

Basal Cell Carcinoma Arising From an Infantile Hemangioma Treated With Gold Radon Seeds

Carmine N. Palladino, MD; Elizabeth Cook, MD; Melanie A. Clark, MD

PRACTICE POINTS

- Historical use of ionizing radiation to treat skin disease is a risk factor for basal cell carcinoma (BCC).
- Mohs micrographic surgery is the treatment of choice for BCC in high-risk areas such as the nose, eyelids, and lips, where tissue conservation and complete margin control are essential.
- Elderly patients should be screened for less common sources of radiation exposure for better risk stratification and to determine appropriate intervals for follow-up with a dermatologist.

To the Editor:

Basal cell carcinoma (BCC), which is the most common type of skin cancer, typically arises on sun-damaged skin as a result of long-term exposure to UV radiation. Another known risk factor for BCC is exposure to ionizing radiation, though this is less commonly encountered.¹ We present a unique case of a BCC arising at the site of an involuted infantile hemangioma that had been treated with implanted and retained gold radon seeds more than 7 decades prior. This case highlights the importance of obtaining a detailed history of radiation exposures to better counsel patients about skin cancer risk and manage disease in complex skin locations.

A 75-year-old woman presented to an outside dermatologist for evaluation of a pink papule on the right upper cutaneous lip that had enlarged over several months (Figure 1). The patient's medical history was remarkable for an infantile hemangioma present since shortly after birth in the same location that had been treated with 10 implanted gold radon seeds when she was 6 years old. Over her lifetime, several seeds had self-extruded from

the area, but some remained within the subcutaneous tissue as confirmed by dental radiographs. A shave biopsy of the papule demonstrated a superficial BCC, and the patient was referred to our institution for Mohs micrographic surgery.

Intraoperative frozen sections revealed both superficial and nodular BCC, and the tumor was cleared in 3 stages. During surgery, a gold radon seed was visualized at the base of the excised BCC and was removed from the subcutaneous tissue (Figure 2). The primary defect on the upper lip was closed with a rotation flap. The patient returned for follow-up 2 months later and showed good healing and cosmetic outcome.

Although not commonly encountered, ionizing radiation is a known risk factor for BCC.¹ Basal cell carcinoma arising from implanted gold radon seeds represents a minority of reported cases.^{2,3} Radium was first used to treat skin disease in the early 1900s.¹ The radioactive decay of radium produced tissue destruction via alpha, beta, and gamma particles, which slowly released over weeks when radium was packaged into a capsule.⁴ Following implantation of the capsule, DNA damage occurred due to double-stranded breaks, chromosomal aberrations, and generation of reactive oxygen species. The downstream effect of these cellular insults resulted in cell-cycle shortening, apoptosis, and carcinogenesis.⁵

Gold radon seeds were used to treat infantile hemangiomas in the United States and Europe from the early 1940s to the 1960s; their use declined dramatically in the 1950s due to adverse effects and discovery of the potential for future malignancies as well as the development of safer and more effective treatments.^{1,3} Our patient received a substantial dose of ionizing radiation from the implantation of gold radon seeds at the site of the

From the Department of Dermatology, Medical College of Wisconsin, Milwaukee and Froedtert Health System, Milwaukee.

The authors have no relevant financial disclosures to report.

Correspondence: Melanie A. Clark, MD, Department of Dermatology, Medical College of Wisconsin, 8701 W Watertown Plank Rd, Milwaukee, WI 53226 (mclark@mcw.edu).

Cutis. 2025 May;115(5):160-161. doi:10.12788/cutis.1212



FIGURE 1. A, A 75-year-old woman with a superficial basal cell carcinoma on the right upper cutaneous lip. B, The patient at 6 months of age with an infantile hemangioma that arose shortly after birth in the same location.

infantile hemangioma, which dramatically increased her risk for BCC in this location.

Infantile hemangiomas are the most common vascular tumors in children. Most infantile hemangiomas regress spontaneously and are stably involuted by about 5 or 6 years of age.⁶ Treatment is indicated for rapidly growing hemangiomas that are at risk for ulceration or are located by critical structures (eg, the eyes or airway). Hemangiomas located on or near the lips should be treated to avoid disfigurement and loss of function as a consequence of rapid growth and involution.⁷ The treatment of choice for large or high-risk infantile hemangiomas over the past 10 to 15 years has been beta blockers.⁶⁻⁸ Propranolol hydrochloride, a systemic beta blocker, was approved by the US Food and Drug Administration in 2014 for the treatment of infantile hemangiomas and has demonstrated safety and effectiveness in promoting involution in these lesions.⁸ Unlike radiation therapy from implanted gold radon seeds, propranolol does not increase the risk for BCC. Although other risk factors such as skin type and cumulative UV exposure contribute to the development of BCC, the exact location of the BCC overlying the residual gold radon seeds was highly suggestive of ionizing radiation playing a major role in the carcinogenesis of the tumor in our patient.

