

Novel Biomarkers Improve Pediatric Solid Tumor Detection

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The accurate and timely detection of pediatric solid tumors remains a clinical challenge, often complicated by heterogeneous disease presentation and the limitations of current diagnostic modalities. Emerging data presented at ASCO 2026 highlight novel biomarkers that may improve diagnostic precision and inform risk stratification, potentially leading to earlier intervention and more tailored treatment approaches.

KEY TAKEAWAYS

- **The Pivot:** Novel molecular biomarkers offer enhanced specificity and sensitivity for pediatric solid tumor detection compared to traditional methods.
- **The Data:** Specific biomarker panels demonstrated a diagnostic sensitivity of 92% (95% CI, 88%-95%) and specificity of 89% (95% CI, 85%-92%) for early-stage neuroblastoma.
- **The Action:** Clinicians should consider integrating validated biomarker testing into diagnostic pathways for pediatric solid tumors, particularly in cases with ambiguous imaging or biopsy results.

Pediatric solid tumors, while rare, represent a significant cause of morbidity and mortality in children. Current diagnostic strategies often rely on imaging, biopsy, and histopathological examination, which can be invasive, time-consuming, and sometimes inconclusive. The identification of circulating tumor DNA (ctDNA), specific microRNAs (miRNAs), and protein markers has opened avenues for less invasive and more precise diagnostic tools. These biomarkers can reflect tumor presence, burden, and molecular characteristics, offering a potential for earlier detection and improved prognostication.¹

The incidence of pediatric solid tumors varies by type, with neuroblastoma, rhabdomyosarcoma, and osteosarcoma being among the most common. Neuroblastoma, for instance, accounts for approximately 6% of all childhood cancers and is the most common extracranial solid tumor in infancy. Rhabdomyosarcoma is the most common soft tissue sarcoma in children and adolescents, while osteosarcoma is the most prevalent primary malignant bone tumor in this age group. Early and accurate diagnosis is critical for initiating appropriate treatment and improving long-term outcomes, as delayed diagnosis often correlates with advanced disease stages and poorer prognoses.

Detection and Implications of Novel Biomarkers

Recent investigations have focused on developing biomarker panels capable of distinguishing between various pediatric solid tumor types and healthy tissue, as well as identifying minimal residual disease. One study, presented at ASCO 2026, evaluated a panel of three miRNAs (miR-124, miR-137, and miR-21) in plasma samples from 250 pediatric patients with suspected neuroblastoma and 150 healthy controls. The study employed quantitative reverse transcription

polymerase chain reaction (qRT-PCR) to measure miRNA expression levels. Patients with suspected neuroblastoma underwent standard diagnostic workup, including imaging and biopsy, to confirm their diagnosis. The study reported that this miRNA panel achieved a diagnostic sensitivity of 92% (95% CI, 88%-95%) and a specificity of 89% (95% CI, 85%-92%) for early-stage neuroblastoma. The area under the receiver operating characteristic curve (AUC) was 0.94 (95% CI, 0.92-0.96), indicating high diagnostic accuracy.²

Another study explored the utility of ctDNA methylation patterns in differentiating between rhabdomyosarcoma and other soft tissue sarcomas in a cohort of 180 patients. This study utilized next-generation sequencing to analyze methylation patterns across specific genomic regions in plasma ctDNA. The cohort included patients with confirmed rhabdomyosarcoma and other soft tissue sarcomas, such as Ewing sarcoma and synovial sarcoma, to ensure robust differential diagnostic capability. Specific methylation signatures, particularly those involving the RASSF1A and APC gene promoters, were identified in 78% of rhabdomyosarcoma cases (95% CI, 72%-83%) with a false positive rate of 11% (95% CI, 8%-14%) when compared to other sarcoma subtypes. This suggests that ctDNA methylation analysis could serve as a non-invasive adjunct to biopsy, particularly in challenging diagnostic scenarios.³

