Review Paper

TECHNOLOGICAL APPLICATIONS IN SKIN CANCER PREVENTION

RUNNING HEAD: Technological Applications in Skin Cancer Prevention

ABSTRACT

In the United States, skin cancer is the most common cancer diagnosed. The three types of skin cancer are basal cell carcinoma, squamous cell carcinoma, and melanoma. Of those, basal and squamous cell carcinomas are the most diagnosed skin cancer types. Both of which are curable, however they can mar skin in addition to being expensive to fight. Melanoma places in third for being diagnosed. While melanoma is less frequently diagnosed, it is the deadliest type of skin cancer when it is diagnosed [1]. All three types of skin cancer are linked to ultraviolet light rays which come from the sun, tanning beds and sunlamps. The checklist for early detection includes being aware of changes to your skin, visiting a licensed dermatologist or primary care physician to receive a body scan and assess for any skin concerns. By the same token, phone apps, recognition technologies, and devices for early detection have become a few of the forward-thinking prevention techniques for the future because of the knowledge that early detection leads to a better survival outcome. These phone apps analyzing digital images of moles and lesions for instance and determining the risk of cancer.

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KEYWORDS*: Skin Cancer, Basal Cell Carcinoma, Squamous Cell Carcinoma, Melanoma, Ultraviolet radiation, early detection*

INTRODUCTION

A person's largest organ is their skin. The scientific name is for your skin is epidermis. Since the 1970s, the United States and the United Kingdom have both seen a 200 percent increase in the diagnosis of melanoma carcinoma [2]. In the year 2017, it is projected at least 87,000 new diagnoses of melanoma will occur, with over 9,000 people dying from melanoma cancer. Twenty-five percent of people who are diagnosed with melanoma are under the age of 45. Early detection has helped in raising the survival rate of melanoma. This is because the melanoma tumors are discovered when they have a thinner depth. Alongside improved treatment and surgical techniques, early detection caused mortality rates to stabilize over the last 10 years [2]. This literature review will convey a better understanding of skin cancer. It will address early educational programs, giving a positive skin education early in life, global concerns regarding skin cancer and new technology for the early detection of skin cancer.

HEALTH PROMOTION AND DISEASE PREVENTION

Local communities are starting programs for educating children in positive attitudes and beliefs about sun behavior which could be promoted and supported by school policies and practices [3]. Globally, there are national campaigns for skin cancer and prevention. These campaigns are SPOT skin cancer promoted by The American Academy of Dermatology,

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ABCDEs of skin cancer promoted by the Skin Cancer Foundation and news articles promoting the benefits of wearing sunscreen [4].

HEALTH CARE DELIVERY: UNITED STATES

The United States ranks melanoma as the 5th most common cancer diagnosed in men. Women share this burden with the 6th placement for melanoma cancer diagnosis. It is costly to treat skin cancer. The cost has increased five times as fast as treatments for other cancers between 2002 and 2011 according to the American Journal of Preventative Medicine [5]. Estimated costs to treat all stages of diagnosed melanoma cancer reveal over 44 million dollars for Medicare patients with existing cases currently receiving treatment and over 930 million dollars for newly diagnosed cases across all age groups [6]. Individualized health care delivery and treatment will change depending on the stage of cancer. Progressive treatment plans proceed through ointment, surgery, differing types of therapies, and eventually palliative care if cancer becomes terminal.

HEALTH CARE DELIVERY: GLOBALLY

The United Nations addressed the effects of Ultraviolet (UV) radiation by introducing an INTERSUN Program at a conference in 1992. The INTERSUN Program has specific goals to provide information, practical advice, and sound scientific predictions on the health impact and environmental effects of UV exposure, to encourage countries to act to reduce UV-induced health risks and to provide guidance to national authorities and other agencies about effective sun

