

Cytologie van bloed en beenmerg

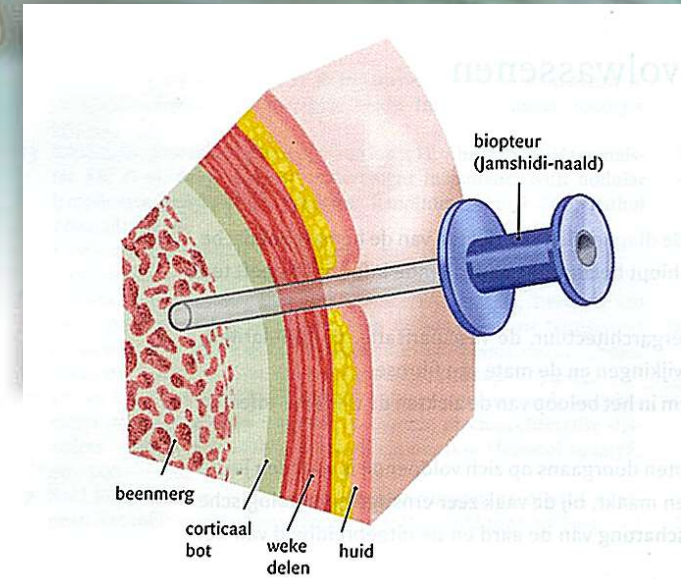
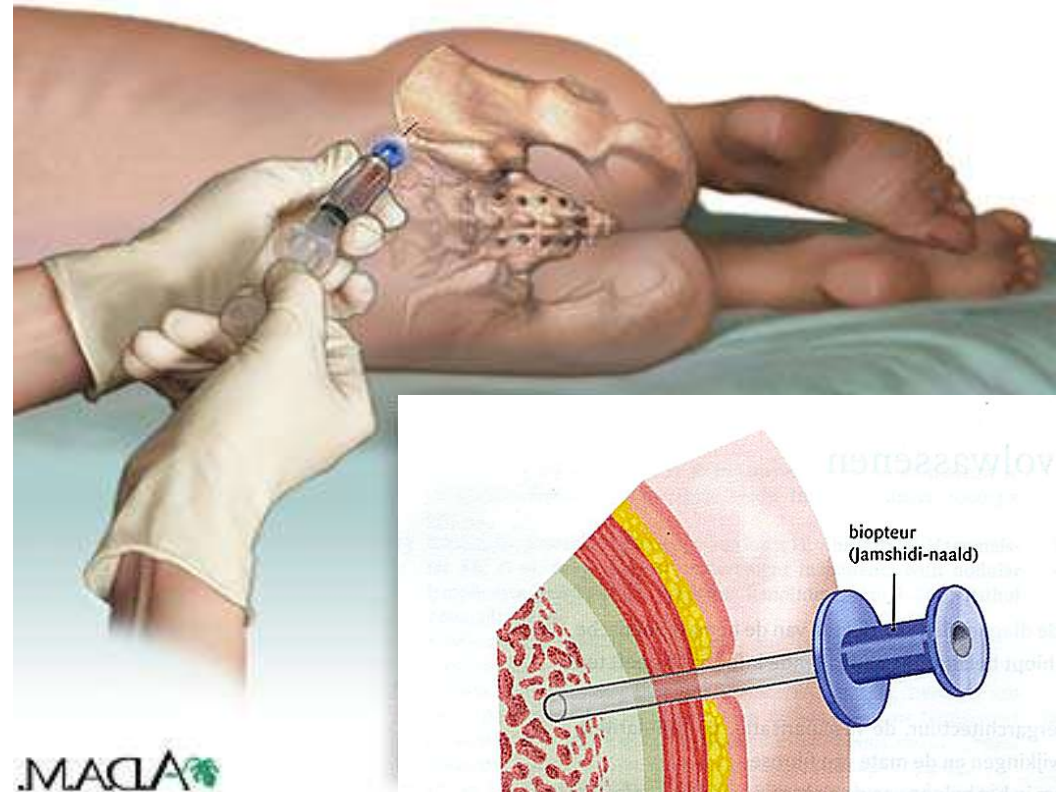
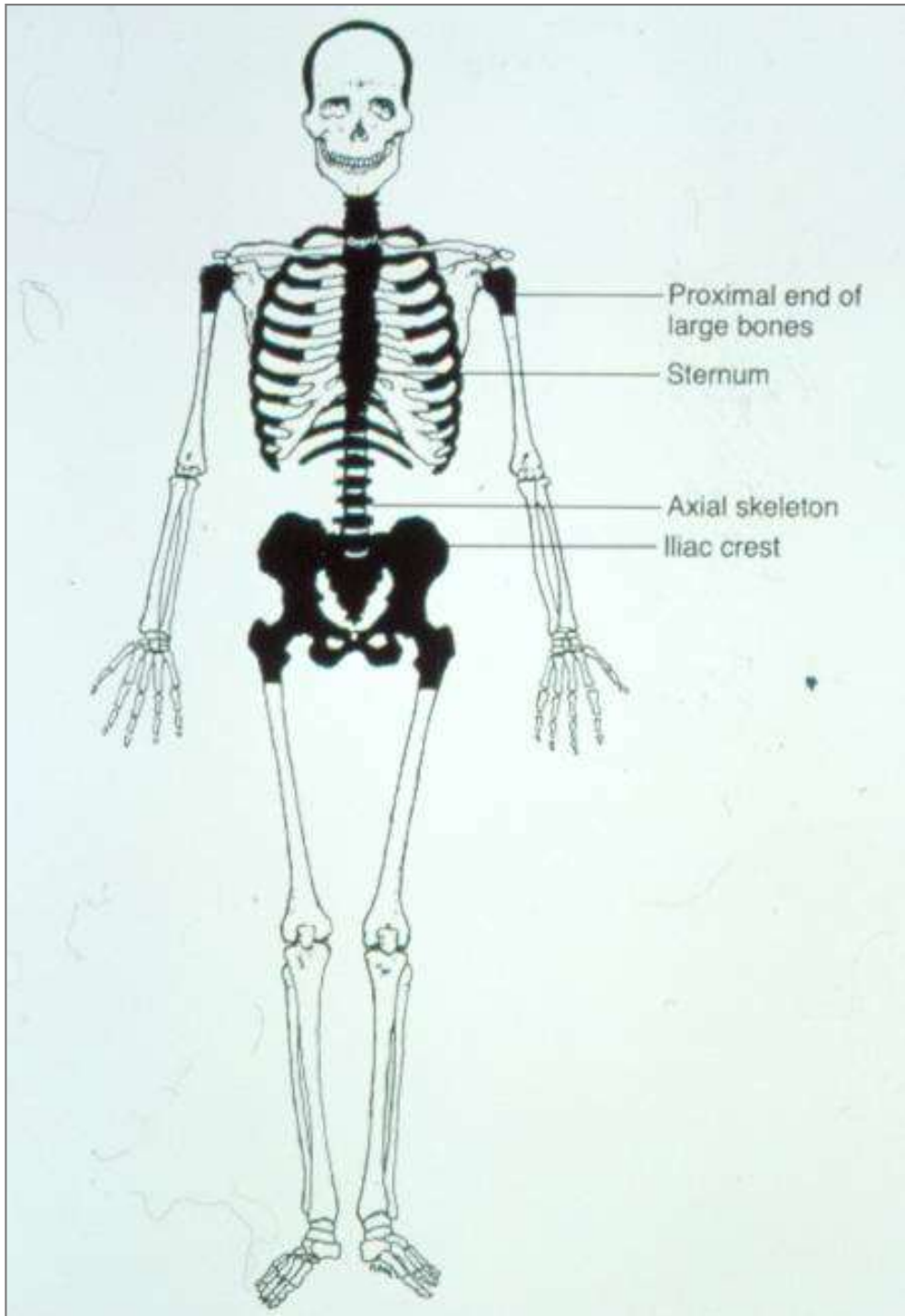
André Mulder

Arts klinische chemie/klinisch chemicus

UMCG

Disclosures

Type van verstrengeling / mogelijk (financieel) belang	Naam van commercieel bedrijf
<i>Ontvangst van subsidie(s)/research ondersteuning:</i>	Geen belangen
<i>Ontvangst van honoraria of adviseursfee:</i>	Geen belangen
<i>Lid van een commercieel gesponsord 'speakersbureau'</i>	Geen belangen
<i>Financiële belangen in een bedrijf (aandelen of opties)</i>	Geen belangen
<i>Andere ondersteuning (gelieve te specificeren):</i>	Geen belangen
<i>Wetenschappelijke adviesraad:</i>	Geen belangen





Aspiraaf

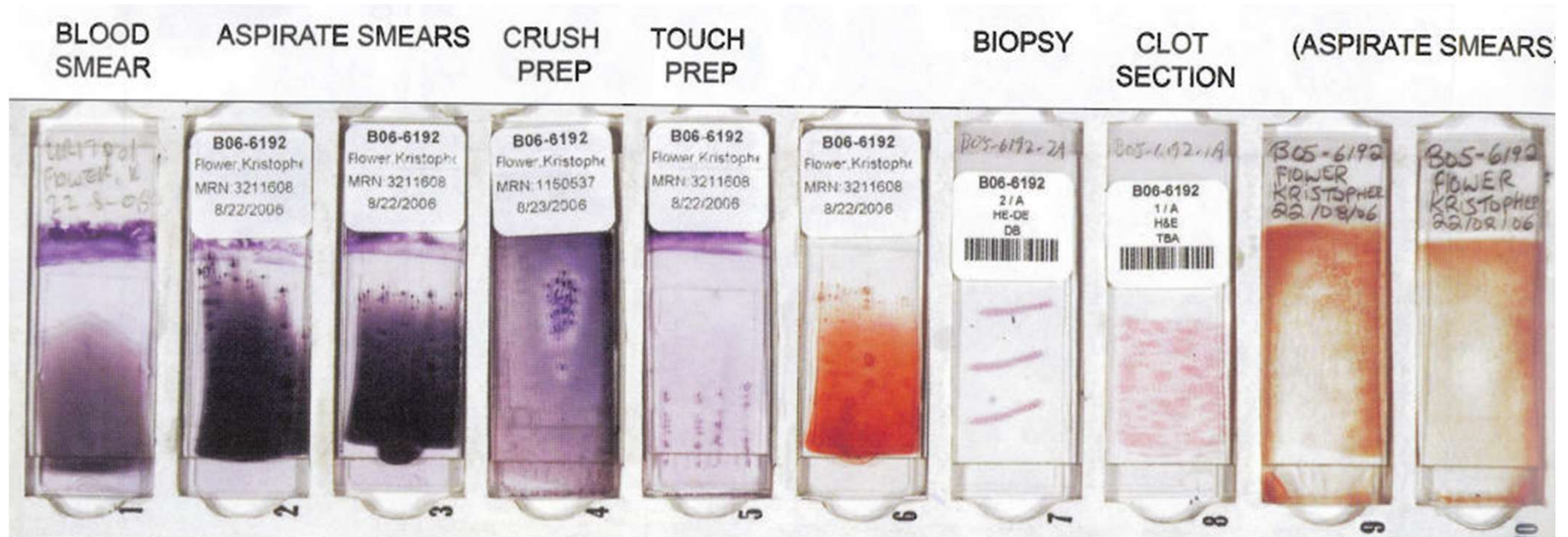
Cave:

- **Bloedbijmenging**
- **Stolsels**
- **Kapotte cellen**

beenmergaspiraat



Preparaten



✓ **Uitstrijk/Zigzag: 2**

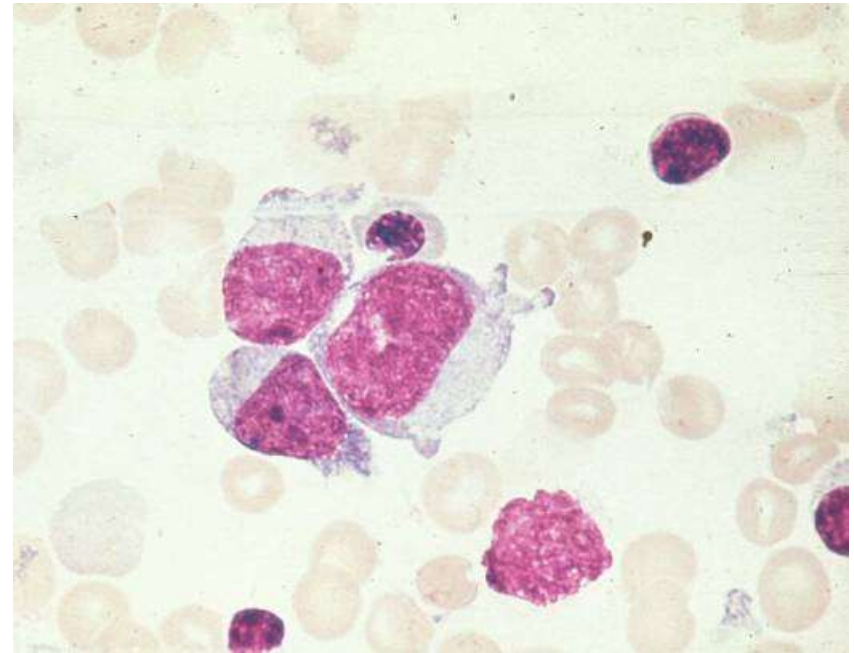
✓ **Plet: 6**

✓ **Dep/Roller: 4**



Keuringen

- **May-Grünwald Giemsa**
 - **Wright**
 - **IJzerkleuring**
 - **Myeloperoxidase/Sudan Black**
 - **Esterase**
 - **Toluidineblauw**
-
- **Belang van ongekleurd preparaten!**



Bloed Wright kleuring elders: blasten

Een duidelijke aanvraag met **indicatie** voor beenmergbeoordeling is een voorwaarde

Bloed is essentieel!

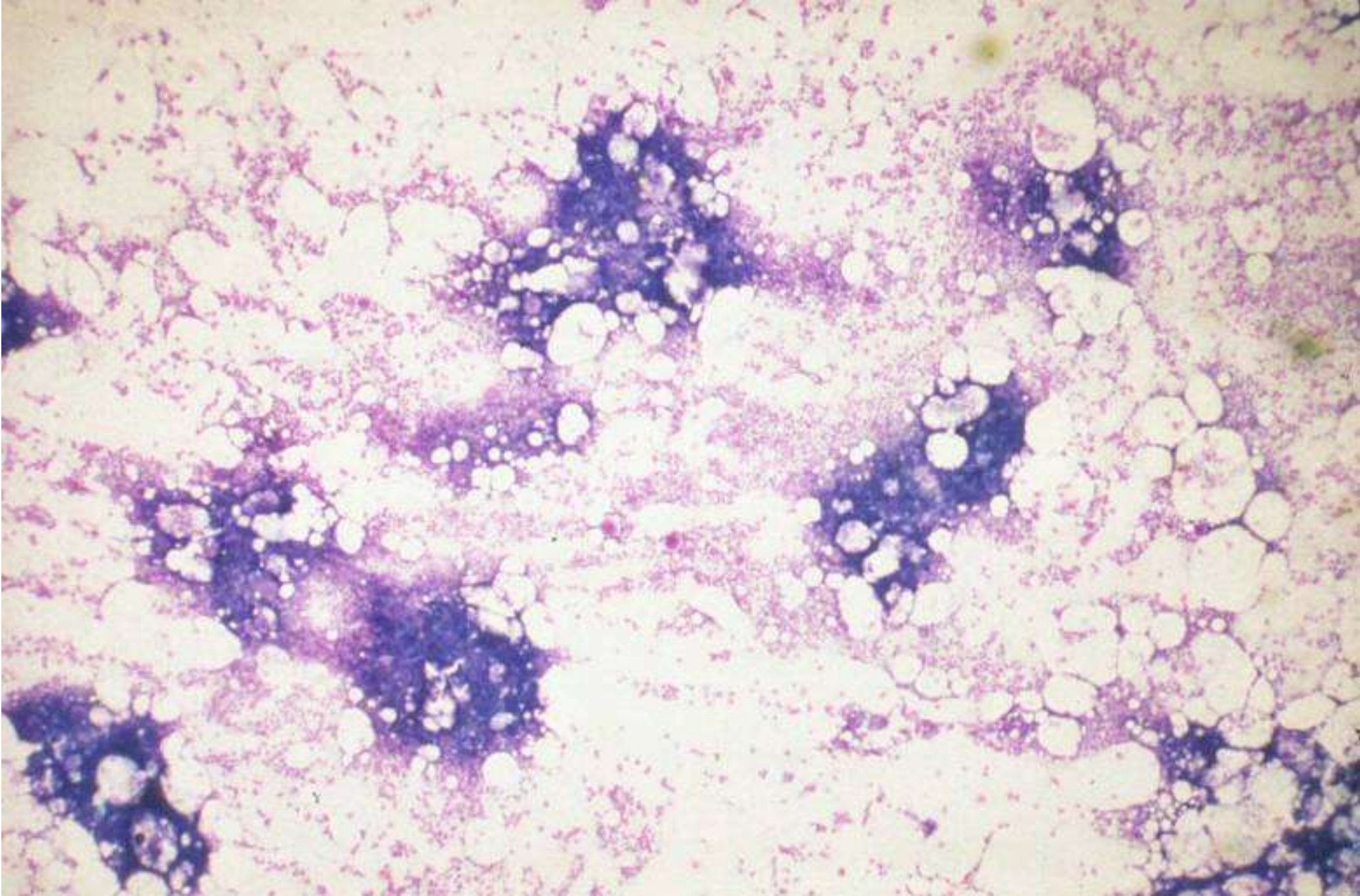
- Soms is diagnose op bloed te stellen (CLL,CML)
- *Representatief beenmerg?*
- **Hemocytometrie**
- **Vaste volgorde bij beoordeling van bloedbeeld:**
 - 10x10x: geldrolvorming, agglutinatie, aggregaten
 - 10x40/50x: diff en aspect/details van cellen
 - 10x100x: inclusies, trombocytenaantal inschatten

Beenmergaspiraat

Vaste volgorde:

10x10:

- **Vlokrijkdom**
- **Celrijkdom**
- **Megakaryocytenaantal: 3-5 per gezichtsveld**
- **Abnormale opeenhopingen**



Beenmergaspiraas

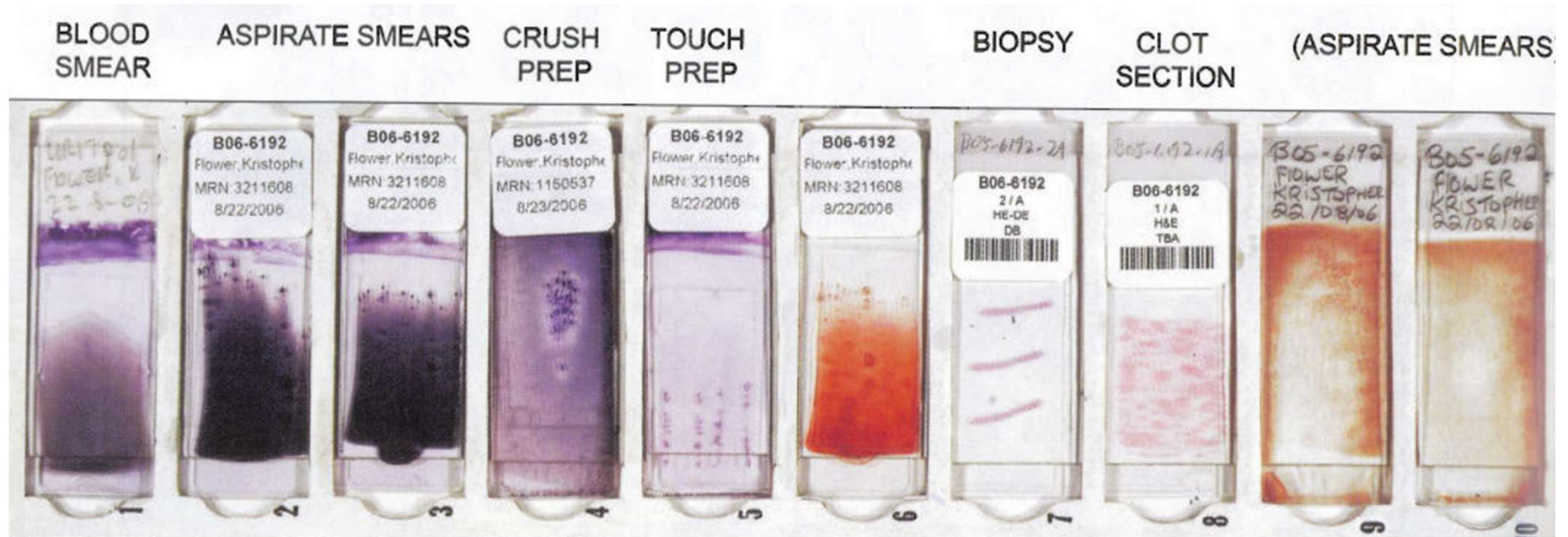
Vaste volgorde:

10x10:

- **Vlokrijkdom**
- **Celrijkdom**
- **Megakaryocytenaantal**
- **Opeenhopingen**

- ***Geen vlokken: niet-representatief!***
 - *Bloody tap: dep/roller preparaten*
 - *Dry tap: dep/roller preparaten*