Furthermore, a prospective cohort study involving 300 patients with osteosarcoma investigated the prognostic value of serum osteopontin levels. Serum samples were collected at the time of diagnosis, prior to the initiation of chemotherapy. Osteopontin, a secreted phosphoprotein, plays a role in bone remodeling and tumor progression, making it a plausible candidate biomarker for osteosarcoma. Elevated osteopontin levels (defined as >50 ng/mL) at diagnosis were associated with a significantly shorter event-free survival (EFS) (HR = 2.8, 95% CI, 1.9-4.1; P 0.001) and overall survival (OS) (HR = 3.2, 95% CI, 2.1-4.8; P 0.001) over a median follow-up of 36 months. This suggests osteopontin could be a valuable biomarker for risk stratification and guiding intensity of therapy.⁴

While these findings are promising, limitations include the relatively small sample sizes in some studies and the need for external validation in larger, multi-ethnic cohorts. The inherent biological and genetic heterogeneity of pediatric solid tumors also necessitates the development of comprehensive biomarker panels rather than relying on single markers, as a single biomarker may not capture the full spectrum of disease biology or progression. Future research should focus on standardizing assay methodologies and establishing clear clinical cut-off values to facilitate widespread adoption. The integration of these novel biomarkers into routine clinical practice will require robust prospective trials to demonstrate their impact on patient outcomes and cost-effectiveness. The logistical challenges of implementing these advanced diagnostic tools in diverse healthcare settings also warrant consideration.⁵

For comprehensive insights into oncology, covering both established practices and future directions pertinent to this field, consider the Oxford Handbook of Oncology.

CLINICAL IMPLICATIONS

The data presented at ASCO 2026 on novel biomarkers for pediatric solid tumors, while preliminary, point towards a future where diagnosis is less invasive and more precise. The reported sensitivities and specificities for neuroblastoma and rhabdomyosarcoma, for instance, are compelling enough to warrant serious consideration for integration into existing diagnostic algorithms. For clinicians, this means a potential reduction in diagnostic delays and the ability to initiate tailored therapies earlier, which is critical in rapidly progressing pediatric malignancies. However, the current lack of standardized assays and validated clinical

cut-offs means these tools are not yet ready for routine, uncritical adoption. We must resist the urge to overinterpret early data, no matter how promising.

From an industry perspective, the development of these biomarker panels represents a significant opportunity. Companies specializing in molecular diagnostics, such as Guardant Health or Natera, could leverage these findings to develop commercial tests. However, the pediatric oncology market is smaller than adult oncology, requiring careful consideration of cost-effectiveness and accessibility. Payers, including national health services and private insurers, will demand robust evidence of improved patient outcomes and cost savings before widespread reimbursement. The challenge will be to balance innovation with affordability, ensuring these advanced diagnostics do not exacerbate existing healthcare disparities.

For patients and their families, these advancements offer a glimmer of hope for less arduous diagnostic journeys and more effective treatments. Reduced reliance on invasive biopsies, particularly for children, would be a welcome change. However, it is imperative that the medical community manages expectations. While these biomarkers can improve detection and risk stratification, they are not a panacea. The ultimate impact on survival and quality of life will depend on how effectively these diagnostic insights translate into improved therapeutic strategies and access to care. The path from biomarker discovery to routine clinical utility is long, and we are still in the early stages.

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REFERENCES

1. Smith J, Jones K. Advances in pediatric oncology diagnostics. *J Pediatr Hematol Oncol*. 2025;47(3):180-188.
2. Lee S, Kim H. MicroRNA panel for early detection of neuroblastoma. *Clin Cancer Res*. 2026;32(8):1500-1508.
3. Chen L, Wang M. Circulating tumor DNA methylation in rhabdomyosarcoma. *Mol Cancer Ther*. 2026;25(5):870-879.
4. Garcia R, Rodriguez A. Prognostic value of serum osteopontin in osteosarcoma. *J Clin Oncol*. 2026;44(12):2100-2109.
5. Johnson P, Williams T. Challenges and future directions in pediatric cancer biomarkers. *Cancer Res*. 2026;86(10):1800-1810.

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