NATIONAL INSTITUTE FOR OCCUPATIONAL HEALTH
Division of the National Health Laboratory Service

# OccuZone

## SKIN CANCER IN THE WORKPLACE

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*inside*
# THIS ISSUE






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# Vuyo Sabani

# MESSAGE FROM THE EDITOR

In this issue, we turn our focus to skin cancer in the workplace, a timely topic as South Africa experiences the peak of summer. With December and January observed as Skin Cancer Awareness Months, it is crucial to highlight the risks associated with excessive sun exposure – one of the leading causes of skin cancer. Contrary to common belief, skin cancer can affect anyone, regardless of skin colour, gender, or age.

South Africa has one of the highest incidences of skin cancer globally, including melanoma – the most severe form of the disease – according to the Cancer Association of South Africa (CANSA). Occupational exposure poses an additional risk, particularly for workers in sectors like farming, construction, and recycling, where prolonged sun exposure is unavoidable.

Dr Nompumelelo Ndaba, an Occupational Medicine specialist at the National Institute for Occupational Health (NIOH), emphasizes that for skin cancer to be classified as occupational, a clear causal link must exist between workplace exposures and the disease.

For a deep dive into cancer research, turn to our Features Section, where:

- Ms Babongile Ndlovu, an Epidemiologist at the National Cancer Registry (NCR), explores trends, risk factors, and prevention strategies in her article, "Skin Cancer in South Africa: Trends, risks, and strategies for prevention." She underscores the importance of awareness and early detection in reducing skin cancer cases.

- Dr Ndaba and co-authors present "Occupational skin cancer awareness," detailing high-risk occupations and workplace strategies – such as the hierarchy of controls to mitigate skin cancer risks.
- Dr Kerry Wilson examines the connection between skin cancer, pigmentation, and climate change, adding a crucial perspective to the discussion.

In the Service delivery section, Ms Karen du Preez profiles the National Health Laboratory Service (NHLS) Biobank, based at NIOH. This cutting-edge facility stores biological samples for research, supporting South Africa and Africa's efforts in genetic research, biodiversity conservation, and biotechnology development for the greater good.

For the latest NIOH peer-reviewed publications and research highlights, see pages 7 to 12.

*Until the next issue, Cheers!*

"South Africa has one of the highest incidences of skin cancer globally, including melanoma – the most severe form of the disease – according to the Cancer Association of South Africa (CANSA).

# Prof. Nisha Naicker

## RESEARCH FOCUS

This issue of the OccuZone focuses on skin cancer, however it's important to be aware of other occupational dermatoses. The NIOH has published several interesting papers on this topic. These papers can be found on the NIOH website. Further research on allergic dermatitis and skin cancer in occupational settings is ongoing.

Occupational skin diseases are conditions affecting the skin due to exposure to harmful substances or environmental factors at the workplace. It is an important cause of morbidity globally, accounting for approximately 30-45% of all occupational diseases.[1] However, it is often underreported, poorly diagnosed and not often compensated.[2,3] Occupational groups who are often affected include "agricultural workers, health care workers, construction workers, metal workers, cleaners, domestic workers, food handlers, hairdressers, beauticians and mechanics."[1]

Table 1 list some examples of occupational dermatoses and associated causes.

**Table 1: Classification of Occupational Dermatoses[4]**

| ***Type of Dermatosis*** | ***Example or Cause*** |
|---|---|
| **Contact dermatitis** (Inflammation of the skin caused by exposure to irritants (irritant contact dermatitis) or allergens (allergic contact dermatitis). | |
| Irritant | Solvents, detergents |
| Allergic | p-Phenylenediamine in hairdressers |
| **Contact urticaria** | |
| Immunologic | Natural rubber latex, crabmeat |
| Non-immunologic | Ammonium persulfate (hairdressers) |
| **Infections** (Fungal, bacterial, or viral infections linked to working conditions, such as wet environments or direct contact with infected materials) | |
| **Bacterial** | *Erysipelothrix* in fishmongers |
| Fungal | Sporotrichosis in gardeners |
| Viral | Warts in butchers |
| Parasitic | Cheyletiellosis in veterinarians |
| **Hair follicle disorders** | |
| Folliculitis | Motor oil in mechanics |
| Chloracne | Polychlorinated biphenyls |
| **Pigmentation disorders** | |
| Post-inflammatory hyperpigmentation | Phytophotodermatitis |
| Acquired leukoderma | Hydroquinones in rubber/plastics |

| *Type of Dermatosis* | *Example or Cause* |
|---|---|
| **Neoplasms** (Increased risk from exposure to ultraviolet (UV) radiation, chemicals, or other carcinogens) | |
| Granulomas | Foreign bodies, beryllium |
| Benign tumours or carcinomas | Anthracene in soot or petroleum |
| | Ionizing or ultraviolet radiation |
| **Miscellaneous** | |
| Scleroderma | Vinyl chloride |
| Raynaud phenomenon | Vibrating tools |
| Telangiectasias | Aluminium smelter workers |
| Eczema and Psoriasis | Work-related flare-ups or aggravation of these chronic skin conditions |

Prevention includes using appropriate Personal Protective Equipment (PPE), safe handling of chemicals, and proper hygiene practices.

