

## ERYTHROCYTES



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## ERYTHROPOIESIS

- Orderly process to maintain red blood cells in the blood
- Pronormoblast



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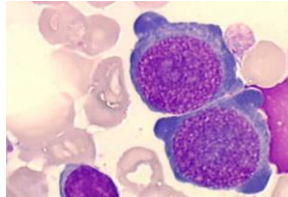
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## PRONORMOBLAST (Rubriblast)

- 14-20  $\mu\text{m}$
- N/C 8:1
- Deep blue cytoplasm
- 1-3 nucleoli, homogenous lacy chromatin
- First recognizable precursor



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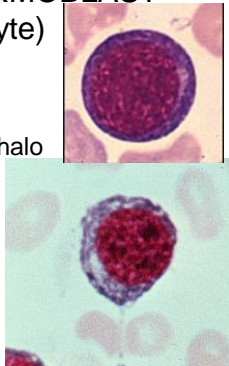
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### BASOPHILIC NORMOBLAST (Prorubricyte)

- 10-16  $\mu\text{m}$
- N/C 6:1
- Blue-purple, perinuclear halo
- Indistinct nucleoli, coarsening chromatin, purplish blue



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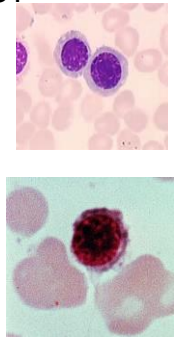
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### POLYCHROMATIC NORMOBLAST (Rubricyte)

- 10-12  $\mu\text{m}$
  - N/C 4:1
  - Abundant grey-blue
  - Chromatin irregular coarsely clumped eccentric
- Last stage able to divide



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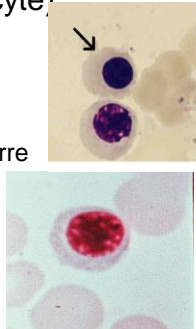
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### ORTHOCHROMIC NORMOBLAST (Metarubricyte)

- 8-10  $\mu\text{m}$
  - N/C 1:2
  - Pink-orange, basophilia
  - Small, dense, round or bizarre eccentric
- Last stage to have a nucleus



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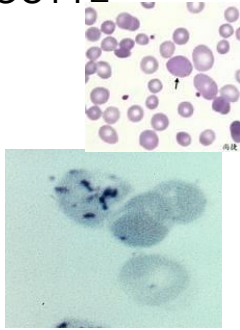
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## RETICULOCYTE

- 7-10  $\mu\text{m}$
- N/C ?
- Polychromatic
- Reference Range  
0.5 – 2%
- 18 – 158 X  $10^9/\text{L}$



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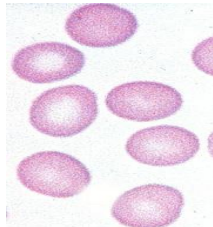
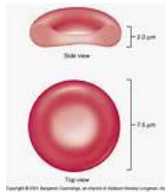
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## MATURE ERYTHROCYTE

- 7-9  $\mu\text{m}$
- Biconcave Disk
- Pink



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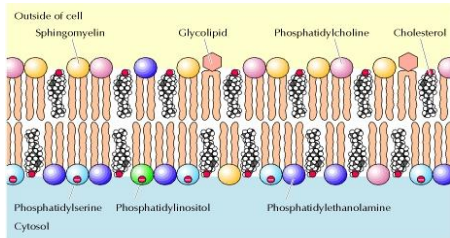
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## MEMBRANE LIPIDS

- Lipids –phospholipids, cholesterol & glycolipids



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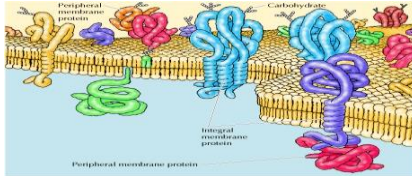
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# MEMBRANE PROTEINS

Integral: glycophorins & Band 3

- Peripheral: spectrin, actin, ankyrin, band 4.2, band 4.1, adducin, band 4.9, tropomyosin




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# ERYTHROCYTE METABOLISM

- Embden-Meyerhof Pathway– glycolysis produce ATP
- Hexose Monophosphate Shunt – NADPH & Glutathione
- Methemoglobin Reductase Pathway – maintain iron in reduced state
- Rapoport-Leubering Shunt – forms 2,3-biphosphoglycerate

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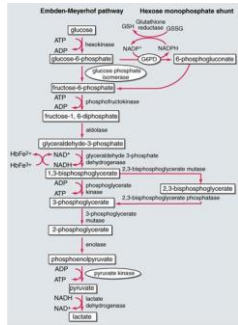
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# EMBDEN-MEYERHOF



Source: Patel et al., Guyton & Hall Textbook of Medical Physiology, 11th Edition, Philadelphia, Elsevier Co., Copyright © 2006. All rights reserved.