Preparaten



✓ **Uitstrijk/Zigzag: 2**

✓ **Plet: 6**

✓ **Dep/Roller: 4!!**

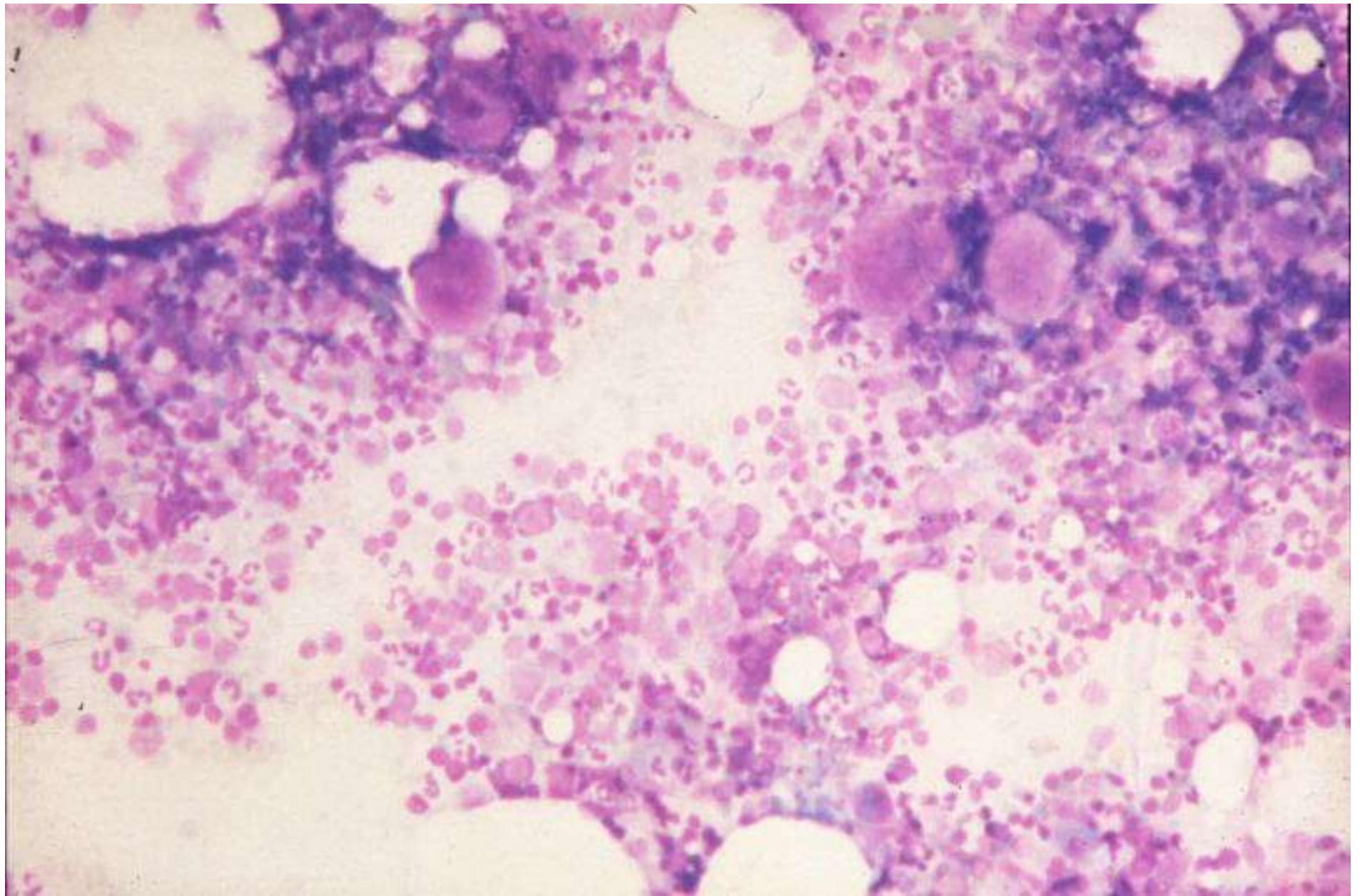


Beenmergaspiraas

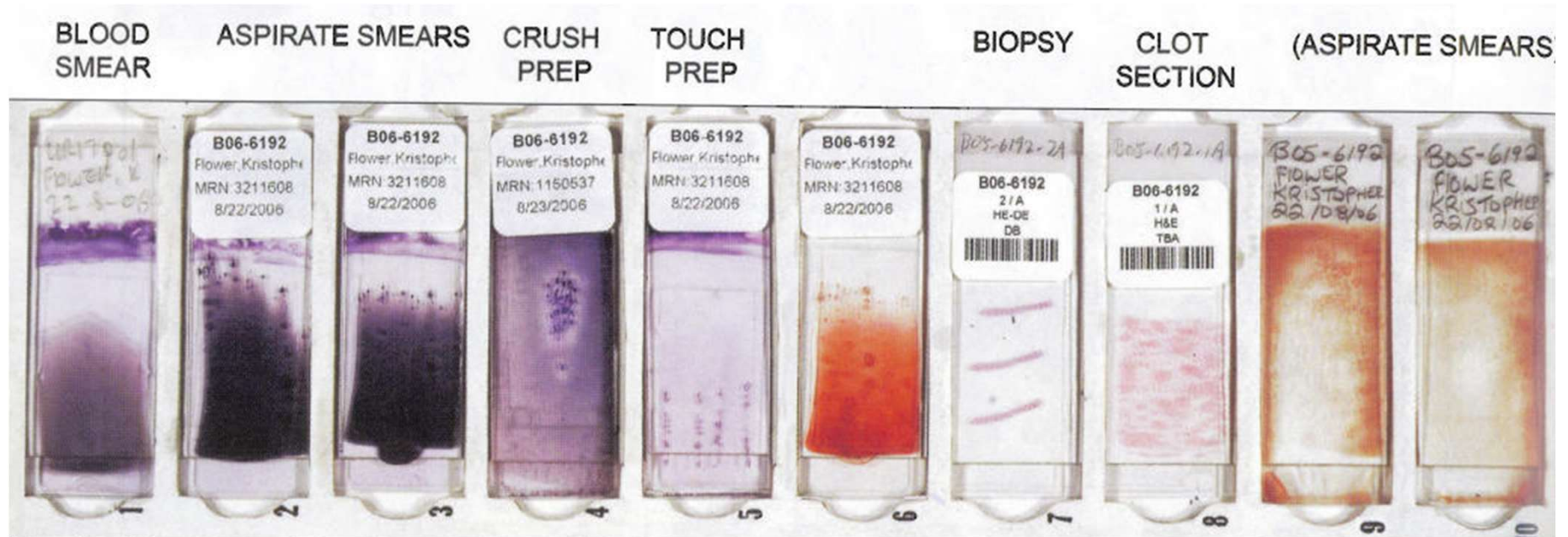
Vaste volgorde:

10x40/50:

- **Megakaryocytenaantal**
- **Telling: BM: 500 en PB: 200 (WHO)**
- **Aspect/details van cellen**



Preparaten



✓ **Uitstrijk/Zigzag: 2**

✓ **Plet: 6**

✓ **Dep/Roller: 4**



Beenmergaspiraart

Vaste volgorde:

10x100:

- **Aspect/details van cellen**
- **Inclusies (o.a. ijzerkeuring)**

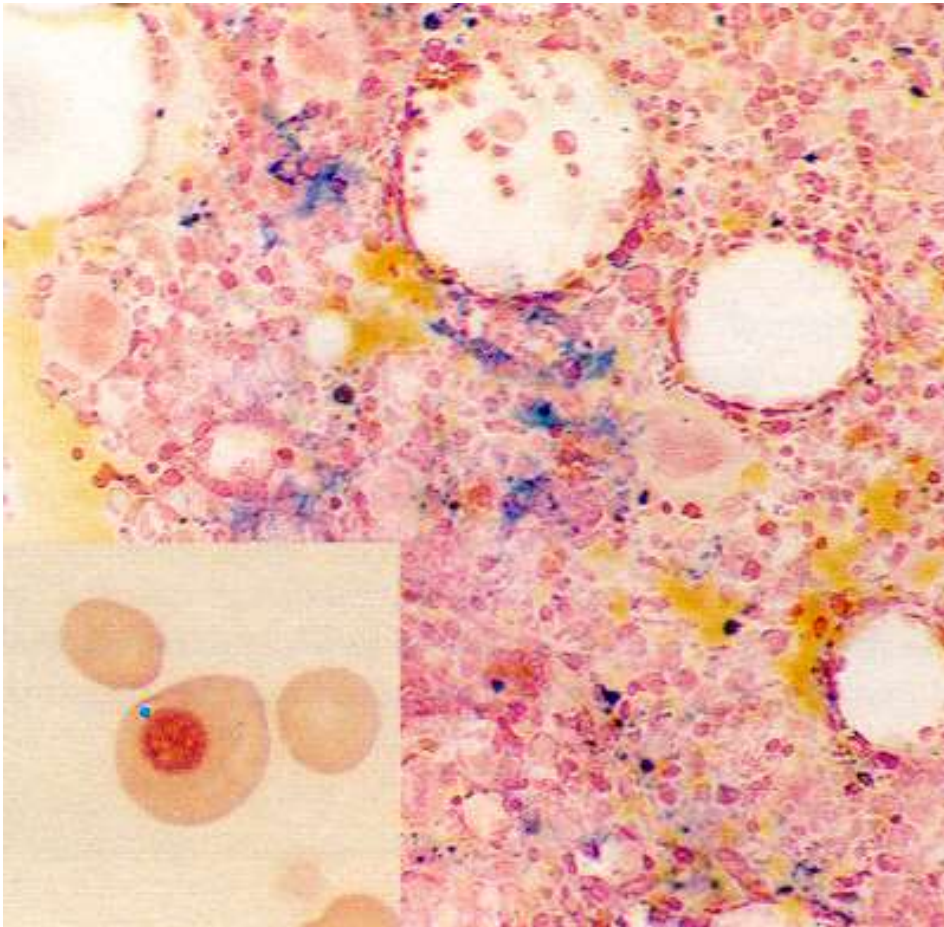
Beenmergaspiraat

Celtype	Pasgeborenen	7 dg	6 mnd – 2 jr	6 jr	12 jr	Volwassenen
Blasten¹	1	1	0,5	1	1	1
Promyelocyten	2	2	0,5	2	2	2
Myelo- metamyelocyten	5	10	8	15	20	21
Neutrofielen	40	40	30	35	40	44
Eosinofielen	1	1	1	1	1	2
Lymfocyten	10	20	40	25	15	10
Erytroblasten	40	25	20	20	20	20
Ratio wit/rood	1,2:1	2,1:1	2,0:1	2,7:1	3,2:1	3,5:1

¹: Maximaal 5%

Ijzerkleuring

Berlijns Blauwkleuring

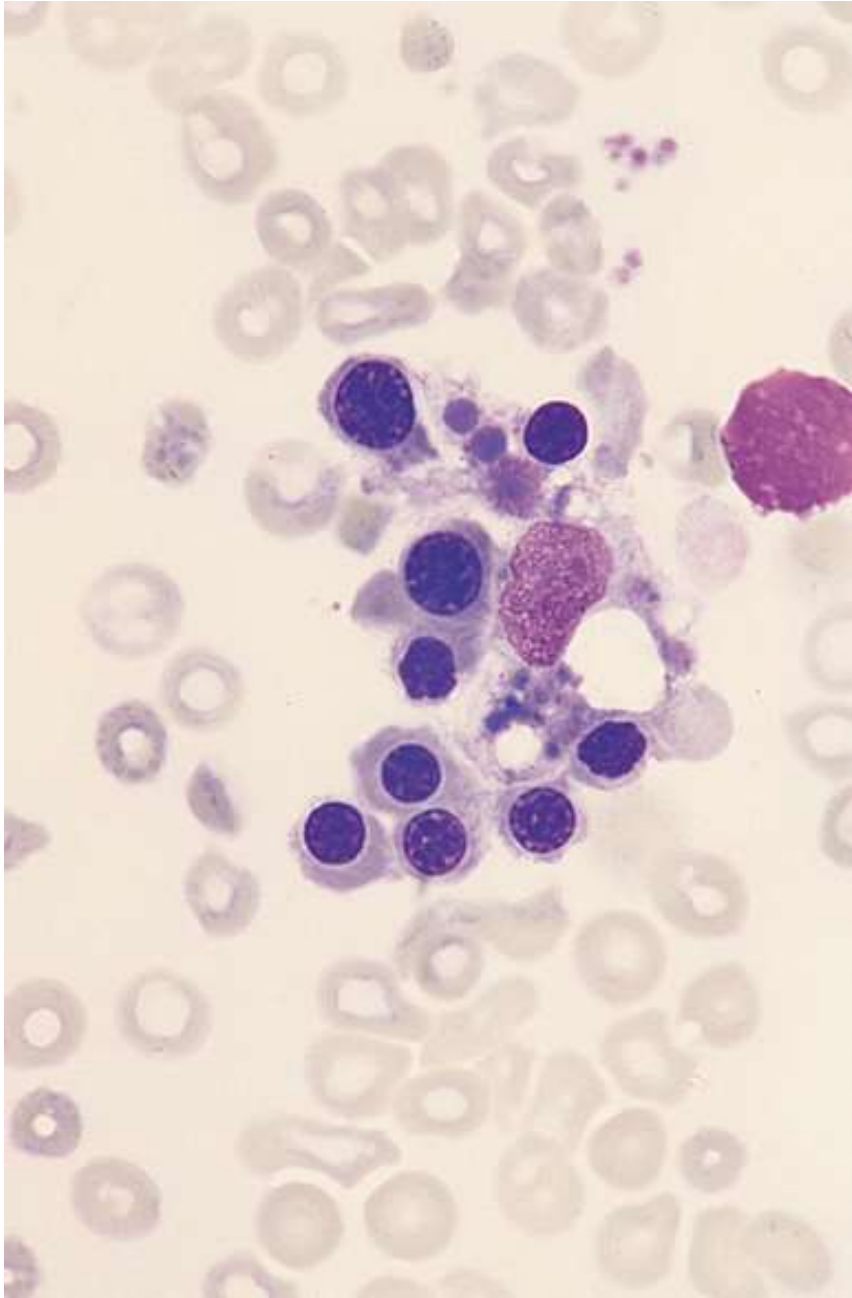


Normaal:

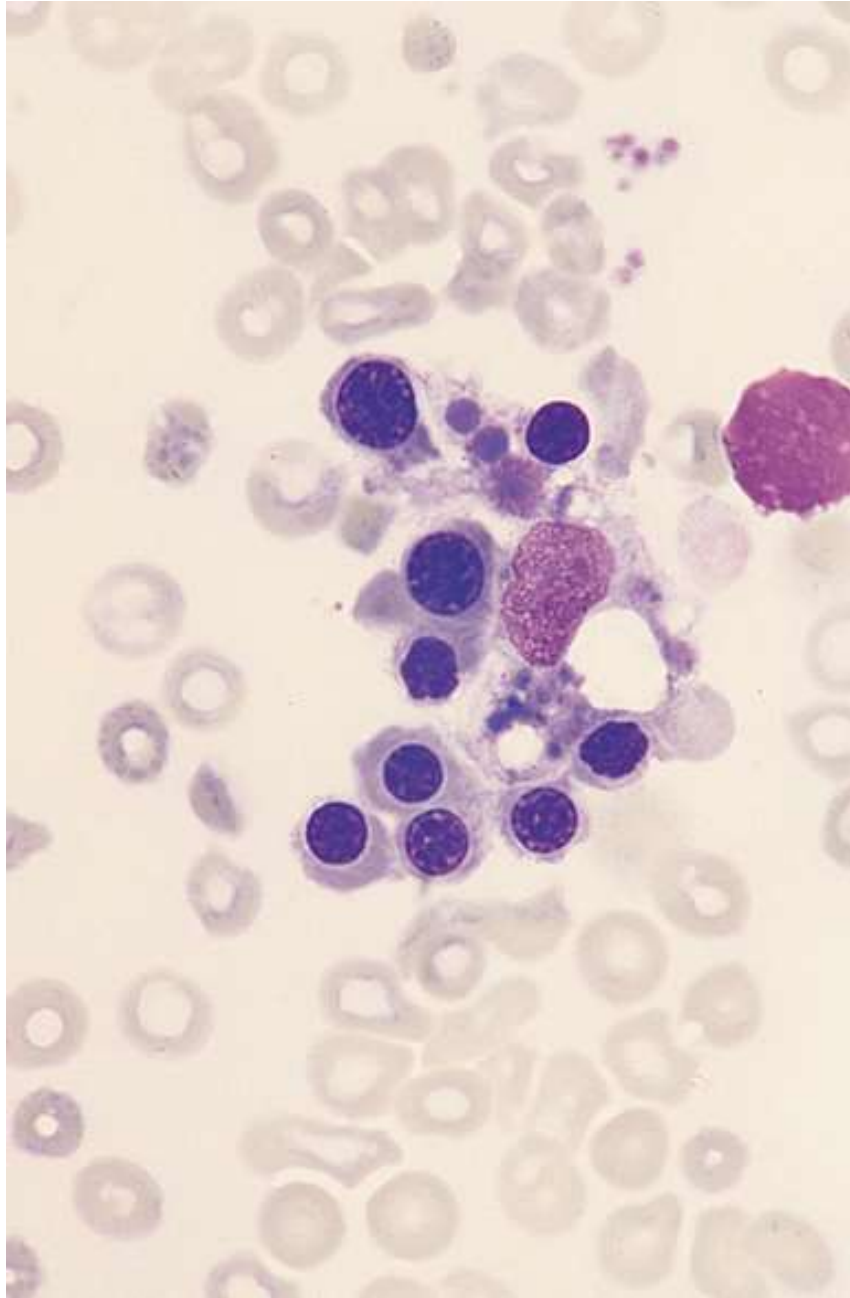
- Depotijzer aantoonbaar 10x objectief
- 20-60 % sideroblasten:
1-2 korrels

Afwijkend:

- < 20% sideroblasten
- Ringsideroblasten: > 4 korrels
- Siderocyten (pappenheimer bodies)

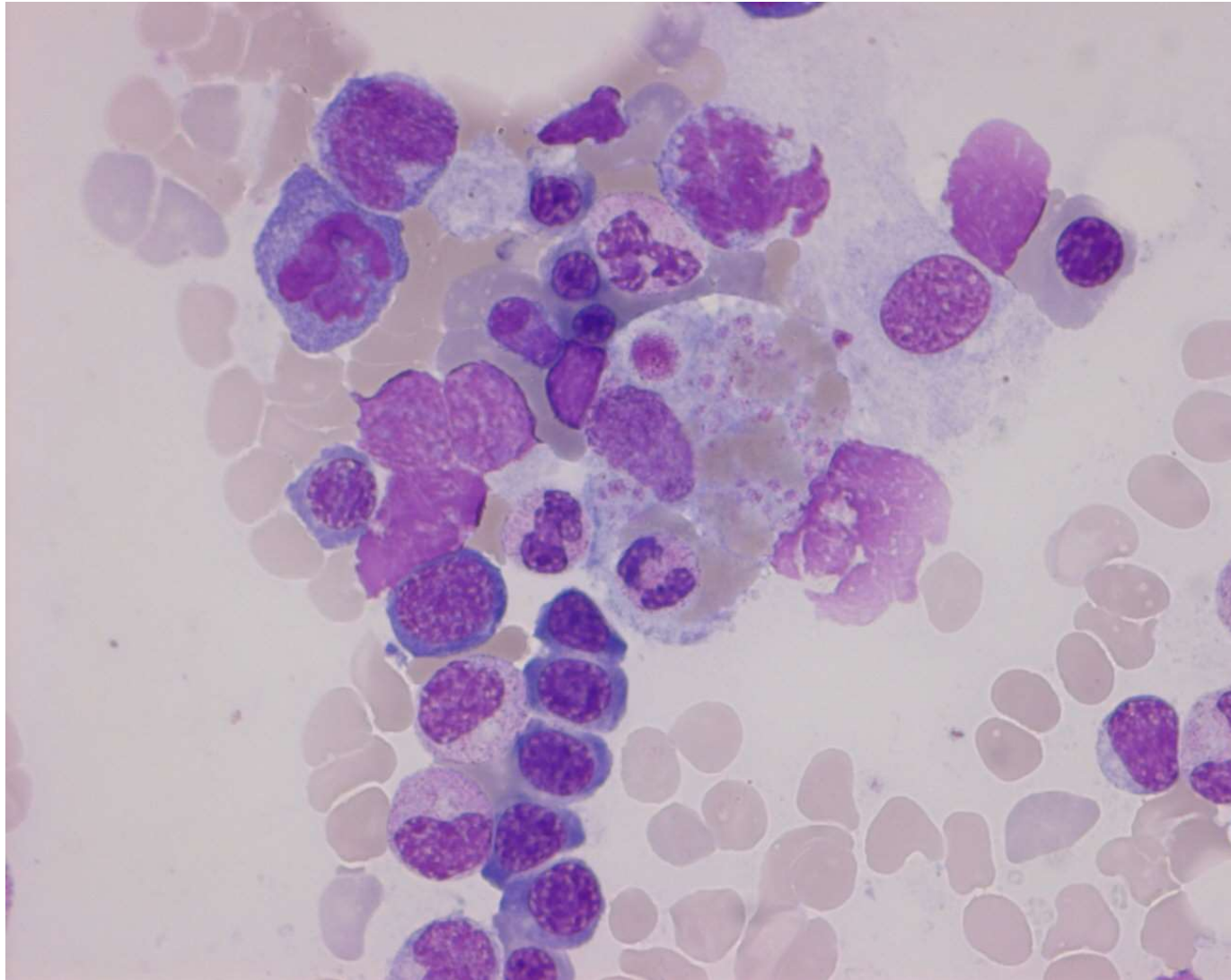


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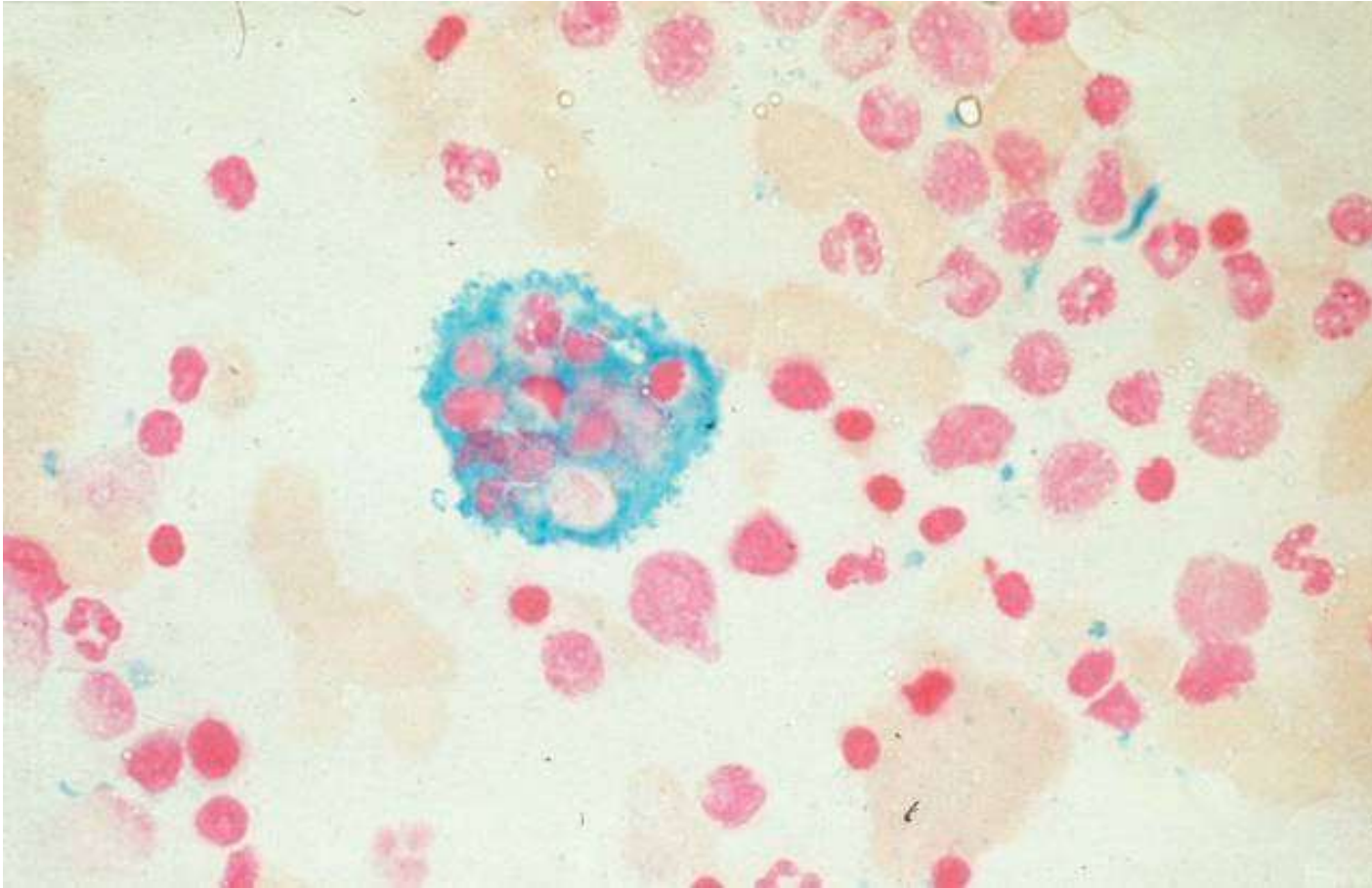


