

# Answers to the Medical Quiz

- A1. Obstructive Jaundice.
- A2. These are red blood cells called "Target Cells".
- A3. Red Cells increase their surface area by increase in membrane lipids. In dried smears the excess surface accumulates and bulges outward in the red cell's central clearing. The resulting flattened cells appear in blood smears as target cells. Increases in the surface to volume ratio may also be due to decrease in cell volume, resulting from diminished haemoglobin synthesis (eg. thalassaemia, iron deficiency), abnormal haemoglobin aggregation (eg. haemoglobins, S,C,D and E) or decreased cell cations and water. This relative increase in surface to volume ratio is at the basis of targeting.
- A4. Conditions characterised by appearance of "Target Cells" in the peripheral smear include:
1. Homozygous haemoglobin C disease; other abnormal haemoglobins: S,D and E.
  2. Obstructive jaundice due to liver disease.
  3. Thalassaemia
  4. Iron deficiency
  5. Splenectomised patients
  6. Familial lecithin: cholesteryl acyltransferase (LCAT) deficiency.

Haemoglobin C disease produces a mild congenital haemolytic anaemia with splenomegaly. The blood smear in this disease reveals striking target cells with decreased osmotic fragility. Targeting is also seen in other haemoglobinopathies such as Hb S, C, D and E.

Patients with liver disease associated with biliary obstruction often develop target cells. The pathogenesis is analogous to that of red cells that acquire excess lipids

from abnormal lipoprotein. As a consequence, membrane surface area expands. Because cellular deformability is unimpaired, these cells survive well, and the abnormality while morphologically interesting produces little clinical morbidity.

The pathogenesis of lipid accumulation in target cells is relatively clear. The process is extracorporeal, reversible and is due to an abnormal serum component. Normal cells acquire target cell surface area, morphologic characteristics and osmotic resistance when transfused into patients with obstructive jaundice or incubated in their serum, whereas target cells from such patients lose their excess lipids and revert to biconcave discs in normal individuals or their sera.

In the first several weeks following splenectomy target cells gradually increase in number. The spleen normally removes some membrane lipid and protein components from reticulocytes soon after their release into the circulation. This process is referred to as surface "remodeling" or splenic "polishing". In splenectomised patients this excess membrane material expands membrane surface area and small numbers of target cells appear on the blood smear.

Excess membrane surface and targeting is a prominent feature in the rare patient who is deficient in the plasma enzyme lecithin: cholesterol acyltransferase (LCAT). It is an autosomal recessive disorder characterised by normocytic anaemia, corneal opacities, hyper-lipidemia, proteinuria, chronic nephritis and premature atherosclerosis.

## REFERENCES

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3. Lux SE, Glader BE. Disorders of the red cell membrane. In: Nathan DG, Oski FA, eds. Hematology of Infancy and Childhood. Philadelphia, 1981: 456-565.