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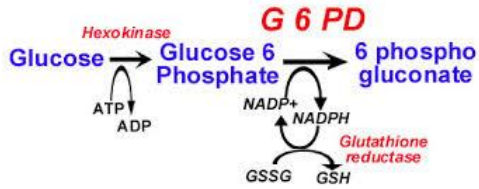
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## HEXOSE MONOPHOSPHATE SHUNT




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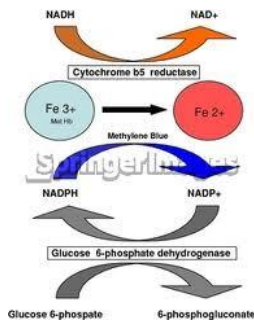
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## METHOGLOBIN REDUCTASE




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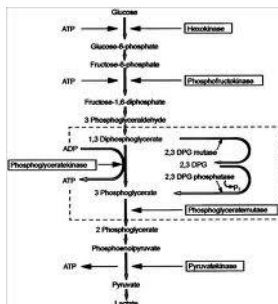
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## RAPOPORT-LEUBERING SHUNT




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## ERYTHROCYTE CONCENTRATION

- Sex
- Age
- Location

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## ERYTHROCYTE REGULATION

- Stimulated by anemia, cardiac or pulmonary disorders, increased altitude
- Erythropoietin

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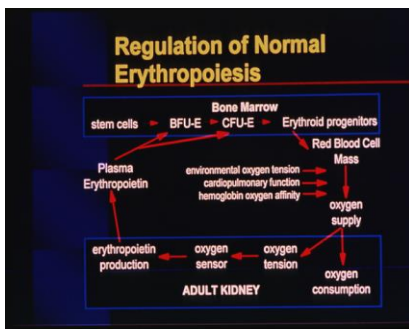
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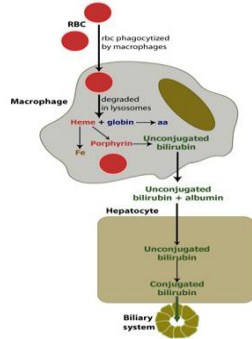
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# ERYTHROCYTE DESTRUCTION

- Extravascular



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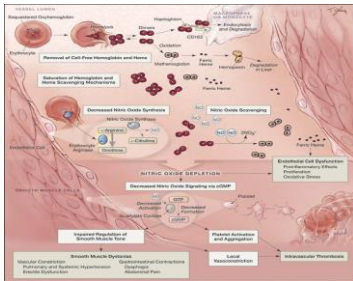
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# ERYTHROCYTE DESTRUCTION

- Intravascular



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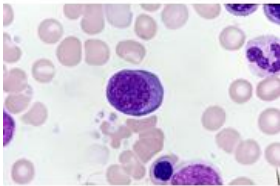
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# REVIEW



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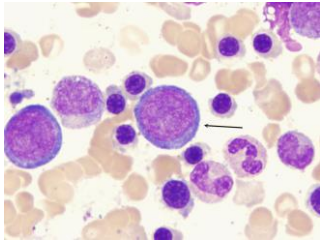
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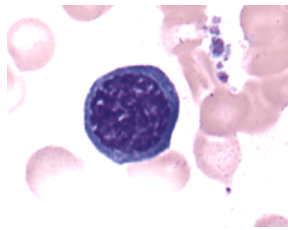
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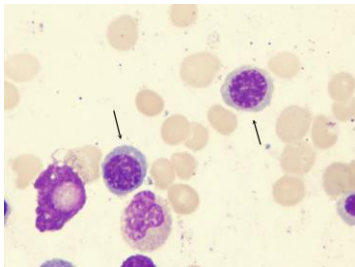
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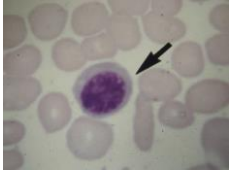
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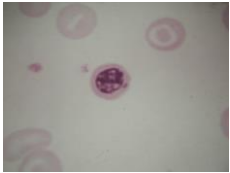
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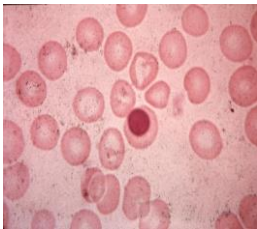
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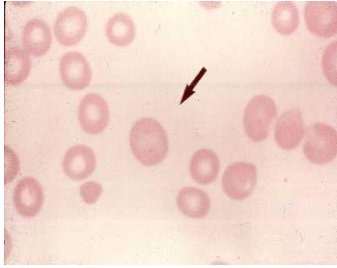
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