CLINICAL VIGNETTE

Unexpected Detection of a Basal Cell Carcinoma: Examining the Evidence for Fitzpatrick Skin Typing, Clinical Visual Skin Examination, and Behavioral Counseling for Skin Cancer Prevention in Clinical Practice

S. Anjani Mattai, MD

Case Presentation

A 45-year-old male presented to discuss weight management and was noted to have pale skin with freckles, a phenotype associated with Fitzpatrick Skin Phototype I. The patient had not seen a primary care physician for two years, and the evaluating physician advised him that his skin type predisposed him to sunburn and skin cancer and that he may benefit from a future formal skin evaluation and regular use of sunscreen. The patient then reported that he had noticed a growth on his left shoulder, which had been enlarging over the last year, and was now bleeding intermittently. Physical exam revealed an irregularly shaped, pearly 1.5 cm x 1.2 cm nodule with superficial telangiectasias and scant bleeding. The patient was referred to dermatology, and biopsy revealed basal cell carcinoma, infiltrative and nodular types. Subsequently, he underwent Mohs surgery with tumor-free margins.

Discussion

This case illustrates the use of the Fitzpatrick skin typing after casual skin inspection to predict an increased risk of skin cancer, and to counsel a patient to undergo formal skin examination and to wear sunscreen. The counseling prompted the patient to report a suspicious lesion on his left shoulder, and while the outcome of the brief exposed-skin survey during an encounter for weight management resulted in the detection of a basal cell carcinoma, the question arises as to whether there is evidence supporting the use of the Fitzpatrick skin type classification, visual skin examination, and sun protection counseling in clinical practice. This article examines the following questions:

1) What is the evidence for use of the Fitzpatrick skin type classification to predict skin cancer?
2) What is the current guideline for skin cancer screening with clinical visual skin examination in primary care?
3) Which patients should be referred to dermatology for skin cancer screening?
4) What behavioral counseling for skin cancer prevention is recommended in clinical practice?

<u>What is the evidence for use of Fitzpatrick skin types to predict skin cancer?</u>

While Fitzpatrick skin typing is now used by dermatologists to evaluate sun sensitivity and skin cancer risk,[1,2] it was originally developed in 1975 to determine the safe initial dose of UVA radiotherapy to deliver to patients undergoing PUVA (psoralen and UVA)—at that time a novel therapy for psoriasis. The Fitzpatrick scale stratified patients based on their subjective report of sensitivity to sunburn and ability to tan.[1-4] The skin of white individuals was categorized into Types I-VI, ranging from pale skin that always burns and never tans, to white to light brown skin that usually does not burn and tans easily and deeply (Table 1).[3] This risk stratification was used to adjust the PUVA dose.[1-3] Since that time the classification has expanded to include darker skin types (V-VI.) (Table 1)[3]

Table I[3]

Skin Phototype	Reactions after Sun Exposure		Unexposed Skin Color
	Burning	Tanning	
I	Always burns	never tans	pale white
II	Always burns	then tans	white
III	Sometimes burns,	may tan without prior burn	white
IV	Usually does not burn	tans easily and deeply	white to light brown
V	Rarely burns	tans easily	moderately pigmented
VI	Burns only with very high UVR dose	tans dark brown to black	darkly pigmented

Adapted from: Runger, TM. Cutaneous photobiology. In: Kang S, Amagai M, Bruckner AL, Enk AH, Margolis DJ, McMichael AJ, Orringer JS, eds. *Fitzpatrick's Dermatology*. 9th ed, New York: McGraw-Hill Edcuation;2019:265-288.

Fitzpatrick skin photoypes have been correlated with clinical phenotypes (hair color, eye color, and freckles) by quantifying an individual's sensitivity to sunburn.[5] Sensitivity to sunburn can be measured by determining the lowest dose of ultraviolet radiation required to produce erythema (minimal erythema dose, MED).[3] Low MED scores correlate highly with red hair, blue eyes, and highly freckled skin phenotypes.[5] Furthermore, skin type, hair color, and freckles are predictors of decreased minimal erythema.[6] Other studies demonstrate that Fitzpatrick skin types I-III have lower MED scores compared to type IV-VI.[7]

The use of Fitzpatrick skin types in clinical practice to detect cancer is based on the principle that chronic skin exposure to UV light can cause sunburn and suntan and that both lesions are sequelae of UV induced skin injury and DNA damage, which lead to DNA mutation and an increased risk for malignancy of all types (basal cell carcinoma, squamous cell carcinoma, malignant melanoma, and Merkel cell carcinoma.)[3,8] Indeed, long term therapy with PUVA increases the risk of squamous cell carcinoma,[9,10] and 15 years after the first treatment, the risk of malignant melanoma increases, especially among patients receiving 250 or more treatments.[11]

Type I skin (pale white skin that always burns and never tans) and Type II skin (white skin that always burns then tans) have the greatest risk for sunburn, UV radiation damage, and skin cancer.[11] Furthermore, the Fitzpatrick skin type is a stronger predictor of an individual's relative risk of developing non-melanoma skin cancer than hair and eye color.[4] Melanoma risk is also increased in association with phototypes of burning easily and tanning poorly, and phenotypes with freckles and light hair and light skin colors.[12] In solid transplant patients Fitzpatrick skin type can be used as a predictor of SCC development particularly when comparing patients with skin types I, II, or III to those of skin type VI.[13]

What is the current recommendation for skin cancer screening in primary care?

