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## Review on skin cancer using machine learning

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**Abstract**---Today, cancer is a deadly disease caused by a division that is unable to govern the abnormal cells in the human body. As a result, malignant cells grow rapidly and can invade and destroy nearby structures as well as spread to distant locations, ultimately leading to death. All live cells at all levels of the human body can be affected by cancer, regardless of gender. Skin cancer is on the rise these days as skin cells multiply and unrepaired DNA damage to those cells causes mutations. It has been established that basal cell, squamous, and melanomas are all separate types of skin cancer. Skin cancers of the melanoma and non-melanoma varieties are the most frequent. Melanocytes, the cells that produce the skin's colour, are malignant and capable of spreading to whole body. Additionally, it has the potential to spread throughout the body, posing a serious health risk or even resulting in death.

**Keywords**---skin cancer, machine learning, abnormal cells.

**Introduction**

Cancer treatment is still a major focus for experts around the world, despite recent improvements in the field. Existing therapy options show promise in terms of increasing treatment effectiveness, extending patients' chances of survival, and enhancing their quality of life while reducing harmful side effects. There are numerous varieties of skin cancer, and this page provides an overview of the features of each, as well as the prevalence of each and the current treatment options, which include advanced nanotechnology-based approaches. Our therapeutic options are continually being improved through the use of nanoparticles as carriers and better targeting of cancer cells' unique features. For the future of skin cancer treatment, we look at a few possibilities. **(Kristjan Orthaber,1 Matevž Pristovnik, n.d.)**

“About Skin Cancer”

Squamous Cell Skin Cancer Every year, more and more people are being diagnosed with skin cancer. Skin cancer is mostly caused by UV exposure because the ozone layer has been depleted, allowing enormous levels of UV radiation to reach the Earth's surface. 4,5 There are primarily two types of skin cancer. Melanoma is a dangerous kind of skin cancer. Non-malignant skin malignancies can be divided into two categories: basal cell carcinoma and seborrheic cancer. Both of these cancers are linked to long-term exposure to UV rays from the sun. A history of sunburn may be to blame for the development of MM. It is estimated that BCC and SCC account for 80% to 85% of all non-melanoma skin malignancies. SCC is more harmful and has been linked to a large number of fatalities. Early-stage skin cancers are treatable with simple surgeries or techniques, but there are no drugs that can effectively treat advanced skin cancers. The earlier disease may be detected and treated, the better. 8 Most skin cancers are BCCs, although there are also SCCs and melanomas, with the latter two accounting for the remainder.



Figure 1: Skin Cancer

#### Etiology

Environmental and host factors are to blame for NMSC's occurrence. Sunlight, ozone depletion, and chemical exposures are all linked to NMSC. HIPV, genetic susceptibility, skin tone, and immunosuppression are all factors that affect the host. Skin cancer is more common among outdoor workers since they “spend a lot of time in the sun”. Because of the ease with which they could be harmed by exposure to UV light. Weekend and holiday exposure to UV radiation contributes to long-term UV exposure in youngsters. **(V, 2013)**

#### A. “Types of Skin Cancer” :

Skin cancers of the basal and squamous cell types are most common. Prolonged exposure to the sun can cause them to form in the epidermis (the skin's outer layer). Cancer arises when the body's cells begin to multiply uncontrolled. Any part of the body can be affected by cancerous cells, which can then spread throughout the body. In order to acquire a better knowledge of what causes cancer to begin in the first place.

