# Hematopoéza

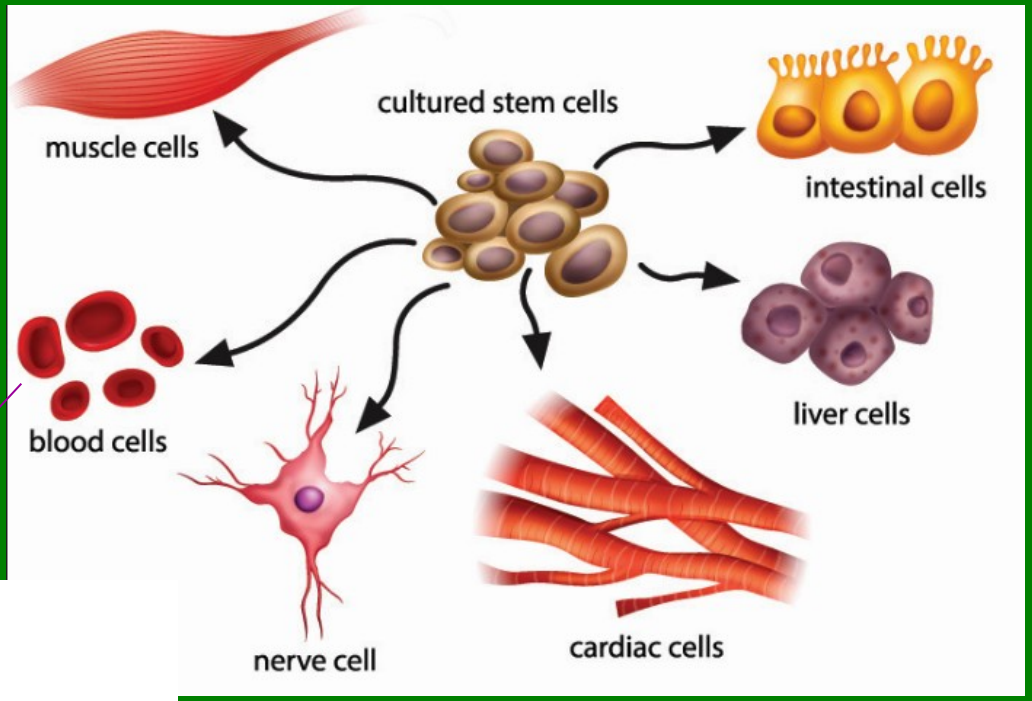
Bourková L., OKH FN Brno

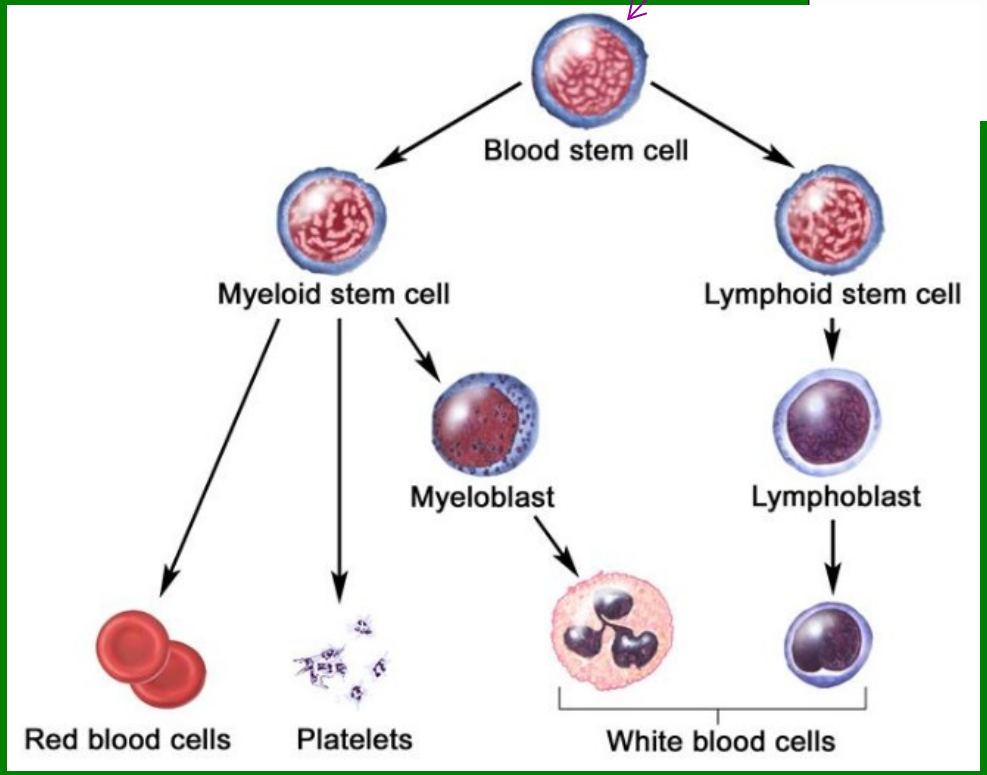
- bílé krvinky – leukocyty – WBC *(White Blood Cells)*
- červené krvinky – erytrocyty – RBC (*Red Blood Cells)*
- krevní destičky – trombocyty – PLT (*Platelets)*

# Kmenové buňky *(stem cells)*

- nediferencované buňky:
  - mají schopnost se dělit (proliferovat)
  - a přeměnit se na jiný buněčný typ (diferencovat)
  - proliferací a diferenciací vznikají zralé funkční buňky
- jsou schopny tvorby vlastní identické kopie (klon) a diferenciace
- podle míry schopnosti dát vznik různě diferencovaným buňkám se dělí na:
  - totipotentní (velmi časné buňky zárodku)
  - pluripotentní, multipotentní či jen unipotentní
  - ❖ *Z krvetvorné kmenové buňky v kostní dřeni může vzniknout kterákoli hematopoetická buňka.*

