Summer 2015

Basal Cell Carcinoma—A Preventable Disease

Jamie Weaver

Otterbein University, jamie.weaver@otterbein.edu

Follow this and additional works at: https://digitalcommons.otterbein.edu/stu_msn

Part of the Medical Pathology Commons, Nursing Commons, and the Skin and Connective Tissue Diseases Commons

Recommended Citation

Weaver, Jamie, "Basal Cell Carcinoma—A Preventable Disease" (2015). Master of Science in Nursing (MSN) Student Scholarship. 78. https://digitalcommons.otterbein.edu/stu_msn/78

This Project is brought to you for free and open access by the Student Research & Creative Work at Digital Commons @ Otterbein. It has been accepted for inclusion in Master of Science in Nursing (MSN) Student Scholarship by an authorized administrator of Digital Commons @ Otterbein. For more information, please contact shickey@otterbein.edu.
Basal Cell Carcinoma—A Preventable Disease
Jamie Weaver, BSN, RN
Otterbein University, Westerville, Ohio

Introduction
Basal cell carcinoma (BCC) is a non- melanoma skin cancer. According to the Skin Cancer Foundation, “BCC is the most frequently occurring form of all skin cancers. More than one out of every three new skin cancers is a BCC, and the vast majority are BCCs.” (www.skincancer.org)

Effects of Ultraviolet (UV) Rays
UV radiation is considered to be a “complete carcinogen” because of its ability to be both mutagenic and a non- specific damaging agent (D’Orazio et al., 2013). Properties of a tumor initiator and tumor promoter are found in ultraviolet light and excessive exposure can lead to “profound health risks, including atrophy, pigmentation changes, wrinkling, and malignancy” (D’Orazio et al., 2013). Once skin damage has been done, “Once a threshold has been exceeded, the keratinocytes become the key players...” (Kasper et al., 2012, p. 456).

Signs and Symptoms
Patients should be on the lookout for a lesion that looks like a pimple, but does not go away. This is a simple and effective way for any lesion that lingers over a month should be checked out. BCCs are typically found on sun- exposed areas such as the face, scalp, neck, ears, and shoulders (Thompson, 2010). The appearance of BCC is most common “a pearly pink or white, dome-shaped papule with prominent telangiectatic surface vessels that develop as the lesion changes” (Firnhaber, 2012, p. 14). Telangiectasias are appreciated using dermoscopy (dermatoscope with polarized light). BCCs are appreciated using dermoscopy techniques that can be used to differentiate BCCs from other skin cancers such as melanoma and squamous cell carcinoma. (D’Orazio et al., 2013). One’s skin tone is determined by how much melanin is produced by the body. Keratinocytes found abundantly in the epidermis accumulate melanin pigments as they are maturing. The epidemic melanin functions to block UV rays from penetrating the skin (D’Orazio et al., 2013). According to D’Orazio et al., “melanin exists in two main chemical forms: (1) eumelanin, a dark pigment expressed abundantly in the skin of heavily pigmented individuals, and (2) phaeomelanin, a light-colored sulfated pigment resulting from incorporation of cysteine into melanins precursors” (2013, p. 12224). The main determinant of skin complexion and sensitivity to UV rays is the amount of melanin (“natural sunscreen”) in the skin along with the type of melanin found in the skin of BCC (D’Orazio et al., 2013). UV rays are separated into UV-A, UV-B, and UV-C. These classifications are based on different wavelengths and energy levels. UV-C rays are mainly absorbed by the atmosphere, so only UV-A and -B are absorbed by the skin. The sun’s direct rays are UV-A, UV-B, and UV-C rays are absorbed by the epidermis (D’Orazio et al., 2013, p. 12233).