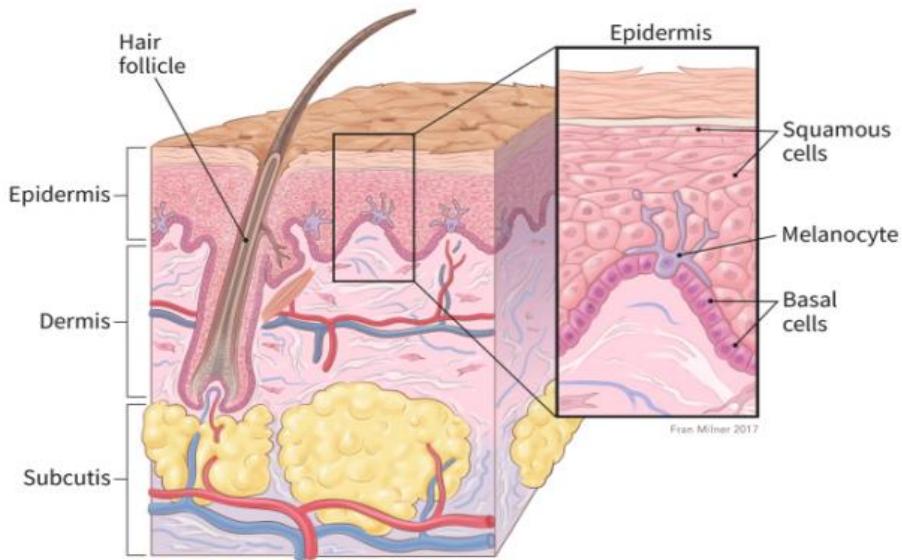


Fig 2

### Squamous Cell Carcinoma

New epidermis cells are continually forming and shedding these flat cells in the upper (outer) epidermis. Squamous cell skin cancer can develop when these cells grow out of control (also called squamous cell carcinoma).



Fig : 3

### “Basal Cell Skin Cancer”

Those cells are found in the epidermis's basal cell layer, which is located at the bottom of the skin. These cells divide continuously in order to replenish the squamous cells that are lost from the skin's surface. Squamous cells form as these cells progress through the epidermis.



Fig: 4 Basal Cell layer

### “Melanoma Skin Cancer”

“It is also known as malignant melanoma and cutaneous melanoma”. Most melanocytes in melanoma tumours continue to produce melanin, which results in dark or black tumours. When melanomas that do not produce melanin are discovered, they can be pink, brown, or even white in hue. When it comes to melanoma, men are more likely to get it on their chest and back, while women are more likely to have it on their legs. Other typical locations are the neck and face. The likelihood of developing melanoma on the hands, feet, or under the nails is lower if you have darkly pigmented skin, although anyone can develop the disease in any of these locations. More African Americans than whites are diagnosed with melanoma, largely because of the higher incidence of this type of cancer in this population. Eye, mouth, genital, and anal melanoma are less prevalent than skin melanoma, but they are possible. Other kinds of melanoma can occur. Much less commonly occurring are squamous cell carcinomas and melanomas, which are more severe types of skin malignancies. **(Martins RG, 2020)**



Fig: 5 Melonoma

### ***B. Causes of skin cancer***

Because most cancers are preventable by limiting one's time in the sun, this is an easy step to take. Ultra violet photons in sunshine, it was discovered, are detrimental to skin and DNA. Damage is permanent before it can be repaired because of a genetic mutation. Cancer development can be influenced by a

patient's genetic background in addition to environmental influences. **In addition, the most commonly occurring kind of cancer is melanomas are hereditary. (M. Imran Qadir, 2016)**

### Objectives

- To educate people about the dangers of sun exposure and how to avoid them.
- Provide more options for sun protection in outdoor settings.

To Reduce harms from indoor tanning

### Review of Literature

(Mathew, 2021) Deep Learning works better with unstructured data than with organized data. Current machine learning technologies are being outperformed by deep learning approaches. In this way, computer models are able to gradually learn features from data at different levels. Deep learning has grown in popularity as the amount of data available and the capabilities of computers have improved. This page covers a wide range of topics related to deep learning, including architectures, techniques, and applications.

(M, 2019) Diagnosing dermatological illnesses is one of the most difficult and expensive medical problems of the twenty-first century because of human interpretation difficulties and the high expenses of testing. When it comes to life-threatening diseases like melanoma, time is of the essence for early detection and treatment. To us, this is an excellent potential for automated systems to aid in the early detection of disease.

(Marc Rocholl, 2021) Exposure to ultraviolet light is the leading cause of skin cancer (UVR). Long-term and immediate effects of UVR exposure can be detrimental to students because of their high rates of sunburn and UVR exposure. This lack of a questionnaire that measures the amount of awareness about this problem is evident in German language surveys that measure "UVR exposure and sun-protection behaviour". Finding cross-sectional research on university students' awareness of "skin cancer and sun protection necessitated a Medline search".