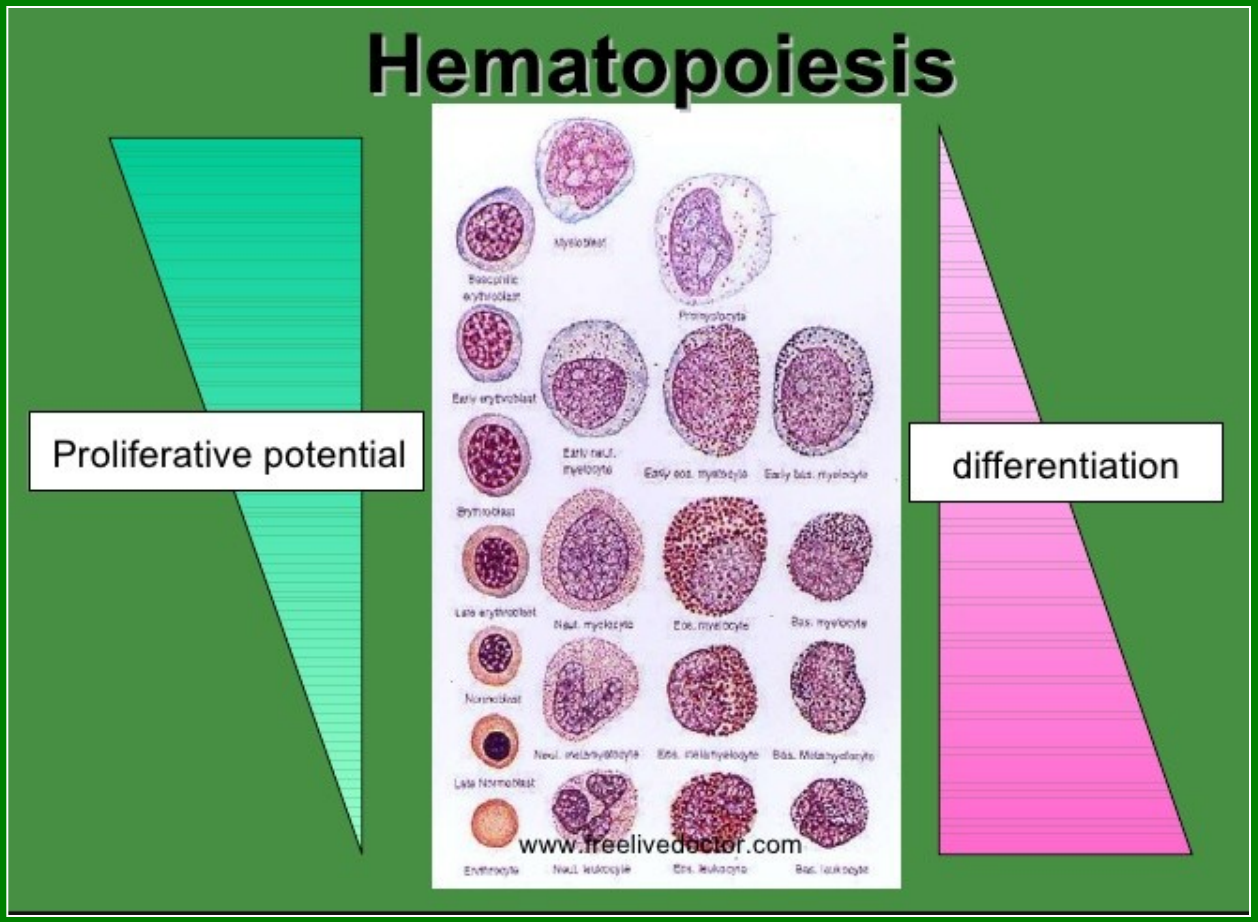
# Kmenové buňky

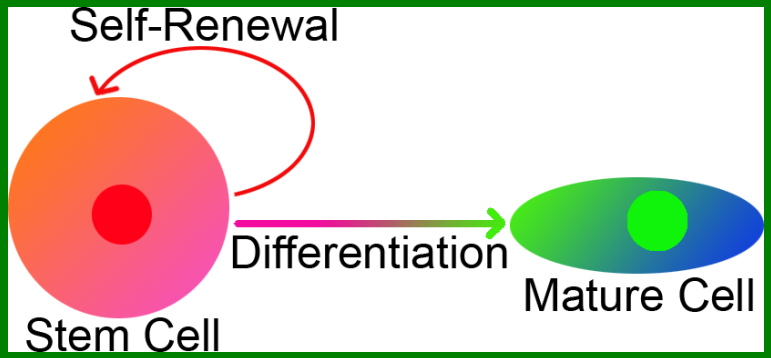


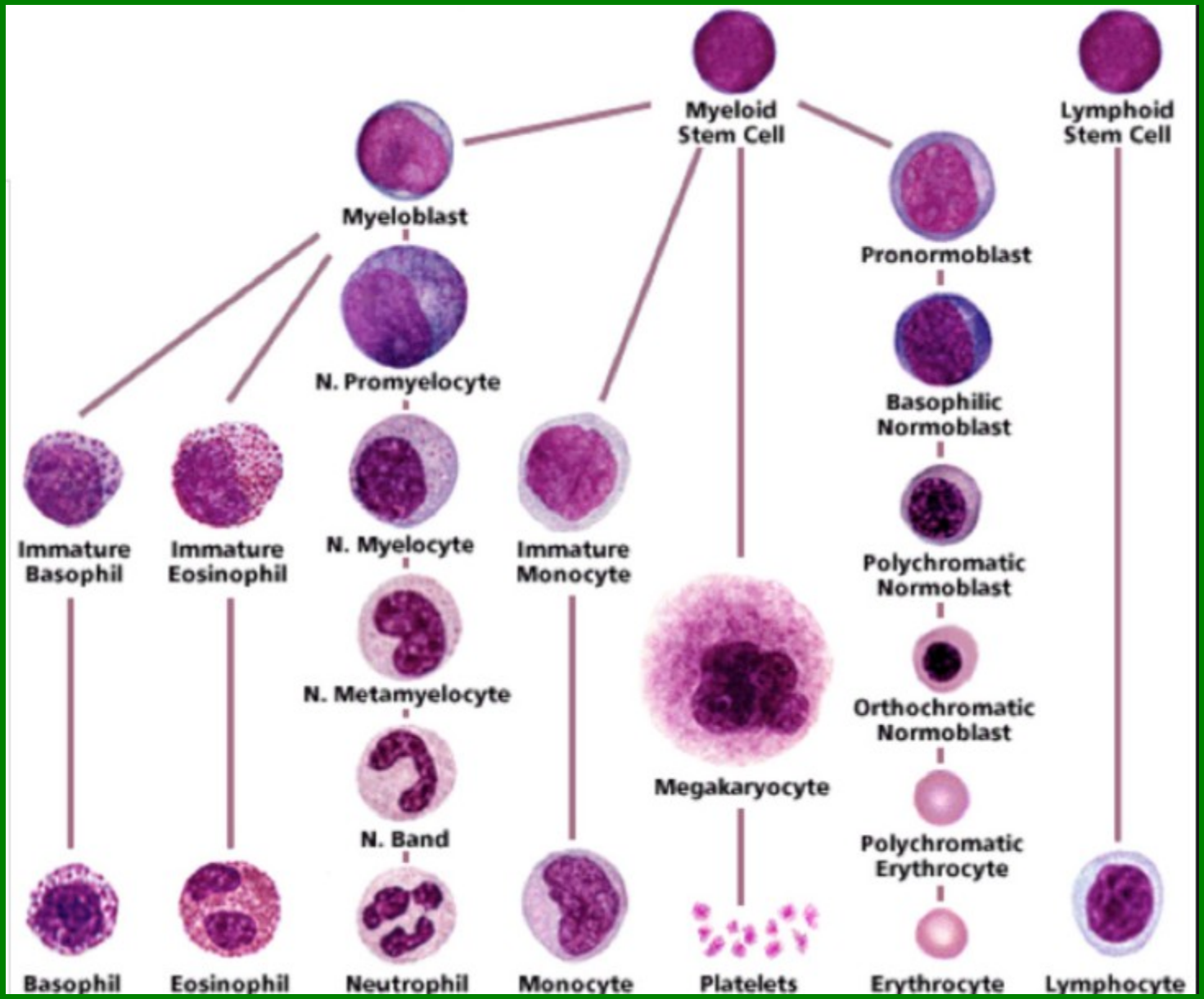




# Hematopoéza

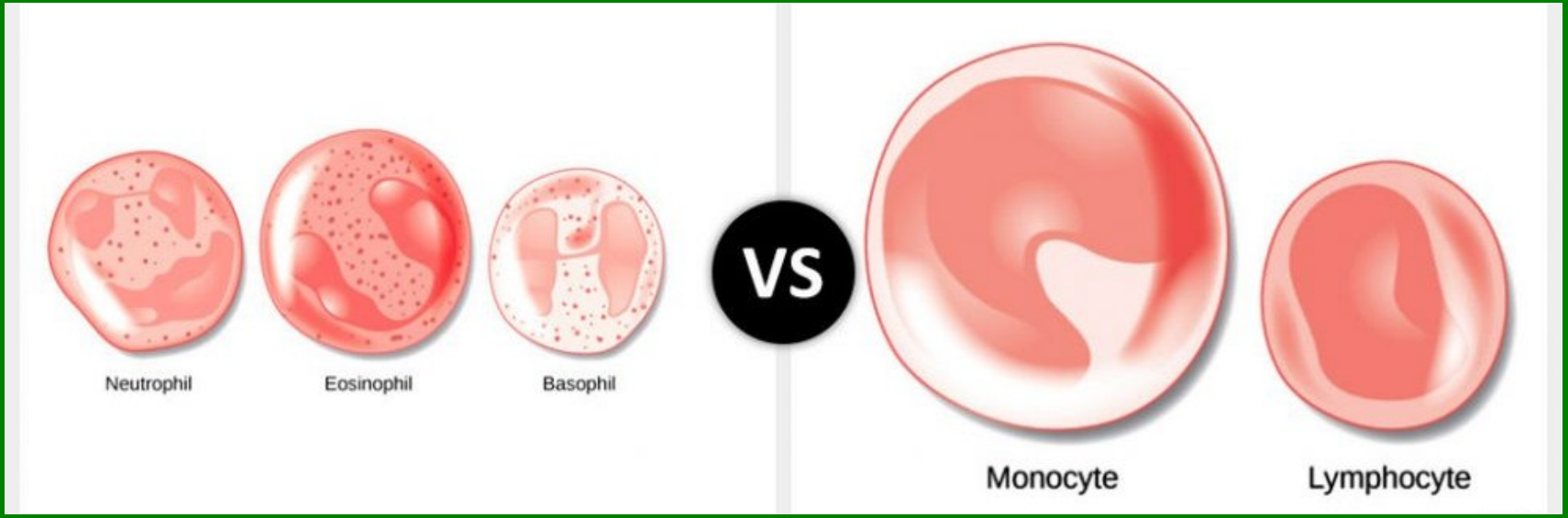
# Hematopoiesis



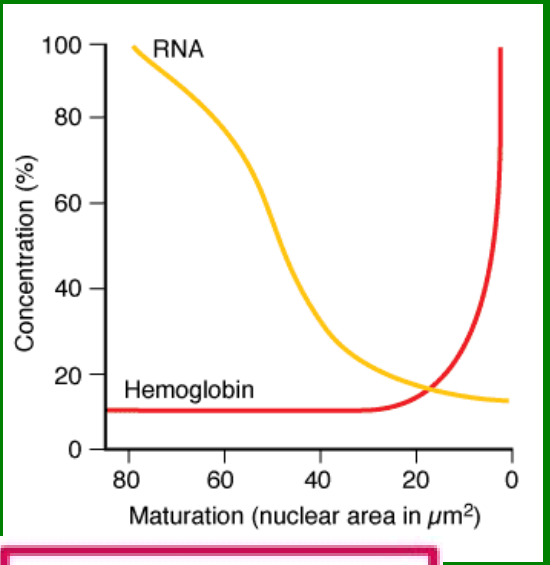



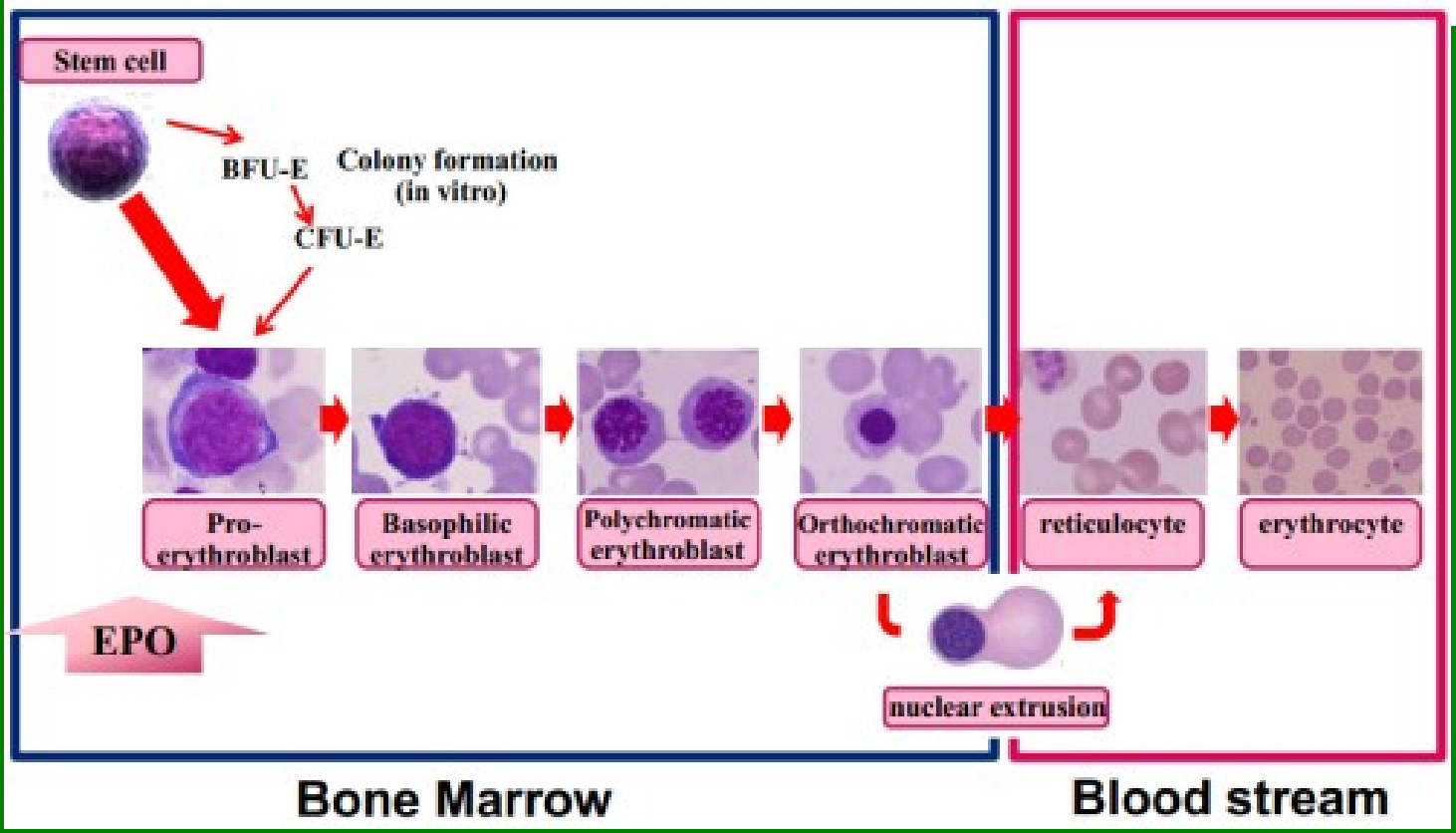

Myeloid Stem Cell
Lymphoid Stem Cell
Myeloblast
Pronormoblast
N. Promyelocyte
Basophilic Normoblast
Immature Basophil
Immature Eosinophil
N. Myelocyte
Immature Monocyte
Polychromatic Normoblast
N. Metamyelocyte
Orthochromatic Normoblast
Megakaryocyte
N. Band
Polychromatic Erythrocyte
Basophil
Eosinophil
Neutrophil
Monocyte
Platelets
Erythrocyte
Lymphocyte

