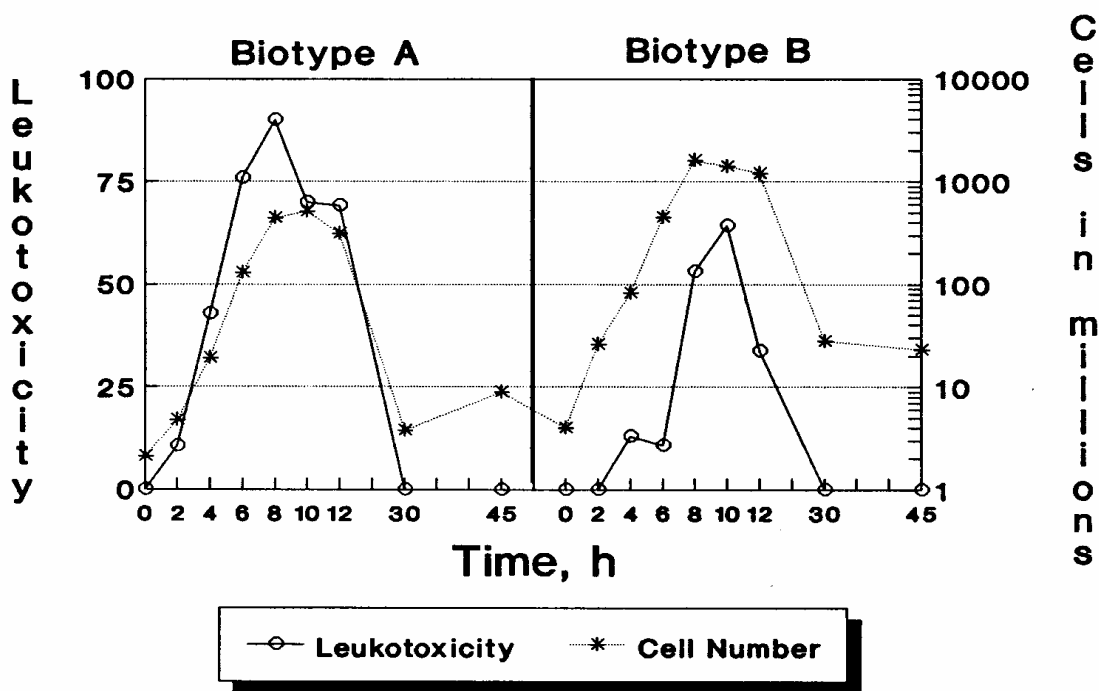


Figure 12.1. Leukotoxin Production in *Fusobacterium necrophorum* Biotypes A and B