An organization in Europe, European Leukemia Net (157), recommends that response to treatments for CML include measuring cytology at various intervals, that is, at 3, 6, 12, and 18 months (158). Cytogenic response at the time point of 12 months has been used as a primary endpoint in clinical trials for CML (159). The term "housekeeping gene" refers to a gene used in the ordinary, day-to-day, metabolism of a typical or generic cell in the body, and that maintains constant expression, even when drugs are administered (160). Another endpoint used in CML clinical trials is genetic response, that is, the ratio of expression of BCR-ABL1 gene to the *ABL1* gene or to another housekeeping gene.

II. MYELODYSPLASTIC SYNDROMES

a. Introduction

Myelodysplastic syndromes (MDS) are a group of disorders involving anemia, neutropenia, and thrombocytopenia. The anemia results in chronic tiredness and shortness of breath, the neutropenia results in increased infections, and the thrombocytopenia (low platelets) results in increased bleeding and bruising. Hence, where a patient presents with anemia, infections, and bleeding, the physician might reasonably suspect MDS. The MDS are distinguished in that they can lead to another type of cancer, namely, AML (161). Even though MDS can occur at any age, most patients are older, and just over 70% of MDS patients are age 70 or older (162).

According to Bacher et al. (163), the diagnosis of MDS is not straightforward and may require a combination of techniques, such as cytochemistry using various stains, flow cytometry (a technique where cells are tagged with fluorescent antibodies), FISH, which involves hybridizing fluorescent nucleic acids to fixed cells, and molecular markers.

According to Barzi and Sekeres (164), higher-risk MDS patients survive only about 1.5 years, while lower-risk MDS patients survive about 3–7 years. The life-threatening aspects of MDS are hematopoietic insufficiency associated with severe anemia and fatal infections due to

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