Erytron

Beenmerg (Giemsa): macrofaag

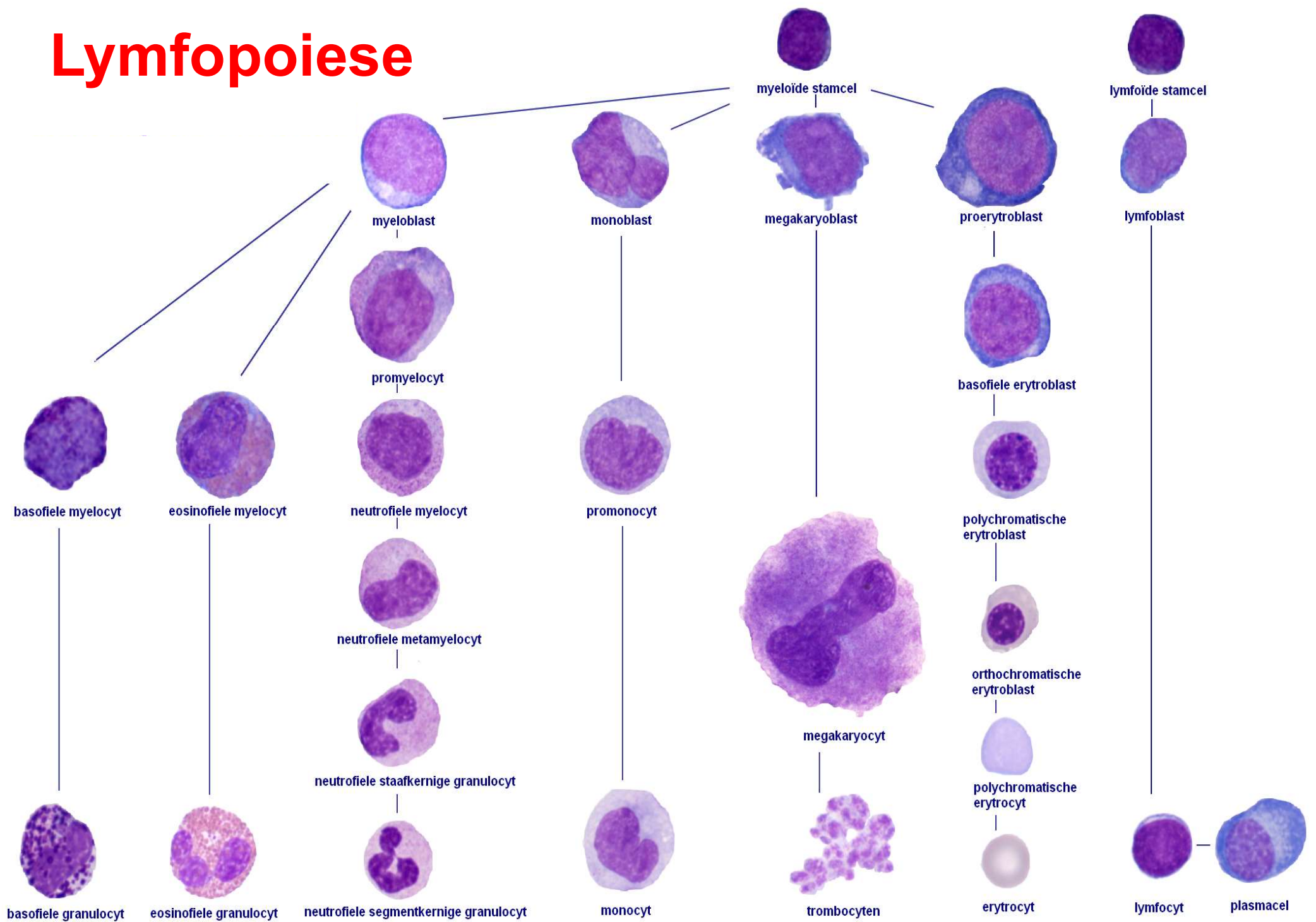


Beenmerg (ijzerkleuring): macrofaag



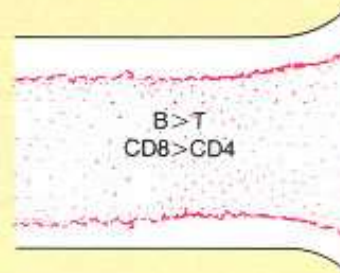


Lymfopoïese



Primary lymphoid organs

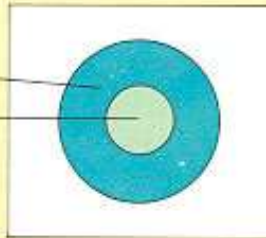
Bone marrow



Thymus

Cortex T α T⁺

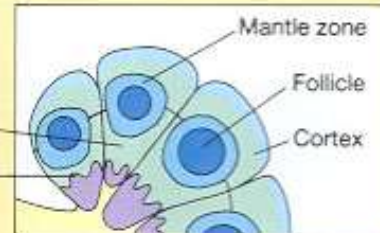
Medulla T δ T⁺



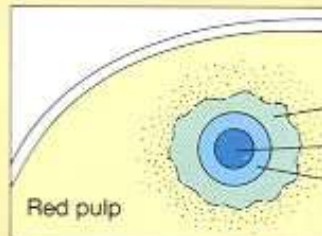
Secondary lymphoid organs

Lymph node

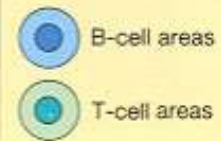
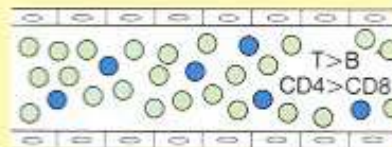
Deep cortical area (paracortex)
Medullary cords



Spleen

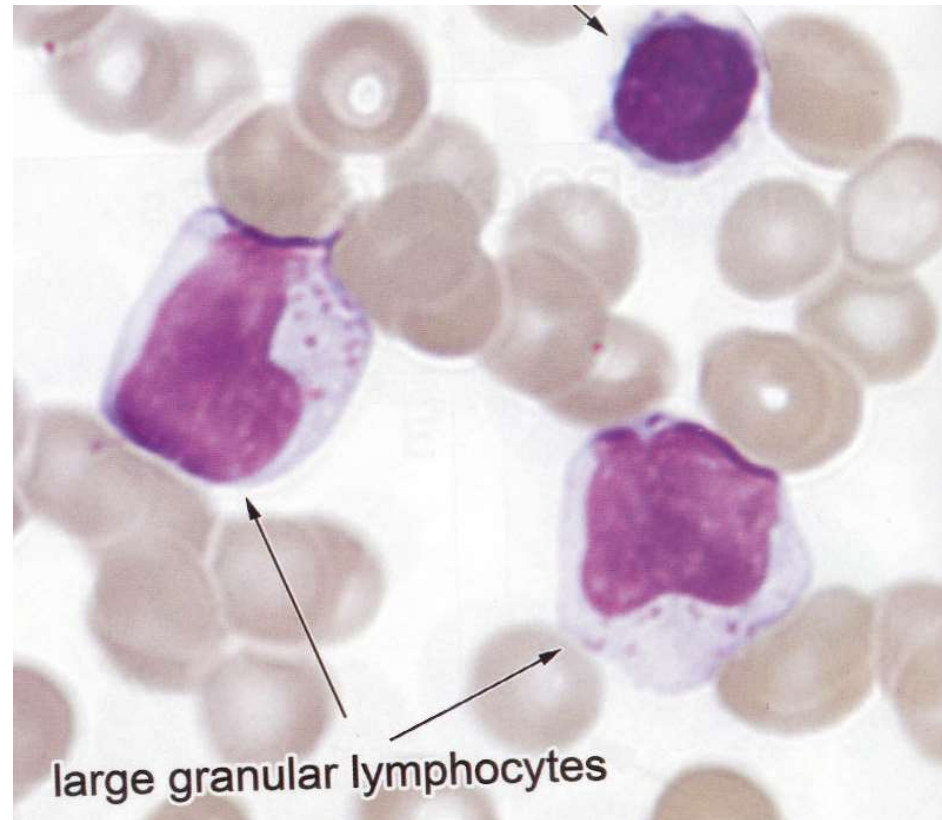
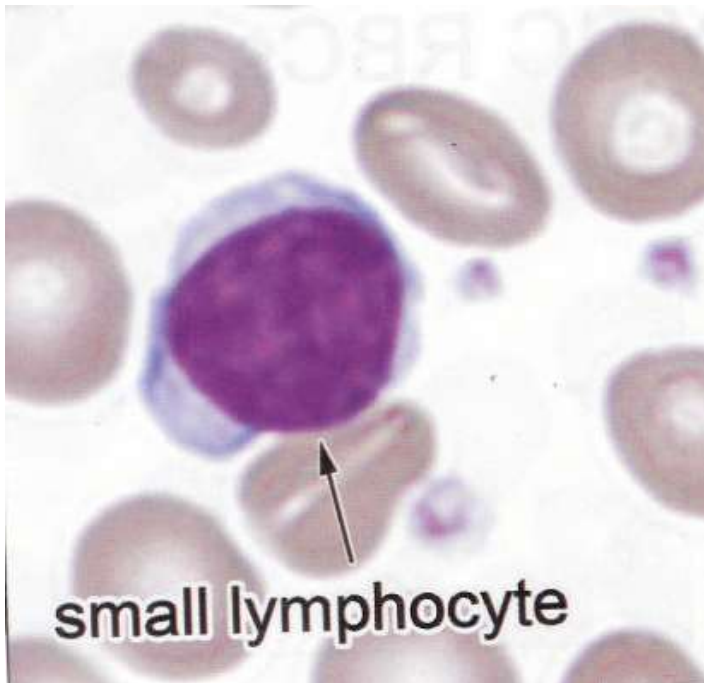


Blood



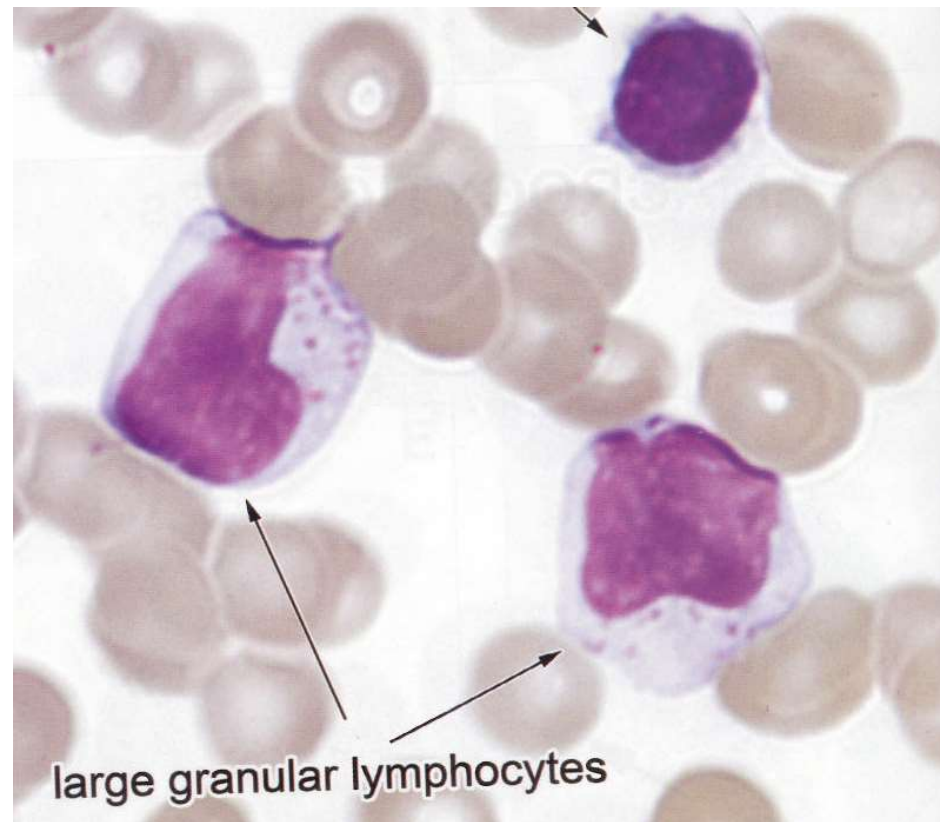
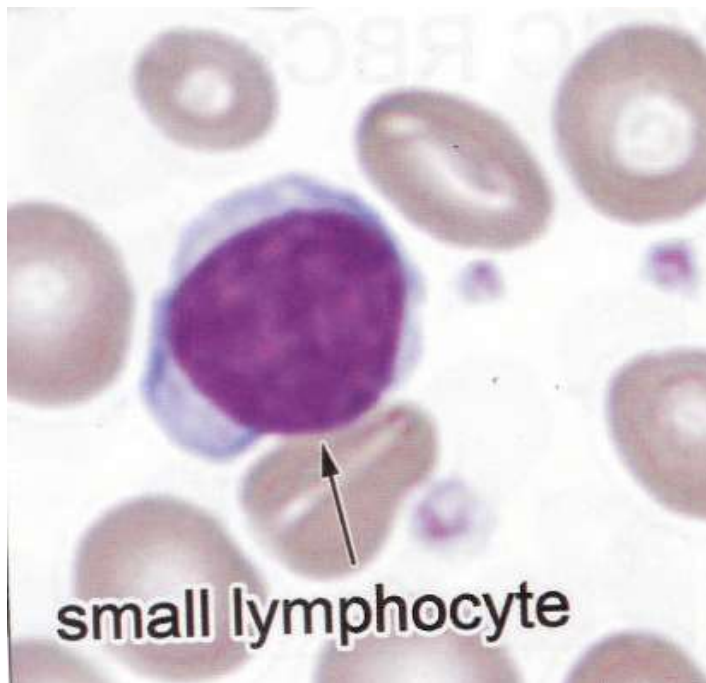
Bloed: lymfocyten ($< 4 \times 10^9/L$)

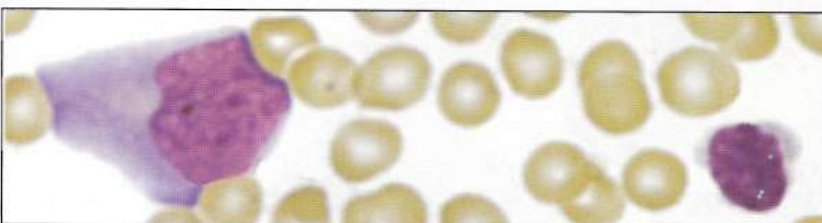
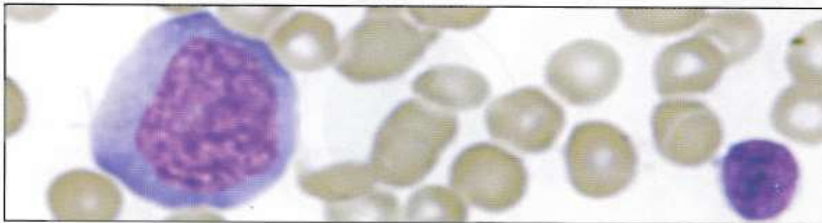
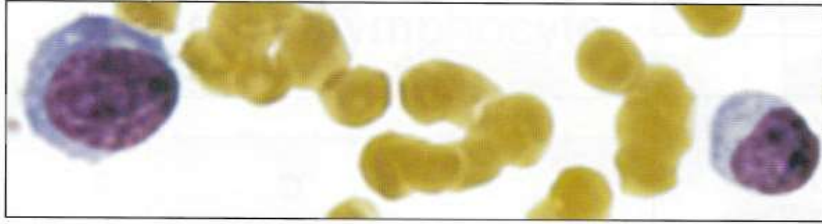
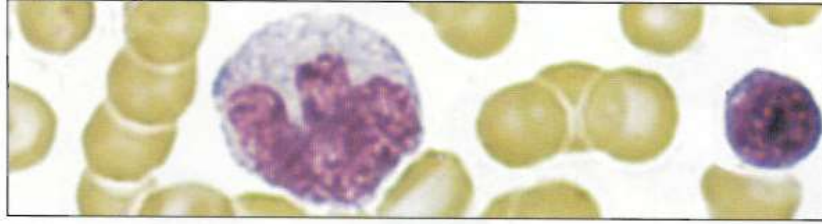
B- of T- of NK-cel?



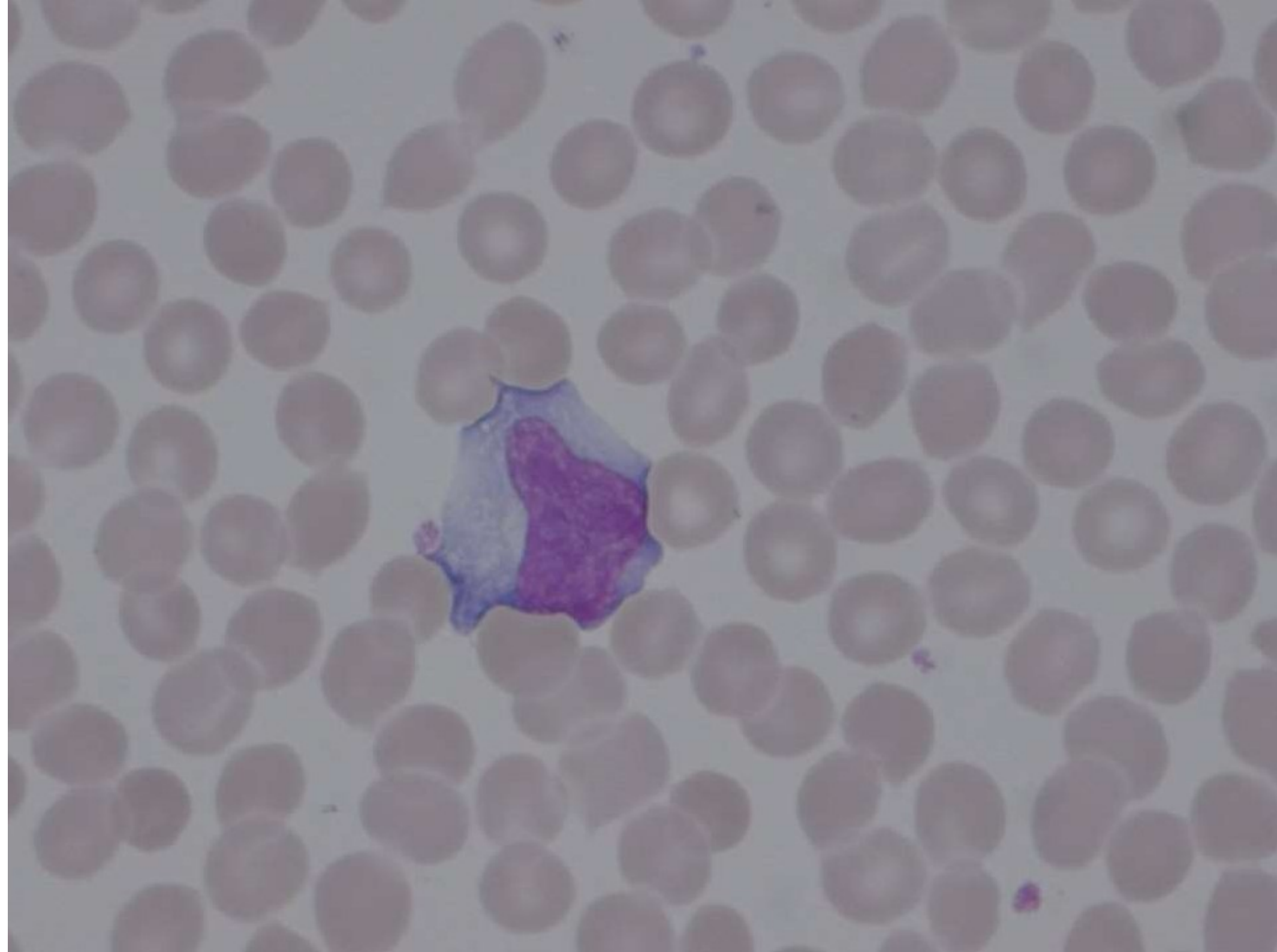
Bloed: lymfocyten ($< 4 \times 10^9/L$)

T-lymfocyten (CD4>CD8) > LGL cellen (T/NK, < 20%) > B-cellen (K>L)



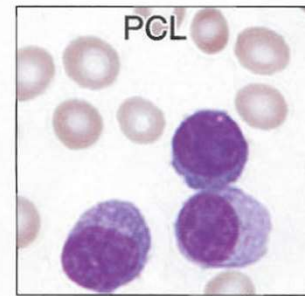
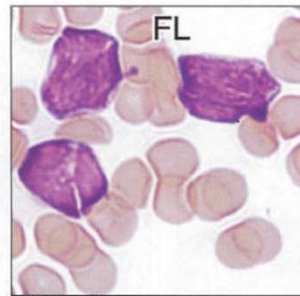
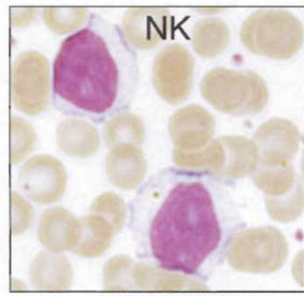
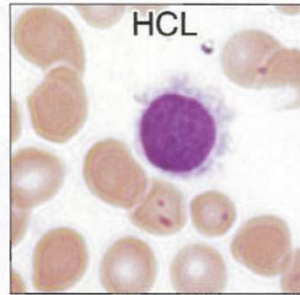
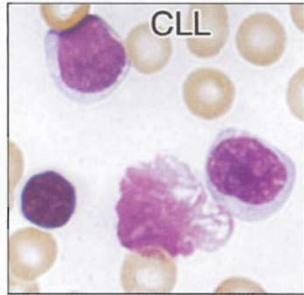


