

A 7-week-old boy is brought to the clinic for the first time since discharge from the neonatal intensive care unit (NICU). The infant was born at 32 weeks gestation weighing 1800 g (4 lb) following a pregnancy complicated only by preterm labor. In the NICU, he initially had difficulty feeding. By age 6 weeks, he was taking an appropriate volume of fortified preterm formula and was gaining weight well. His parents report no problems since discharge. On examination, the infant is slightly pale. Cardiac auscultation reveals a 2/6 systolic flow murmur, but no tachycardia or gallop. Laboratory results are as follows:

Hemoglobin	7.8 g/dL
Hematocrit	24.1%
White blood cells	7,000/mm ³
Platelets	230,000/mm ³
Reticulocytes	0.8%

The peripheral smear shows normocytic, normochromic red blood cells. Which of the following is the most likely diagnosis?

- ☐ A. Alpha thalassemia
- ☐ B. Anemia of prematurity
- ☐ C. Beta thalassemia
- ☐ D. Glucose 6-phosphate dehydrogenase deficiency
- ☐ E. Hemolytic disease of the newborn
- ☐ F. Iron deficiency
- ☐ G. Sickle cell anemia
- ☐ H. Vitamin B₁₂ deficiency

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- ☐ A. Alpha thalassemia [2%]
- ☒ B. Anemia of prematurity [83%]
- ☐ C. Beta thalassemia [3%]
- ☐ D. Glucose 6-phosphate dehydrogenase deficiency [1%]
- ☐ E. Hemolytic disease of the newborn [3%]
- ☐ F. Iron deficiency [8%]
- ☐ G. Sickle cell anemia [1%]
- ☐ H. Vitamin B₁₂ deficiency [0%]

Proceed to Next Item

Explanation:

User Id: XXXXXXXXXX

Anemia of prematurity

Proceed to Next Item

Explanation:

User Id: [REDACTED]

Anemia of prematurity	
Etiology	<ul style="list-style-type: none"> • Impaired erythropoietin production • Short red blood cell life span • Iatrogenic blood sampling
Clinical manifestations	<ul style="list-style-type: none"> • Usually asymptomatic • Tachycardia, apnea, poor weight gain
Laboratory findings	<ul style="list-style-type: none"> • Low hemoglobin & hematocrit • Low reticulocyte count • Normocytic, normochromic red blood cells
Treatment	<ul style="list-style-type: none"> • Minimize blood draws • Iron supplementation • Transfusions

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Anemia of prematurity (AOP) affects most preterm infants, and the onset and severity of anemia are proportional to the degree of prematurity. After delivery, circulating erythropoietin (EPO) normally decreases due to increased oxygen concentration in tissue. Decreased EPO causes **decreased reticulocyte production** in bone marrow. As a result, a physiologic red blood cell (RBC) nadir is expected and occurs at age 2-3 months in term infants. In preterm infants, however, low EPO levels are exacerbated by **short RBC life span** (40-50 days) and **frequent phlebotomy** in the neonatal intensive care unit. This can result in a significant, early-onset anemia.

Most infants with AOP are **asymptomatic**. Those who do have symptoms generally have mild tachycardia, increased apnea, or poor weight gain. AOP often is a diagnosis of exclusion; hemolysis, enzyme defects, hemoglobinopathies, and infection should be ruled out. Laboratory studies show decreased hemoglobin and hematocrit and a low reticulocyte count relative to the degree of anemia. The RBCs appear **normal** under light microscopy.

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Treatment includes minimizing blood draws and ensuring adequate iron intake. RBC transfusions can be given if the infant is symptomatic but will further suppress EPO levels and delay recovery. Supplemental EPO is not effective in preventing the need for transfusions.

(Choices A and C) Patients with alpha or beta thalassemia have hypochromic, microcytic RBCs and abnormal cell morphology (eg, **target cells**) in their peripheral smears.

(Choice D) Glucose 6-phosphate dehydrogenase deficiency can present with severe hemolytic anemia and hyperbilirubinemia. The peripheral smear shows Heinz bodies and **bite cells**.

(Choice E) Hemolytic disease of the newborn is due to Rh or ABO incompatibility. The anemia (and subsequent hyperbilirubinemia) generally develops within 48 hours of birth. The reticulocyte count is increased due to hemolysis.

