



PREDILECTION OF KERATINOCYTE CARCINOMA SKIN CANCER BY AGE AND SEX

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Background: Historical data argue that basal cell cancer (BCC) occurs far more frequently than squamous cell cancer (SCC) (ratio 3-4:1), and men are diagnosed with both types of keratinocyte carcinoma (KC) more often than women. Determining the true incidence of KC, the predominant types of non-melanoma skin cancer (NMSC) in the United States is challenging - there are no significant NMSC registries and insurance or hospital billing data based on ICD-coding are often incomplete.¹ Herein we present current age- and sex-specific KC data using a sizeable institutional dermatopathology database collected over the past decade.

Methods: All KCs diagnosed by the University of Utah Dermatopathology Lab from 2008-2017 were examined for these analyses. All physicians and physician extenders where we could not confirm they used the dermatopath lab exclusively were excluded. Additional records were excluded based on 1) missing data, 2) contradictory data, or 3) additional dermatopath analysis for treatment of diagnosed KC. A Python program (v3.6.3) was used to develop text analytics using natural language processing (NLP) to extract meaning from the diagnostic written text instead of relying on the underlying ICD-9/-10 coding. Anatomical locations were derived from clinical notes using similar methods. Internal validity using random and systematic sampling was utilized to verify the results. Stata statistical software v15.1 was used for all analyses.

Results: Over the past 10 years, 36,343 KCs meeting the criteria were diagnosed at our institution (23,066 in men, 13,276 in women). Men continue to be diagnosed with BCC more often than women (ratio 1.5:1 vs historical ratio 1.75:11). The SCC ratio by sex is significantly closer to equivalent: current M:F ratio 1.7:1 vs. historical ratio 2.7:11, $p < 0.01$). The current BCC:SCC ratio by sex is 0.8:1 for men and 1:1 for women. The median age at diagnosis for BCC is 67 and 73 years for women and men, respectively, compared to 69 years and 71 years for SCC for women and men. Overall, 12.6% vs. 7.6% of all KCs are diagnosed before the age of 50 in women vs. men, respectively ($p < 0.001$). In addition, 14.6% vs. 4.9% of all BCCs vs. SCCs, respectively, are diagnosed before age 50 ($p < 0.001$).

Implications: With the shift in the diagnosis of SCC occurring more often than BCC and a predilection for BCC and SCC to specific anatomical locations, based on gender, many assumptions about the characteristics of the disease need to be reevaluated. Women are as likely to be diagnosed with a BCC as an SCC, and a greater proportion of KCs are diagnosed earlier in their lifetime. This large data set and the ability to extract data from natural language text has allowed us to develop new body maps defining the predilection of KC by anatomical location, gender, and age.

¹ Diepgen TL, Mahler V. The epidemiology of skin cancer. *Br J Dermatol.* 2002 Apr;146 Suppl 61:1-6.