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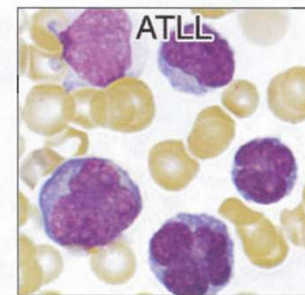
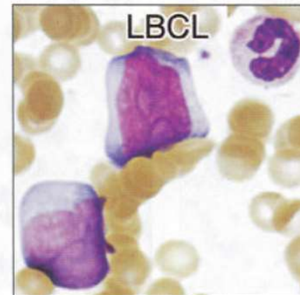
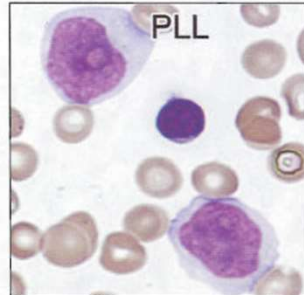
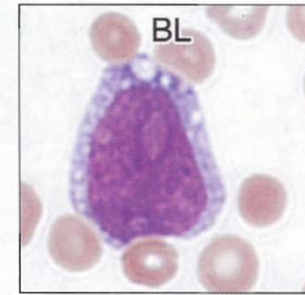
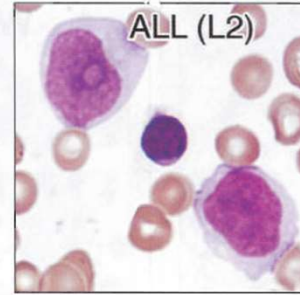
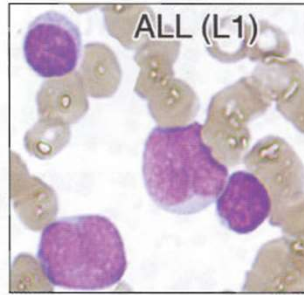




SMALL CELL NEOPLASTIC LYMPHOID DISORDERS

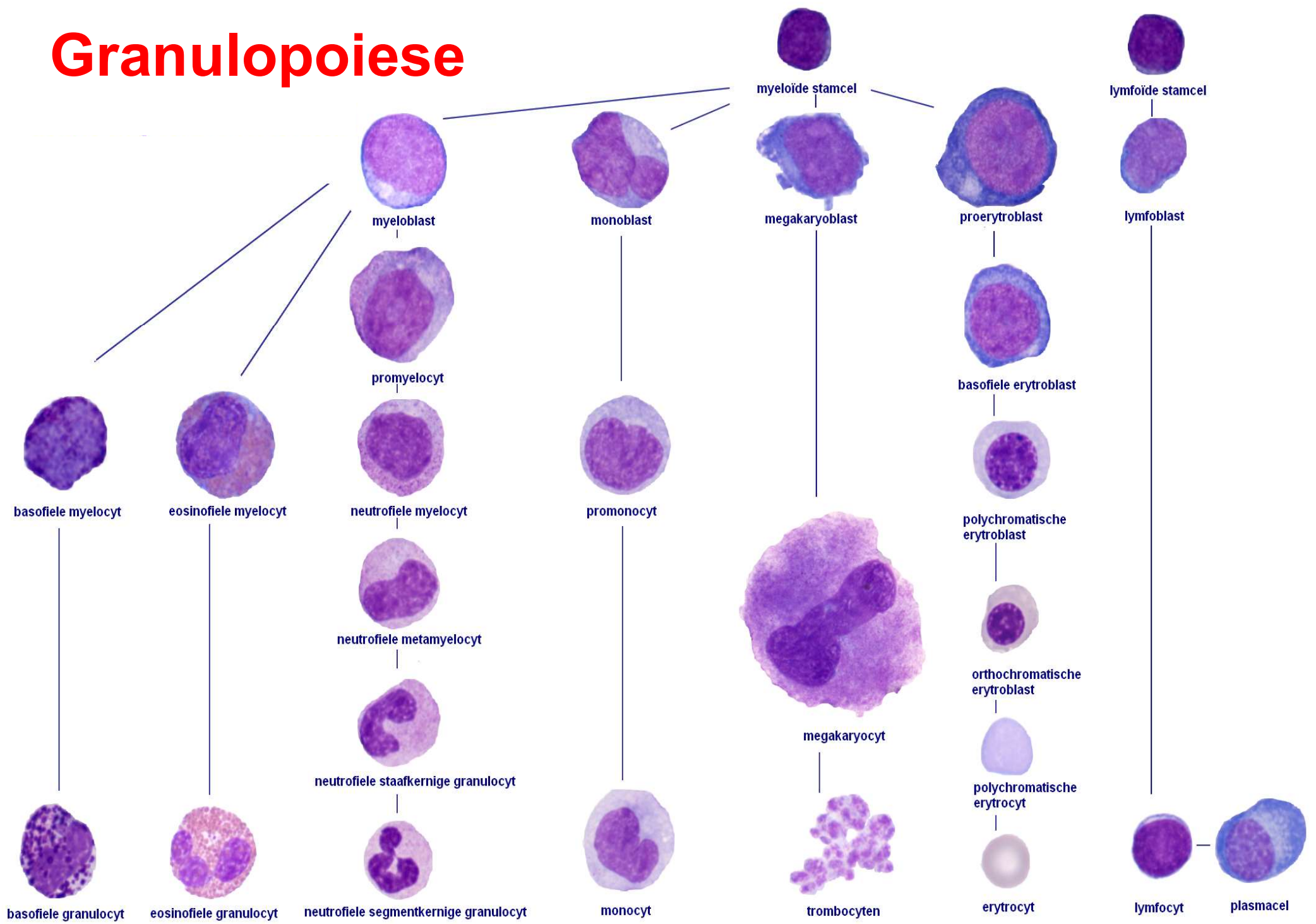


LARGE CELL NEOPLASTIC LYMPHOID DISORDERS

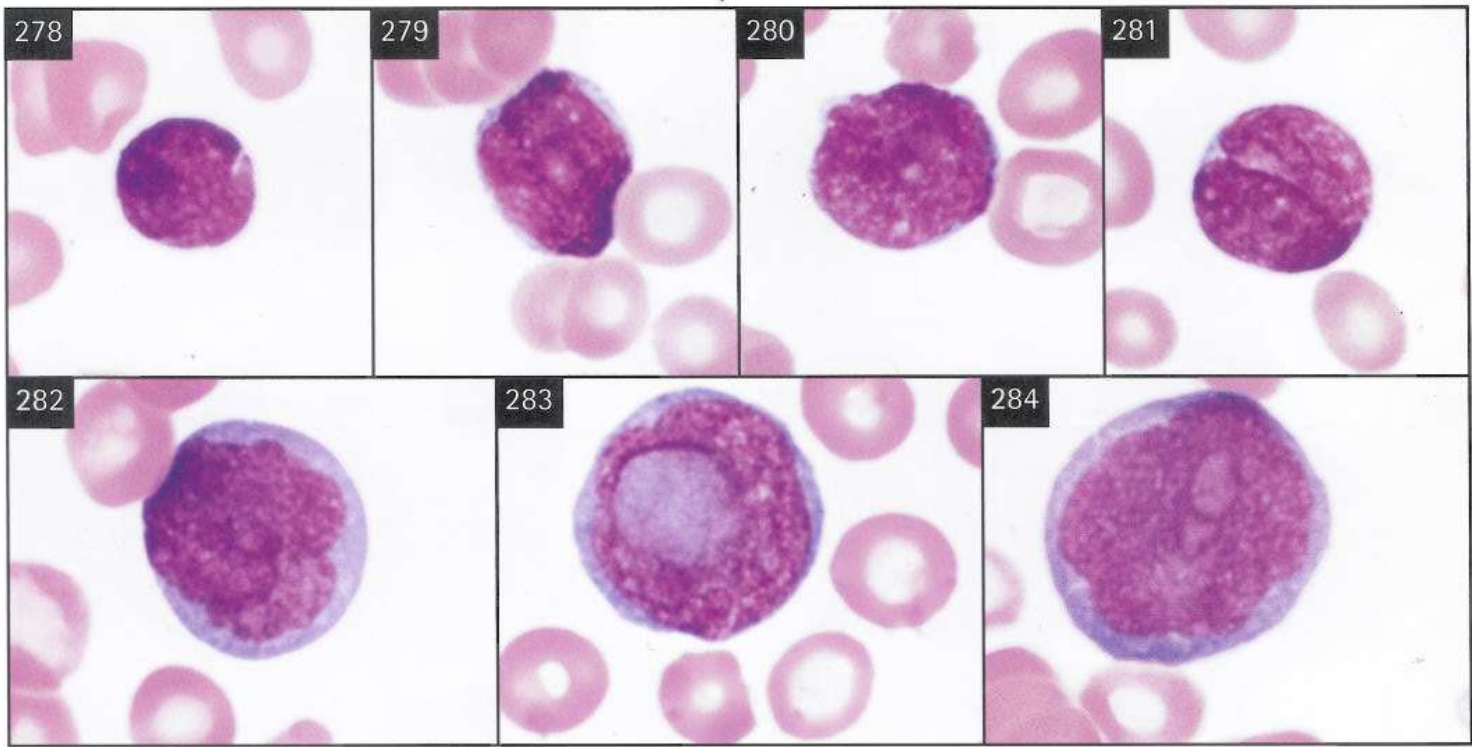




Granulopoïese



Normal Blasts: Images 278-287



278 to 284 Variable size blasts



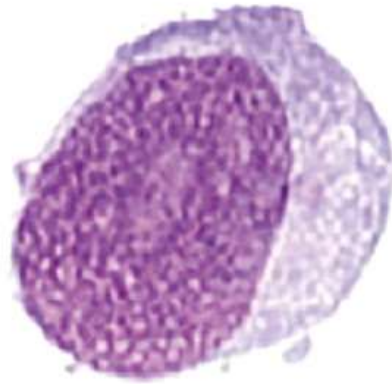
285 to 286 Blasts appearing like reactive/atypical lymphocytes

287 A blast cell with finely reticulated chromatin but no nucleolus



Blasts

Agranular Granular

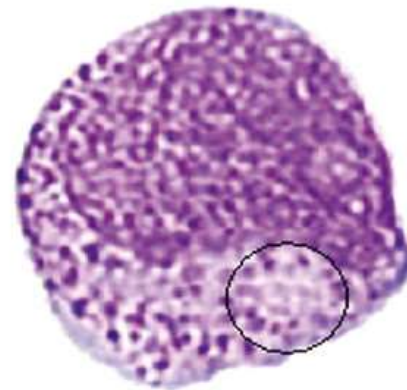


- Basophilic cytoplasm
- Fine chromatin
- Nucleoli



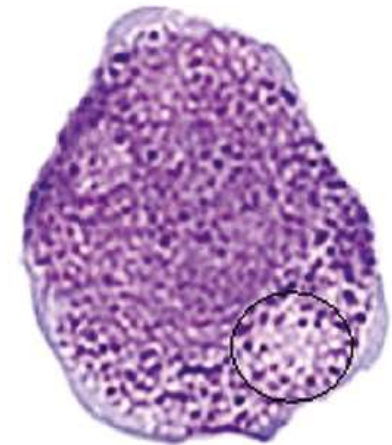
- Azurophilic granulation
- Absence of Golgi zone

Promyelocyte



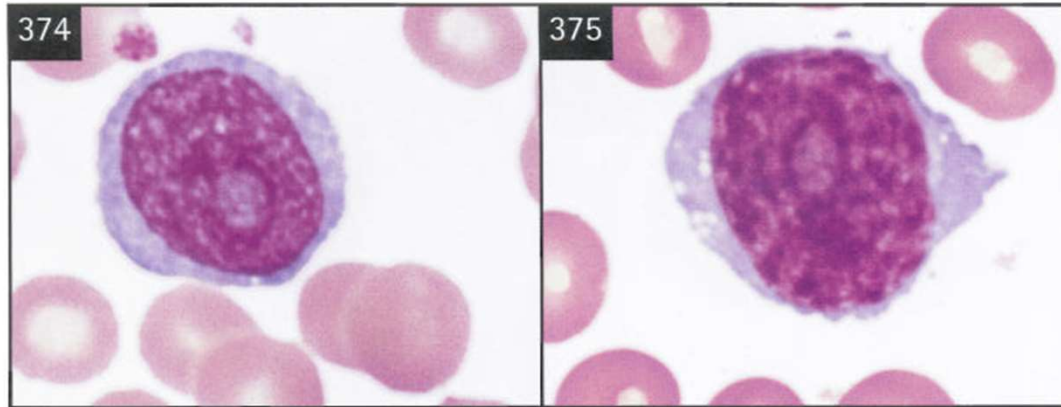
- Azurophilic granulation+
- **Clearly visible Golgi zone**

Abnormal promyelocyte

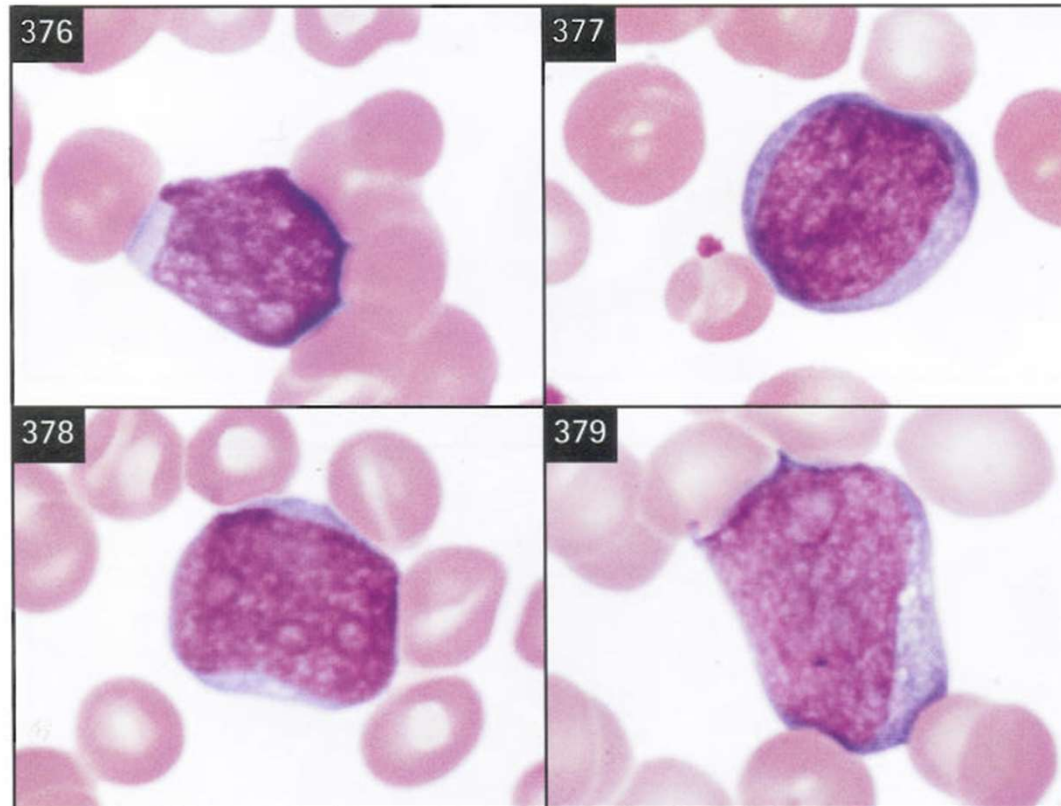


- Azurophilic granulation+++

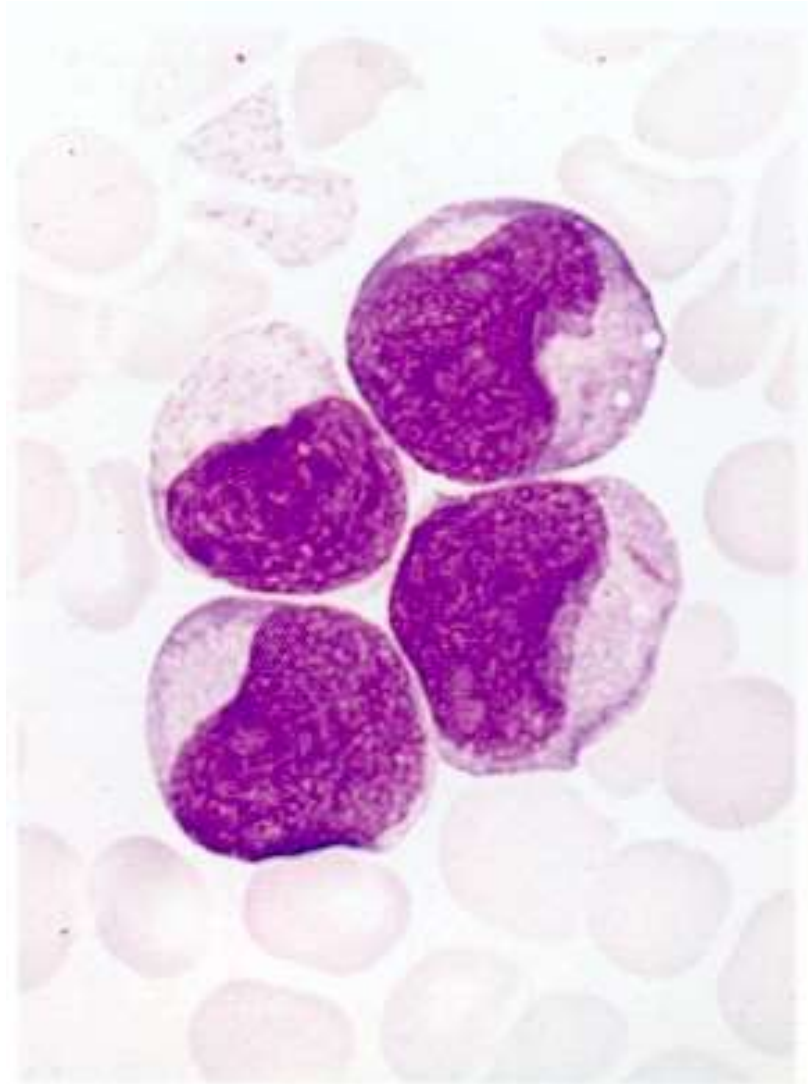
Prolymphocytes: Images 374-375



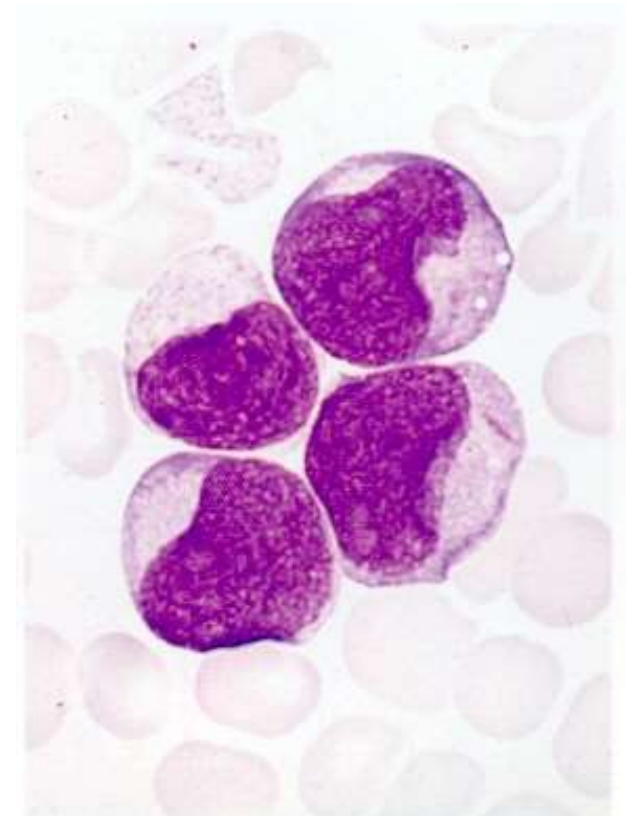
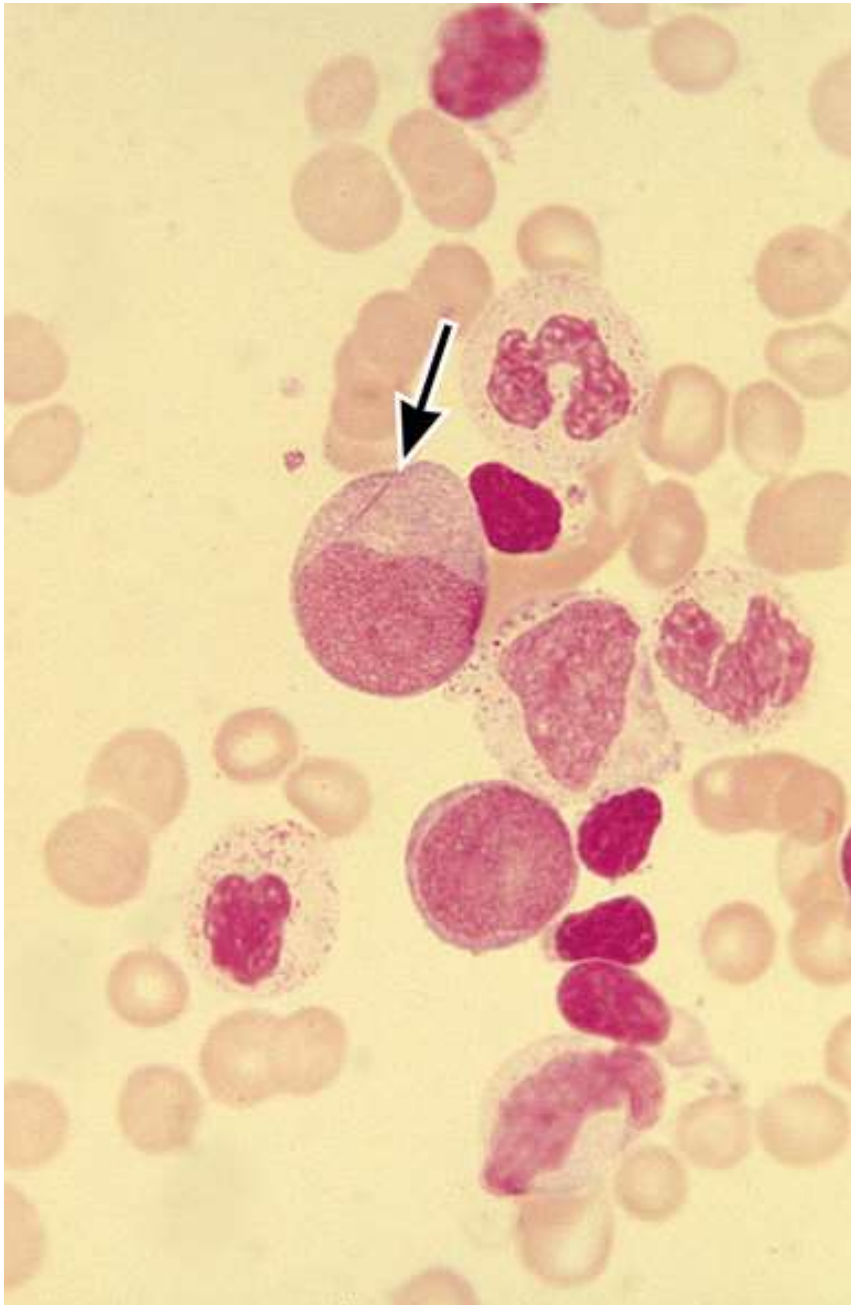
Lymphoblasts: Images 376-379