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# RESEARCH PUBLICATIONS

## A scoping review of occupational biological exposures among horse grooms: a neglected group of workers in a thriving horse-racing industry

**Author(s): Duba, T.**; Naicker, N.; Singh, T.

**Source:** Occup Health Southern Afr. 2024; 30(3). doi: 10.62380/ohsa.2024.30.3.x

**Summary**

**Introduction:** Horse grooms' tasks include grooming, live breeding, foaling, night watch duty, raising and training horses, mucking stalls, landscaping, and horse maintenance. Horse stables have high organic dust levels, which pose a risk to horse grooms. There is an association between working with horses and an increased risk of respiratory symptoms and/or organic dust toxic syndrome. This paper described occupational biological exposures and associated respiratory diseases among horse grooms, shedding light on their working and living conditions.

**Methods:** A scoping review was undertaken using the PRISMA extension for scoping reviews (PRISMA-ScR) checklist. Data were extracted using key questions and eligibility criteria as a starting point. The keywords, occupational health, infectious diseases, workplace exposure, coronavirus disease 2019 (COVID-19), Mycobacterium tuberculosis, (1,3)-β-D-glucan, endotoxin, and horse grooms, were used to search PubMed, Google Scholar, and ScienceDirect.

**Results:** Forty-six papers were selected for final review. These papers highlighted possible biological exposure in horse grooms' day-to-day tasks as well as from hostel living conditions. Due to overcrowding, the spread of tuberculosis was highlighted as a major concern.

**Conclusion:** More research on horse grooms is necessary, considering the paucity of occupational health information in this sector, especially in South Africa.

## Indoor/Outdoor particulate matter (respirable dust) and respirable crystalline silica source tracking in households located proximal to gold mine tailings in Johannesburg, South Africa

**Author(s): Makhubele, N.**; Rathebe, P.; Mbonane, T.; Manganyi, J.; Mizan, G.; Msekameni, M.D.

**Source:** Journal of Air Pollution and Health (Summer 2024); 9(3): 279-296. https://japh.tums.ac.ir/index.php/japh/issue/current

**Summary:** This study aimed to investigate the concentration of respirable crystalline silica (RCS) and particulate matter ($PM_4$) in air samples collected indoors and outdoors of nine households located in close proximity to gold mine tailings dumps in the suburb of Riverlea, Johannesburg. Sampling locations were separated according to the distance from the tailings: zone A (<500 m from the dump), zone B (>500m<1 km) and zone C (1 km-3 km). Three households were selected from each zone to measure the indoor and outdoor $PM_4$ and RCS concentrations continuously over 24 hours using constant flow sampling pumps.

Samples were collected during the dry and wet seasons, and respirable crystalline silica in $PM_4$ samples were analysed by an X-ray diffraction method. The mean indoor and outdoor $PM_4$ mass concentrations ranged from 2.02±0.02 µg/m3 to 2.26±0.02 µg/m3, respectively. The dry season means for $PM_4$ mass concentrations were higher compared to the wet season in all zones. The pairwise comparison of $PM_4$ mass concentrations for the dry and wet seasons revealed no statistically significant difference ($p<0.05$). The dry season mean concentrations of the indoor/outdoor ratio were greater than one across all zones, suggesting indoor activities as the primary source of $PM_4$ measured indoors. In both seasons, the mean indoor and outdoor RCS ranged from 0.02±0.01% to 0.06±0.03%. The mean indoor and outdoor 24-hours RCS concentrations in both seasons were below the California Office of Environmental Health Hazard Assessment (OEHHA) defined 24-hours ambient exposure threshold of 3 µg/m3. In conclusion, the study found that $PM_4$ concentrations were directly proportional to the distance from the gold mine tailings. Using RCS as a signature chemical, we found a similar chemical composition in all samples collected in the wet and dry seasons at varied distances. It was concluded that the gold mine tailings are a major source of $PM_4$ emissions. Therefore, it was recommended that further dust control measures need to be implemented at the gold mine tailings dumps to minimize the environmental impact from particulate matter emissions.

## Preventing occupational injuries in the informal construction industry: a study protocol for the development of a safety education intervention for bricklayers and carpenters in Osun State, Nigeria

**Author(s):** Ojo, T.O.; Onayade, A.A.; and **Naicker, N.**

**Source:** Front. Public Health 12:1464797. doi: 10.3389/fpubh.2024.1464797

**Summary**

**Background:** Occupational injuries are a growing public health problem. Approximately 1,000 workers die daily from occupational injuries globally. Artisans working in the informal sector of the construction industry in many low/middle income countries have a higher injury predisposition. This study will assess the determinants of occupational injuries and design a safety intervention for informal sector artisans in the Nigerian construction industry.

**Methods:** A sequential mixed-methods design will be employed to study 840 bricklayers and carpenters (420 per artisan group) in Osun State, Nigeria. Quantitative data, using a semi-structured questionnaire, followed by qualitative data will be collected. Thirdly, a modified Delphi-technique will be employed to codesign a safety education intervention. A multivariable regression model will be used to determine the association between injury occurrence and independent variables. Twelve to sixteen focus group discussion sessions will be conducted for artisans to obtain group perspectives about injuries and preferred safety training topics. From the study findings, a list of safety training items will be compiled for the modified-Delphi process. Thereafter, the content validation index (CVI) will be derived and items with CVI of ≥0.80 will be included in the final safety training module.

**Conclusion:** The information from this study will be essential in promoting safe working environments for construction artisans.