(Abas Mouhari-Toure, 2021) This study focused on people with albinism (also known as "PWA") living in Togo. Method. Five dermatology consultation campaigns between 2019 and 2021 have been re-examined for PWA records. Results. The investigation led to the discovery of 517 PWAs. A total of 137 cases of skin cancer were reported by 64 PWAs (or 12.3 percent). The experiment's results showed a male:female sexual dimorphism of 0.9. Basal cell carcinomas were the most common form of skin cancer, accounting for 137 of the cases (45.9 percent). More than half (56.2%) of these skin cancers were found on the head and upper limbs; however (33 cases; 24.1 percent). Multivariate analysis found that the prevalence of actinic keratoses in the PWA population was a risk for skin cancer.

(Cristina Carrera, 2020) "Nonmelanoma skin cancer, squamous cell carcinoma, is the primary cause of skin cancer-related metastatic illness and mortality (SCC)". In terms of early sickness identification, better differential diagnosis, precise area

selection for biopsying, and noninvasive therapeutic monitoring, new imaging techniques including dermoscopy and reflectance confocal microscopy have improved diagnostic accuracy.

## **Prevention**

### A. “Current Trends in Sun Protection, Sunburn Indoor Tanning”

The Centers for Disease Control and Prevention (CDC) collects skin cancer risk behaviours in the United States through national YRBS and NHIS surveys. Students' health risk behaviours are monitored every two years by the national YRBS, which conducts a school-based cross-sectional survey every two years to track trends over time.

## **Indoor Tanning**

This national survey included students in classes 9 to 12 from both public and pvt. schools. 223 High-SPF sunscreen and indoor tanning are two of the topics covered in this survey. Non-institutionalized Americans are surveyed every year by the National Health Interview Survey (NHIS). For each household, 224 adults over the age of 18 and any necessary follow-up phone calls are contacted and questioned. Indoor tanning, sun sensitivity, and sun safety will all be examined as part of a future cancer prevention component of the National Health Interview Survey (NHIS) (NHIS).

Dietary supplement sponsored by the National Cancer Institute (NCI) as well as CDC's "Division of Cancer Prevention and Control."

### **“Indoor Tanning”**

High school students who have used an indoor tanning device, such as a sunlamp or sunbed (excluding a spray-on tan), at least once in the past year, according to YRBS data, are more than 12 percent of the population.<sup>132</sup> Females in the 12th grade (27.2 percent) and non-Hispanic white females in general were the most likely to engage in indoor tanning, as were students who were older and non-Hispanic white (30.7 percent). The general prevalence of indoor tanning device use decreased significantly between 2009 and 2013. (from 15.6 percent to 12.8 percent ). During the period from 2011 to 2013, the percentage of people who used an indoor tanning device remained at 13.3%. (12.8 percent ). Tanning beds are frequently used by more than half of students who participated in the 2013 YRBS survey.

### **B. “Reducing the Risk of Skin Cancer”**

Reducing UV exposure lowers your risk of developing skin cancer, which is why it's so important. While most Americans have had a sunburn at some point in the past year, only one out of every three adults in the country follows the government's recommendations for sun protection.

### **“For Individuals”**

Skin cancer, premature ageing, and damage to the eyes and skin are just a few of the problems that can be avoided with proper sun protection. In the context of a

holistic strategy, well-tailored, individual-focused methods can help reach certain subpopulations.

**When it comes to protecting oneself from the elements, densely woven protective clothing is essential.**

**In order to protect your head from the sun, wear a hat that covers your entire head.**

**Whenever possible, seek shade.**

**Outdoor activities should be avoided at times when the sun is at its highest (such as midday).**

- The use of sunblock (in conjunction with other sun protection behaviors).  
(Howard K. Koh, n.d.)

### ***B. Treatment***

To prevent cancer, it is apparent that those causes that cause chronic skin or mucous membrane irritation must be eliminated. As an example, it may be beneficial to familiarize young people with the effects of long-term exposure to sunshine on their skin. Older patients who have farmer's skin should be encouraged to change their jobs and avoid the sun if possible. When exposure to the sun cannot be avoided, a 15 percent paraaminobenzoic acid ointment sunscreen formulation can be given. Patients with leukoplakia may be helped by dental restorations and quitting smoking. Industrial control techniques in the U.S. currently provide excellent protection for workers exposed to carcinogens in the workplace, but this could not always be the case.