(Choice F) Iron deficiency is not part of the pathogenesis of AOP, and this infant is receiving an appropriate amount of iron in his preterm formula. However, infants with insufficient iron intake may have difficulty recovering from AOP due to impaired erythropoiesis.

(Choice G) **Sickle cell anemia** presents later in infancy when their concentration of fetal hemoglobin declines. During the first 4-6 months of life, the presence of fetal hemoglobin protects infants from sickle cell crises.

(Choice H) Low levels of folic acid or vitamin B₁₂ do not cause anemia in early infancy.

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(Choice H) Low levels of folic acid or vitamin B₁₂ do not cause anemia in early infancy. The anemia in such cases is **megaloblastic**.

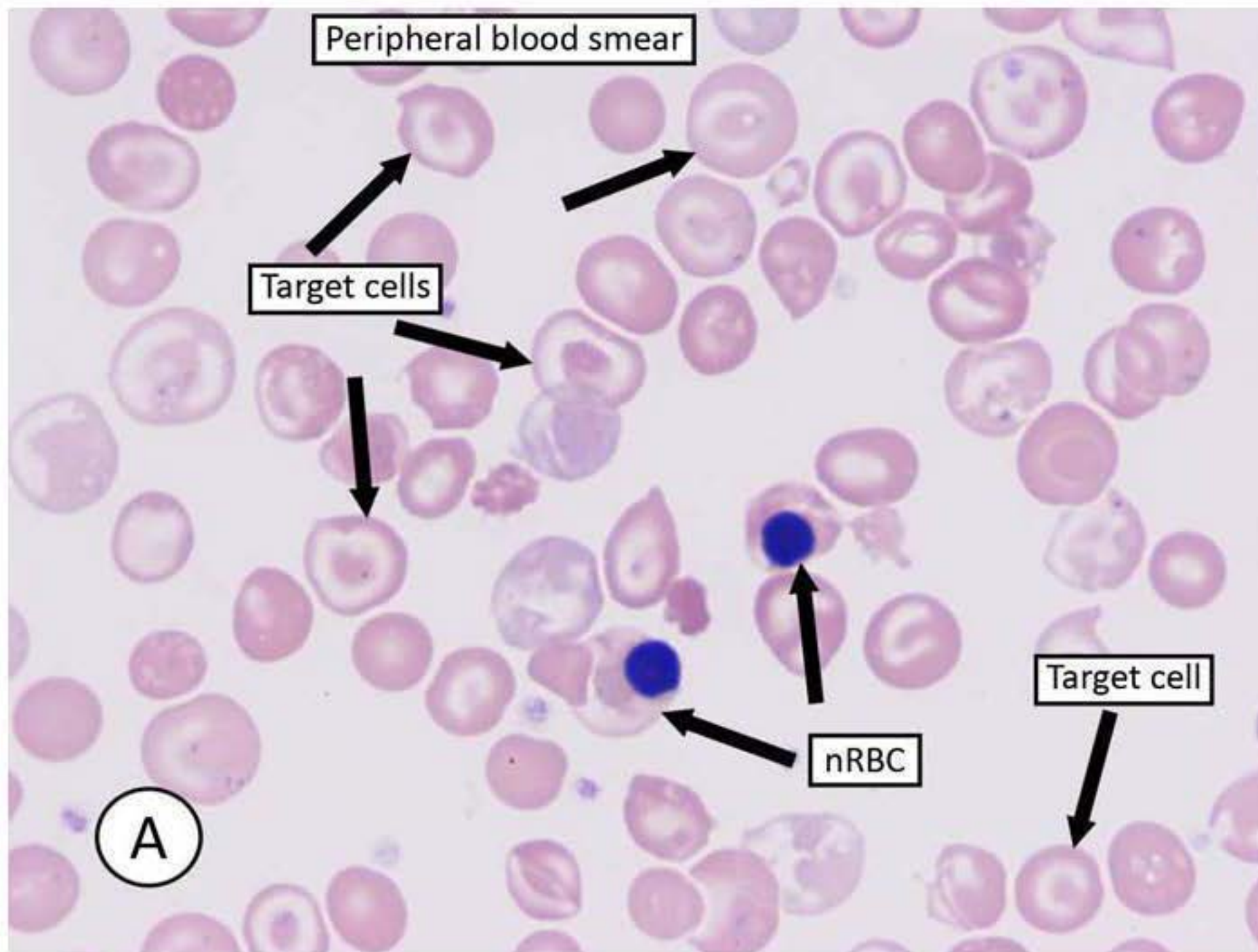
Educational objective:

Anemia of prematurity is the most common cause of anemia in preterm infants. It is due to diminished erythropoietin levels, shortened red blood cell life span, and blood loss. Laboratory studies show decreased hemoglobin and hematocrit and a relatively low reticulocyte count.