## Structural barriers and facilitators to accessing HIV services for marginalized working populations: insights from farm workers in South Africa

**Author(s):** **Mlangeni, N.**, Lembani, M., Adetokunboh, O. and Nyasulu, P.S

**Source:** Health Policy and Planning, 00, 2024, 1–10 DOI: https://doi.org/10.1093/heapol/czae098

**Summary:** This descriptive phenomenological study aimed to explore farm workers' experiences when accessing HIV services, and was conducted in Limpopo province, South Africa. Eighteen in-depth interviews were conducted in four health facilities from two districts, and two focus group discussions were conducted in one of the farms within the province. Purposive sampling and systematic random sampling were used to select study participants. A deductive thematic approach was used to analyze data, informed by the social–ecological model of health. The results reveal that farm workers perceive multiple interdependent factors that inhibit or enable their access to HIV healthcare services. Key barriers to HIV healthcare were transport affordability, health worker attitudes, stigma and discrimination, models of HIV healthcare delivery, geographic location of health facilities and difficult working conditions. Key facilitators to HIV healthcare included the availability of mobile health services, the presence of community health workers and a supportive work environment. The findings suggest disparities in farm workers' access to HIV services, with work being the main determinant of access. We, therefore, recommend a review of HIV policies and programs for the agricultural sector and models of HIV healthcare delivery that address the unique needs of farm workers.

## The role of green chemistry in management of self-harm and suicides by hazardous chemicals

Author(s): **Utembe, W**. and Tlotleng, N.

Source: In: Rezaei, N. (eds) Integrated Science for Sustainable Development Goal 3. Integrated Science, vol 25. Springer, Cham. https://doi.org/10.1007/978-3-031-64288-3_6 Book Chapter

**Summary:** Hazardous chemicals, including very toxic pesticides, house cleaning agents and medical drugs, are often used in self-harm and suicides. Limiting of access to such hazardous substances have previously been shown to reduce incidents of self-poisoning. In this regard, green chemistry offers the opportunity to reduce or eliminate hazardous substances at the design stage and extend the efforts of limiting access by modifying properties of chemical products to render them harmless or safe to potential self-harm and suicide victims. This is in line with Sustainable Development Goal (SDG) number 3 which aims to reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination by 2030. Green chemistry can also specifically contribute to the achievement of SDG Indicator 3.4.2, which aims to reduce suicide mortality rates within the same period. Reduction of self-harm and suicides from self-poisoning will require a wider application of computational toxicology techniques to non-pharmaceutical chemical products such as pesticides and house cleaning agents. Currently, the application of computational toxicology on non-drug chemical products is limited to a few cases because of the challenges of associating chemical structure attributes to mechanistic events, especially when one considers both efficacy of the substance for its intended use and its safety in humans. The application of green chemistry principles should not only focus on the toxicology of active ingredients and co-formulants but also on other parameters that may modulate the dose or exposure levels.

## Inhalation exposure to chemicals, microbiota dysbiosis and adverse effects on human

Author(s): **Utembe, W**. and Kamng'ona, A.W.

Source: Science of the Total Environment 955 (2024) 176938

**Summary:** As shown using methods that do not depend on growing bacteria in the laboratory, disruption of microorganisms that reside in lungs (i.e. lung microbiota (LM) dysbiosis), can result in negative effects. LM dysbiosis has been associated with many respiratory diseases such as asthma, lung cancer, idiopathic pulmonary fibrosis (IPF), chronic obstructive pulmonary disease (COPD) and cystic fibrosis (CF). Indeed, through this mechanism some chemicals appear to play significant roles in human respiratory diseases, as has been shown for some air pollutants, cigarette smoke and some inhalable chemical antibiotics. Lung microbiota are also linked with the central nervous system (CNS) in the so-called lung-brain axis. Furthermore, inhaled chemicals may be ingested following mucociliary clearance from the lung to affect the microbiota in the gut. However, current studies cannot definitively be said to cause these diseases as that requires more robust approaches, methods and techniques than are currently available. For example, current sampling techniques inherently suffer the risk of cross-contamination. Furthermore, the development of continuous or semi-continuous systems designed to replicate the lung microbiome can go a long way to limit these challenges. These challenges notwithstanding, the preponderance of the evidence points to the significant effects that inhalation of chemicals can cause through disruption of microorganisms in the lung.

# Indoor radon exposure: A systematic review of radon-induced health risks and evidence quality using GRADE approach

**Author(s):** Mphaga, K.V., **Utembe, W.**, Mbonane, T., Rathebe, C.R

**Source:** Heliyon 10 (2024) e40439

## Summary

**Background:** Radon is a gas that arises naturally and carries considerable health hazards. It is recognized for increasing the chances of developing serious conditions like lung cancer, leukemia, and Chronic Obstructive Pulmonary Disease (COPD), representing more than half of the radiation exposure individuals face in their daily lives. Studies revealed a notable deficiency in thorough research that examines the strength of evidence linking indoor radon exposure to various health concerns. This shortage of research creates difficulties in fully grasping the potential dangers posed by radon in home settings, despite the known risks it presents.

**Methods:** A systematic review was conducted on PubMed and Google Scholar for studies examining the connection between residential radon exposure and health issues like lung cancer, leukemia, and COPD. We focused on peer-reviewed research published between 2010 and 2024, excluding studies conducted within occupational studies.

**Results:** We found strong evidence linking indoor radon exposure to lung cancer, particularly supported by various case-control studies. However, when it comes to conditions like chronic obstructive pulmonary disease (COPD) and leukemia, the relationship was not clear. More research is needed to better understand if there is a real connection between living in a home with radon and these health issues (namely COPD and leukemia). The current evidence on radon exposure and COPD and leukemia was limited, because most studies had serious weaknesses, produced conflicting results, and had insufficient data on exposure levels. To provide clearer answers, more thorough studies are essential.