# rozdíl velikostí leukocytů

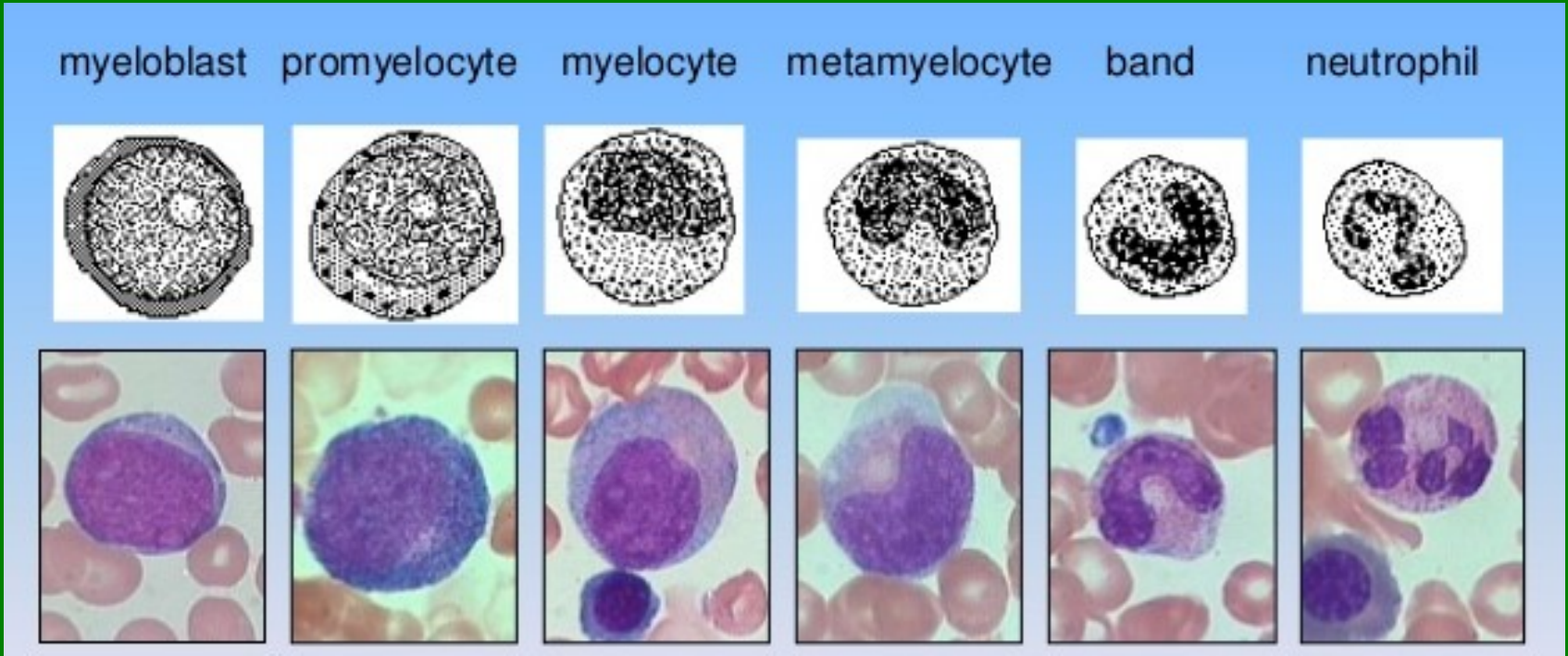


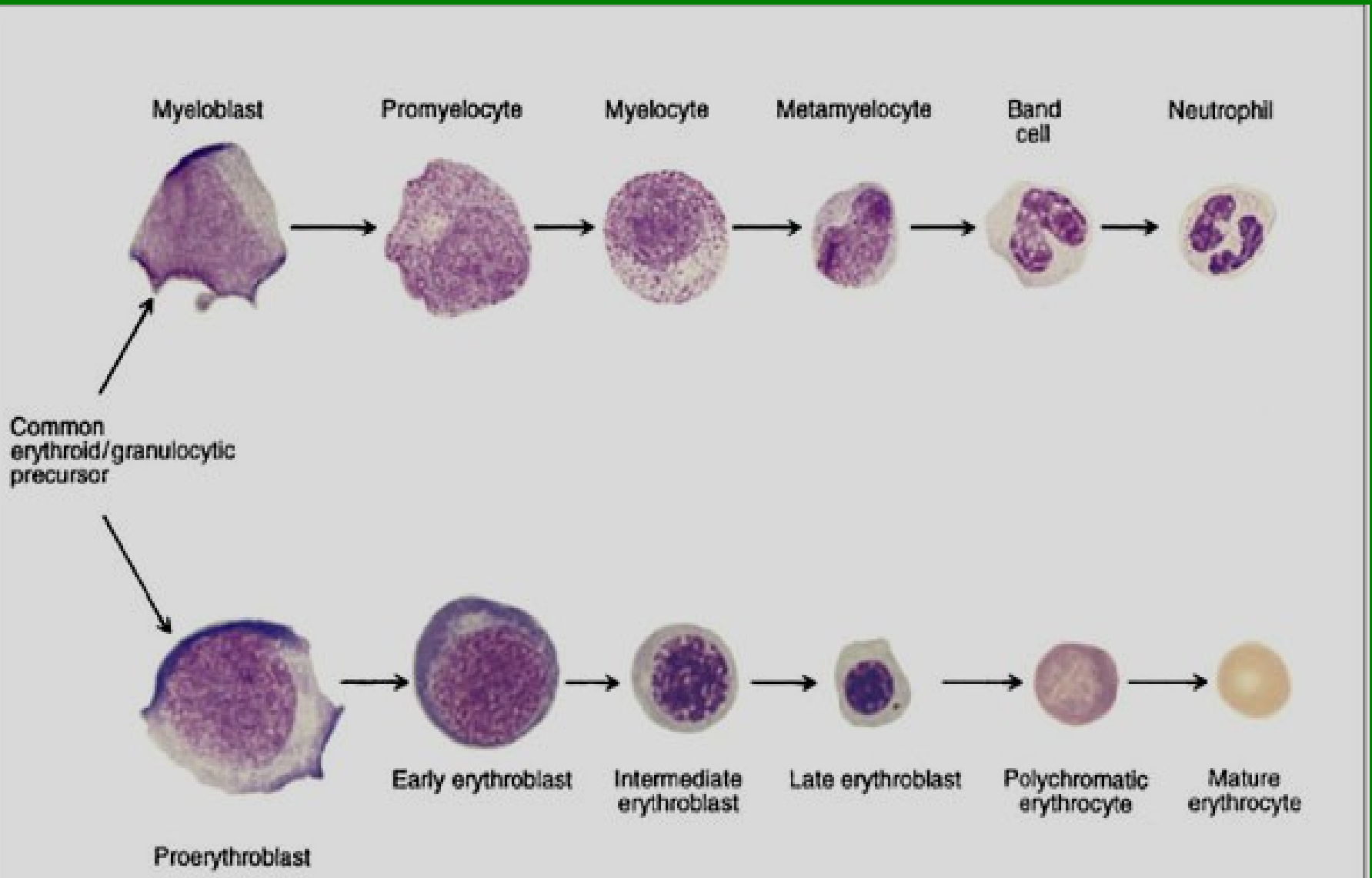
# Erytropoéza



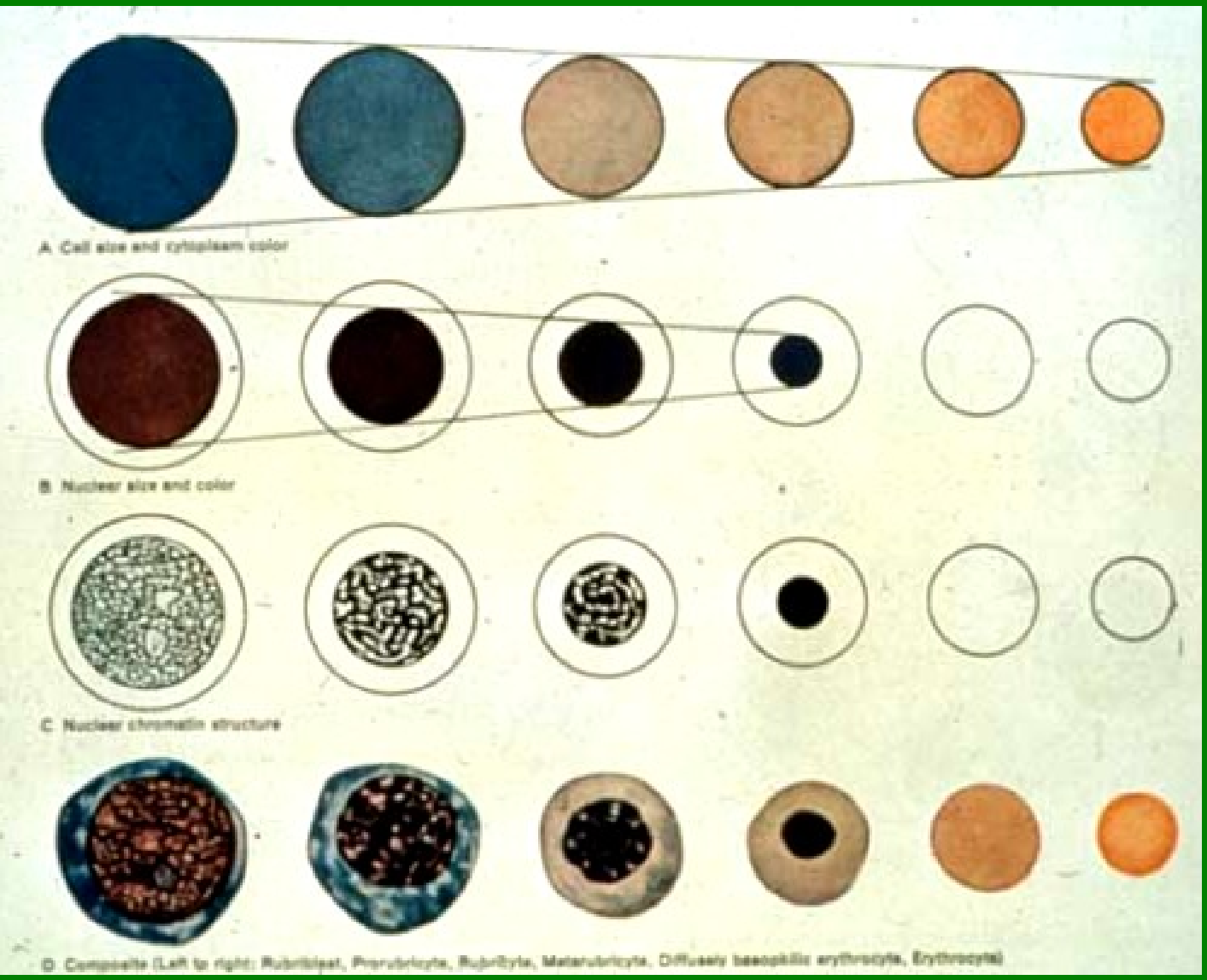



# Granulopoéza




Myeloblast
Promyelocyte
Myelocyte
Metamyelocyte
Band cell
Neutrophil
Common erythroid/granulocytic precursor
Proerythroblast
Early erythroblast
Intermediate erythroblast
Late erythroblast
Polychromatic erythrocyte
Mature erythrocyte

# Sledování buněčných morfologických změn




zbarvení, obsah cytoplazmy

velikost, tvar jádra

struktura chromatinu, jadérka

komplexní hodnocení

KOSTNÍ DŘEŇ

myeloblast

promyelocyt

neutrofilní myelocyt

eozinofilní myelocyt

bazofilní myelocyt

neutrofilní metamy

eozinofilní metamy

bazofilní metamy

proerytroblast

časný erytroblast *(bazofilní normoblast)*

středně zralý erytroblast *(polychromní normoblast)*

pozdní erytroblast *(ortochromní normoblast)*

monoblast

promonocyt

makrofág

magakaryoblast

promegakaryocyt

megakaryocyt

lymfoblast

prolymfocyt

plazmat. b.

