Short Communication

iMedPub Journals
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Medical & Clinical Reviews
ISSN 2471-299X

2024
Vol.10 No.4:55

An Overview of Neuroblastoma: From Symptoms to Advanced Treatments

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Received date: July 10, 2024, Manuscript No. IPMCR-24-19536; **Editor assigned date:** July 12, 2024, PreQC No. IPMCR-24-19536 (PQ); **Reviewed date:** July 26, 2024, QC No. IPMCR-24-19536; **Revised date:** August 02, 2024, Manuscript No. IPMCR-24-19536 (R); **Published date:** August 09, 2024, DOI: 10.36648/2471-299X.10.4.55

Citation: Zehner J (2024) An Overview of Neuroblastoma: From Symptoms to Advanced Treatments. Med Clin Rev Vol.10 No.4:55.

Description

Neuroblastoma is a malignant tumor that originates from neuroblasts, immature nerve cells primarily located in the adrenal glands and sympathetic nervous system. This cancer predominantly affects young children, particularly those under the age of 5 and is one of the most common cancers in infants. The behavior, prognosis and treatment of neuroblastoma can vary significantly, making it a complex condition to manage and study. Although the exact cause of neuroblastoma is unknown, a combination of genetic and environmental factors is thought to contribute to its development. Some cases are linked to inherited genetic mutations, though most occur sporadically. Research has identified specific genetic abnormalities, such as changes in the MYCN gene, which can affect the aggressiveness of the disease. Children with a family history of neuroblastoma or other cancers might be at higher risk, but most cases arise without a known family history [1-3].

Symptoms of neuroblastoma

The symptoms of neuroblastoma can differ based on the tumor's location and stage. Common signs include a palpable abdominal mass, which may cause pain or discomfort and changes in bowel or urinary habits. When the tumor impacts the spinal cord, it can lead to back pain or difficulty walking. In some instances, neuroblastoma can metastasize to the bones, lymph nodes, or bone marrow, resulting in symptoms like bone pain, fever and anemia. Diagnosis typically involves imaging studies such as ultrasound, CT scans, or MRIs to locate and assess the tumor, along with blood and urine tests to detect elevated levels of biomarkers associated with the disease, like catecholamines and their metabolites. Staging of neuroblastoma helps determine the extent of the disease and informs treatment decisions. The stages range from localized tumors (Stage 1) to those that have spread to distant organs (Stage 4) and staging also considers factors like the patient's age and the presence of specific genetic mutations [4-6]. Risk classification is vital for treatment planning, with patients categorized into low, intermediate, or high risk based on their disease characteristics and prognosis. Treatment approaches for neuroblastoma depend on several factors, including disease stage, patient age and genetic features of the tumor. Surgery is often the primary treatment for localized neuroblastoma, aiming to remove the tumor and affected tissue. High-dose chemotherapy followed by a stem cell transplant may be used, especially for high-risk cases involving bone marrow. Emerging treatments such as monoclonal antibodies and Chimeric Antigen Receptor (CAR) T-cell therapy are being investigated in clinical trials. Retinoids, or vitamin A derivatives, may also be used to induce differentiation of neuroblastoma cells and improve outcomes [7-8].

Prognosis for neuroblastoma

Prognosis for neuroblastoma varies widely influenced by factors such as age at diagnosis, tumor stage, genetic characteristics and treatment response. Generally, younger children or those with lower-stage disease have a better prognosis compared to those with advanced disease or adverse genetic features. Long-term follow-up care is essential for survivors to monitor for relapse or late effects of treatment, involving regular physical exams, imaging studies and assessments of growth and development. Ongoing research aims to enhance understanding of neuroblastoma develop new treatments and improve patient outcomes. Innovations in targeted therapies, genetic research and personalized medicine offer hope for more effective and less toxic treatment options. Clinical trials continue to explore new drugs, therapy combinations, and strategies to reduce relapse risk and improve survival rates, highlighting the need for a multidisciplinary approach to treating this challenging cancer [9-10].

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