

Grupo Español de Citología Hematológica (GECH) recommendations for bone marrow aspirate cytological assessment and report

Recomendaciones generales del Grupo Español de Citología Hematológica (GECH) para la valoración del mielograma y la realización del informe citológico de médula ósea

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Abstract

The bone marrow cytological report must contain the essential information necessary to describe the morphological characteristics of the bone marrow aspirates. Diagnosis and treatment of patients, as well as their follow-up depend on the evaluation and interpretation of the bone marrow smears, together with the complementary tests. The GECH has developed a recommendation guideline for evaluating and reporting the bone marrow aspirate specimens. The essential parameters and the recommended information to be reported are indicated by full consensus. The recommendations arose from exhaustive literature review, as well as from the experience of the members of the GECH. Finally, we propose a helpful reporting prototype to perform a uniform and reproducible bone marrow aspirate report, which is adjustable to different hospital models.

Keywords: Bone marrow aspirate. Bone marrow report. Myelogram. Bone marrow cytologic examination.

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Resumen

El informe citológico de médula ósea debe contener la información necesaria para detallar las características morfológicas más importantes del aspirado de médula ósea. De su correcta interpretación, junto con el resto de los estudios complementarios, dependen el diagnóstico y el tratamiento de los pacientes, así como su seguimiento. Se aportan unas recomendaciones de consenso para la evaluación del aspirado medular y la redacción del informe citológico del mismo, elaboradas por los miembros del Grupo Español de Citología Hematológica (GECH). Se han aunado criterios para señalar la información indispensable y la recomendada. Las recomendaciones son el fruto de la revisión exhaustiva de trabajos publicados en la literatura y las aportaciones de los expertos del GECH. Finalmente, se propone un modelo de informe prototipo para ayudar a redactar de forma homogénea y reproducible el mielograma. Este documento es adaptable a los distintos centros hospitalarios.

Palabras clave: Médula ósea. Aspirado medular. Mielograma. Informe citológico de medula ósea.

Introduction

Bone marrow analysis is an essential part of hematologic diagnosis and patient follow-up. The myelogram interpretation is conducted by hematologists with a variable experience in the cytology diagnostic field. Thus, a great diversity arises in the style and content of bone marrow cytology reports. This lack of uniformity is, sometimes, followed by the omission of relevant information to interpret results, which can lead to errors in the hematological diagnosis and follow-up of the patient. Currently, due to the huge number of clinical trials available, a large number of patients are treated in different hospitals during the course of their disease. In these patients, the reproducibility of myelogram reports among the different institutions involved is of paramount importance. The Grupo Español de Citología Hematológica (GECH) has been working on a consensus document based on our own experience and the review of different clinical guidelines available in the literature to facilitate conducting bone marrow cytology reports. The recommendations described below detail data that should appear in the report, in addition to other information that should also be present for its correct interpretation. A prototypical draft report is provided to be used as a guide that can be adapted to the different hospital settings (see supplementary material).

Recommendations to assess and report the bone marrow aspirate cytology analysis

First of all, the report should include the patient's first and last name, sex, age, and number clinical record. The requesting physician should also be included, and the reason for the petition. Furthermore, procedural data should be included like the date when the bone marrow aspirate was drawn, a description of the puncture site, bone resistance when introducing the puncture needle, and both the quantity and quality of the material obtained. The material extracted for further studies (flow cytometry,

cytogenetics, molecular biopsy, microbiological studies, and others) should be reported, as well as if a bone marrow biopsy was performed. Peripheral blood smear analysis, essential while interpreting the bone marrow aspirate, should also be included in the report, although it is not considered part of the bone marrow cytology study *per se*. Other interesting additional data that should be included in the report are certain clinical data, laboratory test results (hemogram and reticulocyte count), and some treatments received like growth factors.