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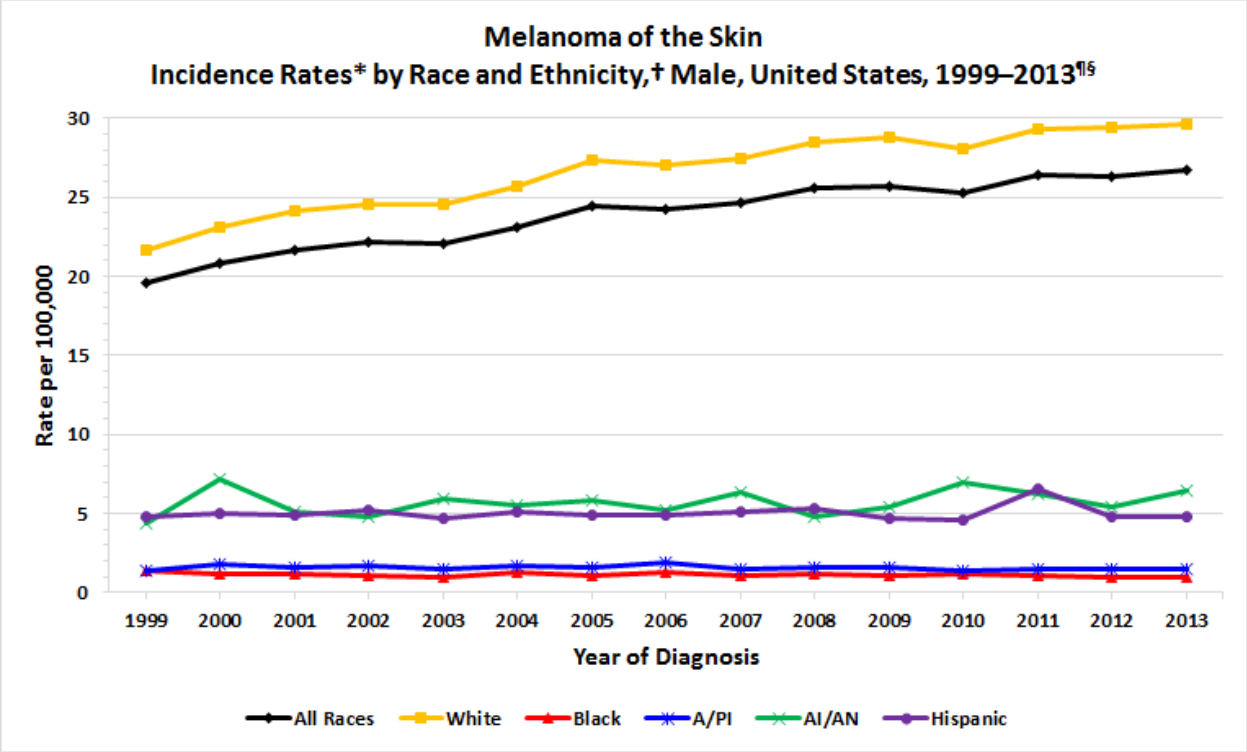
awareness programs [7]. The United Nations collaborated with skin experts from all over the world to create a global initiative to raise skin awareness.

PATTERNS OF DISEASE AND INJURY

Skin cancer is the most common cancer among Caucasian persons and it is increasingly diagnosed. In the year 2017, 6,380 males and 3,350 females are expected to die from melanoma in the United States [8]. Women are 70 percent more likely to develop melanoma before the age of 50. In contrast, men are 40 to 72 percent more likely to develop melanoma after the age of 50. Individuals should always be aware of their skin and see a dermatologist or personal physician regarding skin changes.



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Graph 1: Reflection: Melanoma in Caucasians [9].

DESIGN, METHODS, AND STRATEGY

The medical treatments for skin cancer are developed based on the types, stages and locations of the skin cancer on the patient. When the treatment is excision, the cure rate is 92% however, the cure rate drops to 77% if the cancer reappears [10]. Some treatments are not recommended for certain body sites such as the eyelids, genitalia, lips, ears, or other sites that would be left with cosmetically undesirable results, since the procedure leaves a sizable, hypo-pigmented scar. Most treatment methods include the removal of the cancerous lesion from the patient's body. Scarring from the tumor removal should be expected. Being said, the larger the skin lesion, then removal would often require reconstructive surgery which would involve a skin graft or flap to cover the defect.

TECHNOLOGY, LEGAL, AND ETHICAL

People are coming up with apps, recognition technologies and devices for early detection because of the knowledge that early detection leads to a better survival outcome. The SkinVision smartphone app states it allows users to take high quality pictures with the app's advanced camera, assess the skin cancer risk of their moles and skin conditions, and find out the unique recommendations based on their risk assessment [11]. A team at Stanford is trying to create an algorithm-based technology to coach a computer to pick up on pattern recognition. This technology is known as deep learning and essentially gives the computer the capability of

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applying basic rules when analyzing digital images of moles and lesions and determining the risk of cancer. The last technological advance is a non-invasive Raman spectroscopy system designed to aid medical professionals in the detection of skin cancer [12]. This device will quickly analyze the skin changes which are associated with skin cancer cells and give timely results. Legal and ethical issues with these apps and devices include who will have access to the photographs uploaded. New medical apps are released all the time without the consumer consideration of where their private being sent. When JAMA Dermatology examined the accuracy of 4 smart phone apps offered to help with early detection, they found three of the four incorrectly classified 30 to 93 percent of melanomas as nothing to be concerned about [13].

