PathMD™: Board Review Letter

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Case #1 A 50 y/o of female presents with numerous immature and erythroid cells comprising 90% of the marrow cells. Myeloperoxidase stain is negative, and the cells express glycophorin A by flow cytometry. Based on the histologic and flow cytometry findings, what is the best diagnosis?

Answer: D. This case represents pure erythroleukemia (AML-M6b). AML-M6b is defined as >80% of the marrow cells representing immature erythroid cells without evidence of a significant myeloblastic component. AML-M6a is when there is >= 50% erythroid precursors and >= 20% myeloblasts (counted as a percentage of the non-erythroid cells). AML-M7 is acute megakaryocytic leukemia. AML-M0 is undifferentiated AML, which is shown to be myeloid by flow cytometry. The PAS block positivity of the erythroblasts are characteristic of AML-M6b. (WHO, p. 97-99)

Case #2 A 65 y/o female has persistent anemia with no known cause. A bone marrow biopsy was performed and representative images of the aspirate, biopsy, and iron stain are shown. No significant findings were present in the granulocytic or megakaryocytic lineages. Based on the findings, what is the best diagnosis?

Answer: C. These findings are most consistent with the myelodysplastic syndrome (MDS) refractory anemia with ringed sideroblasts (RARS). RARS is characterized by anemia with >15% ringed sideroblasts and absence of dysplasia except for the erythroid lineage. The image in this case showed an erythroid cell with some bizarre budding. A ringed sideroblast is defined as 10 or more granules around at least 1/3rd of the nucleus of an erythroid cell on an iron stained smear. Numerous ringed sideroblasts are shown on the iron stain for this case. Dysplasia can not be present in the granulocytic or megakaryocytic lineage, or the process should be classified as a different type of MDS. Myeloblasts must also number less than 5%. (WHO, p. 69)

Case #3 A 6 y/o male presents with a pleural mass. A biopsy was performed and representative images and special stains are shown. Based on the findings, the best diagnosis is:

Answer: D. T-Cell ALL. The Tdt stain indicate immaturity and the CD8 limits the process to the T-cell lineage (although CD3 is the only lineage specific marker) . Ki-67 is very high and is characteristic of T-cell ALL, along with the starry sky appearance. ALL is characterized by small to intermediate sized blasts. Interestingly, T-cell ALL only comprises ~15% of leukemic ALL cases, but 85-90% of ALL lymphoma cases. (WHO, p. 115-117)

Case #4 A 45 y/o female presents with increased blasts in the peripheral blood (WBC = 50K) some which have an apple core morphology. A myeloperoxidase stain performed on the peripheral blood shows the blasts to have a high level of positivity in virtually all of the cells. Images for this case show the flow cytometry for this case. Based on these findings, the best diagnosis is:

Answer: B. This case illustrates a case of AML-M3. AML-M4 and M5 which have monocytic differentiation will have many cells that are negative for myeloperoxidase. This case was a hypogranular variant of AML-M3. On flow cytometry they will often have a teardrop morphology in the blast population. This blast population is shifted slightly to the right with brighter CD45 positivity and resembles a monocyte population on the CD45-SS plot. Interestingly, a higher frequency of AML-M3 hypogranular variants have aberrant expression of CD64 (monocytic marker) and CD2 (T-cell marker). Many of the cells in this case have weak CD34 and HLA-DR expression. Classically, AML-M3 are CD13 & CD33 positive and CD34 & HLA-DR negative. CD34 and HLA-DR are expressed on more immature cells. (WHO, p. 84-86)

Case #5 A 45 y/o male presents with a skull based lesion. A biopsy is performed, and representative images with special stains are shown. Based on the findings, the best diagnosis is:

Answer: B. Langerhan cell histiocytosis (LCH, a.k.a. eosinophilic granuloma) is characterized by S-100 and CD1a positive histiocytic cells. In Rosai-Dorfman, the histiocytes will be S-100 positive but CD1a negative. Rosai-Dorfman disease is also characterized by the histiocytes engulfing other nucleated cells and perivascular plasma cells.

Case #6 A patient presents with 70% blasts in the bone marrow aspirate. Cytochemical stains are performed and shown. Based on the findings, what is the proper FAB classification of this process?

Answer: D. This is a case of AML-M4Eo. The M4 subtype is supported by non-specific esterase (NSE, includes alpha naphthyl acetate esterase and butyrate) which stains >20% and <80% of the nucleated non-erythroid cells. Myeloperoxidase and / or Sudan black should stain >3% of the myeloblasts. Blasts must makeup >=20% of the nucleated bone marrow cells. (Naeim, p. 202-204; WHO, p. 94-96)

Question #1 AML-M2 is characterized by all of the following EXCEPT:

Answer: E. AML-M2 shows greater than 10% differentiation of myeloid cells and is composed of <50% erythroid cells. >= 3% of the cells will be myeloperoxidase positive (if less than 3% of the myeloblasts are positive for myeloperoxidase, then it will be classified as AML-M0). These myeloblasts are usually positive for CD13, CD33, and HLA-DR. The most frequent translocation associated with AML-M2 is t(8;21), which is the *AML1/ETO* gene fusion (approximately 20% of cases). (Naeim, p. 198-199)

Question #2 What is the minimum percentage of blasts is required in the peripheral blood to meet the criteria for a diagnosis of acute leukemia?

Answer: C. 20% blasts is the minimal requirement for the diagnosis of acute leukemia in both the bone marrow and the peripheral blood.

Question #3 What is the minimum percentage of blasts is required in the bone marrow to meet the criteria for a diagnosis of acute leukemia?

Answer: C. 20% blasts is the minimal requirement for the diagnosis of acute leukemia in both the bone marrow and the peripheral blood.

Question #4 AML-M2 with basophilia are more often associated with which of the following translocations?

Answer: D. Both A and C are correct. AML-M2 with basophilia is associated with both t(6;9) and t(12p). In general AML-M2 is associated with a long-term remission, but this does not occur in patients with AML-M2 Baso. (Naeim, p. 198-199)

References:

Tumors of Haematopoietic and Lymphoid Tissues. Jaffe, ES, et al. World Health Organization (WHO) Classification of Tumours. 2001.

Pathology of Bone Marrow. Naeim, F. Second Edition. 1998.

Notes for question set:[1]

[1] PathMD strives for the highest quality and accuracy. However, the *PathMD: Board Review Letter* is for review purposes and not meant for clinical decision making. It should not be used in place of review of primary reference texts and the current medical literature. If inaccuracies are identified, please notify us so that a correction may be published. (info@PathMD.com)

