Burn injury and cancer risk: A longitudinal analysis and an opportunity for international collaboration

Janine Duke[1]; James Boyd[2]; Jacqui Bauer[2]; Mark Fear[1]; Suzanne Rea[1,3]; Fiona Wood[1,3,4]

[1]Burn injury Research Unit, University of Western Australia; [2] Centre for Data Linkage, Curtin University; [3] Burns Service WA; [4] Fiona Wood Foundation

Background: While burns predominantly affect the skin, burns also have substantial systemic effects, are associated with depressed immune functioning and prolonged periods of systemic catabolism and hypermetabolism. Impairment of the immune system has been reported to be dependent on the extent of burn injury, with an additive effect occurring with superimposed infections. The systemic immune response to burn injury may be a mediator of cancer susceptibility.

Objective: To investigate risk of cancer and potential gender effects in persons hospitalised with burn injury.

Design: Population-based retrospective cohort study using record-linkage systems in **Scotland** and **Western Australia.**

Subjects: Records of 37,890 and 23,450 persons admitted with a burn injury in Scotland and Western Australia, respectively, from 1983 to 2008. De-identified extraction of all linked hospital morbidity records, mortality and cancer records were provided by the Information Service Division Scotland and the Western Australian Data Linkage Service.

Main outcome measures: Total and gender specific numbers of observed and expected cases of all-cause and site-specific cancers and standardised incidence ratios (and 95% confidence intervals).

Results: *Western Australia, 1983-2008*: 22,705 persons no previous history of cancer included in analyses; 673 patient records with 1st cancer for total of 759 cancer notifications included in analyses (68% male; 35% <15 yrs; 44%: 15-44 yr; 13%: 45-64 yr; 8%: 65+ yr)

Scotland, 1983-2008: 37,506 persons no previous history of cancer included in analyses; 2,005 patient records with 1st cancer for total of 2,260 cancer notifications included in analyses (64% male; 39% <15 yr; 43%: 15-44 yr; 15%: 45-64 yr; 13%: 65+ yr)

For the period 1983-2008, ***female burn survivors*** had a ***greater number of observed versus expected notifications of "all-cause"* cancer** with 1011 (standardised incidence ratio (SIR), 95% confidence interval (CI): 1.3, 1.2 to 1.4) and 244 (SIR, 95%CI: 1.12, 1.05 to 1.30), respectively, for Scotland and Western Australia. No statistically significant difference in all-cause cancer risk was found for males. ***Excesses*** in ***observed*** cancers amongst burn survivors ***(combined gender)*** in ***Scotland and Western Australian*** were found for ***buccal cavity, liver, larynx and respiratory tract, and for cancers of the female genital tract*** (Table 1).

Table 1: Standardised Incidence Ratio (95% confidence interval)

Cancer Site	Western Australia		Scotland	
	Male*	Female*	Male*	Female*
Buccal cavity, pharynx C00-C14	1.4 (1.0-1.9)	1.5 (0.7-3.2)	2.4 (1.9-2.9)	3.4 (2.5-4.8)
Liver C22	2.2 (1.3-3.7)	4.7 (2.0-11.4)	1.7 (1.1-2.5)	1.9 (1.0-3.7)
Larynx C32	1.5 (0.7-3.0)	6.0 (1.5-24.1)	1.5 (1.1-2.2)	4.2 (2.3-7.7)
Respiratory tract C33-C34	1.3 (1.1-1.7)	1.4 (0.9-2.2)	1.3 (1.2-1.5)	1.9 (1.7-2.2)
Female genital tract C51-C57		1.4 (1.0-2.0)		1.7 (1.4-2.0)

* Adjusted for age

Conclusions: Results from the Scotland data confirmed the increased risk of 'all-cause' cancer previously observed amongst female burn survivors in Western Australia. The gender dimorphism observed in this study may be related to the role of gender in the immune response to burn injury. More research is required to understand the underlying mechanism(s) that may link burn injury with an increased risk of some cancers.