Erin M. Burns  
PhD Candidate

"Men and Women Are Not Just From Different Planets: The Role of Sex-Based Differences in the Prevention of Non-Melanoma Skin Cancer"

March 19, 2013  
Graves Hall, Room 1063  
9:00AM

VITA

August 24, 1985 . . . . . . . . . . . . . . . . . . . . . Born – Indianapolis, IN  
May 2007 . . . . . . . . . . . . . . . . . . . . . . B.A., Ball State University  
May 2009 . . . . . . . . . . . . . . . . . . . . . . M.S., Ball State University  
July 2009-present . . . . . . . . . . . . . . . . . Graduate Research Associate, The Ohio State University

COMMITTEE MEMBERS

Tatiana M. Oberszyn, Ph.D., Advisor  
Amanda Ewart Toland, Ph.D.  
Gregory B. Lesinski, Ph.D., MPH  
Traci A. Wilgus, Ph.D.

Area of Research Emphasis: Cancer Biology
ABSTRACT

There are over 3.5 million new diagnoses of skin cancer each year in more than 2 million patients, making skin cancer more prevalent than all other cancers. While the risk of developing cutaneous squamous cell carcinoma, the more deadly type of non-melanoma skin cancer, is three times greater in men than women, the mechanisms that contribute to this disparity are unclear. Our previous studies showed that after equivalent, chronic ultraviolet light B (UVB) exposure, male mice had greater tumor multiplicity, burden, and grade compared to female mice. Additionally, our acute UVB studies revealed decreased antioxidant capacity and cutaneous inflammation in male mice, suggesting that topical antioxidant or anti-inflammatory agents may decrease tumor burden following chronic UVB exposure. In the current studies we examined the potential preventative effects of anti-inflammatory (diclofenac) and antioxidant (C E Ferulic and vitamin E) agents on UVB-induced carcinogenesis in male and female mice. Our results demonstrated that despite observed sex differences in the inflammatory response, prolonged topical diclofenac treatment of chronically UVB-damaged skin effectively reduced tumor multiplicity in both sexes. Unexpectedly, tumor burden was significantly decreased only in male mice. Further, our data demonstrated that topical C E Ferulic treatment effectively reduced tumor number and burden in both sexes. While topical vitamin E treatment provided moderate therapeutic benefits in male mice, it provided no preventative benefits for female mice, and in fact, resulted in accelerated tumor growth rate compared to vehicle-treated female mice. In addition, we sought to investigate the efficacy of diclofenac, C E Ferulic, and vitamin E treatments in our model where UVB exposure was continued throughout the study. Our results demonstrated that both male and female mice that were exposed to 25 weeks of UVB developed more tumors, larger tumors, and a higher percentage of malignant tumors compared to mice that were exposed to 10 weeks of UVB. Further, mice treated with antioxidants exhibited no beneficial effects in terms of tumor number and burden compared to vehicle-treated mice. In contrast, diclofenac continued to be effective for decreasing both tumor number and burden in male and female mice with extended UVB exposure. Unexpectedly, mice treated with diclofenac developed a higher percentage of malignant tumors compared to vehicle-treated mice. These data, in combination with our results demonstrating that the use of previously reported visual criteria resulted in the false identification of 67% of tumors as SCC, indicate that tumor size and appearance are not reliable predictors of tumor grade and underscore the importance of histologically examining every tumor to correctly evaluate the efficacy of treatments in decreasing cutaneous tumor development and progression. Collectively, these studies demonstrate that topical anti-inflammatory and antioxidant treatments exert differential outcomes in the sexes. Overall, these data support the commonly assumed, but not demonstrated, fact that cumulative UVB exposure is a risk factor for UVB-induced SCC and highlight the fact that changing sun worshipping habits, even after early chronic sun exposure and skin damage, may be crucial for experiencing therapeutic benefits and ultimately preventing tumor development in patients.
RECENT ABSTRACTS AND PRESENTATIONS

Oral Presentations


Poster Presentations


RECENT PUBLICATIONS

1. Burns, EM, KL Tober, P Nagarajan, JA Riggenbach, DF Kusewitt, GS Young, and TM Oberyszyn. Tumor size is not a reliable predictor of grade in a murine UVB-induced carcinogenesis model. (In preparation)


**AWARDS AND HONORS**


2. Selected for participation in the debut of the Society for Investigative Dermatology PhD Retreat, Raleigh, NC, May 2012.

3. Finalist, 26th Annual Edward F. Hayes Graduate Research Forum, Columbus, OH, February 2012.

4. Albert M. Kligman Travel Fellowship to attend the Annual Meeting of the Society for Investigative Dermatology, May 2011.

**FUTURE PLANS**

I am pursuing a postdoctoral position in cancer epidemiology. In the future, I hope to have my own research lab in an academic setting.