**Conclusion:** This review confirmed that radon exposure increases the risk of lung cancer, aligning with previous research. However, the link between radon and other health issues like COPD and leukemia was not clear or was weak. More studies are needed to determine if these associations exist. To improve the quality of future research, scientists should use stronger study designs and accurately measure long-term radon levels in homes.

## Hypersensitivity pneumonitis: Impact of secondary exposure to pigeon antigens from residential small-scale animal husbandry

**Author(s): Muvhali, M.**, Graham, A., Ratshikhopha, E. Singh, T.

**Source:** Current Allergy & Clinical Immunology | December 2024 | Vol 37, No 4

**Summary:** Hypersensitivity pneumonitis (HP) triggered by avian antigens is one of the most prevalent forms of HP, with pigeon antigens being the most common cause. Although the health effects associated with exposure to pigeon antigens has been well documented among pigeon breeders, this is not the case for family members and individuals living near breeding facilities. This case explored this less known aspect associated with pigeon breeding in or around residential dwellings.

A 56-year-old housewife who was referred to an academic hospital's respiratory outpatient department with a primary complaint of progressive worsening shortness of breath and intermittent dry cough, which she had experienced for six years. Comprehensive evaluations performed included physical examination, chest x-rays (CXR), high-resolution computed tomography (HRCT), and lung function testing. The patient's blood was analysed for immunoglobulin G (sIgG) to avian antigens due to the patient's husband breeding birds at their residence for racing purposes.

The clinical results suggested HP diagnosis, which was supported by the laboratory findings of elevated sIgG antibodies to pigeon mix Ge 91 (pigeon serum proteins, feathers, and droppings) and Ge 93 (pigeon serum proteins). These results assisted in the confirmation of the diagnosis of HP due to secondary pigeon exposure.

The findings, in this case, emphasise the need to establish national reference ranges for IgG against common HP antigens in order to improve the use of sIgG antigen testing in the diagnostic framework. Furthermore, this case highlights the significance of monitoring exposures within the growing cottage industry in South Africa, in order to reduce the exposure risk to humans, animals and the environment.

# FEATURES AND NEWS

## Skin Cancer in South Africa: Trends, risks, and strategies for prevention

By Babongile Ndlovu

Skin cancer is a growing public health concern in South Africa (SA), characterised by increasing incidence rates and significant disparities among different population groups[1,2]. Understanding the trends and risk factors is crucial for coming up with prevention strategies, amongst which are awareness and early detection.

Data from the National Cancer Registry (NCR) indicates that non-melanoma skin cancers (NMSCs), particularly basal cell carcinoma (BCC) and squamous cell carcinoma (SCC), are the most common forms of skin cancer in SA[2,4]. The average age-standardised incidence rate (ASIR) for BCC is 45 per 100,000 in men and 23 per 100,000 in women. For SCC, the ASIR is 23 per 100,000 in men and 10 per 100,000 in women[3,5]. Melanoma skin cancer (MSC), while less common, presents a significant risk as it is the most aggressive form of skin cancer, and the prognosis for metastasised disease is poor, especially among white populations[6]. MSC ranks among the top five cancers in the white population but does not appear in the top five for other demographic groups[5].

White men exhibit the highest incidence rates of MSC at 24 per 100,000, followed by white women at 19 per 100,000. In contrast, the incidence rates for Black and Asian men are significantly lower, with Asian females showing rates as low as 0.96 per 100,000, Asian males at 1, Black females at 0.82, and Black males at 0.88 per 100,000[5]. The lifetime risk of developing skin cancer varies significantly by population group, with white men having a lifetime risk of 1 in 5 for BCC, compared to 1 in 363 for Black men[5] (see infographic).

### Skin Cancer

**Lifetime risk of skin cancer stratified by gender and population group**

| Population Group | BCC Lifetime Risk | SCC Lifetime Risk | MSC Lifetime Risk |
|---|---|---|---|
| White Women | 1 in 8 | 1 in 26 | 1 in 51 |
| Coloured Women | 1 in 40 | 1 in 102 | 1 in 257 |
| Black Women | 1 in 590 | 1 in 522 | 1 in 1171 |
| Asian Women | 1 in 269 | 1 in 525 | 1 in 1014 |
| White Men | 1 in 5 | 1 in 13 | 1 in 38 |
| Coloured Men | 1 in 21 | 1 in 44 | 1 in 179 |
| Black Men | 1 in 363 | 1 in 292 | 1 in 976 |
| Asian Men | 1 in 210 | 1 in 329 | 1 in 911 |

Several risk factors contribute to the development of skin cancer in South Africa. Skin type is a primary factor; individuals with fair skin, light-coloured eyes, and those with oculocutaneous albinism are at greater risk due to lower melanin levels, which offer less natural protection against UV radiation[7,8]. Additionally, South Africa's high levels of solar ultraviolet radiation (UVR) significantly increase the risk of skin cancer, with the average summer UV Index often exceeding 10, indicating extreme UV exposure[9]. Occupational exposure to UV light is another critical factor; jobs such as farm workers and construction workers often require prolonged outdoor activity, increasing their risk of skin damage[10].