PERIFERNÍ KREV

neutrofilní tyč

eozinofilní tyč

bazofiln tyčí

neutrofilní segment

eozinofilní segment

bazofilní segment

retikulocyt

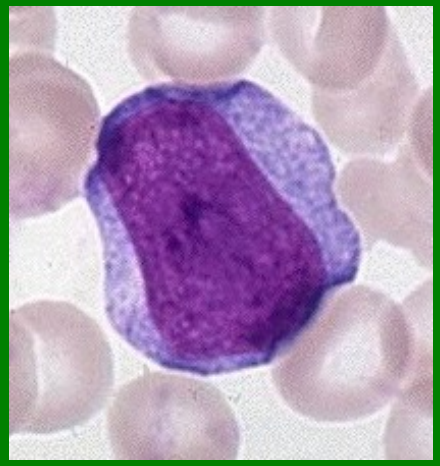
erytrocyt

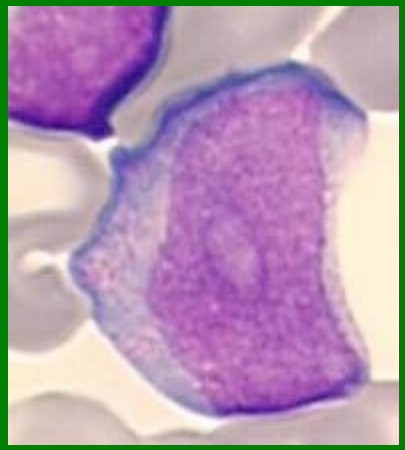
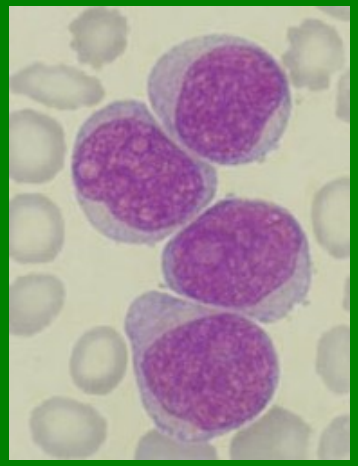
monocyt

trombocyty

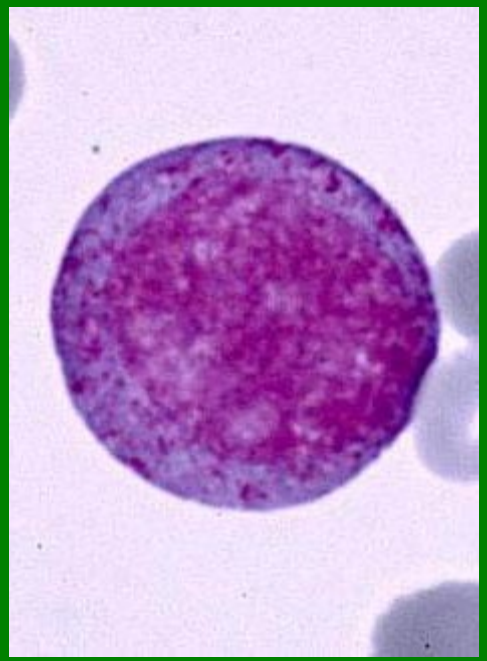
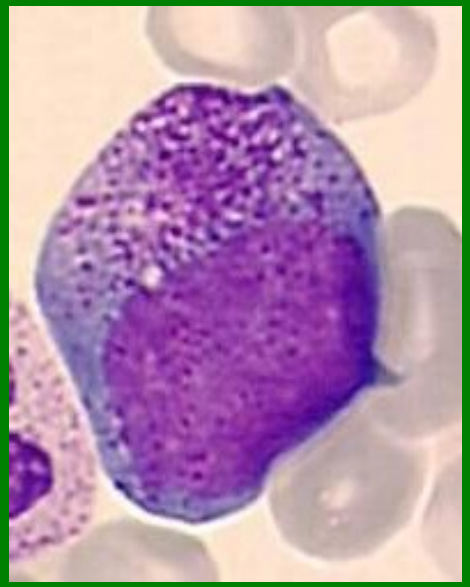
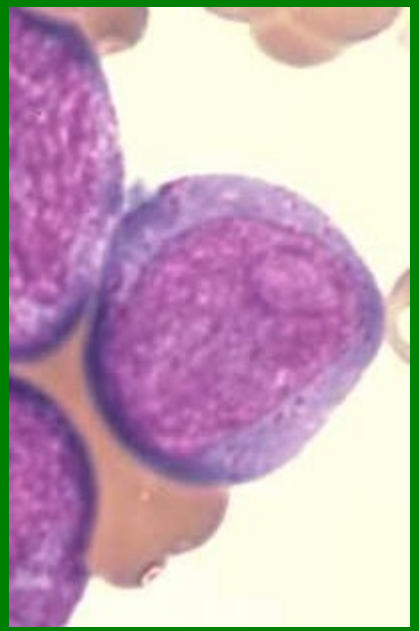
lymfocyt

## Myeloblasty

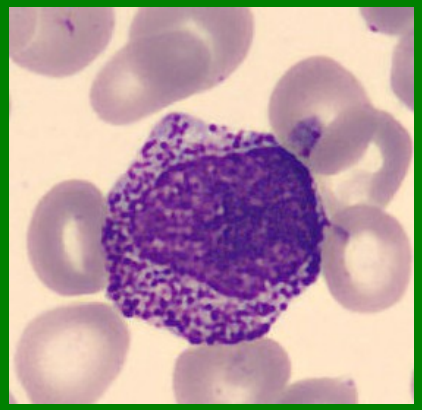


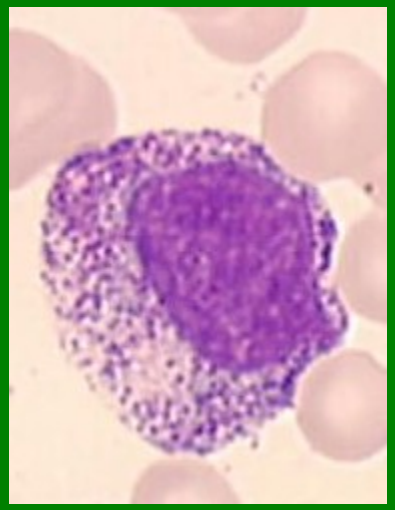



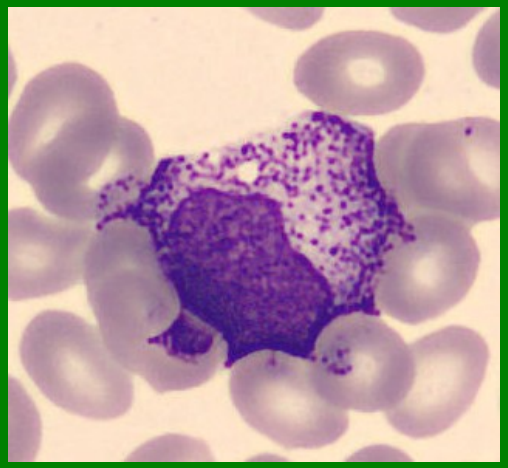
## Promyelocyty

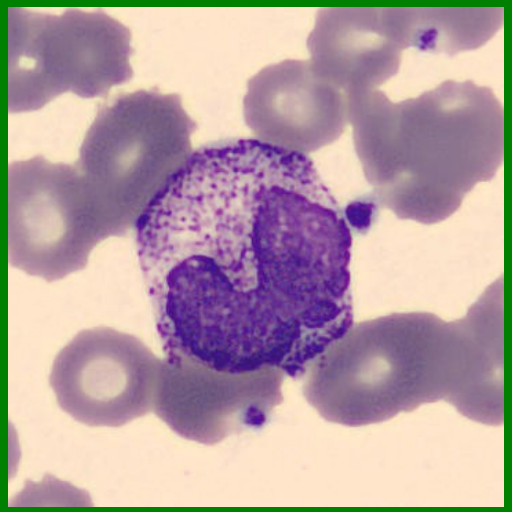
## Myelocyty – Ne *(nezralé, zralé)*

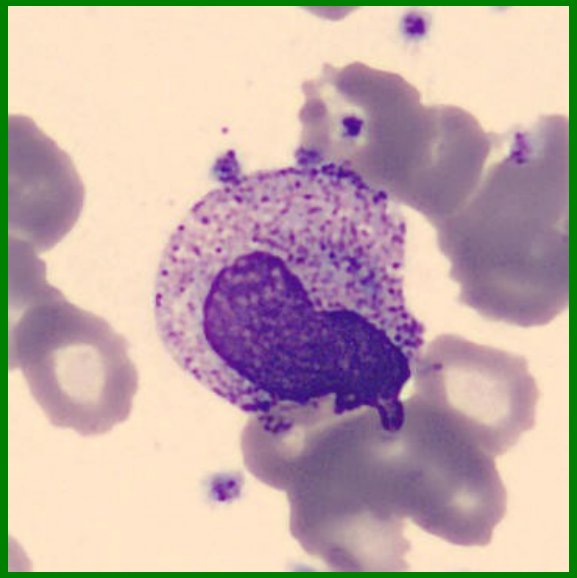




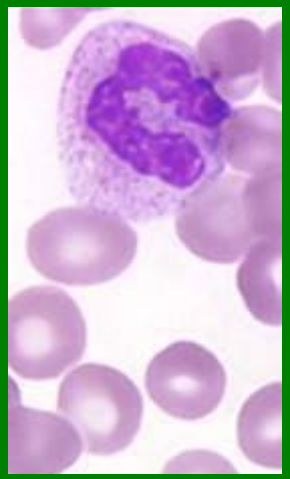


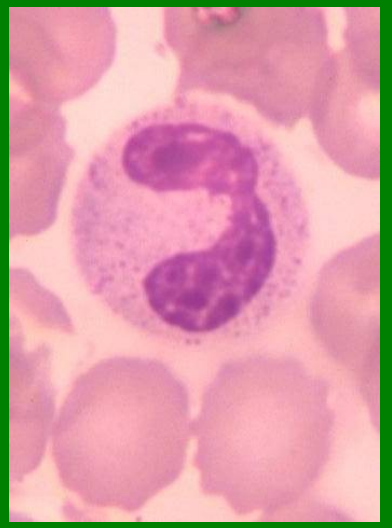
## Metamyelocyty - Ne



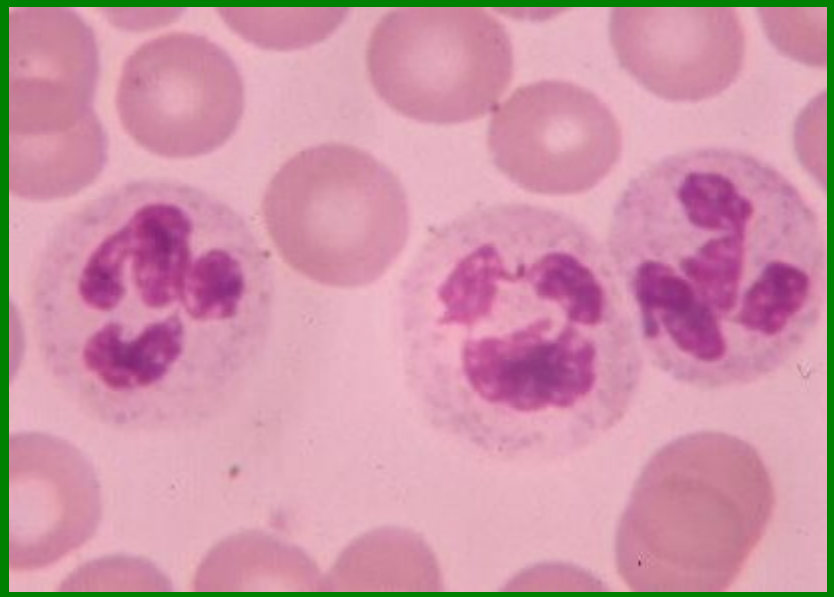
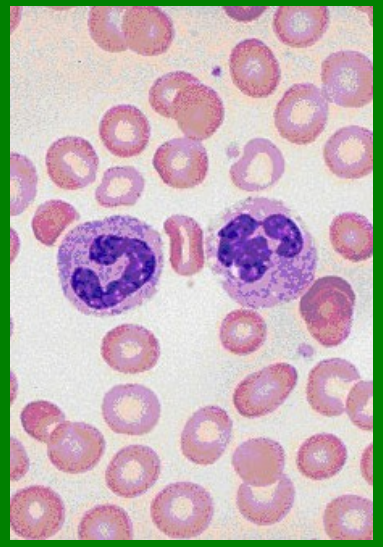


