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Improving BCC Screening in Childhood Cancer Survivors Through Risk Modeling

Ryan Quigley:
Welcome to *AudioAbstracts* on ReachMD. I'm Ryan Quigley and today, I'll be exploring new evidence supporting age-based screening for basal cell carcinoma, or BCC, in childhood cancer survivors.

With long-term survival after childhood cancer now exceeding 85 percent, risk-based screening strategies for subsequent neoplasms in adult survivors are at the forefront of care. BCC stands out as one of the most common subsequent neoplasms in this population, with survivors of childhood cancer facing a 30-fold higher risk of BCC compared with the general population.

The Children's Oncology Group, or COG, Long-Term Follow-Up Guidelines recommend annual dermatologic screening for survivors exposed to radiation therapy or hematopoietic cell transplantation. These recommendations are appropriately cautious, but they don't incorporate age-specific risk, cumulative dose gradients, or chemotherapy exposures that may meaningfully modify risk trajectories.

A recent large-scale modeling study offers a more individualized approach.

Using data from 23,166 survivors in the Childhood Cancer Survivor Study—and externally validating findings with 5,314 participants from the St. Jude Lifetime Cohort—investigators developed prediction models estimating BCC risk by ages 40 and 50.

They found that the cumulative incidence of BCC in the Childhood Cancer Survivor Study reached 5.2 percent by age 40 and 14.7 percent by age 50. In the St. Jude Lifetime Cohort, estimates were even higher—6.6 percent and 21.2 percent, respectively.

Using machine learning—specifically XGBoost—the researchers created one dose-specific model incorporating cumulative radiation and chemotherapy dosing and another simple model based on categorical exposure history.

Both models outperformed risk stratification based on current COG Long-Term Follow-Up Guidelines, with significantly better discrimination and precision at both age thresholds. In external validation, the dose-specific model achieved an AUROC of 0.75 at age 40 and 0.76 at age 50, substantially exceeding COG-based classification.

Importantly, key predictors extended beyond radiation exposure alone. Age at childhood cancer diagnosis, hematopoietic cell transplantation, cranial and neck radiation therapy dose, and cumulative exposure to anthracyclines and alkylating agents were among the strongest predictors in the dose-specific model. This broader exposure profile helps explain why clinically meaningful risk may emerge in some survivors without a history of radiation or hematopoietic cell transplantation.

Perhaps the most notable finding lies in risk reclassification. The models stratified survivors into low risk, or less than five percent, moderate risk, which was five to 19 percent, and high risk, which was 20 percent or higher. By age 40, more than a third of survivors who would automatically qualify for screening under COG guidelines were reclassified as low risk using the dose-specific model. Conversely, by age 50, nearly 30 percent of survivors who were not recommended for screening under COG guidance were identified as moderate or high risk with the model.

These findings suggest that younger survivors may be screened more intensively than is necessary, and older survivors without classic exposures may be underrecognized.

We should keep in mind that this was a retrospective cohort study, and while externally validated, both cohorts were largely composed of Non-Hispanic White survivors treated decades earlier. Plus, the models didn't incorporate ultraviolet exposure, skin phototype, or newer therapies such as immunotherapy. So, as treatments evolve, these prediction tools will likely require updating.

Even so, the models can help address an urgent present-day need: a growing cohort of adults now entering their fourth and fifth decades after childhood cancer.

In survivorship care, risk is rarely binary. This study demonstrates that BCC screening doesn't have to be either.

This has been an *AudioAbstract*, and I'm Ryan Quigley. To access this and other episodes in our series, visit ReachMD.com, where you can Be Part of the Knowledge. Thanks for listening!

Reference

Im C, Boull C, Lu Z, et al. Basal cell carcinoma risk prediction in survivors of childhood cancer. *J Natl Cancer Inst.* 2025;117(11):2352-2361. doi:10.1093/jnci/djaf228