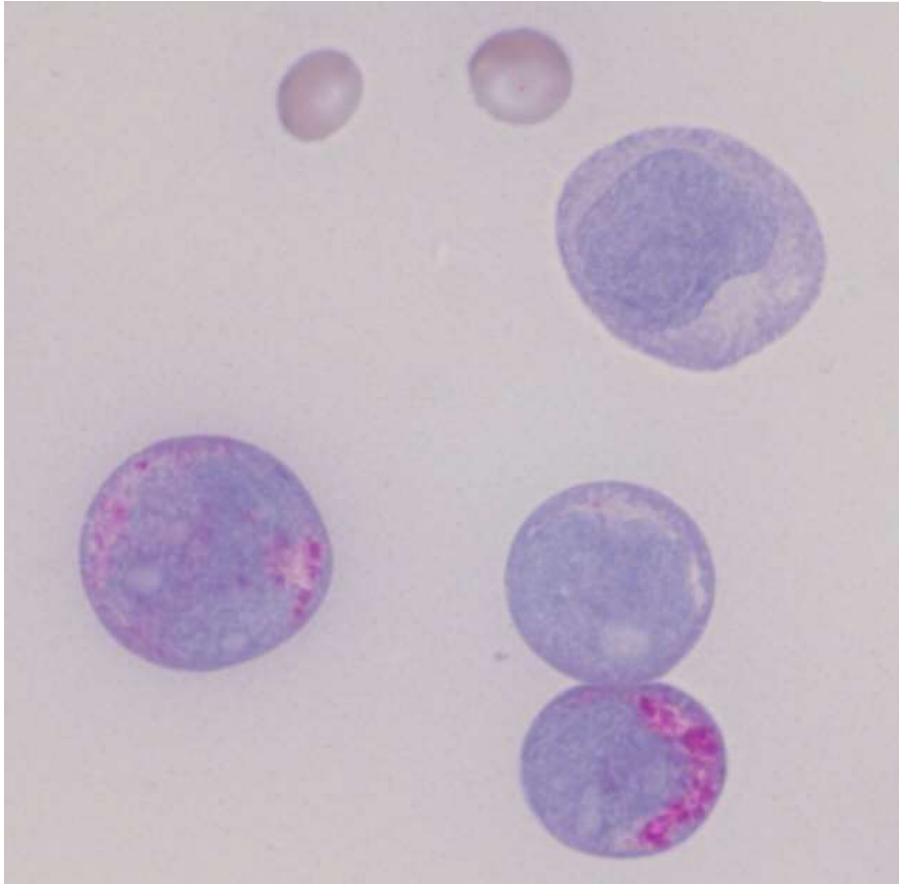


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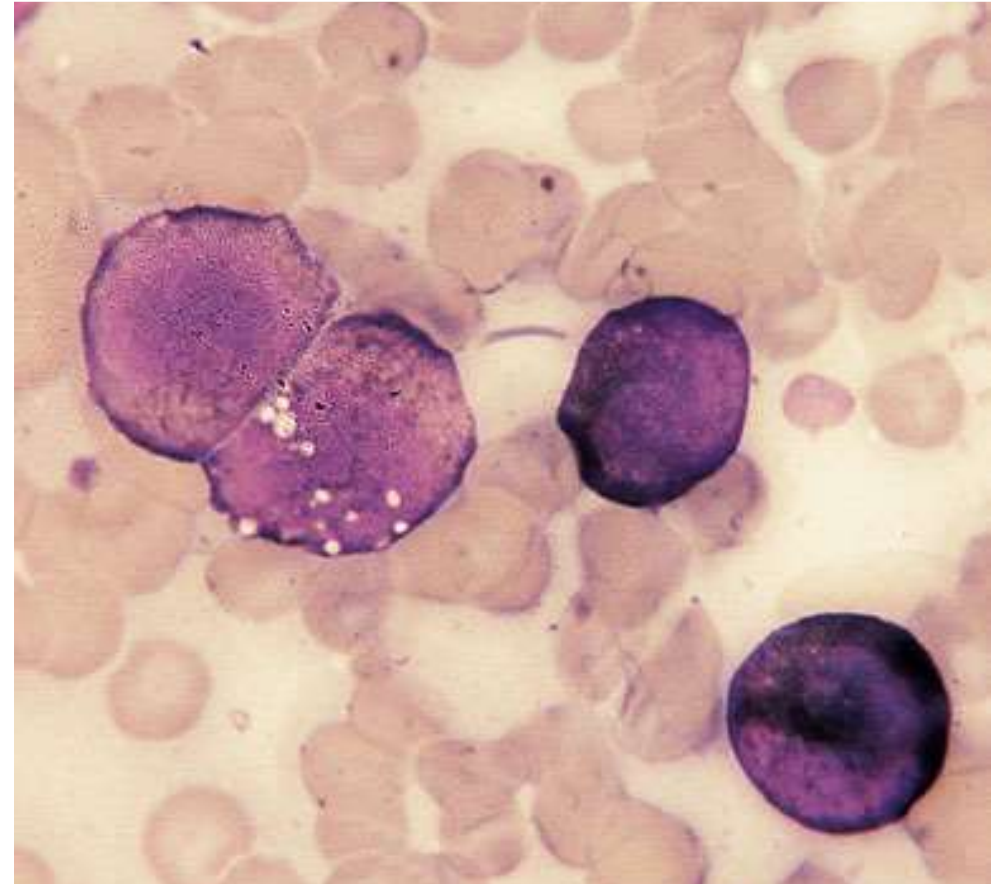


Auerstaaf



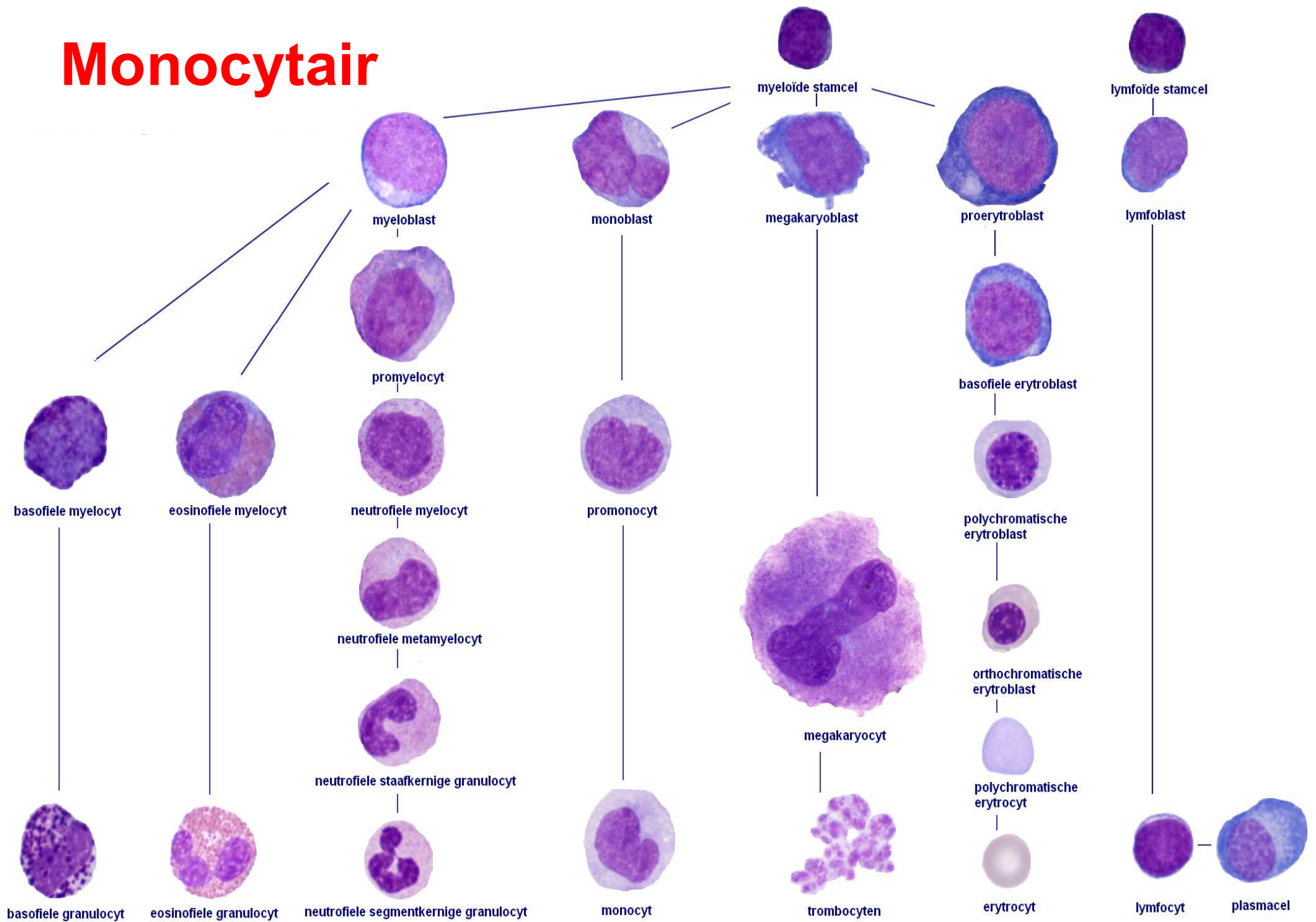


Peroxidase

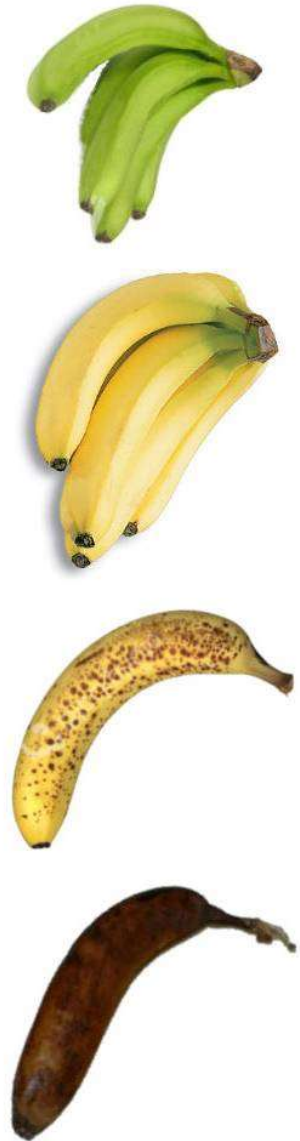
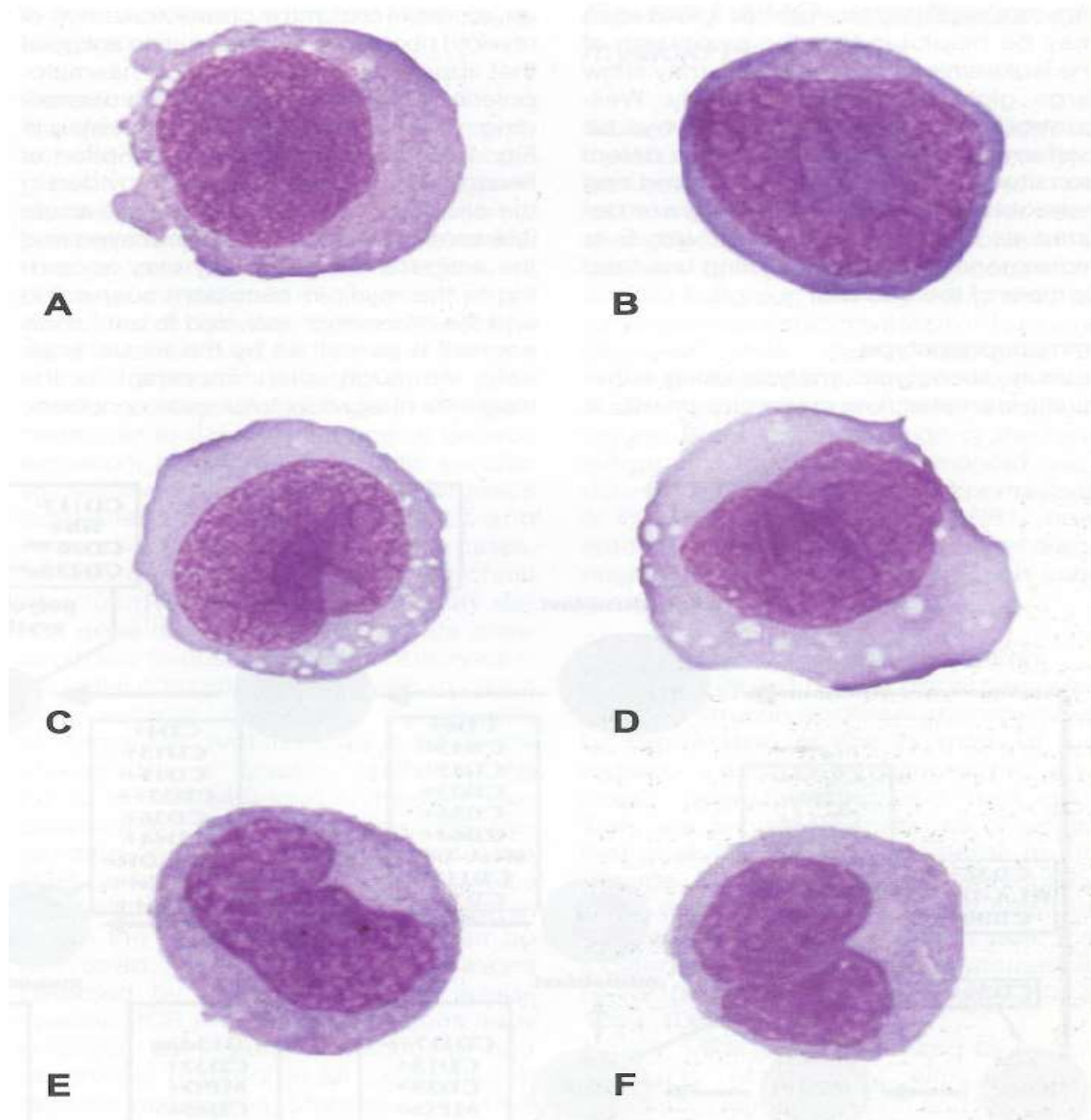


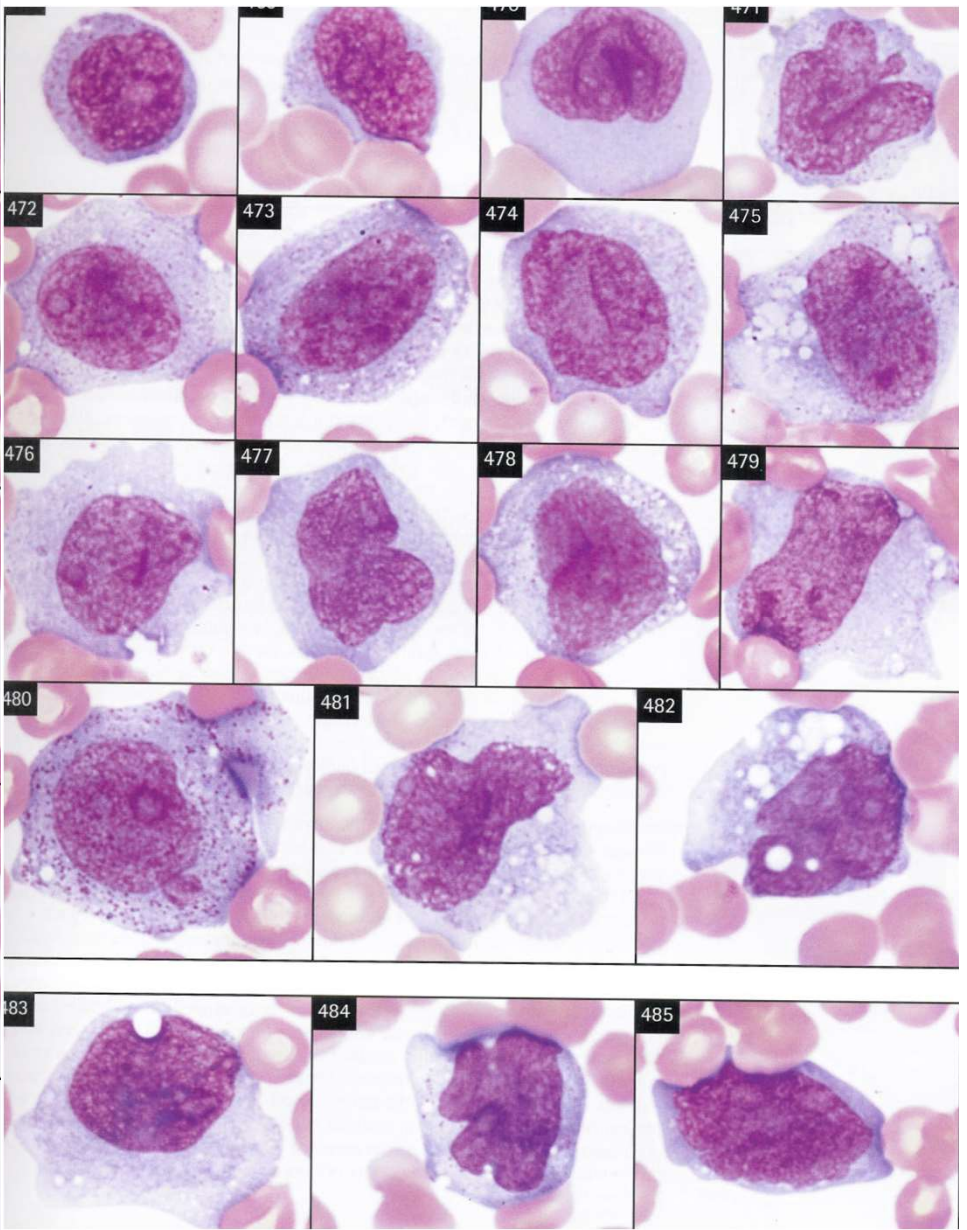
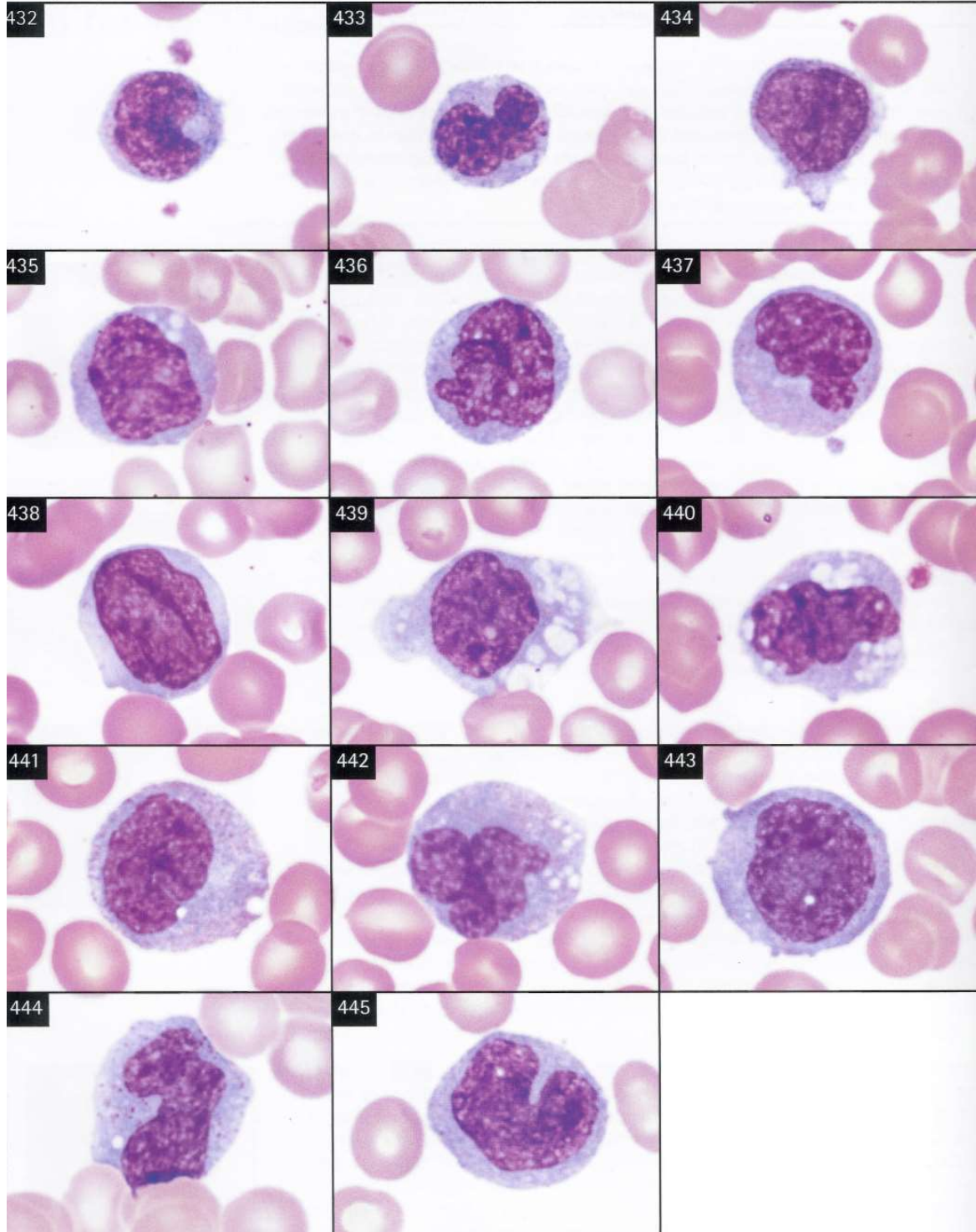
Sudan-Black