In a 2016 update to the 2009 US Preventive Services Task Force Recommendation Statement, The USPSTF again concluded that "the current evidence is insufficient to assess the balance of benefits and harms from screening for skin cancer in adults with a clinical visual skin examination." Potential harms of screening include overdiagnosis and unnecessary biopsies, and consequent cosmetic or functional impairment. Alternatively, failure to detect a nonmelanoma lesion could lead to local destruction and subsequent disfigurement; however, there is insufficient evidence in any population, including those with a family history of melanoma, that regular clinical visual skin examination using the ABCDE method (which assesses for asymmetry, irregular borders, variegated coloration, diameter > 6 mm, and evolving lesions) reduces skin cancer-related morbidity and mortality. Of note, while generalizable to all skin cancers, the USPSTF recommendation focused on melanoma because morbidity and mortality rates in melanoma greatly exceed other cancers.

Other groups, including the American College of Physicians, the American College of Preventive Medicine, and the American Academy of Family Physicians currently do not provide guidelines for skin cancer screening. The American Academy of Dermatology encourages self-examination.[14] The American Cancer Society recommends that adults 20 years and older have a skin examination as part of their general cancer-related check-up,[15] and additionally recommends monthly skin exams.[14]

Which patients should be referred to dermatology for skin cancer screening?

Currently there are no conclusions as to whether screening performed by primary care physicians, dermatologists, or plastic surgeons show differing accuracy.[15]

What behavioral counseling for skin cancer prevention is recommended in clinical practice?

In a 2018 update to the USPSTF 2016 Recommendation Statement, the Task Force reviewed behavioral counseling approaches for skin cancer prevention and concluded that "young adults, adolescents, children, and parents of young children should be counseled about minimizing exposure to UV radiation for persons aged 6 months to 24 years with fair skin types to reduce their risk of skin cancer;" they should be advised to avoid tanning beds, seek shade when outdoors, avoid midday sun exposure, wear sun-protective clothing, hats, and sunglasses and to apply and reapply sunscreen. Fair skin types include those with ivory or pale skin, light hair and eye color, freckles, or those who sunburn easily (consistent with Fitzpatrick phototypes I and II.) Similarly adults >24 years of age with fair skin types, and those who are at high risk for skin cancer such as HIV positive individuals, those with a family history of skin cancer, and solid organ transplant recipients may benefit from counseling. However, there is insufficient evidence for or against performing self-skin examinations.[14]

Conclusion

In this individual case, Fitzpatrick skin phototyping by the physician was used to predict an increased risk of cancer in a patient with Type I phototype/freckled phenotype resulting in detecting and treating a basal cell carcinoma and counseling the patient to undergo clinical visual skin examination and to wear sunscreen.

Currently, the USPSTF does not recommend for or against clinical visual skin exam in screening for skin cancer because evidence is lacking with regard to the harms and benefits of early detection and whether examination reduces morbidity and mortality. Furthermore, there is no evidence that accuracy of skin detection differs among care physicians, dermatologists, and plastic surgeons in detecting skin cancers.[15] There is some evidence that specific populations of children, young and adults with fair skin type as a well as high risk adults (HIV positive persons, those with a family history of skin cancer, and organ transplant recipients) should be counseled regarding sun protection behaviors.[14]

Given the lack of established evidence, the USPSTF recognizes that "clinical decisions involve more considerations than evidence alone." Understanding the evidence and individualizing decision-making to each patient is then a reasonable strategy. Since Fitzpatrick skin type can be used to predict an increased risk of malignancy, particularly with Types I or II, as in this case, its use as a tool in clinical practice may be helpful, until

the evidence suggests otherwise. Whether these patients should undergo screening with clinical visual skin exam or should be referred to dermatology can be addressed using shared-decision making, while skin cancer prevention counseling can be recommended based on the current evidence. In this case the identification of Fitzpatrick skin type to guide both screening and counseling resulted in the successful outcome of detecting a basal cell carcinoma. More RCT's will be needed to provide definitive guidelines, and the USPSTF agrees that a useful approach would be to focus on populations with a high burden of disease.