## Tyč – Ne *(rozdíl mezi nejširším a nejužším tvarem jádra je 1/3 až ½)*

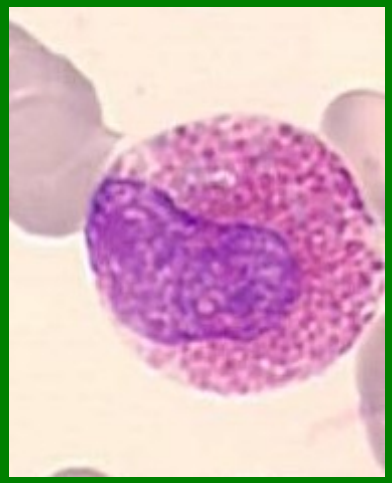



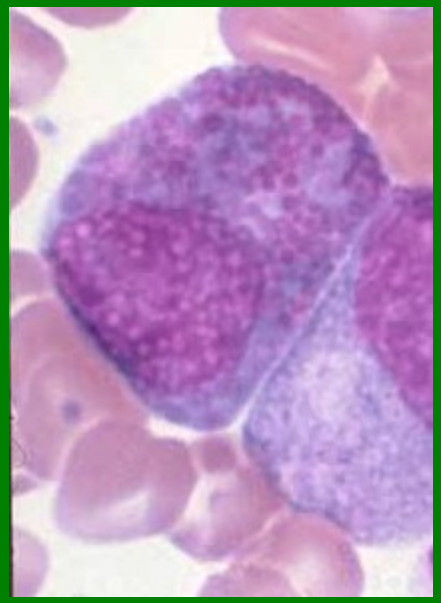



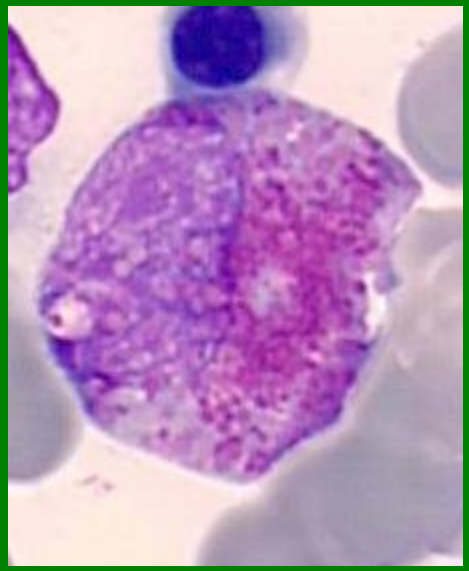
## Segment - Ne

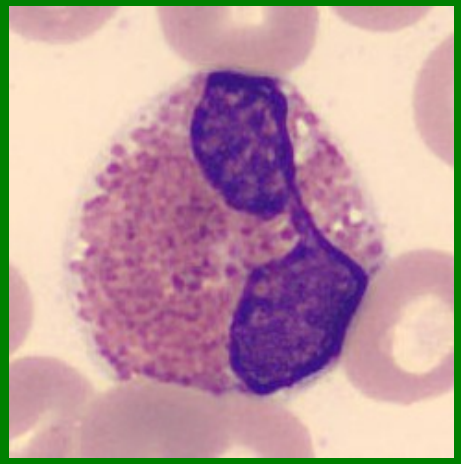




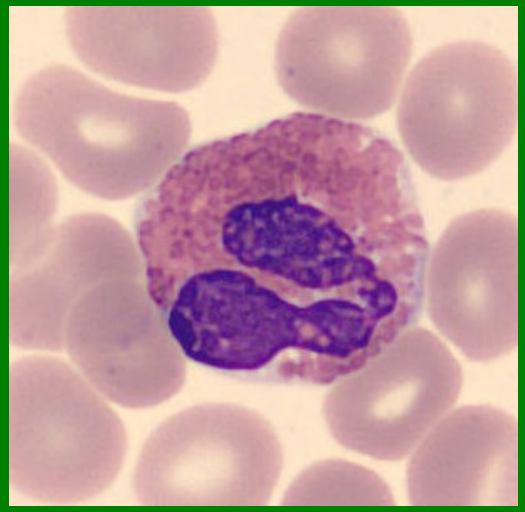
# Eozinofily

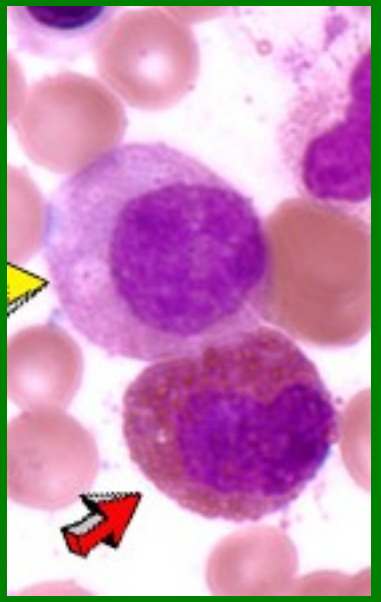


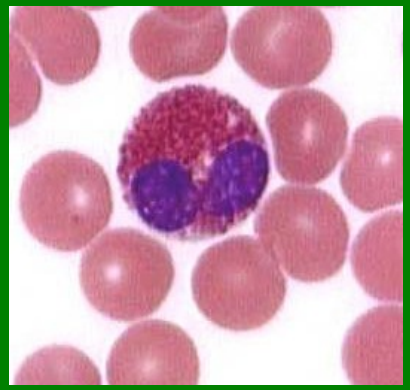




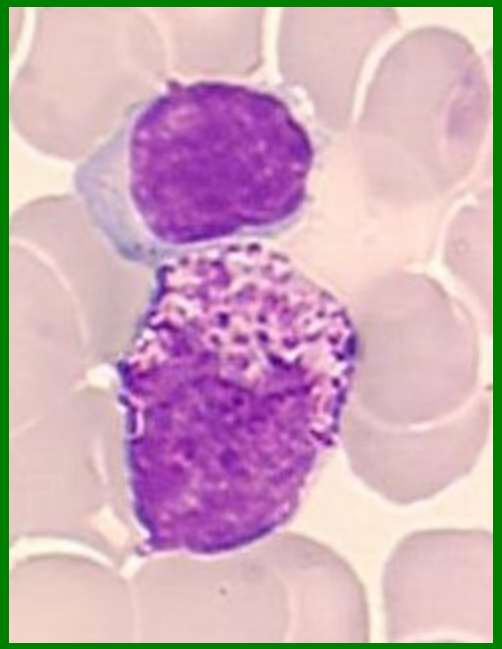


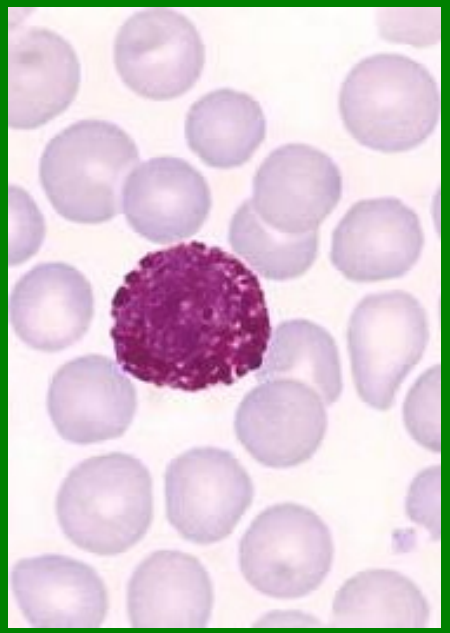


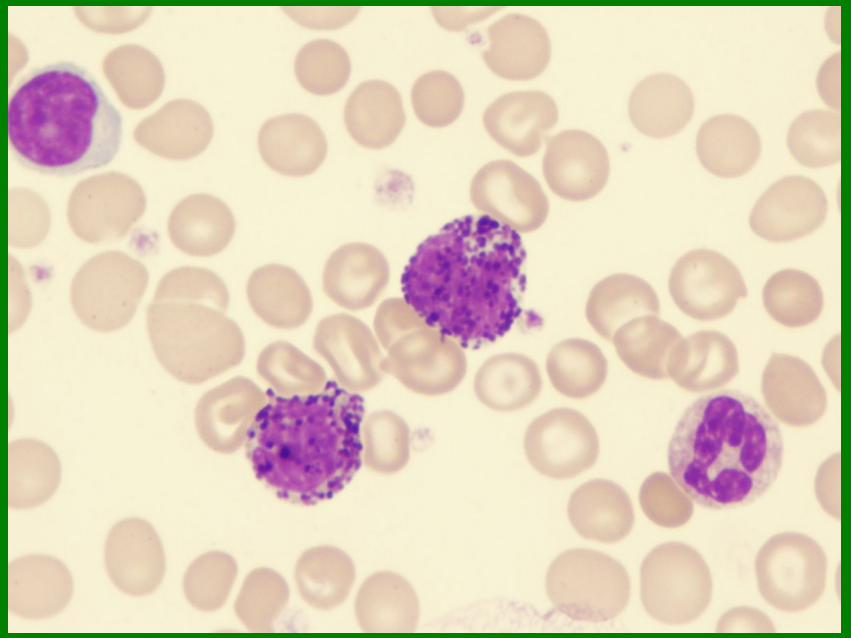


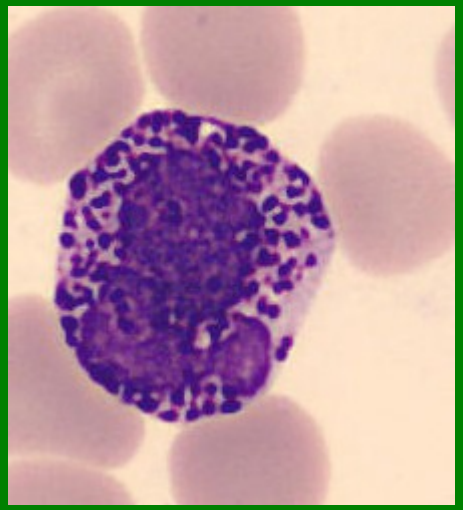


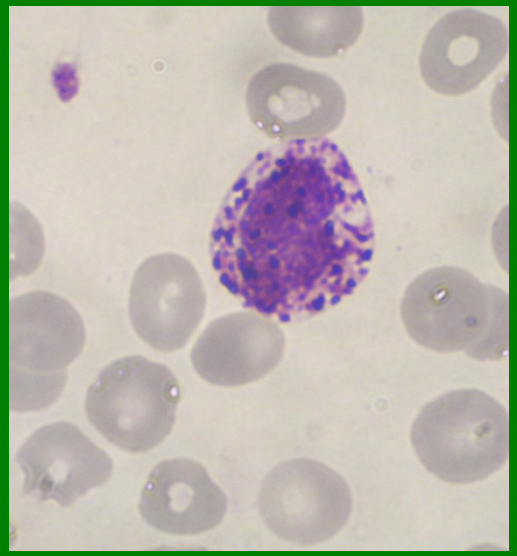