Common outdoor activities among South Africans, like swimming and sports, also contribute to higher UV exposure[11]. Furthermore, individuals with compromised immune systems, such as those living with HIV/AIDS, face increased risks[10]. It is also important to note the role of sunbeds, which are linked to a rise in melanoma cases, particularly among white women, even in those who do not engage in outdoor jobs[12]. Demographic disparities are evident, with the incidence of skin cancer being notably higher in white populations compared to black and coloured populations, reflecting differences in skin type and UV exposure.

Preventing skin cancer involves a combination of public health initiatives and individual actions. Awareness campaigns aimed at educating the population about the risks of UV exposure and the importance of regular skin checks can significantly reduce incidence rates. These campaigns should target high-risk groups, including those with fair skin and individuals living with HIV/AIDS[13]. Individuals are encouraged to adopt sun safety measures, including wearing protective clothing like sun hats and long sleeves and applying broad-spectrum sunscreen with an SPF of 30 or higher[14]. An SPF of 30 means the sunscreen can theoretically allow you to stay in the sun 30 times longer without burning than if you weren't wearing any sunscreen, so seeking shade during peak sun hours is also advised[14].

Regular skin checks are also essential; early detection is key to successful treatment. Individuals should be educated on how to perform self-examinations and recognise the signs of skin cancer, such as changes in moles or new growths. Furthermore, implementing policies that promote sun safety in schools and workplaces can help protect vulnerable populations, particularly outdoor workers and children. Increasing awareness of skin cancer in South Africa is essential for reducing incidence and improving outcomes. By understanding the trends, recognising risk factors, and implementing effective prevention strategies, we can work towards a healthier future.

**Ms Babongile Ndlovu is an Epidemiologist at the National Cancer Registry (NCR), housed within the National Institute for Communicable Diseases (NICD).**

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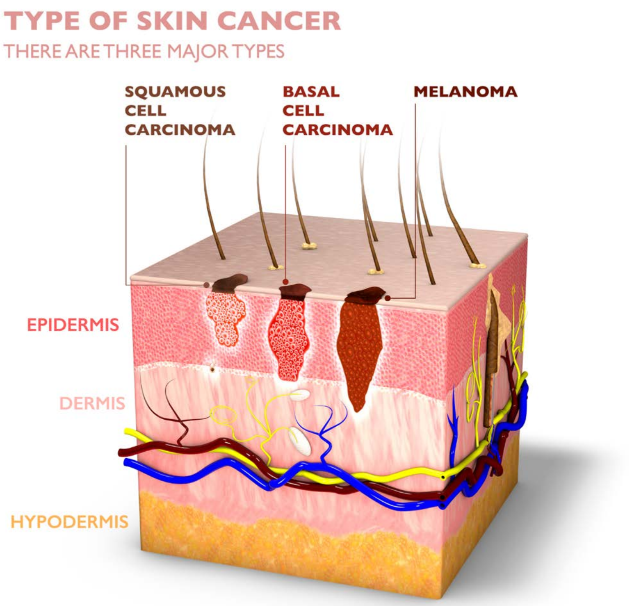
Dr Nompumelelo Ndaba

Sr Goitsimang Buffel

Ms Anna Fourie

# Occupational Skin Cancer awareness in the workplace

Skin cancer is an abnormal growth of skin cells that can be caused by UV light exposure, moles, or other factors. This cancer begins in skin cells and typically causes unusual growth or changes. Some types of skin cancer can spread to other parts of the body. There are various types of skin cancers, caused by different factors.

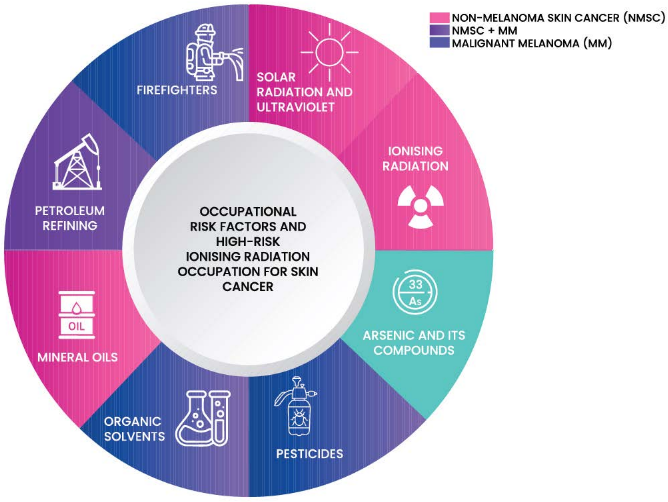



According to Centers for Disease Control and Prevention, anyone can get skin cancer, but people with certain characteristics are at greater risk namely, people who have a lighter natural skin colour, many freckles or moles and skin which reddens easily, becomes painful or blisters on exposure to the sun. It has also been reported that people with blue or green eyes, or who are blond or red haired are also at a higher risk of skin cancer. Other risk factors include a history of repeated sunburn or frequent tanning, a family or personal history of skin cancers, genetics and exposure to ultraviolet A (UVA) and ultraviolet B (UVB) rays.

In some cases, occupational exposures have been implicated to cause skin cancer. Examples of these include exposures to chemicals, biological and physical agents in the workplace.

More established and recognised risk factors for all occupational skin cancers include the following:

- Exposure to arsenic and its compounds
- Working in petroleum refining
- Risk factors for malignant melanoma include:
  - Firefighting
  - Exposure to organic solvents
  - Exposure to pesticides
- Risk factors for non-melanoma skin cancers (squamous cell carcinoma and basal cell carcinoma as shown in the illustration above)
  - Radiation (solar, ultraviolet and ionising)
  - Occupational exposure to mineral oils.