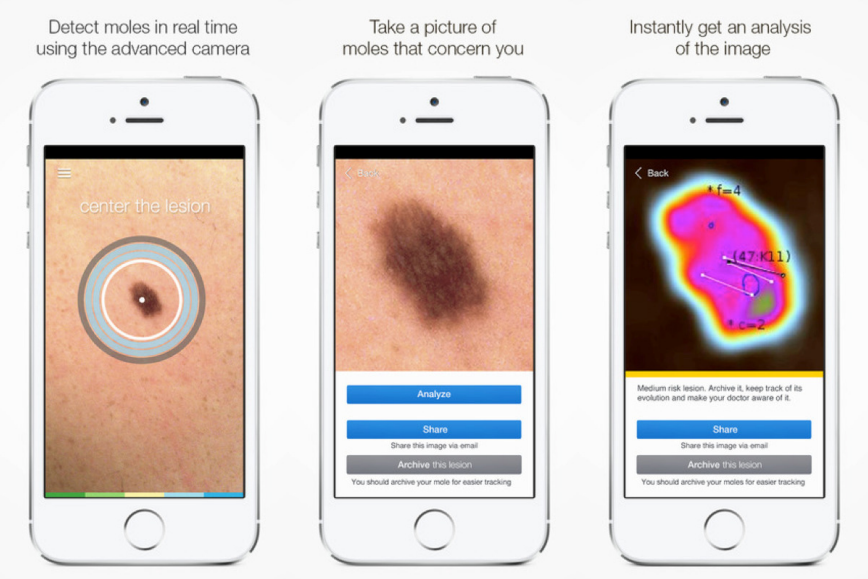

Image 1: SkinVision [11].

INTERDISCIPLINARY APPROACH: ACUTE AND LONG-TERM CARE

An interdisciplinary team will allow doctors to work together and see different perspectives, work in groups, and make the synthesizing of disciplines, to help their patients fight cancer [14]. Cancer is not a single disease that can be successfully treated with a single, generic approach. A

patient having an interdisciplinary approach will have the advantages of expertise in oncology, hematology, surgery, pathology, nurses and a collaboration of knowledge with insights for treatment [15]. The disadvantages of interdisciplinary approach include risks of miscommunication between medical professionals, specialist remaining silent, and not truly coordinating the patient's medical care. Immediate treatments for skin cancer include surgery, ointments, radiotherapy, cryotherapy, curettage, cautery, chemotherapy and other drug therapies. Terminal patients may receive palliative care to assist in the pain and help patients cope with any other emerging symptoms.

SKIN CANCER AMONG NATIONAL BORDERS, CLASS, RACE, ETHNICITY, AND CULTURE

Skin cancer does not discriminate against culture, ethnicity or class. However, if you are Caucasian you are 26 times more likely to develop melanoma while the Asian race is least likely to develop melanoma. Ten percent of people diagnosed with melanoma have a family history of this cancer but melanoma is not necessarily passed genetically. In contrast, colorectal cancer carries a specific gene that passes down within family genetics. Men are more likely to be diagnose with skin cancer; 205 out of 100,000 men are diagnosed with skin cancer annually while women are diagnosed at a rate of 165 out of 100,000 annually [17].

CONCLUSION

Educating children with correct and positive attitudes toward skin protection will help these children throughout their life. Getting the word out about Global skin cancer awareness programs developed and promoted by the United Nations to children in schools may raise awareness about the dangers of UV light and sun exposure. The most important items to learn

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are the importance of personal awareness of one's skin, changes that are happening on your own skin, changes that are happening on your own body, and having a medical professional available to consult if needed. In conclusion, early detection of skin cancer increases survival rates exponentially. Detecting skin cancer at an earlier stage is aided by understanding skin cancer, paired with the tools of early educational programs and supporting positive skin education in early life. The implementation of research on local and global levels will aid in the advancement of technology, creating programs to educate the population, and the ability to detect skin cancer at an earlier stage. Individual diligence will always be required in seeking treatment, but the medical community is aware and ready to assist in a timely manner.

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