# Bazofily

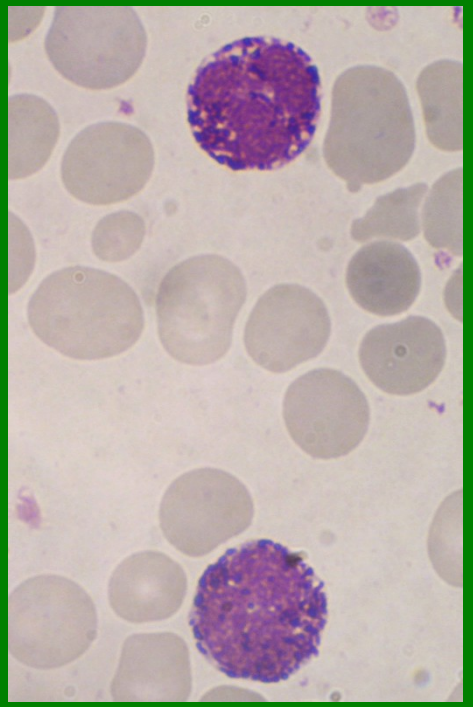




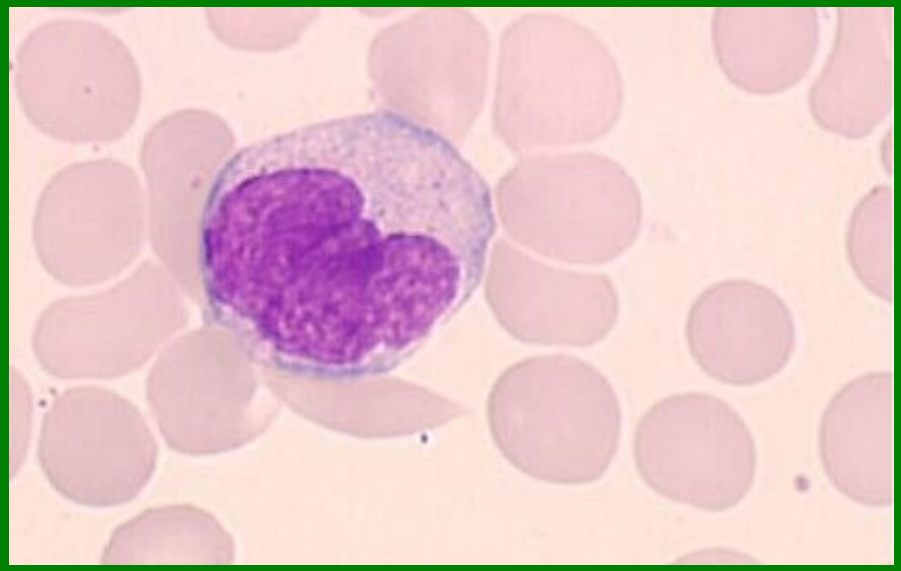


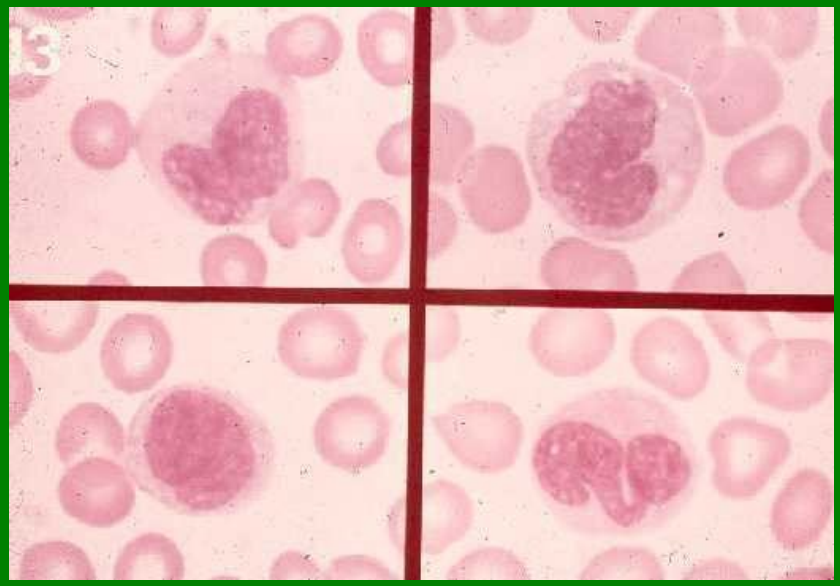


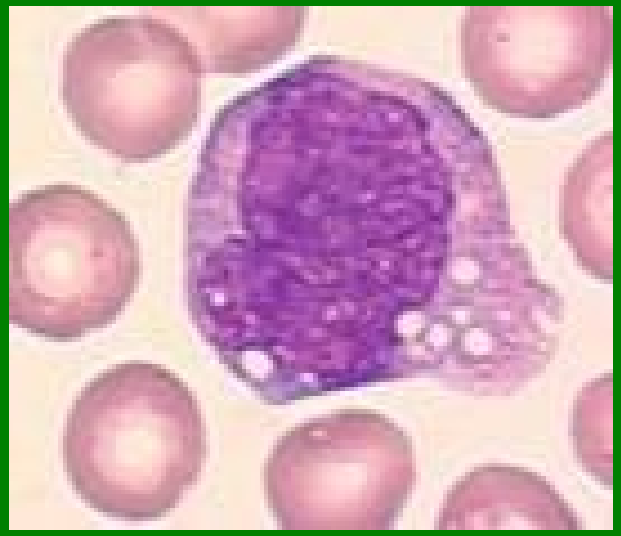


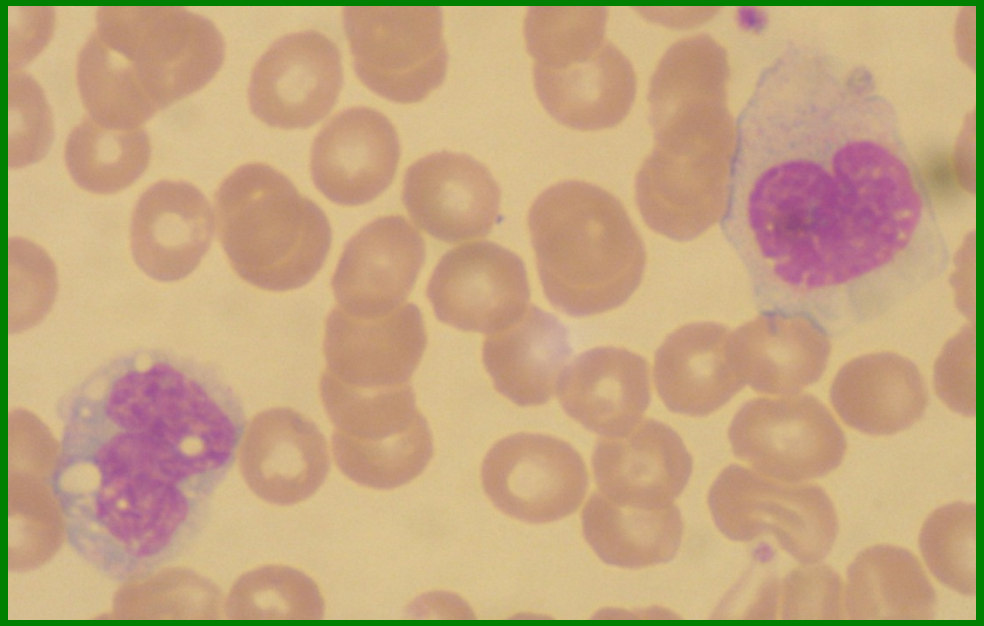


# Monocyty

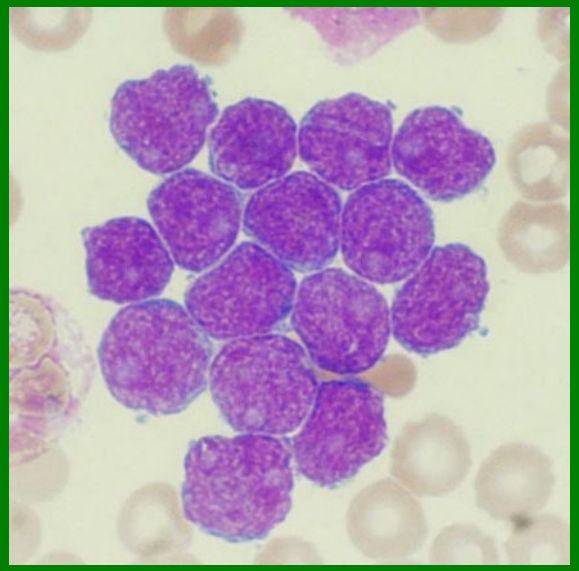


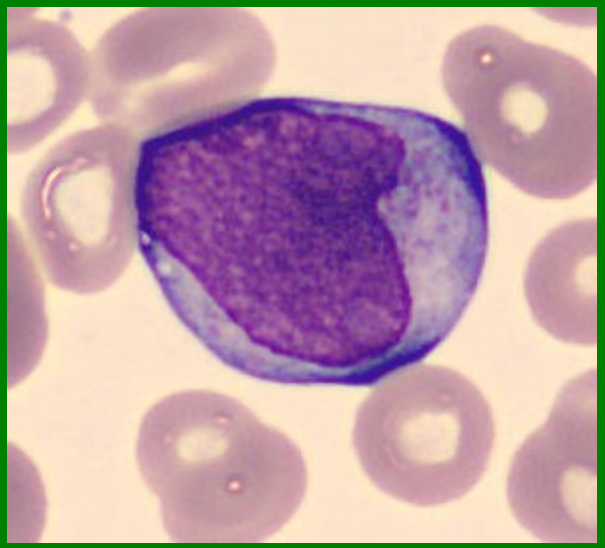




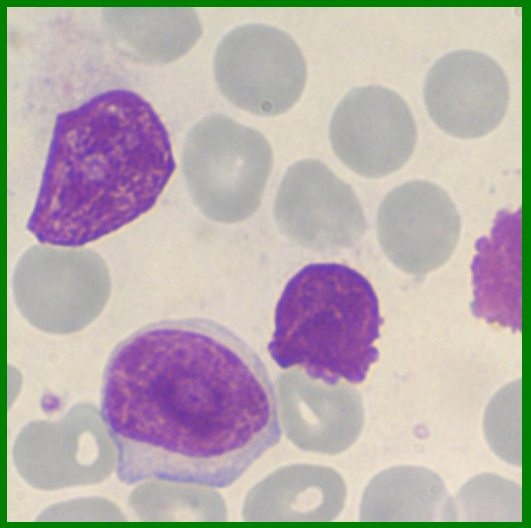


## Lymfoblasty

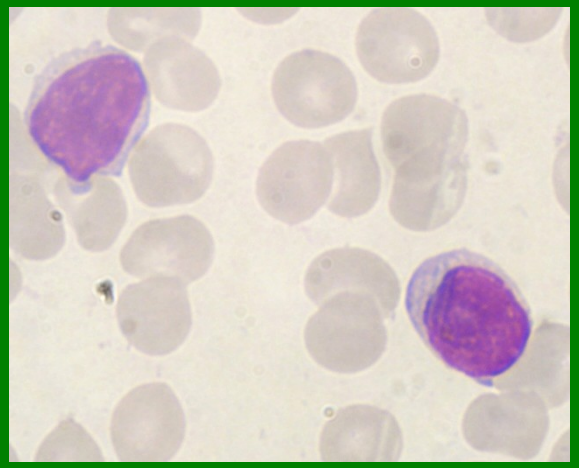


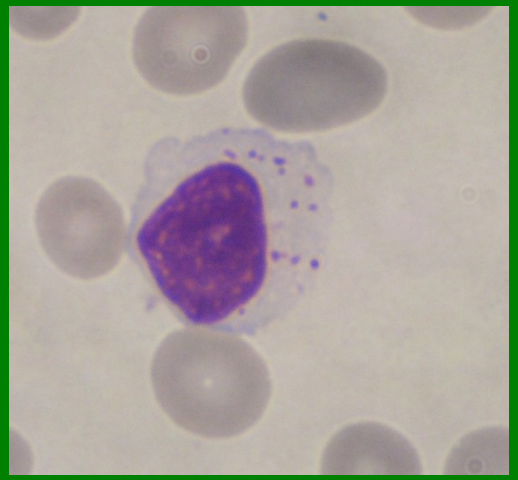


## Prolymfocyt

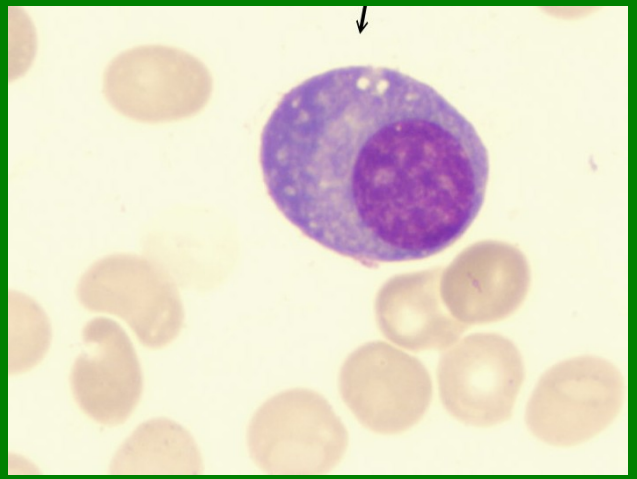


## Lymfocyty

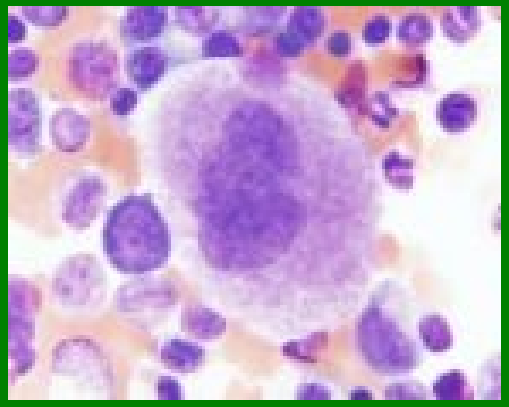


