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Highlights: Focus on Bone Marrow Pathology

Commentary

Topics of recent advances in bone marrow pathology

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In the field of lymphoma, hematopathologists have played an important role in classifying and diagnosing lymphoma, as well as being responsible for treatment strategies. The pathological diagnosis should be made based on phenotypic, genotypic and morphological analysis. This concept is now also applied for other organ systems.

In hematopoietic neoplasms other than lymphoma, such as acute leukemia, bone marrow or peripheral cell morphology is the basis for morphological diagnosis, and phenotypic analysis by flow cytometry and genetic analysis support the morphological diagnosis. On the other hand, MDS and MPN are heterogeneous cell proliferative diseases that cannot be diagnosed by blast morphology. The incidence of MDS is recently increasing due to the aging society. Clinicopathological and genetic advances in MDS and MPN fields have aided in the development of specific molecule-targeting therapy.

Bone marrow pathology, such as lymphoma invasion, granulomatous diseases, metastatic tumors, tuberculosis, and fibrosis, has limited diagnostic significance for acute leukemia. However, the diagnostic significance of bone marrow pathology for MDS and MPN was recently reevaluated. In the WHO blue book, the number of attached histological figures has increased with each revision.[1-3]

Educational lectures on recent advances in bone marrow pathology were given at the Japanese Society of Hematopathology in Kumamoto in 2017. Lectures on MDS, MPN, myeloma, and pediatric bone marrow failure were given by specialists in these fields. In this issue, we asked each speaker to review the topics in each field.

For MDS, the diagnostic criteria were revised in 2016. Many erythroid-rich MDS cases were classified as AML-M6a by the previous classification because the definition of blast count was per non-erythroblast. The blast count was redefined to per bone marrow cell, which is the same as conventional leukemia. Dr. Kayano summarized recent advances in bone marrow pathology for MDS, especially regarding this point.

In the MPN classification, following the discovery of driver genes beginning from CML, the importance of identifying specific genetic abnormalities was proposed as a "molecular first" in the 2008 classification. In the 2016 revision, in order to advance the understanding of primary myelofibrosis (PMF), prefibrotic/ early-stage PMF was proposed, in which early lesions, such as ET, are separated from other MPN. Bone marrow pathology was more reliable than cytology or molecular analysis for diagnosing these lesions.[4] "Pathology first" is the main issue for MPN classification. Dr. Fujiwara reviewed the overall pathological diagnosis process for MPN.

In the 2008 classification, refractory cytopenia of childhood (RCC) was added as a provisional entity of MDS.[5] The pediatric hematology field was confused by this category because pediatric MDS is very rare. As the presented clinical features were similar with those of aplastic anemia, there was doubt as to whether patients had aplastic anemia, methods to distinguish RCC, and whether there a diagnosis of RCC was clinically significant. In the registration system of the Japan Society of Pediatric Hematology, aplastic anemia and MDS were independent of each other, but in 2009, the review system was centralized for evaluating RCC. As a result, many cases of pediatric bone marrow failure were registered, and the central diagnosis revealed the existence of aplastic anemia and morphologically diagnosed RCC.[6] In addition, advances in genetic analysis have improved discrimination from congenital hematopoietic failure. Based on the central review results, Dr. Iwafuchi reviewed the pathology of pediatric bone marrow failure, including RCC and RCMD.

Although it is a lymphoid neoplasm, plasma cell myeloma has been assessed by cytology because bone marrow is the main proliferation site. Therefore, it is difficult to

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consider the concept of MGUS as lymphoma. Dr. Fujino reevaluated myeloma by bone marrow pathology, and provided a review based on morphology, phenotype, and genes involved.

All reviews reflected the recent progress of bone marrow pathology, and are expected to guide the field of hematopathology in the future.

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