**Occupational risk factors and high-risk occupation for skin cancer**

For a skin cancer to be considered occupational in origin, there must be a causal relationship between the occupation or work exposures and the skin cancer. The general approach used to check for symptoms and signs of skin cancer in a mole is: looking for lack of, or poor symmetry in a mole (**A**symmetry), a border with uneven crusty or notched edges (**B**order), change in colour (**C**hange) a diameter larger than 0,5 cm (**D**iameter) and changes of the edges in color, shape, and beginning bleed (**E**dge).

This is referred as the ABCDE rule as shown in the diagram below.

In workplaces where exposure to these agents listed above as risk factors occurs, a risk assessment should be conducted and be communicated to all stakeholders. It should include controls to minimise the risk.
Some of the strategies that workplaces can use to mitigate this risk include taking steps from the hierarchy of controls to protect workers:

- **Elimination:** the most effective method of control refers to eliminating exposure to the agent, compound or product that causes the skin cancer/condition, where possible.

- **Substitution:** If possible, employers should attempt to substitute the hazardous agent to a less hazardous one.

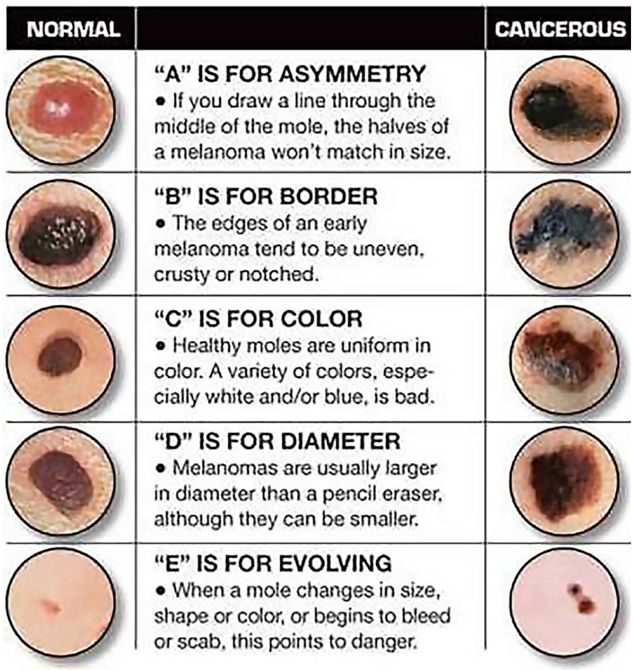
- **Engineering controls:** If the above two are not possible, engineering controls can prevent hazardous agents from making contact with the workers' skin.

- **Administrative controls:** Employers should provide training programmes that educate workers about hazards that they may be exposed to and ways to protect themselves. This should include limiting access to hazardous areas, reducing the exposure dose, duration and frequency of such exposure.

- **Personal protective equipment (PPE):** When other control methods are unable to reduce the hazardous exposure to safe levels, employers must provide PPE. Gloves, safety glasses or goggles, shop coats or coveralls, and boots should be provided by employers and worn by workers involved in the activities where exposure and contact to the agents listed above might occur.

However, where there is suspicion from symptoms and signs, and there are exposures to possible carcinogens at work, the worker should consult with attending medical practitioner or the company programmes (OMP) to assist with referral to a dermatology clinic/specialist for urgent attention and further investigations. Further assistance, assessment and referrals can be offered by the NIOH consultant Occupational dermatologist as applicable. The NIOH Occupational Medicine section can assist to determine whether the condition can be attributed or linked to the workplace or work processes.

**One should see the doctor if having the following:**



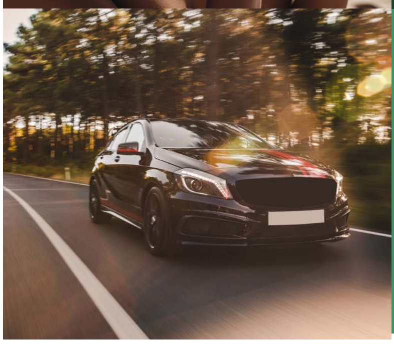

- A spot or sore that doesn't heal within four weeks.
- A spot or sore that hurts, is itchy, crusty, scabs over, or bleeds for more than four weeks.
- Areas where the skin has broken down (an ulcer) and does not heal within four weeks, and you cannot think of a reason for this change.

**Some of the measures that people could use/ adopt to prevent skin cancer include the following**

Seeking the shade whenever possible

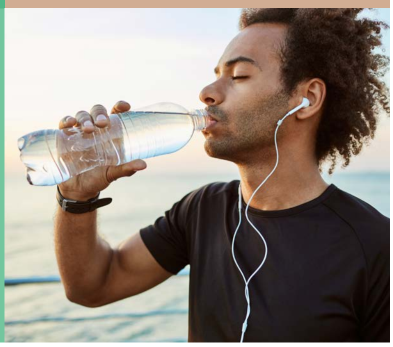
Using of a broad spectrum sunscreen with an SPF 15+ daily, sun protective clothing UV-blocking sunglasses and wide-brimmed hats.

Annual skin exams with your physician and monthly self-exams

Protective window film in your car and home

Always keep hydrated



# Climate change and Skin Cancer: Occupational health role

By Dr Kerry Wilson

This overview highlights the relationship between skin cancer, pigmentation and climate change.