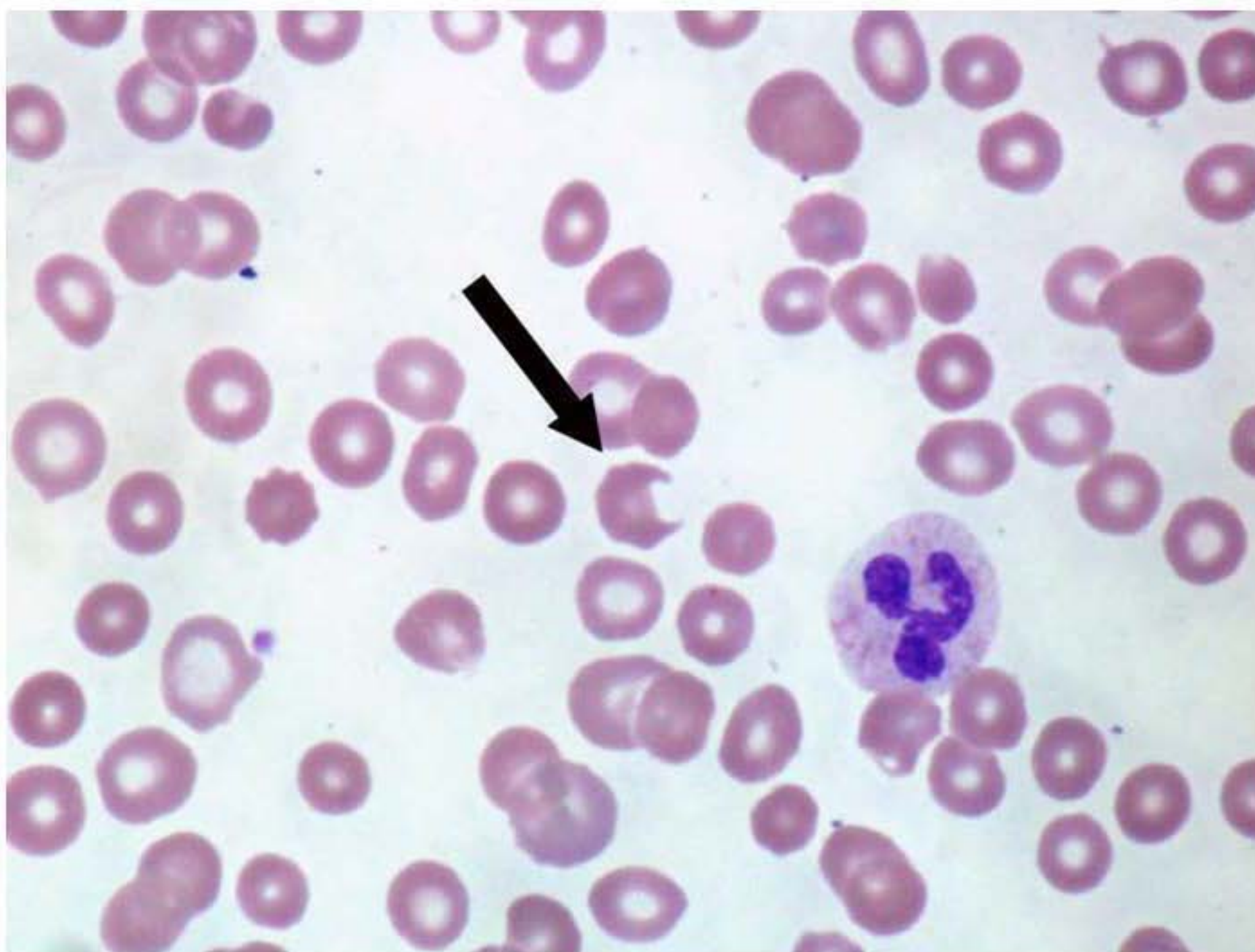
References:

