

# Occupational causes of skin cancer – non-melanoma



PREVENTION. CARE. RECOVERY.

Te Kaporeihana Āwhina Hunga Whara

» *A distillation of best practice reflecting ACC's current position*

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- Squamous cell carcinoma is associated with cumulative sun exposure; basal cell carcinoma is not.
- Regular sunscreen use diminishes squamous cell carcinoma risk.
- Exposure to arsenic or to polycyclic aromatic hydrocarbons increases the risk of skin cancer.
- Skin cancer may arise in burn scars.
- Skin which tans poorly and burns easily is at increased risk of skin cancer. Other factors including immunosuppressant medications and wart virus also modify risk.

## Introduction

A recent Australian national household survey found the age-standardised rate for non-melanoma skin cancer per 100,000 population was 1170; for basal cell carcinoma (BCC) it was 884 and for squamous cell carcinoma (SCC) it was 387<sup>1</sup>. The likelihood of having at least one non-melanoma skin cancer by age 70 was estimated as 70% for men and 58% for women. The New Zealand situation is undoubtedly similar. These figures probably underestimate the true incidence; nevertheless it is clear that non-melanoma skin cancer is extremely common here.

## Sun exposure, ionizing radiation and genetic predisposition

Individuals who freckle and burn easily but tan poorly following sun exposure have an increased risk of both SCC and BCC<sup>2</sup>. Individuals with blue eyes are also at added risk for the development of non-melanoma skin cancer where cumulative sun exposure occurs.<sup>3</sup> While there is a clear association between cumulative sun exposure and SCC<sup>4</sup>, BCC risk is determined by a complex interplay of genetic, environmental, and lifestyle factors. Mutations in the TP 53 tumour suppressor gene and the patched/hedgehog pathway play a role<sup>5</sup>. However, BCC risk does not seem to increase with increasing sun exposure; and can be associated with recreational (or intermittent) sun exposure<sup>2</sup>. It does not seem to be diminished by regular sunscreen use<sup>6</sup>. However the risks for developing repeated occurrences of BCC may be different to the risks of developing a single BCC, and there is some evidence to suggest that the preventative effect of sunscreen may be greater on repeated occurrences of BCC<sup>7</sup>. The discordance in incidence in twin pairs is not accounted for by outdoor work<sup>8</sup>. BCC risk may be associated with childhood sunburn episodes<sup>7</sup>.

SCC risk is associated both with childhood sunburn, and with lifetime sun exposure<sup>9</sup>. Outdoor work is associated with increased risk of SCC with an odds ratio of 1:6<sup>4</sup>. Regular sunscreen use has prolonged preventive effects on SCC, decreasing their incidence by almost 40%<sup>6</sup>.

SCC in physicians using X-rays and radiation sources is now largely of historical interest, due to adequate controls on exposure. There is some suggestion that ultraviolet radiation from welding may increase the risk of non-melanoma skin cancer<sup>10</sup>. There may also be an increased risk of SCC and BCC from cosmic radiation exposure in airline pilots<sup>11</sup>.

## Arsenic and tar

Chronic exposure to inorganic arsenic increases the risk of developing Bowen's disease (SCC in situ), BCC, and SCC<sup>12</sup>. Arsenic enhances ultraviolet carcinogenesis<sup>13</sup>. Chronic liver disease<sup>14</sup>, malnutrition<sup>14</sup> and smoking<sup>15</sup> may increase the risk of skin cancer in arsenic-exposed individuals. Contaminated drinking water is the commonest source of arsenic exposure. Industries which may use arsenic include glass production, and manufacture of semiconductors; it may be found in some pesticides, and may occur as a by-product in the smelting of copper, lead and zinc<sup>10</sup>.

Exposure to polycyclic aromatic hydrocarbons (e.g. in shale oil, creosote, asphalt, coal tar products, chimney soot) may result in an increased risk of SCC and keratoacanthomas<sup>16</sup>.

## Trauma and scars

SCC, BCC and melanoma may arise in burn scars<sup>17</sup>. BCC may also arise at the site of sharp or blunt trauma, or vaccinations<sup>18</sup>.

## Other factors influencing non-melanoma skin cancer risk

Increased risk of non-melanoma skin cancer is associated with immunosuppressant medications, human papilloma viruses<sup>19</sup>, and stress<sup>20</sup>. There is increasing interest in the role of dietary factors.

## Management

The management of occupational skin cancer is the same as the management of non occupational skin cancer. As always, a detailed history of occupational exposures is critical in determining occupational causation. Where ultraviolet exposure is implicated in causation, then measures to reduce ultraviolet exposure (which include but are not limited to the use of good quality sunscreens) are appropriate. A general practitioner who suspects occupational exposures as a cause of skin cancer should lodge a claim with ACC. The relevance of the exposure can then be determined and patients may receive assistance with ongoing treatment.

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