Bone marrow cytomorphological assessment should be performed from films of aspirate marrow extracted without an anticoagulant agent. The smear should be first examined with a low magnification objective ($\times 10$) to study spicules, cellularity, and the number of megakaryocytes, and detect the presence of non-hematopoietic cells. The amount of bone marrow cellularity seen will be compared to the amount of fat. However, we should mention that the best test to quantify both correctly is the bone marrow trephine biopsy. Subsequently, assessment using an objective of $\times 50$ is advised to study cellularity and the morphology of megakaryocytes. Finally, fine cytology details will be studied with oil immersion with $\times 100$ objective.

Afterward, the myelogram is performed, defined as the quantitative (percentual) and qualitative assessment of bone marrow cells. The count should include blasts, promyelocytes, myelocytes, metamyelocytes, bands, polysegmented neutrophils, eosinophils and basophils, promonocytes, monocytes, mastocytes, lymphocytes, plasma cells, and finally erythroblasts from which is useful distinguish their differentiation (pro-erythroblasts, basophils, polychromatic, and orthochromatic). Megakaryocytes or macrophages should not be taken into consideration in the percentual count of the myelogram. Metastatic cells, osteoblasts, and osteoclasts should not be taken into consideration either, however if spotted, they should be reported in a descriptively.

The cellular count should be performed on at least two smears. A minimum of 500 cells should be counted when an accurate count of some specific cells is needed. In the remaining cases, a minimum of 300 cells would be enough. When atypical cells are found at a percentage that is very close to the threshold for disease stratification or when they are very irregularly distributed, a larger count is advised to reduce the margin for error.

The myeloid/erythroid ratio should appear in the report as well. In this ratio, the myeloid population includes neutrophil, eosinophil, and basophil granulocytic series and monocytic ones. Myeloid looking blasts should be included in the myeloid population, especially when found in high percentage.

The blast count obtained by morphological assessment should not be replaced by the blast count. They complementary methods, but one cannot replace the other.

Descriptive comments on the morphology of each cellular line should always be included as long as they are essential to achieve an accurate diagnosis. In the remaining cases, these descriptive comments are often helpful in understanding the myelogram, which is why they should be included in the report as well. If enlarged, the mononuclear phagocyte system should be reported descriptively, reporting both content and morphologic alterations. Perls' stain is required to assess the presence of hemosiderin. Findings such as gelatinous degeneration, medullary necrosis, presence of crystals, and intra/extracellular microorganisms, among other, should be reported descriptively as well.

The final comment must be a myelogram summary with the most significant remarks. It must include the cellularity amount, the different hematopoietic series presence and proportional quantification, as well as their dysmorphic features (when necessary), and the percentage of abnormal cells to highlight in each case (blasts, plasma cells, or lymphocytes). Indicate here also if metastases, histiocytes, parasites, or other findings are observed.

If the information on Perls' stain and other crucial studies results to achieve diagnosis are available, such as hemogram, peripheral blood smear examination, other cytochemical analysis, immunophenotype, cytogenetics, molecular biology, and bone biopsy, they should be summarized at the end of the myelogram final comment, or instead, a final integrated report can be made with the results of all the studies. A final diagnostic orientation is recommended after including all the available information and taking into account the patient's clinical context. It is advisable to agree on the integrated diagnosis, whenever possible, all the specialists involved in the different studies plus the patient's treating clinician.

In the case of hematologic neoplasms, we recommend using the nomenclature following the last World Health Organization (WHO) classification for hematologic neoplasms and/or the current consensus classification nomenclature.

If the myelogram has been reviewed by more than just one physician, the final report should be signed by all of them.

A model of the report is attached herein with an example of how to complete each section. We should mention that this template is but a guide for completing the myelogram report. This document can be changed and adapted to each different hospital.

Supplementary data

Supplementary data are available at Revista Sangre online (DOI: 10.24875/SANGREE.M22000008). These data are provided by the corresponding author and published online for the benefit of the reader. The contents of supplementary data are the sole responsibility of the authors.

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Conflict of interests

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