1. **Erythropoiesis and the approach to anemia in premature infants.**

Media Exhibit

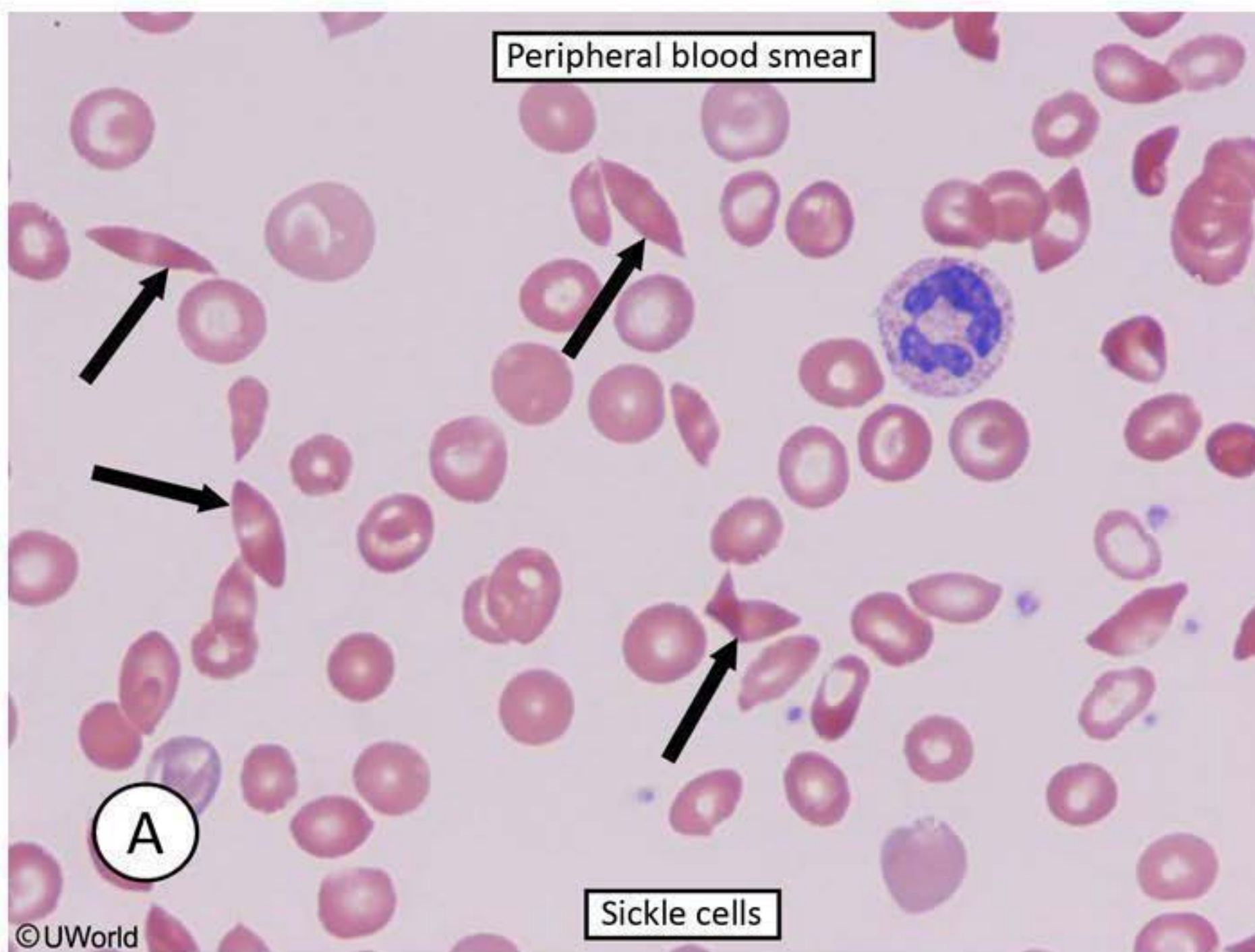


Media Exhibit



Media Exhibit

ell anemia



Media Exhibit

plastic anemia: Macrocytic anemia