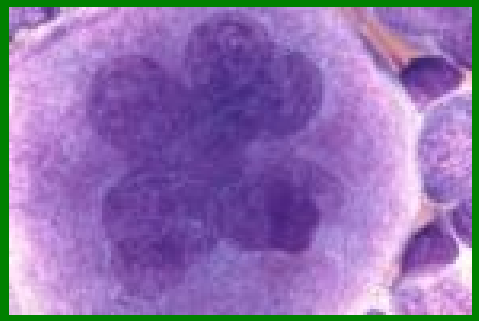


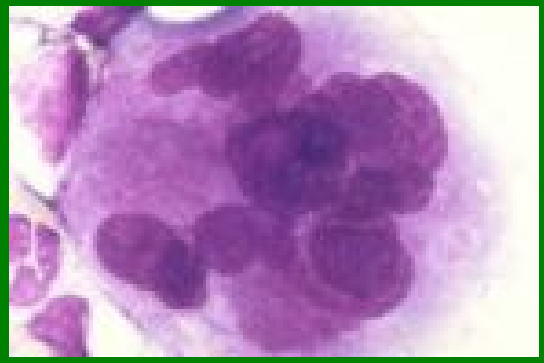
## Plazmatická buňka

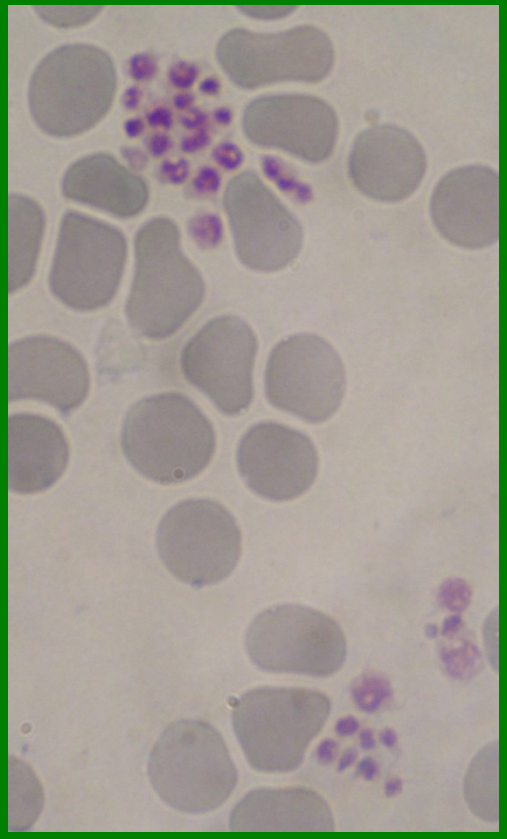


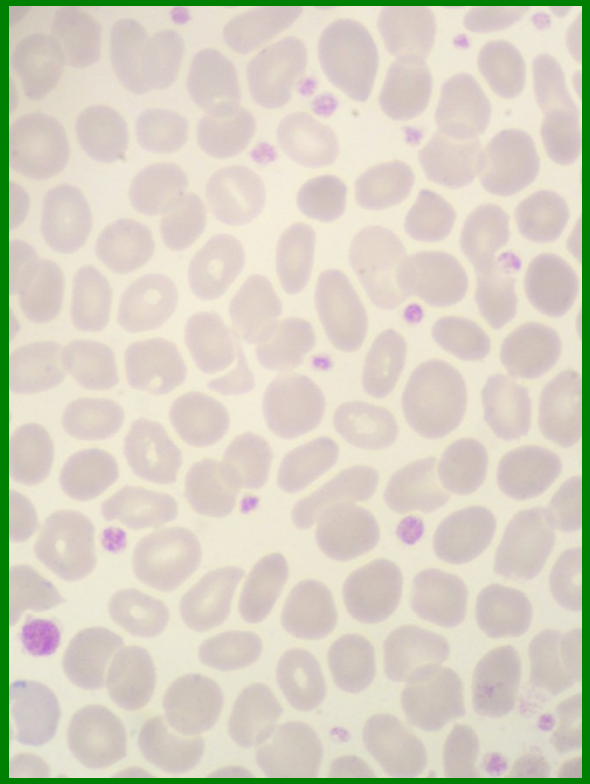
# Megakaryocyty, PLT

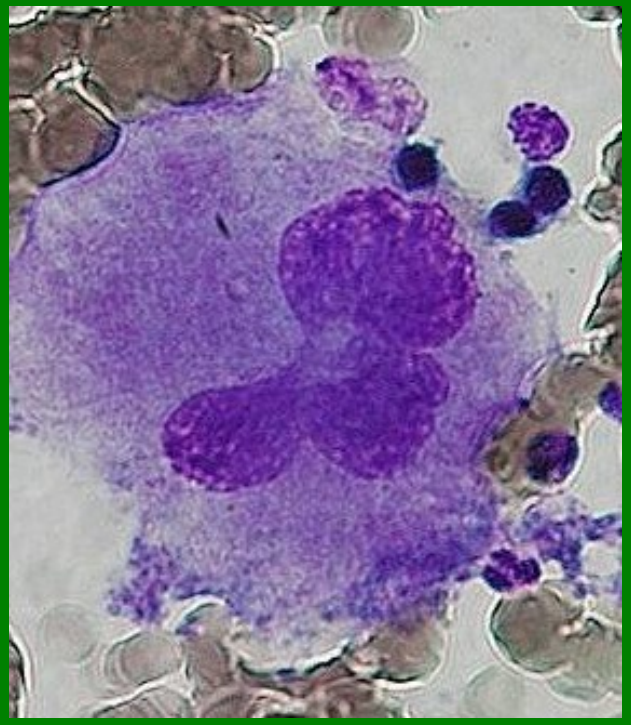




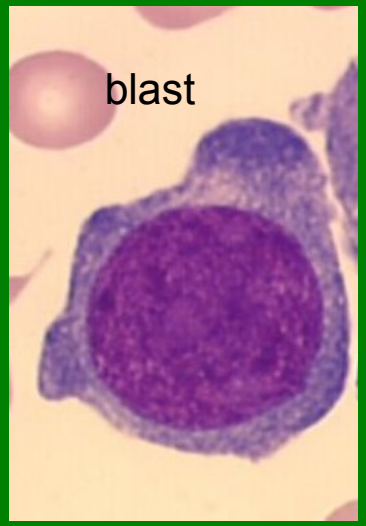


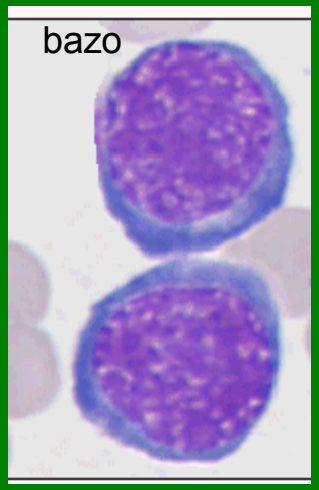




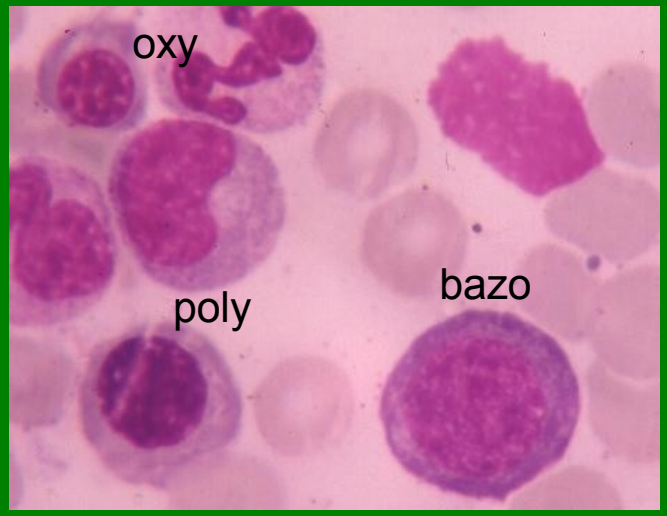


# NRBC

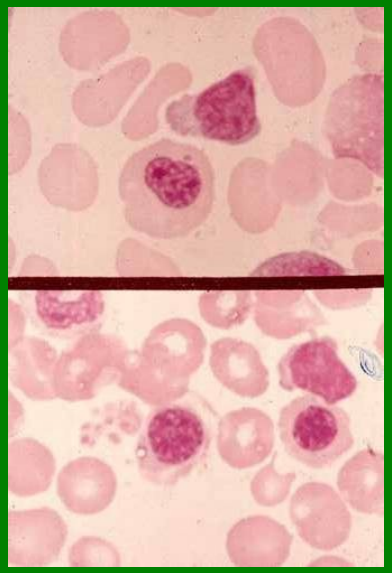



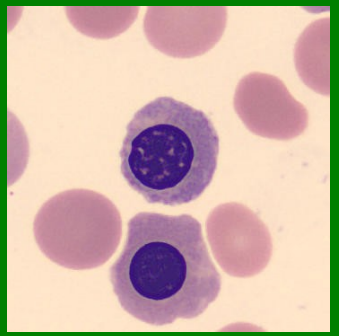







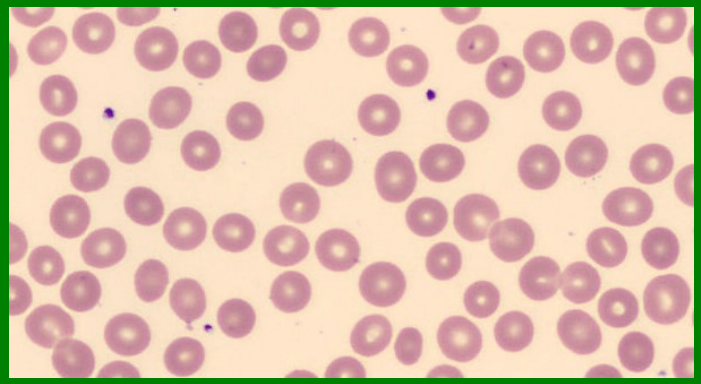




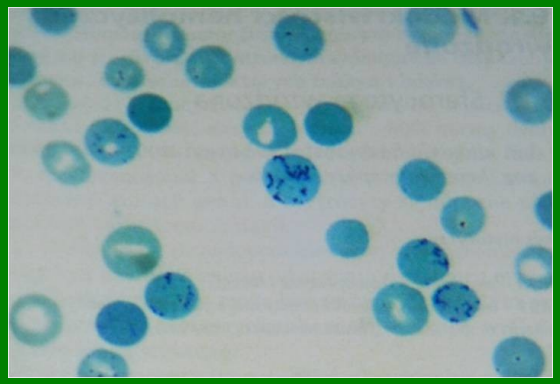


# Retikulocyty

RBC/*Retic*?