For patients who are at risk for occupational cancer and those with recurring or persistent leukoplakia, the physician must realize that long-term monitoring is critical. Any lesions that indicate abnormal changes should be evaluated by a doctor or specialist. Periodic medical exams are also recommended for anyone who works with radioactive materials or roentgen radiation. Treatment options for senile keratosis are dependent on the specific history and appearance of the lesions. Small keratoses that have not grown or changed on their surface can be left alone. (Fredrick . D, n.d.)

### **Treatment for BCC**

Basal cell carcinoma (BCC), also known as basal cell epithelioma, is the most common cancer in humans. On the other hand, BCC is rarely found on the mucous membranest. Excision, electrodesiccation & curettage (EDC), cryosurgery, and Mohs micrographic surgery are the most often used surgical methods for the treatment of BCC. The 5-year cure rates of such procedures are normally over 95%, and they are typically reserved for localized BCC. (Talel Badri; Robert B. Steele., 2021)

### ***C. Chemotherapy for skin cancer***

Topical chemotherapy may be an option if your advanced BCC has not spread to other places of your body. There are two choices:

- 5-fluorouracil
- Imiquimod

Cancer-fighting lotions can be applied topically to the skin. You can expect to use them for three to six weeks at a time. They can only handle skin malignancies

that have spread to the epidermis. If you have a deep tumor, topical chemotherapy won't be able to completely eradicate it.

“If your advanced BCC is metastatic, or has spread to other parts of your body”, you may need chemotherapy by IV. Rapidly proliferating cells are killed by these potent medications. The following are some of the possible adverse effects:

- “Nausea and vomiting”
- “Diarrhea”
- “Hair loss”
- “Loss of appetite”
- “Fatigue”
- “Fever”
- “Mouth sores”

Advanced BCC is rarely treated with chemotherapy. As a result, doctors frequently opt for more narrowly focused pharmacological treatments. **(Rachel Reiff Ellis, 2021)**

#### ***D. “Follow-up & Reducing Risk For Future Skin Cancers”***

When selecting the frequency of in-office screens for primary skin cancers such as basal cell carcinoma, clear cell carcinoma, and melanoma, it is important to evaluate the risk of each patient. High-risk lesions may require a lymph node basin clinical assessment as part of the physical examination. Studies and registries show that patients who have had at least one cSCC are more likely to acquire BCC and melanoma in the future. Patients who have been diagnosed with cSCC in the years following their original diagnosis have been prescribed a variety of topical and oral treatments in an effort to lower their chance of developing another SCC or skin cancer. However, the evidence supporting these agents is conflicting at best. Skin cancers and actinic-keratosis have not been reduced by topical application of retinoids in persons who have previously had keratinocyte malignancies. **(J Am Acad Dermatol, 2019)**

#### **“HOW TO EXAMINED”**

Before focusing on specific problematic lesions, a methodical inspection of the patient's skin should be used to allow for a visual scan of the entire surface. This includes the palms and nails, as well as the spaces between toes and the body.. A person's entire body should be scrutinized from the front to the back, including the intertriginous areas. It is recommended that the genital and oral mucosae be checked if the patient has given permission. In addition to a mix of direct visual examination and palpation, a close focus should be placed on the head and neck region. Examining skin lesions under a microscope with a dermascope can provide information about the deeper layers of the skin when performed by a trained professional.

#### **Conclusion**

The rate of new cases of skin cancer is rising at an alarming rate. Simple procedures and techniques can cure skin cancer, however advanced skin cancer can't be adequately treated with any drug. As a result, early disease detection and treatment are essential. Approximately 80% of all skin malignancies are BCCs, with the remainder being SCCs (16%) and melanoma (4%). Skin cancer is mostly

caused by UV-A and UV-B rays. Because they are exposed to skin cancer on a regular basis, outdoor workers are more likely to develop skin cancer. Because of this, a person's risk of skin cancer is best assessed by taking preventative measures like using sunscreen lotion. "In the early stages of skin cancer, it is possible to treat it; nevertheless, the chances of curing skin cancer improve with time".

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