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9-1-2012

## Female Neutrophils Produce Less Neutrophil Extracellular Traps in Response to the Escherichia Coli Hemolysin than Male Neutrophils

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### Recommended Citation

Brown, Melissa and Aulik, Nicole, "Female Neutrophils Produce Less Neutrophil Extracellular Traps in Response to the Escherichia Coli Hemolysin than Male Neutrophils" (2012). *Student Research and Creative Projects 2012-2013*. 7.

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RESEARCH / CREATIVE PROJECT ABSTRACT / EXECUTIVE SUMMARY  
FINAL REPORT FORM

## Title of Project

Female neutrophils produce less neutrophil extracellular traps in response to the Escherichia coli hemolysin than male neutrophils

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Department Biology  
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## Abstract

Urinary tract infections (UTIs) have been estimated to cost the U.S. approximately 1.6 billion dollars in health care costs. The majority of UTIs affect women more than men where fifty to sixty percent of women will experience a UTI in their lifetime. Uropathogenic Escherichia coli is the leading cause of UTIs. When uropathogenic E. coli is incubated in human urine, E. coli produce significantly more of the hemolysin, an RTX toxin that can lyse a wide variety of cell types. Up regulation of the hemolysin is believed to be important in E. coli colonization of bladder and kidney epithelial cells. During a UTI there is an influx of neutrophils into the bladder, which have been demonstrated to produce neutrophil extracellular traps (NETs). NETs are composed of extracellular DNA studded with antimicrobial proteins that trap and kill various pathogens. The hypothesis of this research is that female neutrophils produce significantly less NETs in response to the E. coli hemolysin in comparison to male neutrophils. Human neutrophils and macrophages were isolated from whole blood taken from healthy male and female volunteers and were incubated for various times or with various concentrations of the E. coli hemolysin. Extracellular DNA was then quantified using PicoGreen. Red blood cells were also incubated with various concentrations of the hemolysin and red blood cell lysis was determined by the quantification of the release of heme. We observed a significant decrease in the amount of NETs produced by female neutrophils in response to the E. coli hemolysin in comparison to male neutrophils. Similarly, we observed significantly more lysis of female red blood cells as compared to male red blood cells. Preliminary results also suggest that male macrophages produce more macrophage extracellular traps (METs) than female macrophages. Our findings suggest that female neutrophils, which have a reduced ability to produce NETs and METs in response to the E. coli hemolysin, may contribute to the significant difference in the amount of UTIs women experience in comparison to men.

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The end product of this project in electronic format has been submitted to the Provost/Vice President for Academic Affairs via the Office of Grants & Sponsored Projects Officer (Maxwell 161, npeterson@winona.edu).

Student Signature \_\_\_\_\_ Date \_\_\_\_\_

Faculty Sponsor Signature \_\_\_\_\_ Date \_\_\_\_\_