

Interesting Images

# Extramedullary Hematopoiesis in Liver

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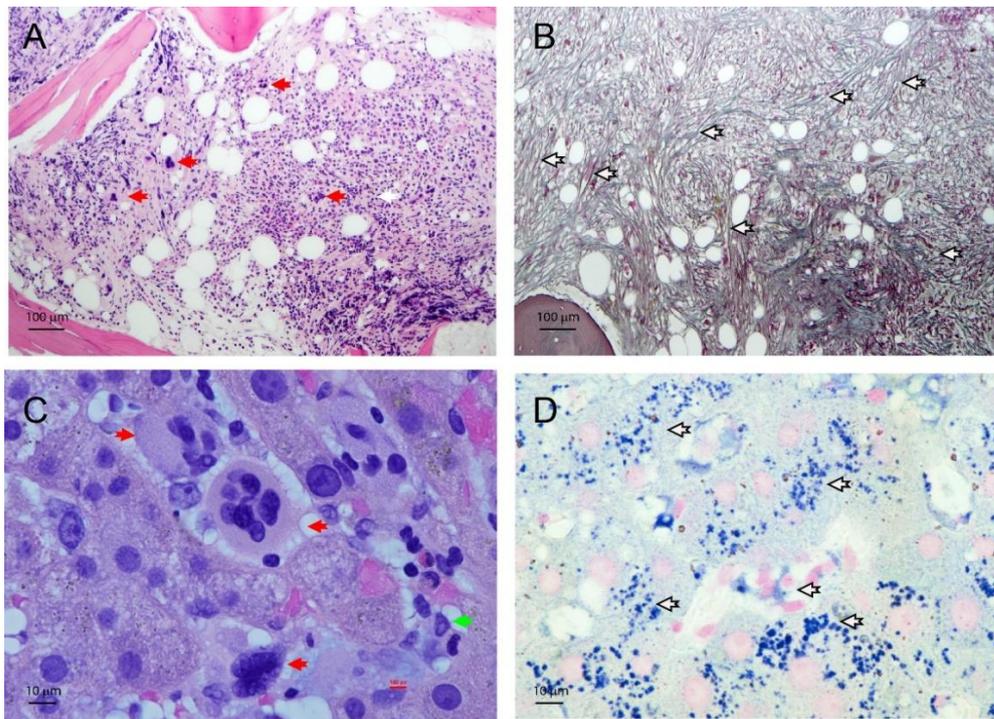
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A 71-year-old man had transfusion-dependent anemia due to primary myelofibrosis associated with *JAK2V617F* mutation. The peripheral smear showed leukoerythroblastic picture with teardrop and nucleated red blood cells. The bone marrow biopsy showed a hyperplastic bone marrow with megakaryocytic hyperplasia and extensive fibrosis in reticulin stain, which detects collagen fibers (Figure 1 A and B). He had moderate splenomegaly with a span of 19 cm (normal <13 cm), transferrin saturation of over 90% (normal <50%). He was being treated with oral deferasirox (iron chelator) for iron overload and with a combination of ruxolitinib (a JAK1/2 inhibitor) and luspatercept (a TGF- $\beta$  inhibitor) for myelofibrosis. He had progressive worsening of his liver functions with prothrombin time of 19.1 s (normal 12.0–14.7); activated partial thromboplastin time, of 47.8 s (normal 27.0–36.6), and albumin of 1.5 g/dL (normal 3.7–4.9). A liver biopsy was performed as an MRI scan showed a possibility of hepatic cell cancer and there were concerns about liver toxicity due to deferasirox. The biopsy showed non-cirrhotic liver parenchyma with brownish pigments and sinusoidal dilatation and congestion. Most remarkably there was extensive extramedullary hematopoiesis in the sinusoids as evidenced by the presence of megakaryocytes, myeloid and erythroid precursors (Figure 1 C). In addition, there is marked iron deposition due to multiple transfusions (Figure 1 D).

In adults bone marrow is the primary site of hematopoiesis. Extramedullary hematopoiesis occurs when hematopoietic stem cells lodge and differentiate in sites other than the bone marrow due to insufficient bone marrow microenvironment or abnormalities in hematopoietic stem cells as in myeloproliferative diseases [1]. The hallmark of extramedullary hematopoiesis is the presence of megakaryocytes. These large cells cannot pass through the pulmonary vasculature and be trapped and hence their presence denote de novo local hematopoiesis. The most common site of extramedullary hematopoiesis is spleen due to its filtering function. Liver also entraps circulating hematopoietic stem cells and promotes hematopoiesis via CXCL-12 expressed in sinusoidal endothelial cells [2].





**Figure 1.** (A), the H & E stain of bone marrow biopsy shows hypercellular marrow with prominent megakaryocytes (red arrows) and in (B), Snook's silver stain shows extensive fibrosis in the marrow (white arrows pointing black collagen strands). The H & E stain of liver biopsy shows megakaryocytes (red arrows) and myeloid precursors (green arrow) in the sinusoidal space in (C) and Prussian blue stain (D) shows marked increase iron deposition (white arrows) in liver cells and in myeloid cells due to iron overload.

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Both authors contributed equally.

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### Institutional Review Board Statement

This study was approved by the institutional review board of Baylor College of Medicine with a waiver of ethical review and informed consent (H-23175), as this study is a retrospective analysis of specimens collected for other diagnostic purposes.

### Informed Consent Statement

Informed consent waived as this study was a retrospective analysis of specimens collected for other diagnostic purposes.

### Data Availability Statement

Not applicable.

### Conflicts of Interest

The authors declare no conflict of interest.

### Use of AI and AI-Assisted Technologies

No AI tools were utilized for this paper.

**References**

1. Kapatia, G.; Kaur, A.; Rastogi, P.; et al. Extramedullary hematopoiesis: Clinical and cytological features. *Diagn Cytopathol.* **2020**, *48*, 191–196. <https://doi.org/10.1002/dc.24353>.
2. Mendt, M.; Cardier, J.E. Role of SDF-1 (CXCL12) in regulating hematopoietic stem and progenitor cells traffic into the liver during extramedullary hematopoiesis induced by G-CSF, AMD3100 and PHZ. *Cytokine* **2015**, *76*, 214–221. <https://doi.org/10.1016/j.cyto.2015.05.004>.