Our case highlights the importance of screening elderly patients for exposures that may increase the risk

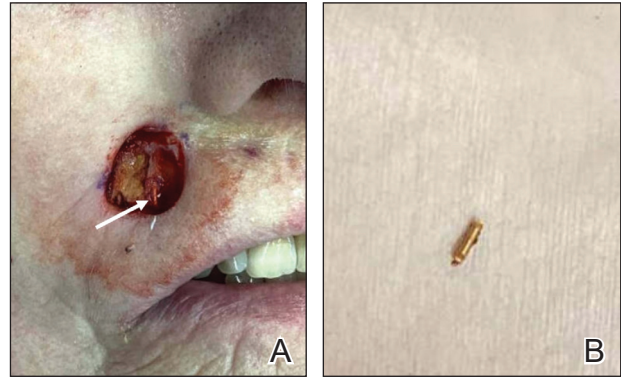


FIGURE 2. A and B, A gold radon seed was visible at the base of the excised basal cell carcinoma (white arrow) and subsequently was removed.

for skin carcinogenesis. Dermatologists are accustomed to asking about history of UV exposure, sunburns, and use of sun-protective measures; however, direct questioning about less common sources of radiation exposure also may help stratify a patient's risk for developing BCC. Although the US Preventive Services Task Force 2023 guidelines determined there is insufficient evidence to recommend visual skin cancer screening examinations in asymptomatic adults,⁹ we advocate for verbal screening of radiation exposure in both primary care and dermatology office settings. At a time when access to care, particularly dermatology services, is challenging, determining the appropriate interval for follow-up based on the patient's skin cancer risk is imperative.

REFERENCES

1. Fürst CJ, Lundell M, Holm LE. Radiation therapy of hemangiomas, 1909-1959. a cohort based on 50 years of clinical practice at Radiumhemmet, Stockholm. *Acta Oncol.* 1987;26:33-36. doi:10.3109/02841868709092974
2. Bräuner EV, Loft S, Sørensen M, et al. Residential radon exposure and skin cancer incidence in a prospective Danish cohort. *PLoS ONE.* 2015;10:E0135642. doi:10.1371/journal.pone.0135642
3. Weiss E, Sukal SA, Zimble MS, et al. Basal cell carcinoma arising 57 years after interstitial radiotherapy of a nasal hemangioma. *Dermatol Surg.* 2008;34:1137-1140. doi:10.1111/j.1524-4725.2008.34229.x
4. Lavery MJ, Lorenzelli D, Crema J. A radon seed identified during skin surgery: an unusual finding. *Clin Exp Dermatol.* 2021;46:604-606. doi:10.1111/ced.14454
5. Robertson A, Allen J, Laney R, et al. The cellular and molecular carcinogenic effects of radon exposure: a review. *Int J Mol Sci.* 2013;14:14024-14063. doi:10.3390/ijms140714024
6. Rodríguez Bandera AL, Sebaratnam DF, et al. Infantile hemangioma. part 1: epidemiology, pathogenesis, clinical presentation and assessment. *J Am Acad Dermatol.* 2021;85:1379-1392. doi:10.1016/j.jaad.2021.08.019
7. Krowchuk DP, Frieden IJ, Mancini AJ, et al. Clinical practice guideline for the management of infantile hemangiomas. *Pediatrics.* 2019;143:E20183475. doi:10.1542/peds.2018-3475
8. Sebaratnam DF, Rodríguez Bandera AL, Wong LF, et al. Infantile hemangioma. part 2: management. *J Am Acad Dermatol.* 2021;85:1395-1404. doi:10.1016/j.jaad.2021.08.020
9. US Preventive Services Task Force, Mangione CM, Barry MJ, Nicholson WK, et al. Screening for skin cancer: US Preventive Services Task Force recommendation statement. *JAMA.* 2023;329:1290-1295. doi:10.1001/jama.2023.4342