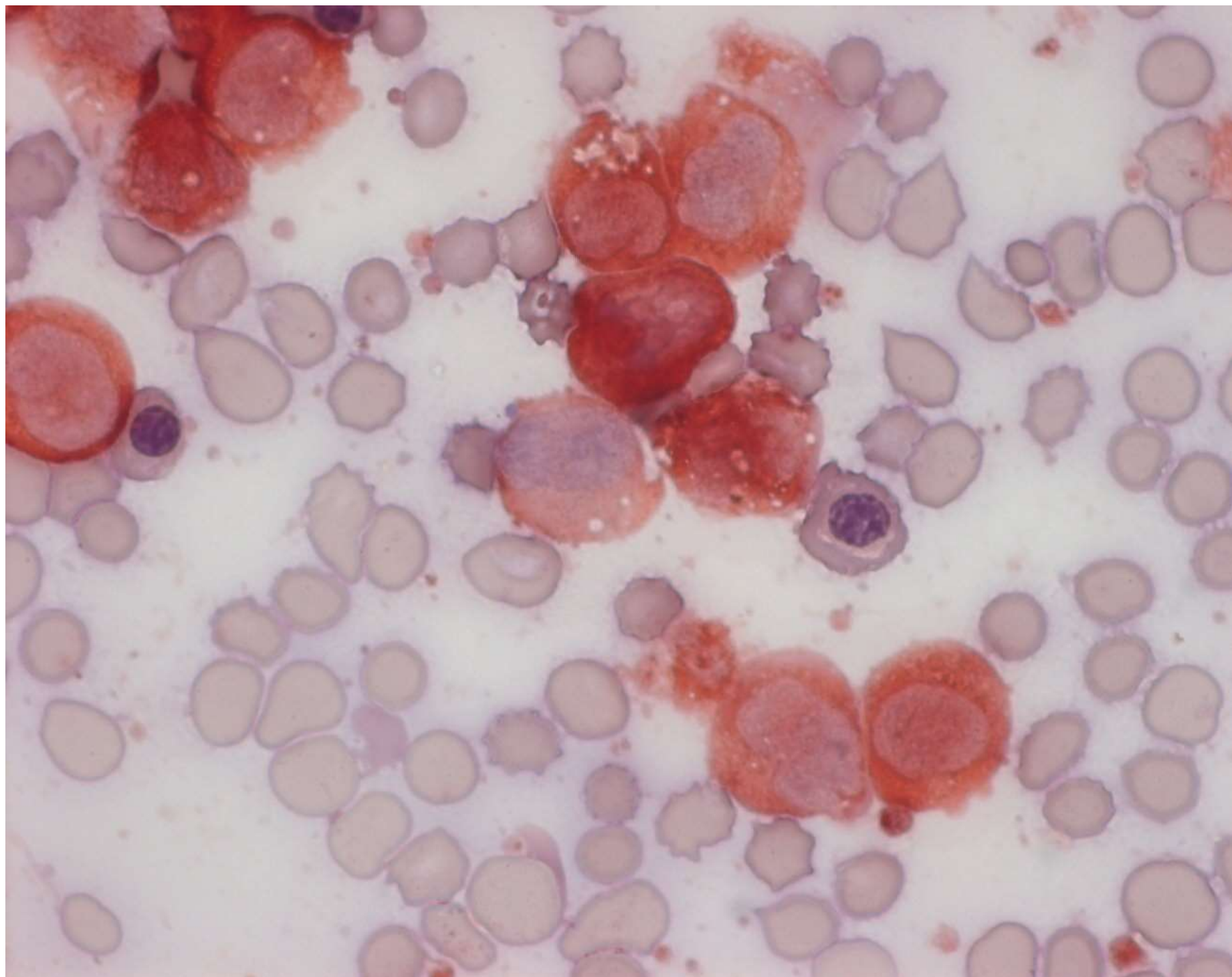
Monocytair

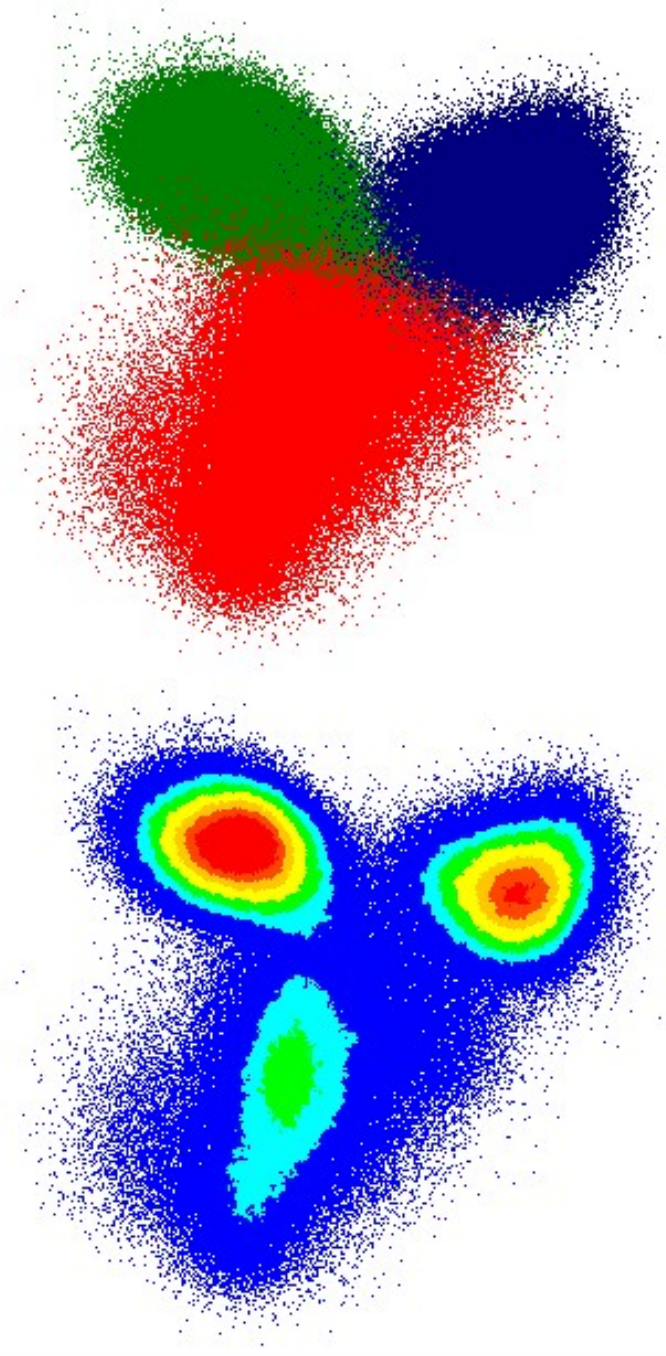
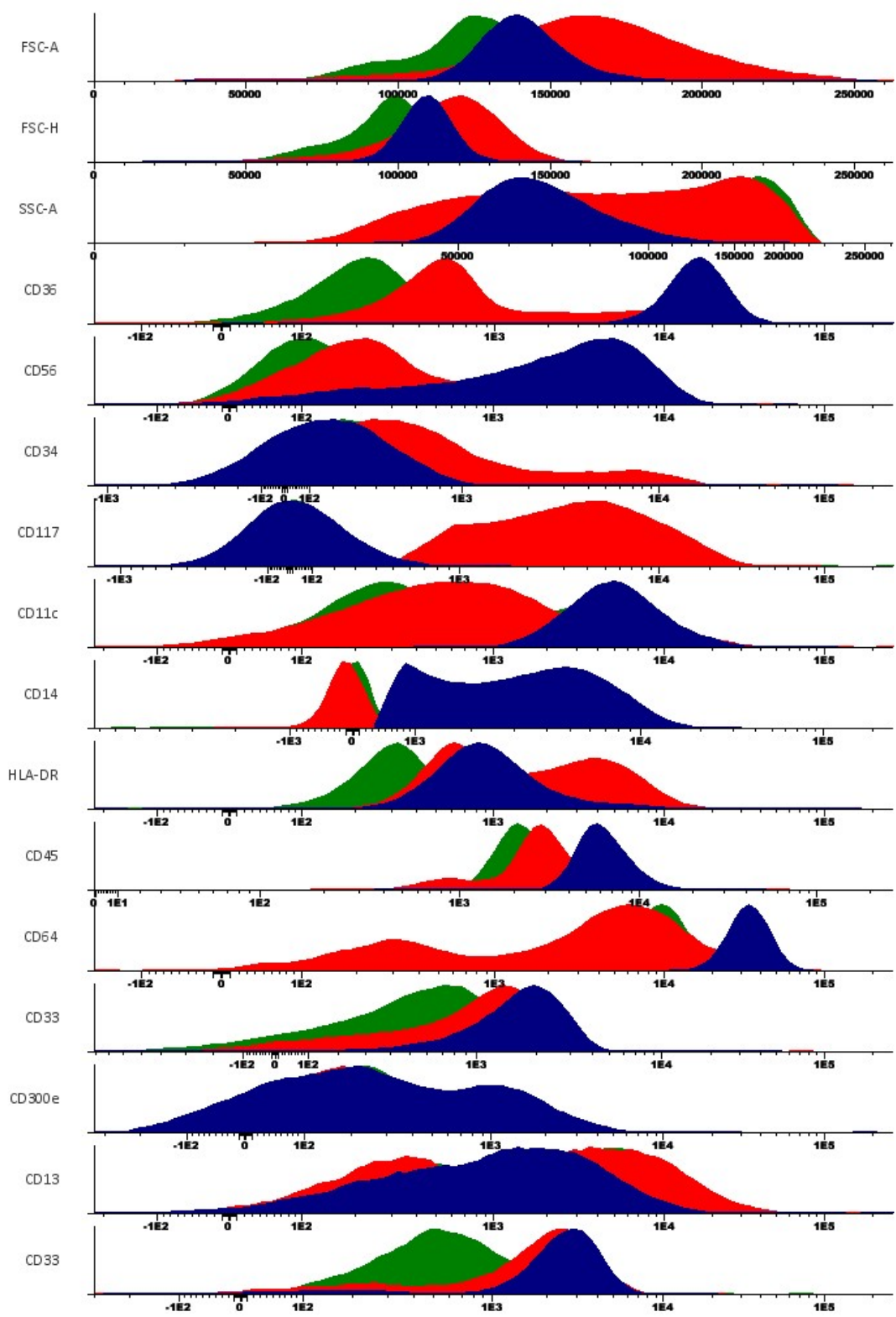


