Acute and Chronic Disease Reports

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Commentary

Leukaemia: Types and Effects on Human Health

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DESCRIPTION

Leukaemia, a complex and diverse group of blood cancers, represents a significant challenge in modern medicine. It affects people of all ages across the globe, presenting a spectrum of types with varying treatments and prognoses.

Types of leukaemia

Leukaemia originates in the bone marrow where abnormal white blood cells are produced. These cells, which typically aid in the body's immune response, multiply uncontrollably, displacing healthy blood cells. The main types of leukaemia are broadly categorized into acute and chronic forms, depending on the speed of progression and the type of white blood cell affected.

Acute leukaemia: This type progresses rapidly, with immature blood cells (blasts) accumulating in the bone marrow and interfering with normal blood cell production. Acute Lymphoblastic Leukaemia (ALL) primarily affects lymphoid cells, while Acute Myeloid Leukaemia (AML) affects myeloid cells. ALL is more common in children, whereas AML occurs more frequently in adults.

Chronic leukaemia: Progression is slower compared to acute leukaemia, allowing mature cells to partially function. Chronic Lymphocytic Leukaemia (CLL) affects lymphoid cells and is more prevalent in older adults. Chronic Myeloid Leukaemia (CML) affects myeloid cells and is characterized by the presence of the Philadelphia chromosome, a genetic abnormality that accelerates cell growth.

Treatment approaches vary significantly between acute and chronic forms. The classification of leukaemia types informs medical decisions, including the choice of therapies such as chemotherapy, targeted therapy and stem cell transplantation.

Effects on human health

Leukaemia exerts profound effects on human health, manifesting through a range of symptoms and complications. Common symptoms include fatigue, easy bruising or bleeding, frequent infections, weight loss and swollen lymph nodes. These arise due to the body's compromised ability to produce healthy blood cells and maintain immune function.

As leukaemia progresses, complications such as anemia (due to decreased red blood cell production), thrombocytopenia (low platelet count leading to bleeding tendencies) and increased susceptibility to infections become more prevalent. Additionally, the infiltration of leukaemic cells into organs such as the liver, spleen and central nervous system can cause organ dysfunction and neurological symptoms.

The diagnosis of leukaemia and its demanding treatment regimen can impose significant psychological and emotional stress on patients and their families.

Recent decades have witnessed substantial progress in understanding the molecular mechanisms underlying leukaemia, leading to the development of targeted therapies and immunotherapies. These advancements have revolutionized treatment strategies, offering more precise and effective options with reduced toxicity compared to traditional chemotherapy which are as follows.

Targeted therapy: Drugs targeting specific genetic mutations or proteins unique to leukaemia cells have shown potential in inhibiting cancer cell growth while sparing healthy cells. Examples include Tyrosine Kinase Inhibitors (TKIs) for CML and monoclonal antibodies for CLL.

Immunotherapy: Techniques like Chimeric Antigen Receptor (CAR) T-cell therapy control the patient's immune system to recognize and destroy leukaemia cells. This approach has demonstrated remarkable efficacy, particularly in relapsed or refractory cases of ALL.

Stem cell transplantation: Transplantation of hematopoietic stem cells (bone marrow or peripheral blood stem cells) offers a potential cure by replacing diseased bone marrow with healthy cells capable of producing normal blood cells.

Along with these treatments, challenges remain, including drug resistance, treatment-related complications and access to advanced therapies.

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Received: 27-May-2024, Manuscript No. ACDR-24-32135; **Editor assigned:** 31-May-2024, PreQC No. ACDR-24-32135 (PQ); **Reviewed:** 14-Jun-2024, QC No. ACDR-24-32135; **Revised:** 21-Jun-2024, Manuscript No. ACDR-24-32135 (R); **Published:** 28-Jun-2024, DOI: 10.35248/ACDR.24.8.221

Citation: Dutt A (2024) Leukaemia: Types and Effects on Human Health. Acute Chronic Dis. 8:221