## Skin Cancer Causes

Skin cancer is the most common type of cancer, but not the most common cause of cancer death. Skin cancer can also cause disfiguration. The leading cause of all skin cancer types is exposure to ultraviolet radiation (UVR). Early detection or screening is important, as well as prevention through the use of sunscreen, clothing, and avoidance of high UVR times outdoors.

There are other less common causes of skin cancer, such as exposure to chemicals such as arsenic, coal tar and soot[1]. Different forms of radiation, suppressed immune systems, or treatments can also increase the risk of skin cancer[2].

## Climate change and skin cancer

Climate change refers to disasters such as floods, droughts, fires, habitat loss, and long-term changes in temperatures and weather patterns. These changes, particularly higher maximum temperatures, are being seen across South Africa and are confidently predicted to continue during the 21st Century[3]. Climate change increases the risk of developing skin cancer through multiple mechanisms: ozone depletion increases the amount of UVR; deforestation and desertification reduce shade and increase reflection; and heat exposure combined with other known exposures synergistically increases the risk of skin cancer[4]. Heat stress or hyperthermia is a well-described stressor that interferes with multiple cellular systems, particularly DNA inhibition repair. Thus, heat stress and UVR amplify skin cancer development[5].

## Skin pigmentation and skin cancer

Skin colour is influenced by melanin distribution. Melanin can absorb and scatter UVR reducing damage and skin cancer, which leaves lighter-skinned people at increased risk of skin cancer. However, while individuals with darker skin tones have a lower incidence of skin cancer, they are not immune[7]. In darker-pigmented individuals, skin cancers often occur in areas with less melanin or chronic trauma, such as the palms, soles, and nails. Skin cancer is often diagnosed at later stages in individuals with darker skin, leading to poorer outcomes. Squamous cell carcinoma (SCC) and basal cell carcinoma (BCC) also occur in these populations, particularly in regions of scarring or chronic inflammation[8]. Increasing awareness of skin cancer is important in these populations.

## Occupational Hygiene: Reduction of Heat and UV exposure

Workplace recommendations fall into a few areas: acclimatisation, controls, training, and PPE. Engineering controls include increasing air velocity and/or air conditioning in indoor workspaces or breakrooms for outdoor workers, heat-absorbing barriers or reflectors, insulation, and the use of tools and machines to reduce the physical difficulty of the work. Acclimatisation of workers to hot environments should occur over a few days to weeks, with physical activity sessions of increasing length. This allows the body to adapt physiologically to heat, reducing the effect of higher temperatures [9,10].

Weather monitoring and work plans for extreme temperatures should be conducted. The work plans should include increased hydration, a buddy system to identify heat stress symptoms, rescheduling work times to cooler periods of the day, increased duration of breaks, rotating jobs to minimise exposure, and having appropriate first aid available. Specifically, there should be means to cool the person as quickly as possible. PPE to reduce exposure to UVR is important, such as cool, loose, long-sleeved clothing, neck wraps, hats, and sunscreen. Training workers and supervisors on signs and symptoms of heat stress and dehydration and how to reduce the risk of heat stress (including clothing, PPE and effects of other factors such as alcohol and nutrition on heat tolerance) is essential training is also required on all available controls and first aid [9,10].

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# SERVICE DELIVERY

By Karen du Preez

## National Biobank

The NIOH fields a multidisciplinary team of experts dedicated to promoting healthy and safe working environments in the workplace in South Africa, the African region and globally. With specialities ranging from occupational medicine and epidemiology to workplace policies and programs, NIOH's staff provide a comprehensive suite of services to employers, workers, government agencies and other stakeholders. In this issue, **Ms Karen du Preez** puts the spotlight on the **National Health Laboratory Service Biobank Section.**

A Biobank is a type of biorepository that stores biological samples for use in analysis and research. The National Health Laboratory Service (NHLS) has the vision to secure and manage collections of human biomaterials that are representative of the genetic resources within South Africa (SA) and Africa at large for research, biodiversity conservation and biotechnology development, for the benefit of society. The National Biobank, a division of the NHLS, was established in 2012 in response to the growing burden of disease in South Africa, and relocated to the National Institute of Occupational Health (NIOH) in 2014.

The National Biobank supports the NHLS laboratories, SA Military Health Service (SAMHS), private institutions and the international research community. It is unique amongst biobanks and caters for research communities in cancer, cell culture, genetics, molecular biology, diagnostic pathology, health technology and medical therapies.

### The relevance, importance, and benefits of Biobanking

South Africa's biodiversity presents a unique opportunity to generate a strong mass of scientific expertise. Human tissue biobanks have been recognised as the driving force behind the next revolutionary wave of scientific and technological advancement. Biobanking forms the foundation of bio-economy and accelerates research and development by strengthening the biosecurity and sustainability of biological samples. It further strengthens the ability to map population flow, evolution of diseases and sources of epidemics. Biobanking promotes the early development of prevention and treatment strategies through the application of modern technology, and accelerates opportunities for global collaboration and secondary use of samples to increase statistical confidence.

### Quality Management

The National Biobank is certified for ISO 9001:2015, making it the first biobank in Africa to obtain certification. Biobank staff members are certified with the International Aviation and Transport Authority (IATA) and registered with the Health Professions Council of South Africa (HPCSA), ensuring guidelines for good practice are adhered to. The Biobank follow best practices as published by the International Society for Biological and Environmental Repositories (ISBER).