Monoblast/promonocyt/monocyt



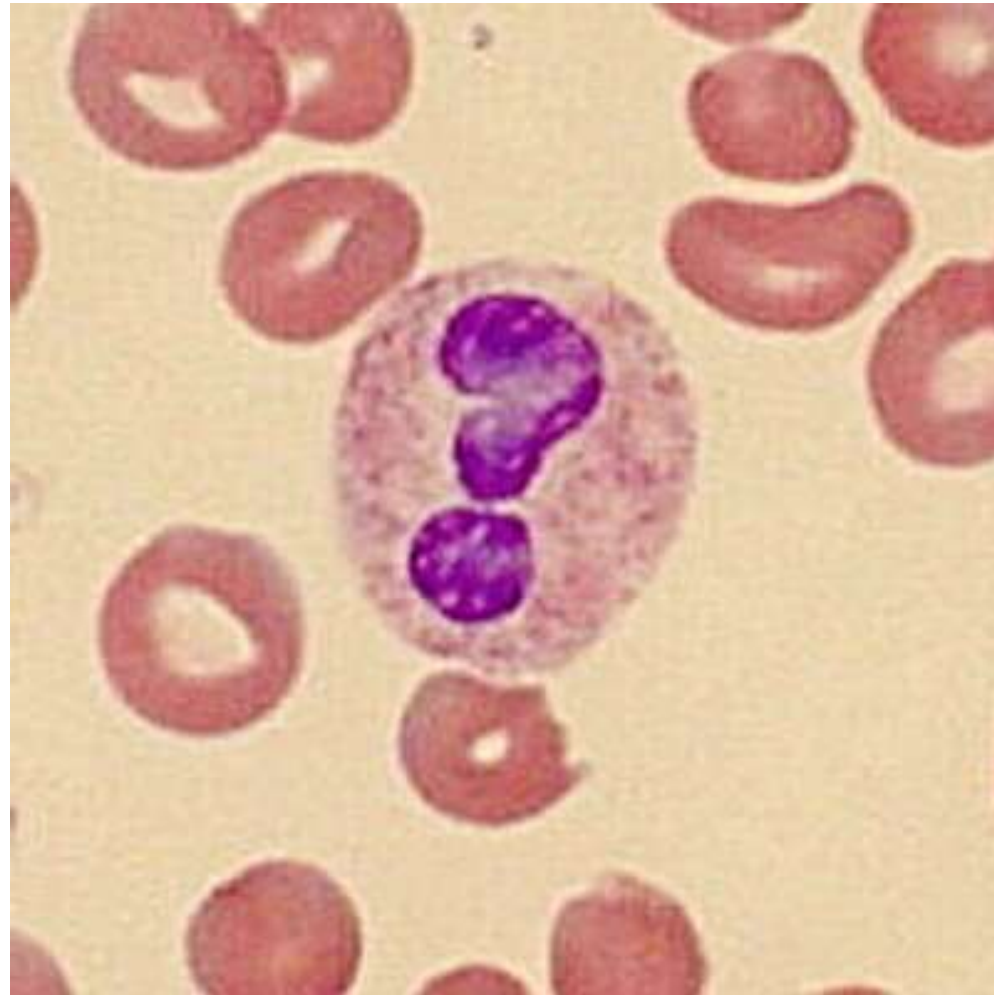




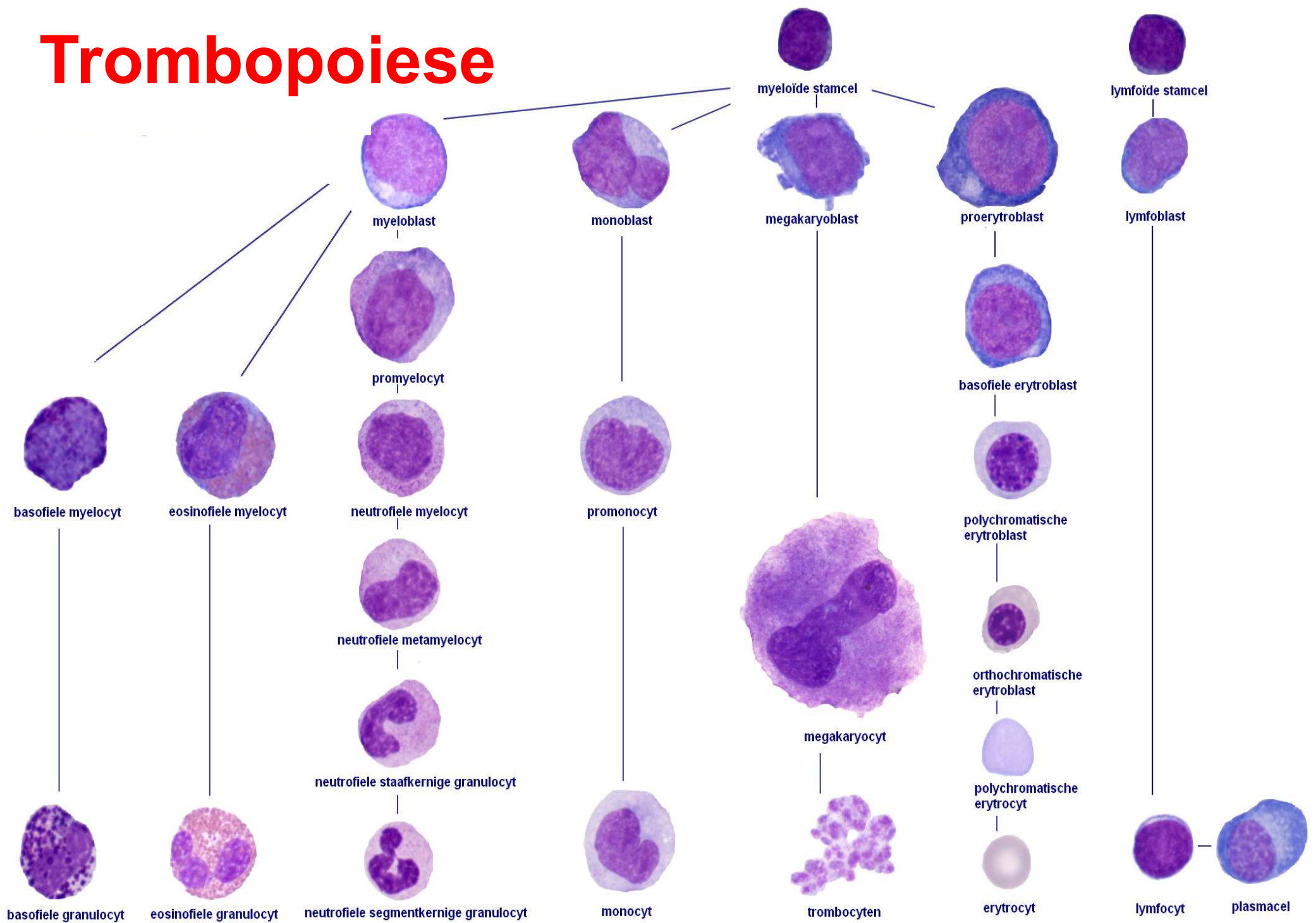


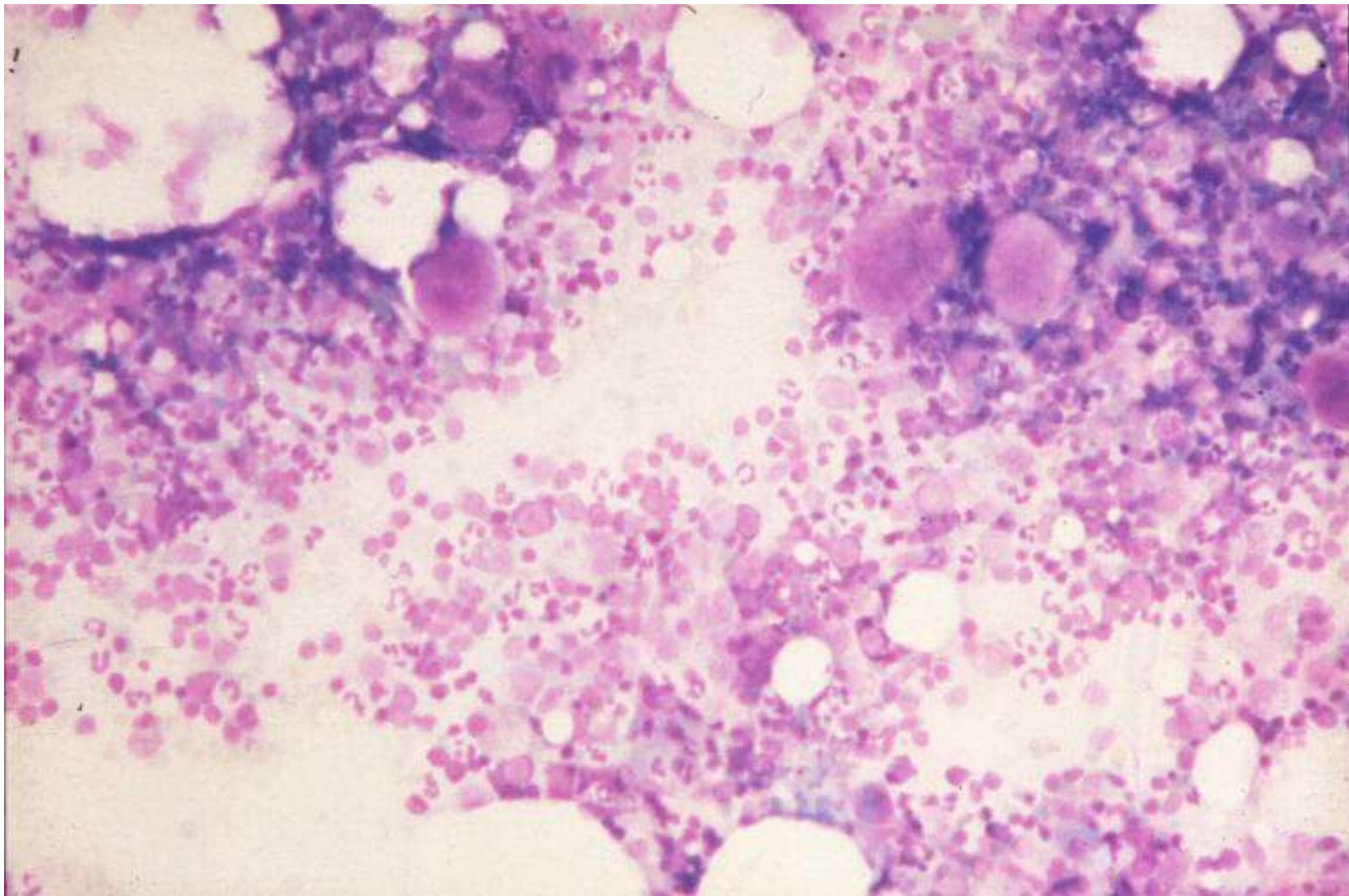
APS 1

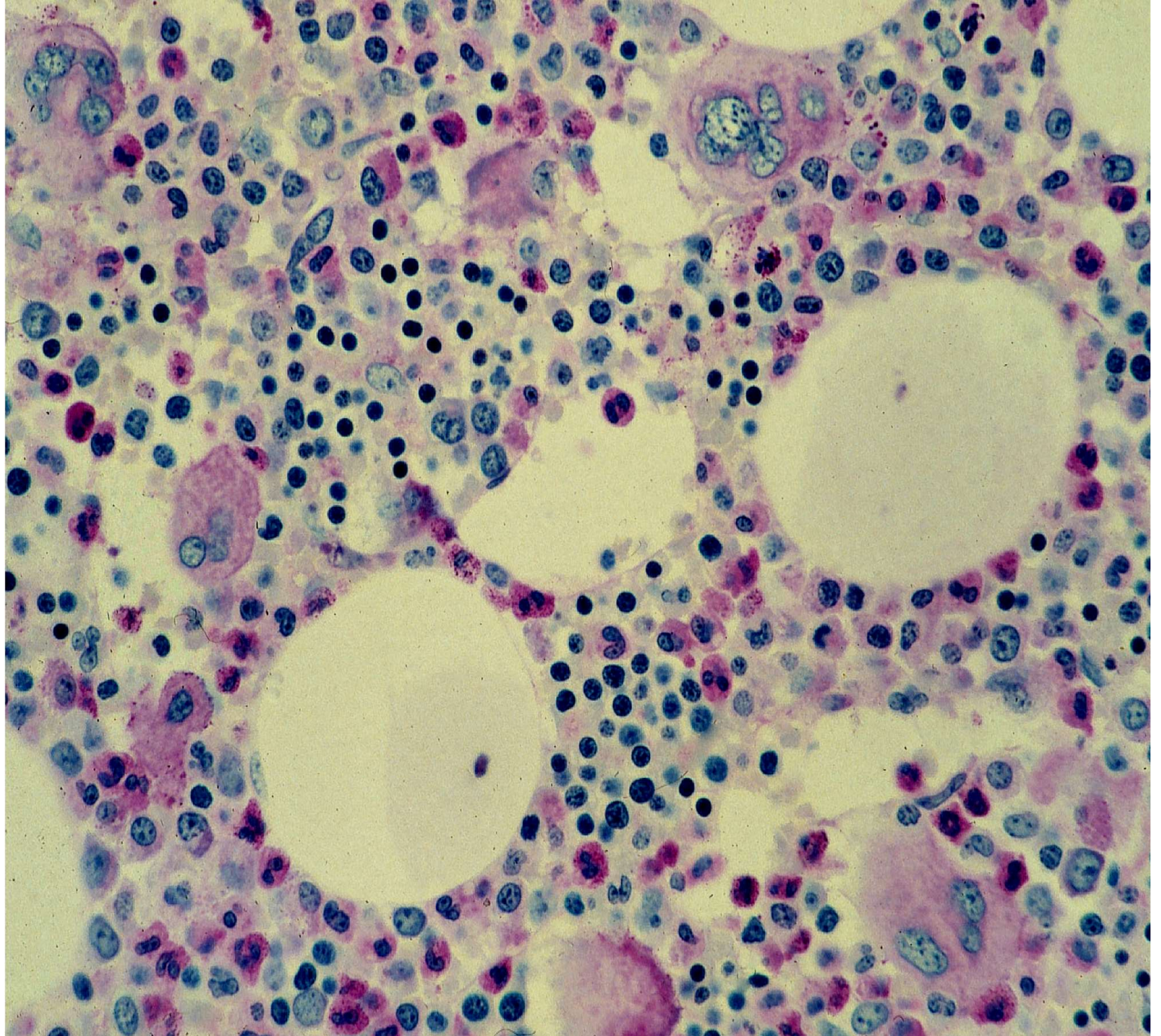
CD64⁺⁺/CD300e⁺: rijpe monocyten

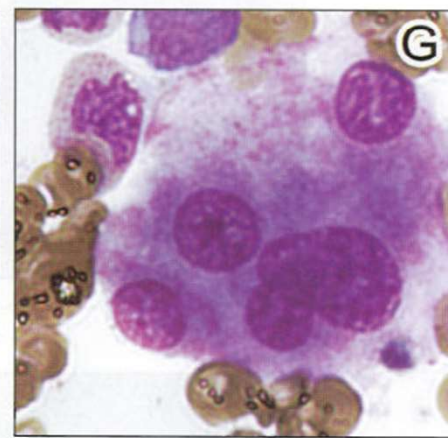
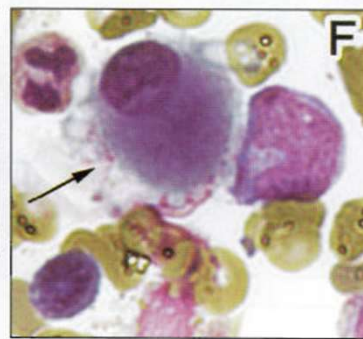
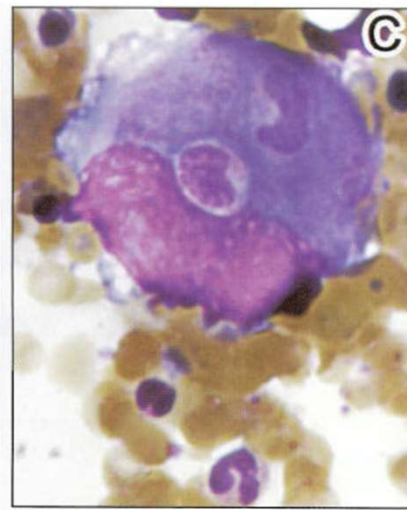
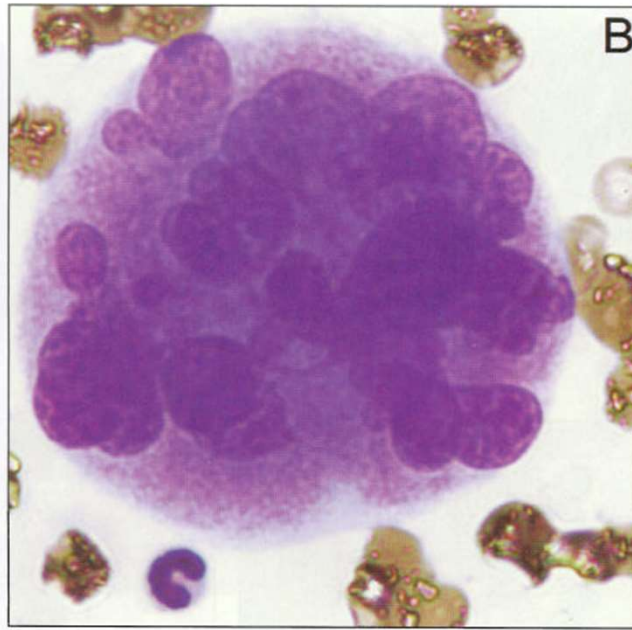
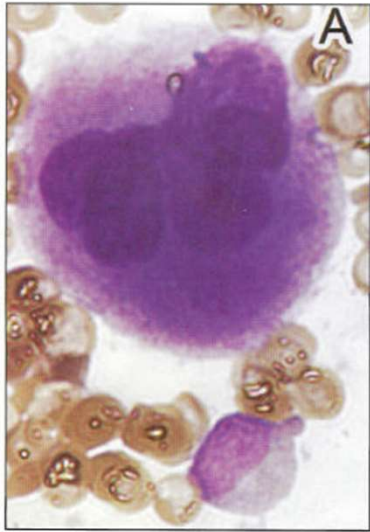


Trombopoiese

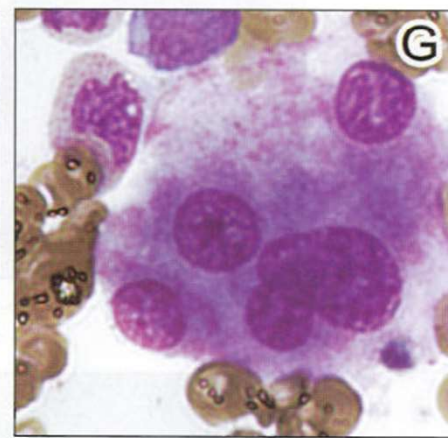
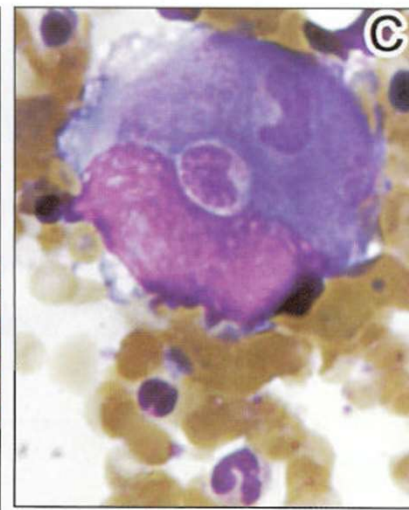
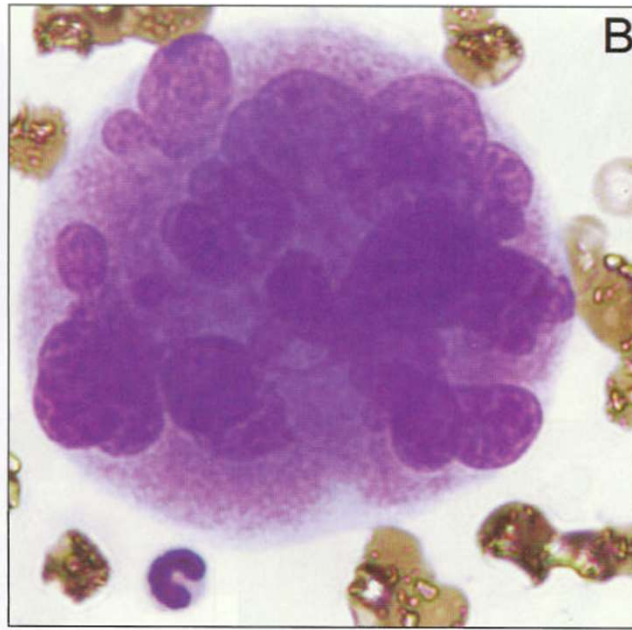
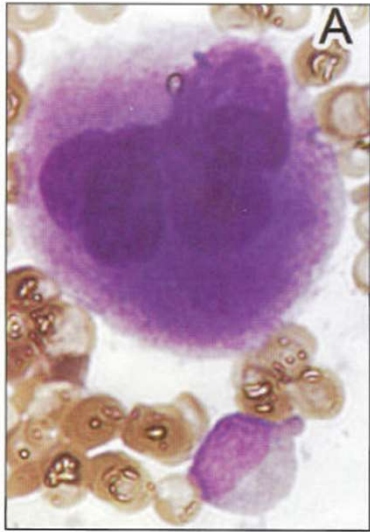


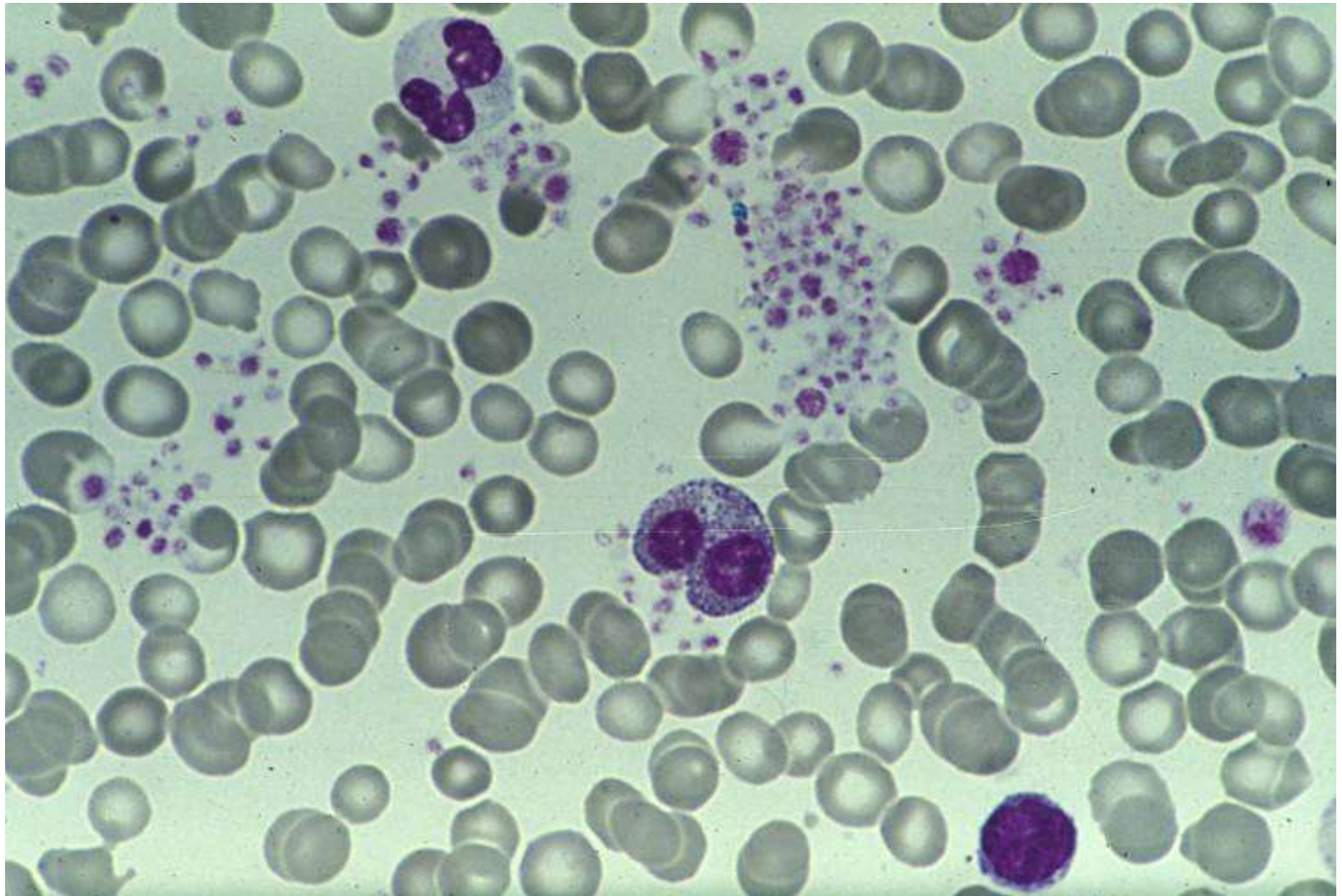




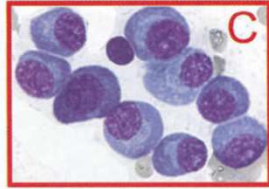
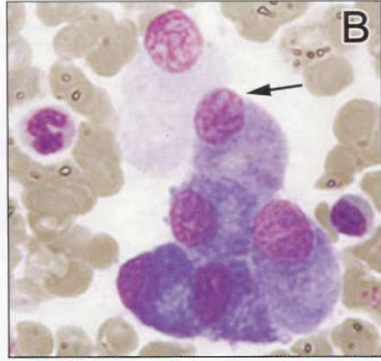
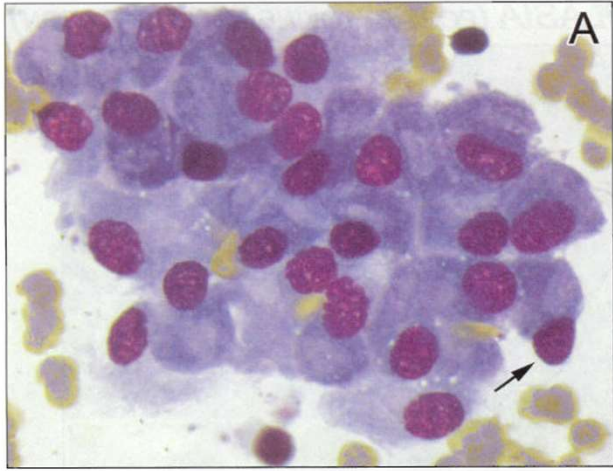


Emperipolesis

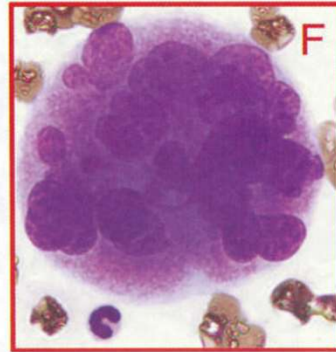
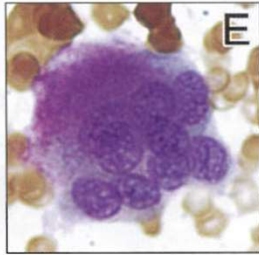
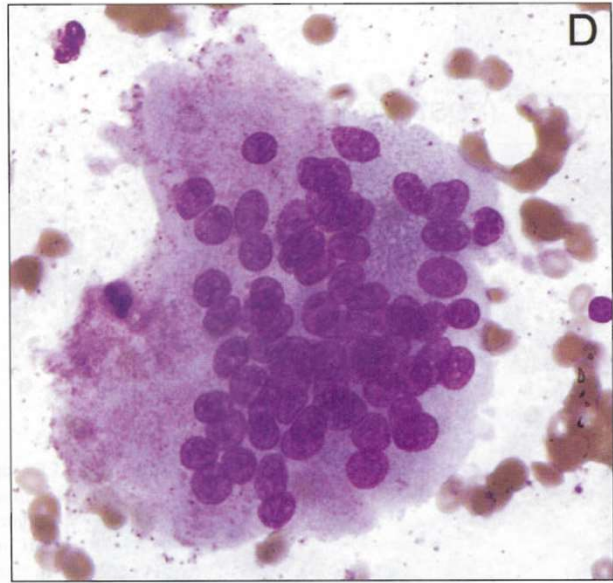




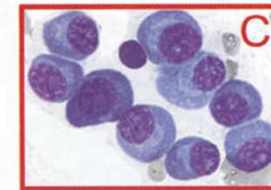
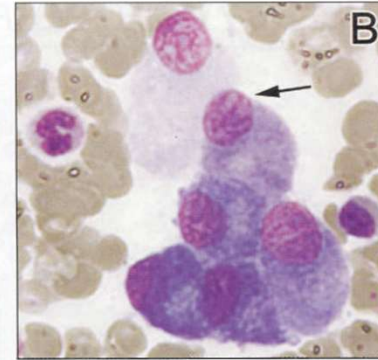
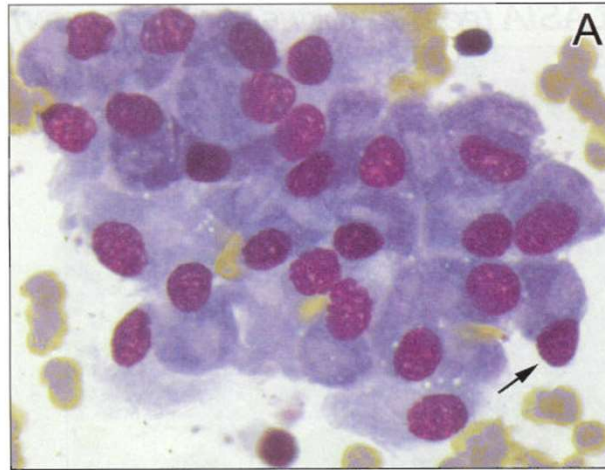
?



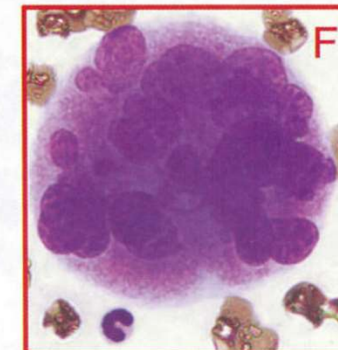
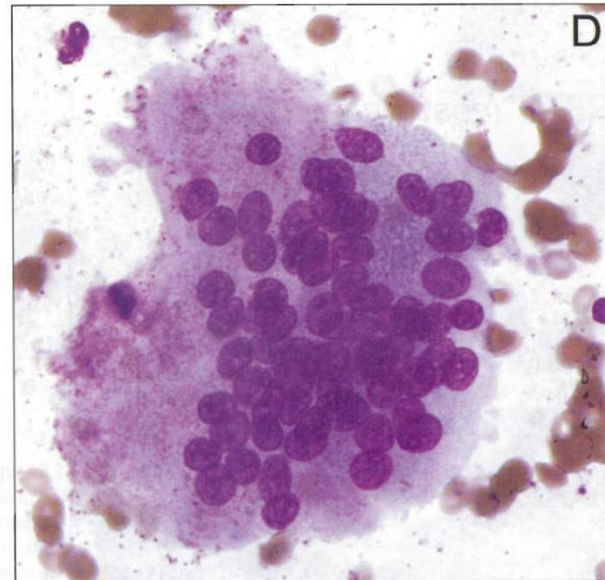
?



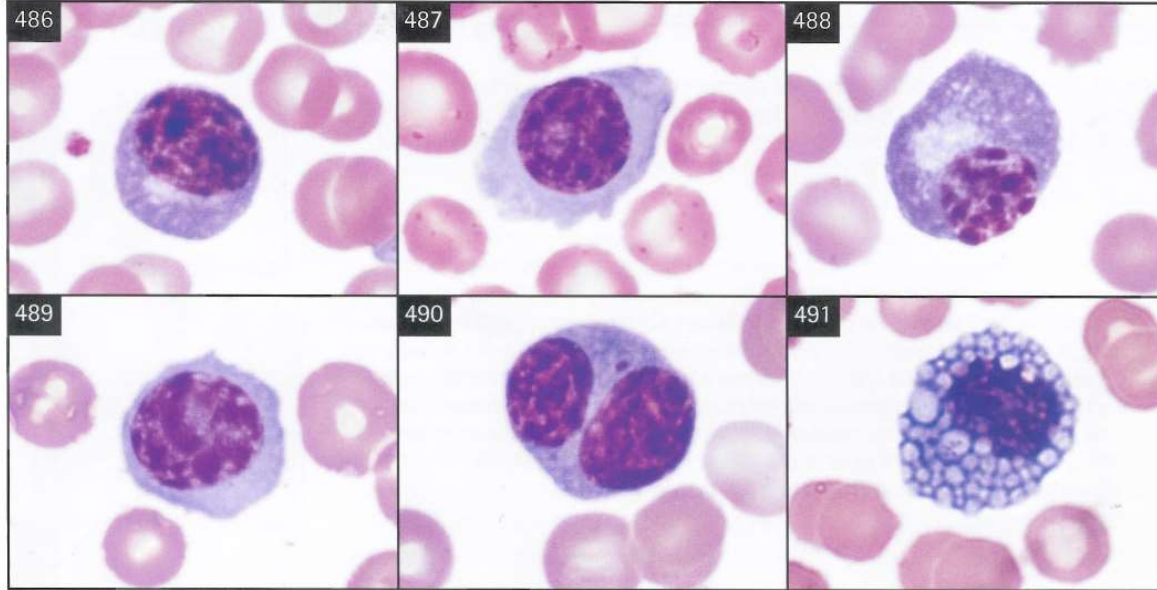
Osteoblasten



Osteoclasten

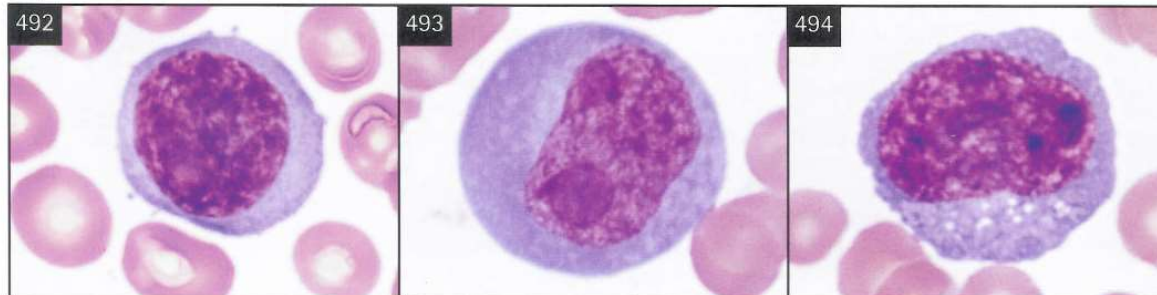


Plasma Cells: Images 486-491

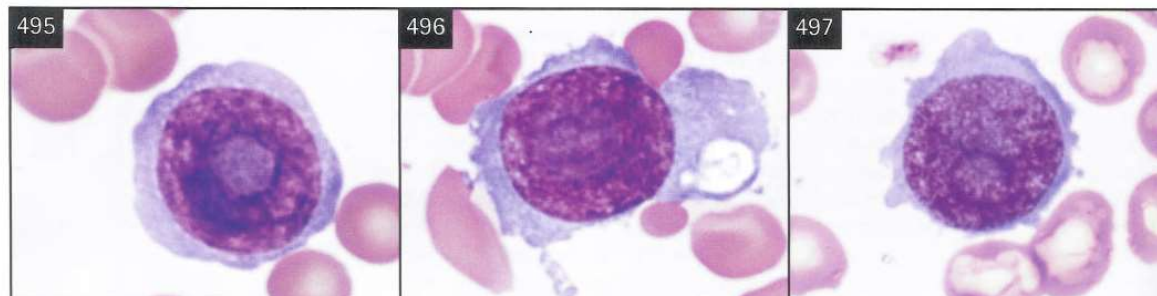


Mature plasma cells (491 is also known as a grape cell or Mott cell)