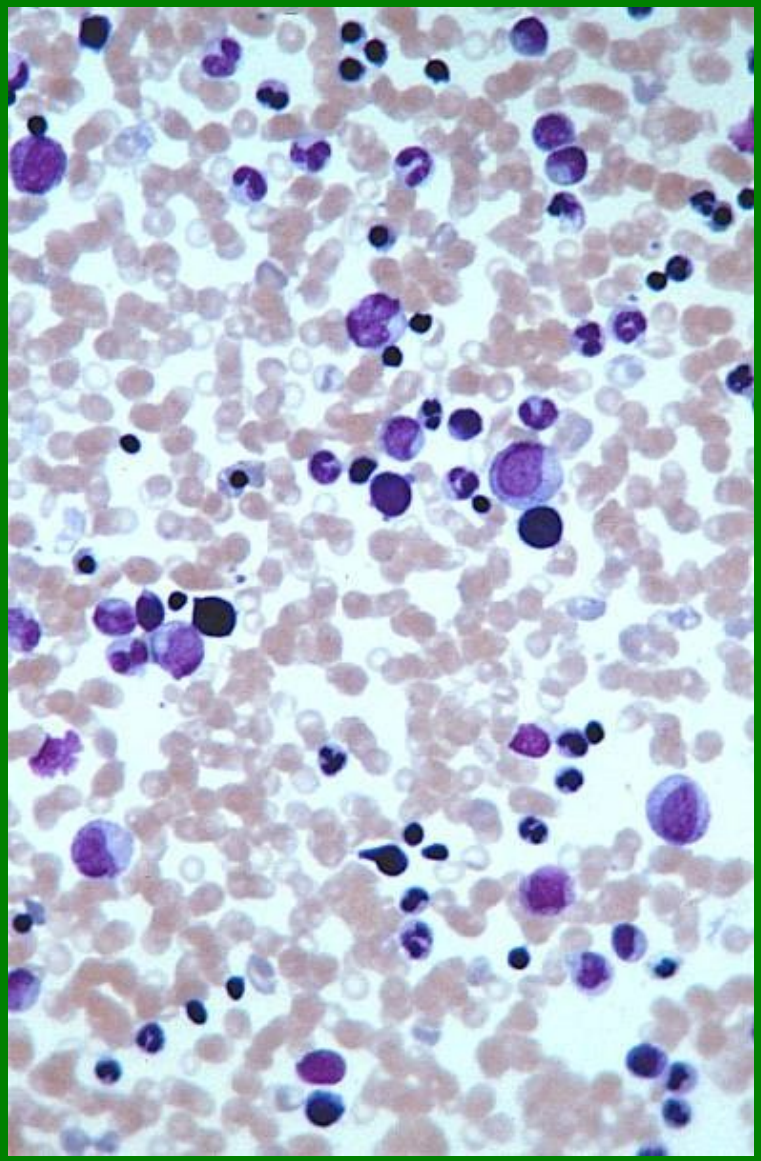
Retic



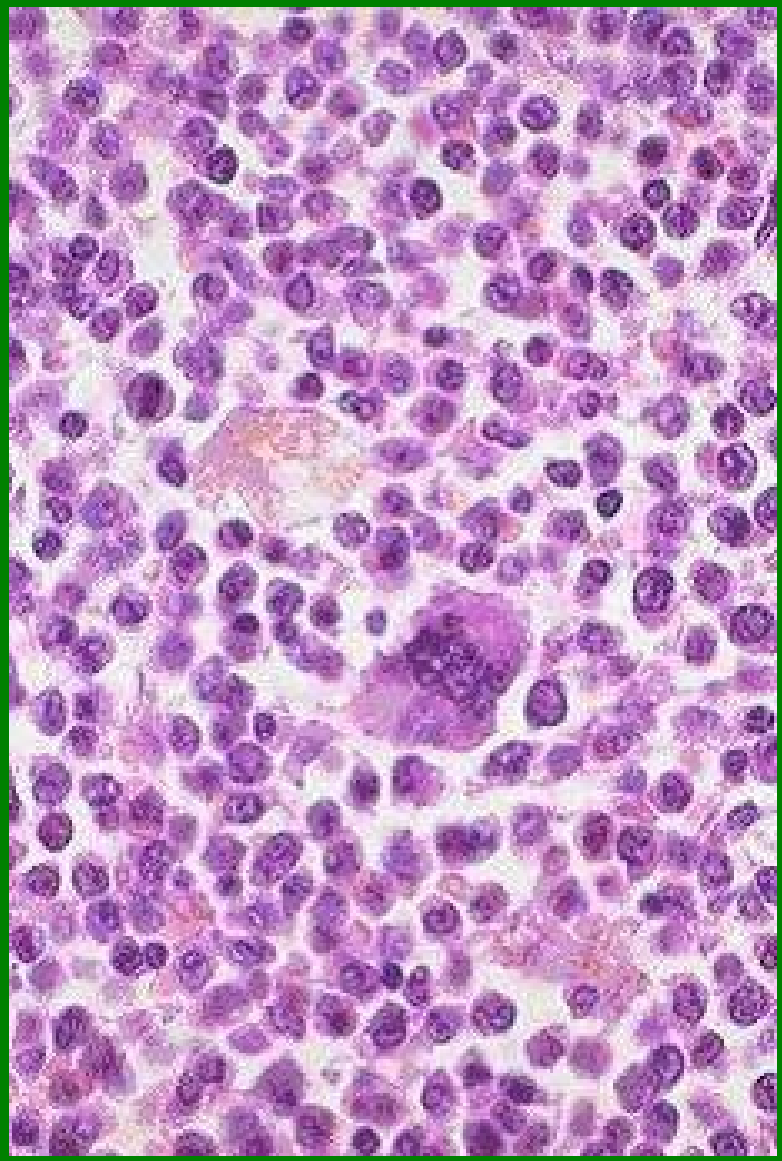
- větší než normocyty
- obsahují zbytky RNA v buněčných organelách (ribozomy, endoplazmatické retikulum)
- proto ještě může docházet k syntéze hemoglobinu
- průkaz speciálním barvením
  *(nelze prokázat běžným panoptickým barvením)*

# Kostní dřeň - buněčnost

normální

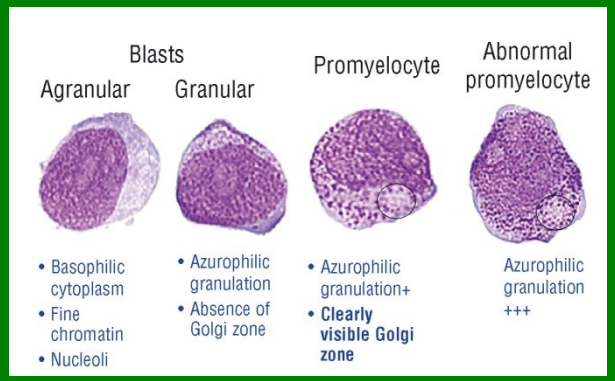


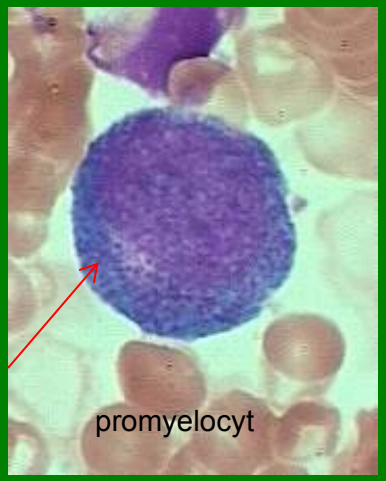
vysoká

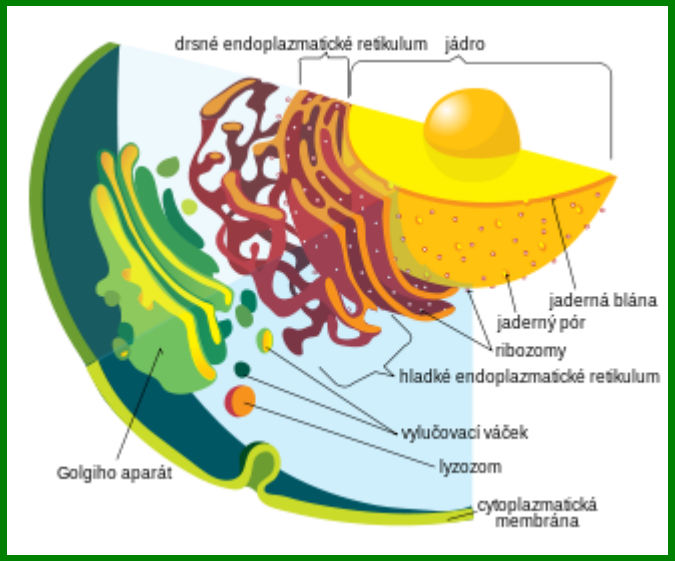


# Perinukleární projasnění

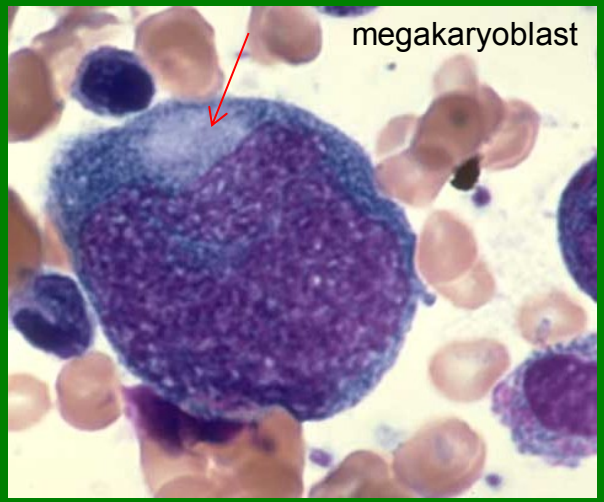
## Golgiho zóna *(návaznost na jádro přes endoplazmatické retikulum)*

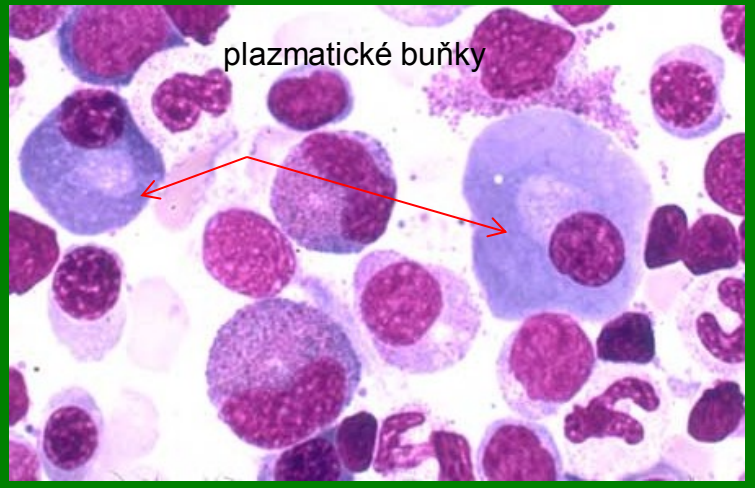







Podpořeno MZ ČR – RVO (FNBr, 65269705)