MDS: Pediatric vs. Adult
From the clinics to molecular biology approach

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The myelodysplastic syndromes (MDS) are a group of clonal stem cell disorders characterized by cytopenia, ineffective hematopoiesis and hypercellular bone marrow.

Overall, MDS is the most common hematological malignancy in the elderly. In children the incidence is lower but effective treatment of both adults and children in the advanced stages of the disease is problematic. Some patients show a prolonged and stable clinical course without treatment, but most cases will eventually progress. Hematopoietic stem cell transplantation (HSCT) is the treatment of choice, but the outcome following HSCT is jeopardized if disease progression has occurred.

The clinical course of MDS can be divided into several distinct phases related to the percentage of leukemic blasts in bone marrow. In the early, indolent stage, affected individuals manifest only cytopenia.

Information on prognostic factors predicting progression or death is important in the planning of therapy. There have been few systematic attempts to define a prognostic score in pediatric MDS. A prognostic scoring system proposed by the British group1 assigned one point each to fetal hemoglobin (HbF), platelet count, and two or more cytogenetic abnormalities (FPC score). A significantly superior survival was found in children with an FPC score of zero. The score has not been applied to other large series of children with MDS mainly because HbF is not routinely evaluated in MDS patients The International Prognostic Scoring System (IPSS) was developed for adult MDS and includes weighted data on BM blast percentage, cytopenia, and cytogenetics, dividing patients into four prognostic groups. The IPSS has shown strong prognostic value in adults with MDS but not the same application to children.

The development of an effective treatment for MDS will require the characterization of the molecular mechanism that underlies stage progression. Many chromosomal abnormalities (e.g. 5q- and monosomy 7) have been detected in adult MDS patients and several studies of gene profile by cDNA microarray have been conducted on hematopoietic cells from adult MDS patients and the specific changes identified are likely to be biologically important markers for the various stages of this disorder. Cytogenetic alterations are well documented in pediatric MDS and chromosome 7 is frequently altered (monosomy 7 or deletion 7q). Although some of these alterations are associated to a poor prognosis, the molecular alterations involved in the initiation and evolution of the disease remain unknown.