Pathophysiology
Baseline cell carcinoma arise in basal keratinocytes found in the epidermis, sebaceous ducts, and hair follicles (Firnhaber, 2012). These cells “have high proliferative potential, express keratin 5 and 14, express keratin 6a and 16, express keratin 10 and 19, express keratin 14 and 15, express keratin 17 and 19, express keratin 20 and 22, express keratin 23 and 24, express keratin 26 and 27, are sensitive to sensory neuromodulators, and are hypogonadal (Firnhaber, 2012).” Basal cell carcinomas arise in basal keratinocytes found in the epidermis, sebaceous ducts, and hair follicles (Firnhaber, 2012). These cells “have high proliferative potential, express keratin 5 and 14, express keratin 6a and 16, express keratin 10 and 19, express keratin 14 and 15, express keratin 17 and 19, express keratin 20 and 22, express keratin 23 and 24, express keratin 26 and 27, are sensitive to sensory neuromodulators, and are hypogonadal (Firnhaber, 2012).” Basal cell carcinomas are associated with exposure to UV rays (D’Orazio et al., 2013). “UV rays are divided into UV-A, UV-B, and UV-C. These classifications are based on different wavelengths and energy levels. UV-C rays are mainly absorbed by the atmosphere, so only UV-A and -B are absorbed by the skin. The sun’s direct rays are UV-A, UV-B, and UV-C rays are absorbed by the epidermis (D’Orazio et al., 2013, p. 12233).”

Melanocortin 1 receptor
The melanocortin 1 receptor (MC1R) is a critical genetic locus involved in pigmentation, the adaptive tanning response and skin cancer susceptibility. MC1R is found on the surface of melanocytes where it binds to alpha-melanocyte stimulating hormone (MSH) and transmits differentiation signals into the cells through activation of adenyly cyclase and generation of cAMP” (D’Orazio et al., 2013, p. 12223). Loss of signaling MC1R alleles are associated with up to a four fold increased lifetime risk of melanoma and other skin cancer” (D’Orazio et al., 2013, p. 12234-35).

Genetics & the Hedgehog (Hh) pathway
Since there are different appearances of BCCs, it is thought that the cell of origin could be proaggressive cell (Kasper et al., 2012). Stem and progenitor cells are thought to be the most probable sources of tumor initiation due to their longevity and ability to well “renew” (Kasper et al., 2012, p. 456). In basal cell carcinomas, the hedgehog (Hh) pathway seems to be impaired. The Hh pathway is responsible for transmitting information and plays a role in embryonic development, but also plays a role in adults as well (medical dictionary.thefreedictionary.com). With the impairment of the Hh pathway, this could explain why the immune system does not take care of the carcinomas cells when they first develop.

Melanin-Dependent Protection
One’s skin tone is determined by how much melanin is produced by the body. Keratinocytes found abundantly in the epidermis accumulate melanin pigments as they are maturing. The epidemic melanin functions to block UV rays from penetrating the skin (D’Orazio et al., 2013). According to D’Orazio et al., “melanin exists in two main chemical forms: (1) eumelanin, a dark pigment expressed abundantly in the skin of heavily pigmented individuals, and (2) phaeomelanin, a light-colored sulfated pigment resulting from incorporation of cysteine into melanins precursors” (2013, p. 12224). The main determinant of skin complexion and sensitivity to UV rays is the amount of melanin (“natural sunscreen”) in the skin along with the type of melanin found in the skin of BCC (D’Orazio et al., 2013). UV rays are separated into UV-A, UV-B, and UV-C. These classifications are based on different wavelengths and energy levels. UV-C rays are mainly absorbed by the atmosphere, so only UV-A and -B are absorbed by the skin. The sun’s direct rays are UV-A, UV-B, and UV-C rays are absorbed by the epidermis (D’Orazio et al., 2013, p. 12233).”

Conclusion
There is an epidemic of skin cancer in our society. The obsession with getting a tan is setting up society for future health issues that could have been easily prevented. It is important that people understand the importance of good skin protection practices at a young age, but it is also important for individuals to start treating their skin better. With proper education, hopefully the number of cases of this skin cancer will rapidly decrease.

References

Additional Sources
Dermatology Nursing. 30(4), 2012. 10.3390/ijms14122227. Immunological and Experimental Dermatology.