### Activities, Membership and Networks

The National Biobank actively participates in education and training, staff development, technology transfer, and infrastructure development, with activities influencing policy, legislation, and regulations. Recent training activities included Biobank training in Vietnam as well as the Africa Centres for Diseases Control and Prevention Biobank Network, where the NHLS also serves as an adviser. International Biobank Membership and Biobank Networks also include the International Society for Biological and Environmental Repositories (ISBER), the European, Middle Eastern & African Society for Bio preservation and Biobanking (ESBB), the World Health Organisation (WHO) and the Medical Biorepositories of South Africa (MBirSA).

## Future Strategy

The focus of the National Biobank is to be a knowledge-hub. It will continue to archive data and samples, to remain a reference hub for samples and data use now and in future, providing for multi-disciplinary use of resources.

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The NHLS National Biobank is located in the NIOH Building in Braamfontein.


Africa CDC Biobank Training conducted by NHLS Biobank staff.

Infrastructure at the Biobank include ultra-freezers.

# TEACHING AND TRAINING

## Waterborne Pathogens and the World of Work Workshop

The National Institute for Occupational Health's (NIOH) Immunology & Microbiology Section is facilitating a two day "waterborne pathogens and the world of work workshop" scheduled for 12-13 March 2025.

For enquiries e-mail "ZubaydahK@nioh.ac.za" / "info@nioh.ac.za".
for more details visit nioh webste www.nioh.ac.za

# NIOH SERVICES

| Section | Services | Contact person |
|---|---|---|
| **Analytical Services** | Analytical Services makes available to a wide range of users analytical services in occupational hygiene, biological monitoring, and some clinical laboratory tests. | Head of Section<br>Dr Boitumelo Kgarebe<br>Tel: +27(0)11-712-6410<br>E-mail: boitumelok@nioh.ac.za |
| **Immunology & Microbiology** | **Bioaerosols laboratory**<br>Bio-risk management workshop to different professionals in the workplaces | Ms Onnicah Matuka<br>Tel: 011 712 6487<br>Email: dikeledim@nioh.ac.za |
| **Information Services and Training** | **Archive**<br>Documenting and preserving the institutional memory and create access points to the rare and unique information resources showcasing how the institute has evolved over time. These records stretch as far as 1912, they include personal papers, conference papers, registers, obsolete instruments, photographs etc. | Mr Simphiwe Yako<br>Tel: 011 712 6518<br>Email: simphiwey@nioh.ac.za |
| **Pathology Division** | **Training laboratory technical staff:**<br>The laboratory performs practical training of technical laboratory staff enrolled as medical laboratory scientists, and laboratory technologists in the histopathology disciple. | Ms Sharlene Naidoo<br>Tel: 011 712 6595<br>Email: sharlenen@nioh.ac.za |
| **Toxicology and Biochemistry** | **United Nations Globally Harmonised System of Classification and Labelling of Chemicals (UNGHS)**<br><br>The Toxicology Department facilitates the UNGHS workshop to train individuals who handle hazardous chemicals in their workplaces in the identification and management of chemical hazards according to GHS classification criteria. | Dr Wells Utembe<br>Tel 0117126741<br>Email: wellsu@nioh.ac.za |
| **Occupational Medicine** | **Advisory services**<br>Advisory services on the prevention and management of occupational diseases and disorders offered to organizations within the SADC region. | **Occupational Medicine Specialist referral clinic:**<br>Mr Jacob Senamolela<br>Tel: 011 712 6462<br>Email: JacobSe@nioh.ac.za |

| Section | Services | Contact person |
|---|---|---|
| **Occupational Hygiene** | **Occupational Hygiene Training Association (OHTA) Modules**<br><br>The Occupational Hygiene Section is an approved OHTA trainer, and provide training on the following modules:<br><br>Foundation level:<br>• OHTA201 Basic principles in Occupational Hygiene<br>Intermediate level – core modules:<br>• OHTA501 Measurement of Hazardous Substances<br>• OHTA503 Noise – Measurement and its effects<br>• OHTA505 Control of Hazardous Substances<br>• OHTA507 Health effects of Hazardous Substances<br>Intermediate level – optional modules:<br>• OHTA502 Thermal Environment.<br>• OHTA504 Asbestos and other fibres.<br>• OHTA506 Ergonomics Essentials. | Dr Jeanneth Manganyi<br>Tel: 011 712 6406<br>Email: JeannethM@nioh.ac.za |
| **Epidemiology & Surveillance** | **Training:**<br><br>Epidemiology and Biostatistics Training:<br><br>• Basic and Advanced courses.<br>• How to use routine surveillance data to improve the health of workers.<br>• How to use REDCap Protocol development for research on Occupational exposures and Health outcomes.<br>• Development of REDCap tools and other data collection tools.<br>• Research on work exposures and health outcomes in the workplace.<br>• Analyses of routine medical surveillance data.<br>• Developing analysis plans for surveillance data.<br>• Literature Reviews on occupational health topics.<br>• Evaluation of Surveillance systems.<br>• Advice and guidance around developing a surveillance system or advice for selecting a service provider for surveillance tools.<br>• Designing or conducting occupational health screening surveys along with staff satisfaction and mental health surveys in your workplace.<br>• Evaluation of training programs in occupational hazards, health and safety. | Asanda Jekwa<br>Email: AsandaJ@nioh.ac.za |

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