REFERENCES

1. **Fitzpatrick TB**. The validity and practicality of sun-reactive skin types I through VI. *Arch Dermatol*. 1988 Jun;124(6):869-71. PubMed PMID: 3377516.
2. **Weinstock MA**. Assessment of sun sensitivity by questionnaire: validity of items and formulation of a prediction rule. *J Clin Epidemiol*. 1992 May;45(5):547-52. PubMed PMID: 1588360.
3. **Runger, TM**. Cutaneous photobiology. In: Kang S, Amagai M, Bruckner AL, Enk AH, Margolis DJ, McMichael AJ, Orringer JS, eds. *Fitzpatrick's Dermatology*. 9th ed, New York: McGraw-Hill Education; 2019. Pgs 265-288.
4. **Eilers S, Bach DQ, Gaber R, Blatt H, Guevara Y, Nitsche K, Kundu RV, Robinson JK**. Accuracy of self-report in assessing Fitzpatrick skin phototypes I through VI. *JAMA Dermatol*. 2013 Nov;149(11):1289-94. doi: 10.1001/jamadermatol.2013.6101. PubMed PMID: 24048361.
5. **Andreassi L, Simoni S, Fiorini P, Fimiani M**. Phenotypic characters related to skin type and minimal erythemal dose. *Photodermatol*. 1987 Feb;4(1):43-6. PubMed PMID: 3615247.
6. **Azizi E, Lusky A, Kushelevsky AP, Schewach-Millet M**. Skin type, hair color, and freckles are predictors of decreased minimal erythema ultraviolet radiation dose. *J Am Acad Dermatol*. 1988 Jul;19(1 Pt 1):32-8. PubMed PMID: 3403743.
7. **Sachdeva S**. Fitzpatrick skin typing: applications in dermatology. *Indian J Dermatol Venereol Leprol*. 2009 Jan-Feb;75(1):93-6. Review. PubMed PMID: 19172048.
8. **US Department of Health and Human Services**. The Surgeon General's Call to Action to Prevent Skin Cancer. Washington (DC): Office of the Surgeon General (US); 2014. PubMed PMID: 25320835.
9. **Stern RS, Laird N, Melski J, Parrish JA, Fitzpatrick TB, Bleich HL**. Cutaneous squamous-cell carcinoma in patients treated with PUVA. *N Engl J Med*. 1984 May 3;310(18):1156-61. PubMed PMID: 6709010.
10. **Stern RS, Liebman EJ, Väkevä L**. Oral psoralen and ultraviolet-A light (PUVA) treatment of psoriasis and persistent risk of nonmelanoma skin cancer. PUVA Follow-up Study. *J Natl Cancer Inst*. 1998 Sep 2;90(17):1278-84. PubMed PMID: 9731734.
11. **Stern RS, Nichols KT, Väkevä LH**. Malignant melanoma in patients treated for psoriasis with methoxsalen (psoralen) and ultraviolet A radiation (PUVA). The PUVA Follow-Up Study. *N Engl J Med*. 1997 Apr 10;336(15): 1041-5. PubMed PMID: 9091799.
12. **Elwood JM, Gallagher RP, Davison J, Hill GB**. Sunburn, suntan and the risk of cutaneous malignant melanoma--The Western Canada Melanoma Study. *Br J Cancer*. 1985 Apr;51(4):543-9. PubMed PMID: 3978032; PubMed Central PMCID: PMC1977145.
13. **Gogia R, Binstock M, Hirose R, Boscardin WJ, Chren MM, Arron ST**. Fitzpatrick skin phototype is an independent predictor of squamous cell carcinoma risk after solid organ transplantation. *J Am Acad Dermatol*. 2013 Apr;68(4):585-591. doi: 10.1016/j.jaad.2012.09.030. Epub 2012 Oct 26. PubMed PMID: 23107311; PubMed Central PMCID: PMC3562416.
14. **Henrikson NB, Morrison CC, Blasi PR, Nguyen M, Shibuya KC, Patnode CD**. Behavioral Counseling for Skin Cancer Prevention: Evidence Report and Systematic Review for the US Preventive Services Task Force. *JAMA*. 2018 Mar 20;319(11):1143-1157. doi: 10.1001/jama.2017.21630. Review. PubMed PMID: 29558557.
15. **US Preventive Services Task Force, Bibbins-Domingo K, Grossman DC, Curry SJ, Davidson KW, Ebell M, Epling JW Jr, García FA, Gillman MW, Kemper AR, Krist AH, Kurth AE, Landefeld CS, Mangione CM, Phillips WR, Phipps MG, Pignone MP, Siu AL**. Screening for Skin Cancer: US Preventive Services Task Force Recommendation Statement. *JAMA*. 2016 Jul 26;316(4):429-35. doi: 10.1001/jama.2016.8465. PubMed PMID: 27458948.