Nodular Melanoma Serendipitously Detected by Airport Full Body Scanners

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Abstract

Background: Nodular melanoma is the most dangerous form of melanoma and often evades early detection. Methods: We present a frequently traveling businessman whose nodular melanoma was detected by airport full body scanners. Results: For about 20 flights over 2 months, the airport full body scanners singled out an area on his left lower leg for a pat-down. Dermatologic examination discovered a nodular melanoma in this area, and after surgical excision, the man traveled without incident. Conclusion: This case raises the possibility of using full body imaging in the detection of melanomas, especially of the nodular subtype. In its current form, full body scanning would most likely not be sensitive or specific enough to become a recommended screening tool. Nonetheless, for travelers with areas repeatedly singled out by the machines without a known justification, airport scanners could serve as incidental free screening for suspicious nodular lesions that should prompt dermatologist referral.

Fig. 1. A full body scanner image such as this one was rendered after the patient went through a scanner on four separate occasions.

Introduction

The incidence and mortality rates of melanoma have risen throughout most of the world for the past several decades [1]. Nodular melanoma, the most aggressive type of melanoma, accounts for only 14% of all melanomas but comprises 37% of fatal cases [2]. Nodular melanomas grow faster and present thicker at diagnosis than other types. Often evading early detection, they typically do not adhere to the ABCD warning signs of melanoma and frequently can be amelanotic [3].
mented papule with irregular borders and mild variation in color (fig. 2). Biopsy yielded a nodular melanoma: 1.35 mm thickness, nonulcerated, mitotic rate 2/mm². He underwent wide local excision and sentinel node biopsy, which was negative. Since the excision, the patient has gone through the airport scanners approximately 40 times, and the scanner has not once flagged his left lower leg.

Discussion

Starting in June 2013, all airport full body scanners in the USA utilize millimeter wave technology, which in order to identify metallic and nonmetallic threats, bounces nonionizing electromagnetic waves off a person’s body to create three-dimensional images of what lies underneath clothing [4]. While no previous reports exist of airport scanners detecting melanoma, scientists have created other three-dimensional imaging devices, such as a handheld device called MelaFind, in order to specifically detect melanoma [5]. While this device’s sensitivity for melanoma can be as high as 98%, its specificity is under 10% [6], and the device is not intended to be used for some of the most dangerous melanomas, such as those that are amelanotic or acral [5]. Therefore the need remains for technology that can reliably detect all manifestations of nodular melanoma.

This case raises the possibility of using full body imaging in the detection of melanomas, especially of the nodular subtype. In the past, however, the public has raised concern over the safety of full body scanners. Yet, the radiation from a millimeter wave scan is less intense than the background radiation emitted by cell phone towers in urban cities. The scanners’ radiation is in the 24- to 30-GHz range, and 90% of the radiation is lost once it reaches a depth of 1 mm in the skin. If the scanners function as designed with this low dose of nonionizing radiation, scientists do not believe that the machine should cause any harm. At higher doses, the mechanism of injury would most likely be via heating – not DNA damage – and therefore damage from repeated scans should not be cumulative or carcinogenic [7].

Although safe, in its current form full body scanning would most likely not be sensitive or specific enough to become a recommended screening tool. For example, the machines presumably would flag large seborrheic keratoses and other common growths. Nonetheless, for travelers with areas repeatedly singled out by the machines without a known justification, such as a prior surgery or implant, airport scanners could serve as incidental free screening for suspicious nodular lesions that can then prompt dermatologist referral. In the future, scientists should further explore this technology to determine if it can be refined for the detection of occult cancers.

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Fig. 2. A hyperpigmented papule with irregular borders and mild variation in color overlying the left lower leg.

References

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