SUN, SAVVY AND SKIN: A REVIEW OF SKIN CANCER IN SOUTH AFRICA AND BEYOND

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HOW BAD IS IT?

CANCER INCIDENCE WORLDWIDE

1,570,500

2,203,500

612,900

103,700

649,800

GLOBAL BURDEN OF DISEASE: LIVING WITH CANCER

PERSONS LIVING WITH CANCER

CANCER CASES OF 30 YEARS OF AGE OR OLDER

CANCER CASES OF 75 YEARS OF AGE OR OLDER

CANCER DEATHS ANNUALLY

2030 = 27 MILLION CASES OF CANCER HAS II

75 MILLION CASES OF CANCER OF 30 YEARS OF AGE OR OLDER

14,570,000
GLOBAL PICTURE

POPULATIONS

SKIN CANCER
SKIN CANCER: THE NUMBERS GAME

Age-standardized deaths from skin cancers per 100 000 inhabitants in 2004, WHO Report 2009

- Most common type of cancer worldwide
- Increasing at an alarming rate (4.2% per year in the US)
- SA has second highest incidence in the world after Australia
- >700 South Africans die each year from skin cancer
WHAT MAKES SKIN SO SPECIAL?

- PROTECTION
- TEMPERATURE CONTROL
- SENSORY
- DEFINES US...

AS A SPECIES...

SKIN CANCER: WHAT IS IT?

AS A CULTURE...
IT’S TOUGHNESS AND ELASTICITY...
FOR EXPRESSION...
TYPES OF SKIN CANCER

BASAL CELL CARCINOMA (BCC)

BCC – 80-85% of non-melanoma skin cancers

BCC – Most common skin cancer, 10% worldwide

SQUAMOUS CELL CARCINOMA (SCC)

SCC – 15-20% of non-melanoma skin cancers

SCC – more likely to invade other tissues and leads to death

MELANOMA

Human melanomas, represent the least common skin cancer (5%) but causes 80% of deaths
MYTH

"MELANOMA IS A WHITE SKIN CANCER!!"

SAME NUMBER OF MELANOCYTES!!

South Africa, next to Australia, has one of the highest incidences of malignant melanoma in the world.

Reliable statistics for South Africa are lacking, however an estimate figure of develop malignant melanoma:
1 in 1449 people (the South African Cape region) or 1 in 1539 people (in Australia).

The incidence of melanoma increase for per 100 000 was
35% for males and 50.9% for females (from report 1990-1999 to report 2000-2003)

Source
CAUSES OF SKIN CANCER

1. SUN
UV-A – “AGEING” WAVELENGTH

UV-B – “BURNING” WAVELENGTH

MED = MINIMAL ERYTHEMAL DOSE
- Defined as the minimal dose/time needed to produce skin reddening

SPF = SUN PROTECTION FACTOR
- Defined as effectiveness of sun creams

(Personal photo, Martin Nilsson)
2. **CAUSES OF SKIN CANCER**

**Sunbeds = 97% UVA; 3% UVB**

**Habitual use of sunbeds under the age of 18 yrs – increases RISK of skin cancer**

- 28 Million Americans use artificial UV tanning
- Sunbed users increase RISK of NMSC by 2-3 fold
- >250 000 British children aged between 11-17 yrs use artificial UV tanning

**Certain areas of Britain, 50% of females between 11-17 yrs use artificial UV tanning**

*Source: Wikipedia*  
*Source: CANSA*
RISK FACTORS FOR SKIN CANCER

- IMMUNOSUPPRESSION
  - AIDS

- CERTAIN SKIN DISORDERS
  - Albinism
  - Vitiligo?

- SKIN LIGHTENING PRACTICES
  - Unregulated Hydroquinone based creams?

- HISTORY AND PRECURSOR LESIONS

- LIFESTYLE, ALCOHOL INTAKE AND SMOKING

- WORKING OUTDOORS
TREATMENTS FOR SKIN CANCER

- **SURGERY**
  - The physical removal of cancerous growth.
  - Most successful type of treatment.

- **CHEMOTHERAPY**
  - Use of cell-killing drugs.
  - Tends to kill fast-growing cells (including hair, skin).

- **IONIZING RADIATION**
  - Gamma or X-rays directed at tumors.
  - Kills or stuns growth of cancer cells.

- **PHOTODYNAMIC THERAPY (PDT)**
  - Use of Photosensitizing Agents
  - Use of Light for activation (Visible or UV or Laser)

What are we, as scientists, doing ?...
PHOTODYNAMIC THERAPY (PDT)

Topical / systemic application of photosensitizer

 Preferential uptake by tumor cells

 Activation by light

 ROS

 Oxidative damage

 Cell death

 TUMOR DESTRUCTION

Pictures are from an open access internet source.
PDT FOR DERMATOLOGICAL CONDITIONS AND SKIN CANCER

Dermatological conditions

Psoriasis

Acne

Actinic keratosis

Photorejuvenation

Melanoma

PIGMENTED

UNPIGMENTED

Non-Melanoma

Pictures are from an open access internet source
Melanomas display increased cytoprotection to hypericin-mediated cytotoxicity through the induction of autophagy, 
*Cell Bio Int, 2009*
**Lester M. Davids**, Britta Kleemann, Susan Cooper, Susan H. Kidson

Combating melanoma: The use of photodynamic therapy as a novel, adjuvant therapeutic tool, 
*Cancer Treatment Reviews, 2011*
L.M. Davids and B. Kleemann

Photodynamic therapy-induced killing is enhanced in depigmented metastatic melanoma cells, 
*Cell Bio Int, 2011*
Krishna V. Sharma, Natalie Bowers and **Lester M. Davids**

Depigmentation in melanomas increases the efficacy of hypericin-mediated photodynamic-induced cell death 
*Photodynamic Therapy and Photodiagnosis, 2012*
Krishna V. Sharma and **Lester M. Davids**
The Future ?...
TO USE A 3D EPIDERMAL SKIN CULTURE MODEL TO INVESTIGATE THE EFFECT OF PDT ON MELANOMA AND OTHER SKIN CANCERS
PREVENTION STRATEGIES

- **MINIMIZE SUN EXPOSURE**
  - 12-3PM peak sun hours
  - “Clever Clothing”
  - Sun block

- **AVOID ARTIFICIAL TANNING**

- **POLICIES AND MEDIA CAMPAIGNS**
  - SUNSMART Campaign
  - Petition to stop sunbed use

- **SUN SAFETY EDUCATION**

- **REGULAR DERMATOLOGICAL CHECK-UPS**
  - Health Cover for check-ups
  - “Love your Derm”

- **SCREENING**
  - Promotion & usage of free cancer screening programmes
IN SUMMARY.....
Why SA? What makes SA relevant/unique regarding skin cancer?

Heterogenous population of skin colours (Skin Type I – VI)

Second highest incidence of skin cancer in the world!!

Beautiful, attractive locations which we must utilise to launch anti-cancer campaigns BUT...

We **MUST** have a way to **regulate and quantify** the usefulness of these campaigns

**Research questions outstanding....**

Sponsored research into the molecular basis of chemo-resistance to cancer

Partnerships with cosmetic houses towards i) research
  ii) awareness..in SA

**Update statistics**

Epidemiological studies related to skin care and awareness
“Focus should be on the four pillars of cancer control: prevent those cancers which can be prevented; treat those cancers that can be treated; cure those cancers that can be cured; and provide palliation whenever palliation is required,”

Peter Boyle, Int Agency for Res on Cancer (IARC).
THANK YOU FOR YOUR TIME....

Cape Town 2010 World Cup Stadium at Night with V&A Waterfront in the foreground