Proplasmacytes: Images 492-494



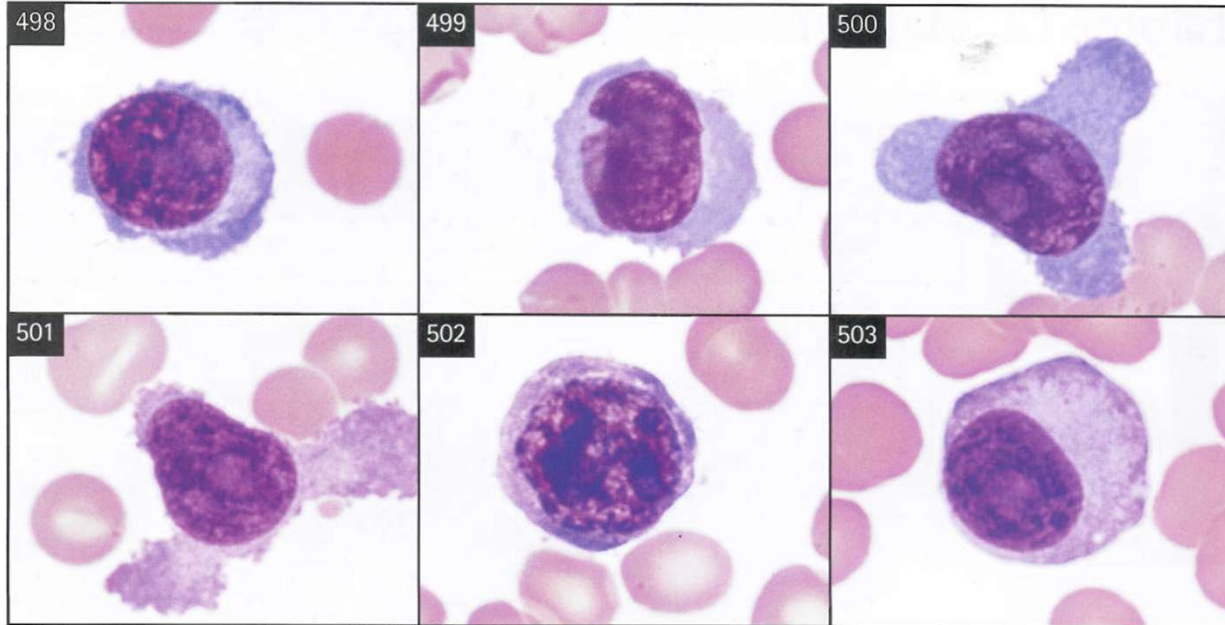
Plasmablasts: Images 495-497



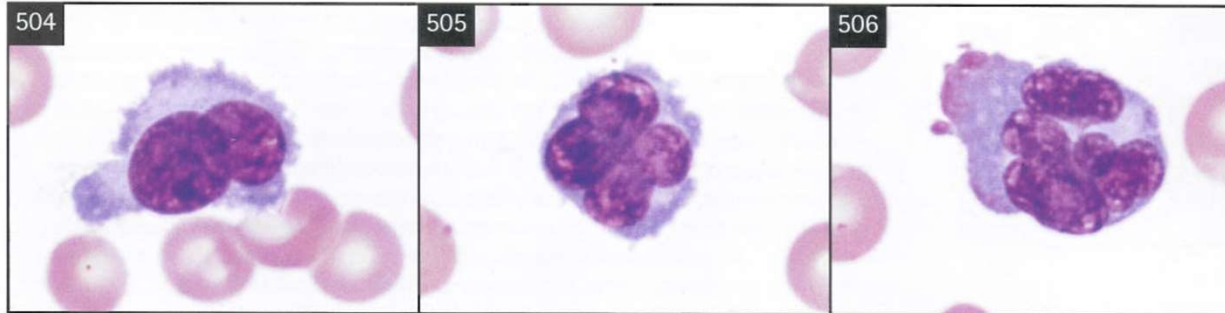
Russell bodies

Dutcher bodies

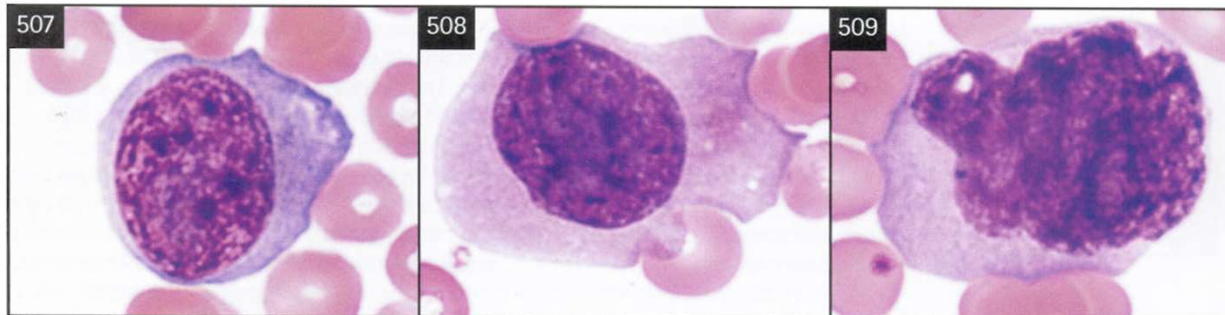
Myeloma Cells: Images 498-509



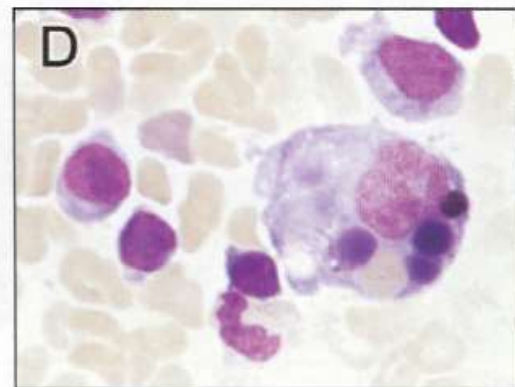
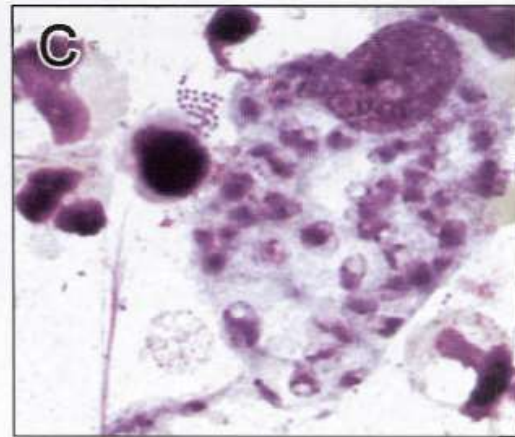
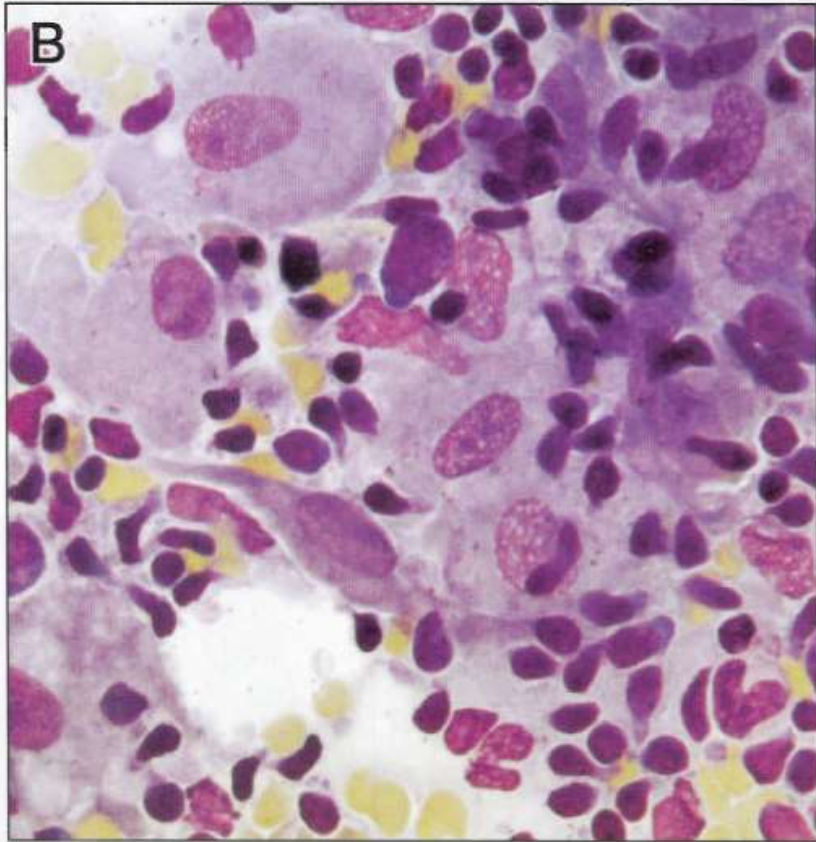
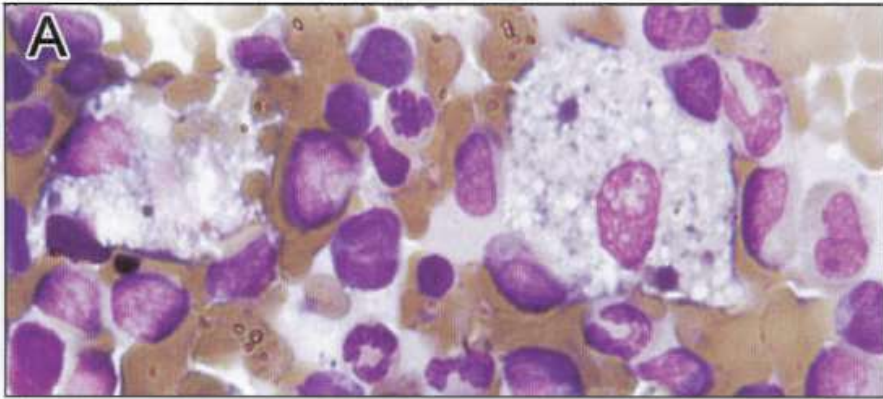
Myeloma cells (501 and 503 are flame cells)

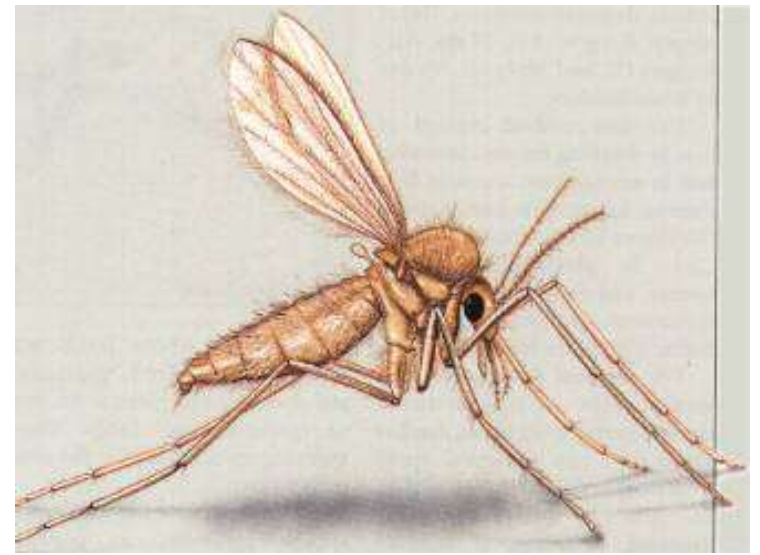


Multinucleated myeloma cells (506 is a flame cell)



Giant myeloma cells (508 and 509 are flame cells)

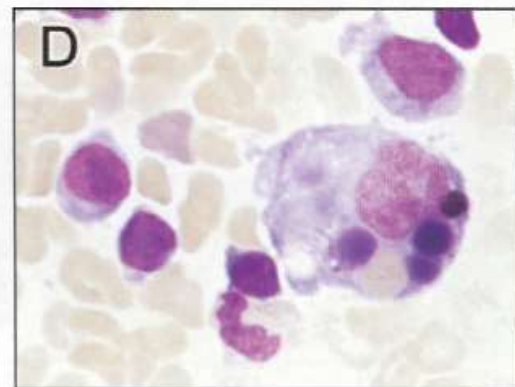
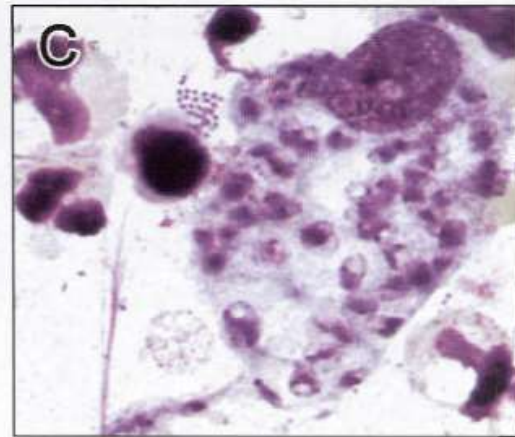
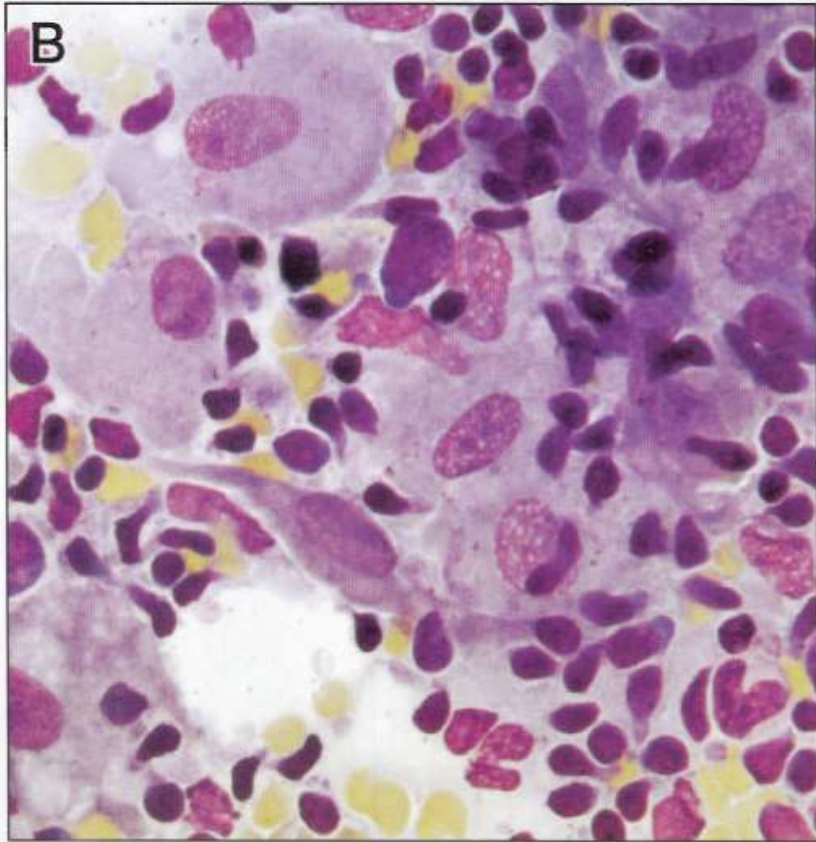
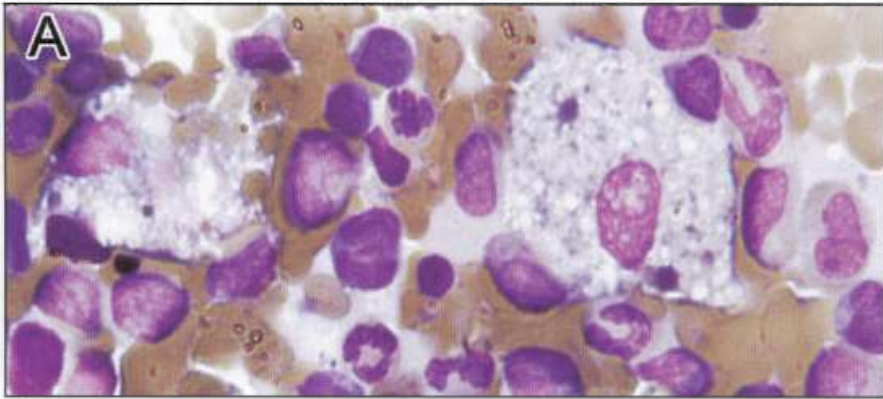




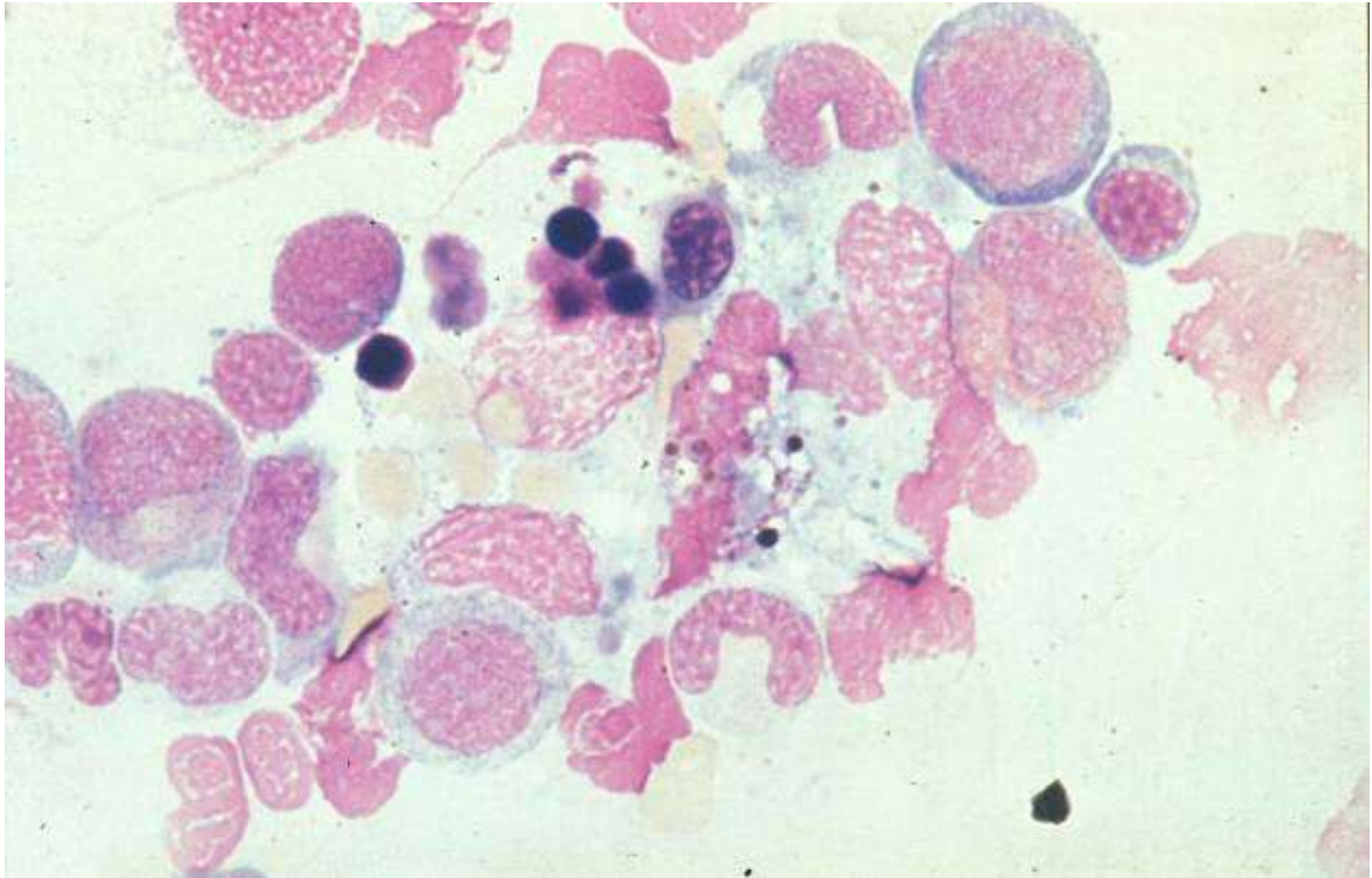
Het zandvliegje

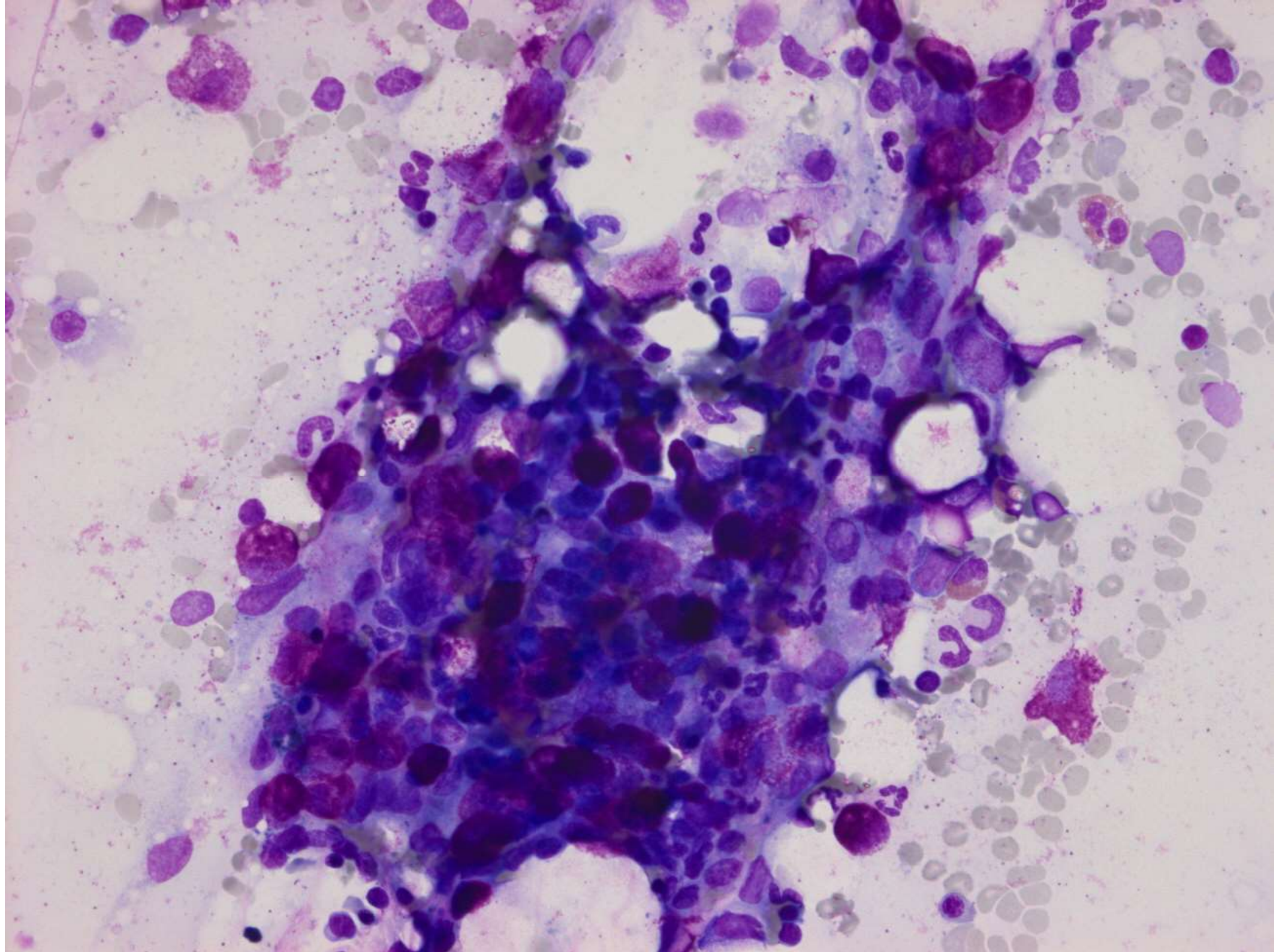
Visceral leishmania (kala-azar)

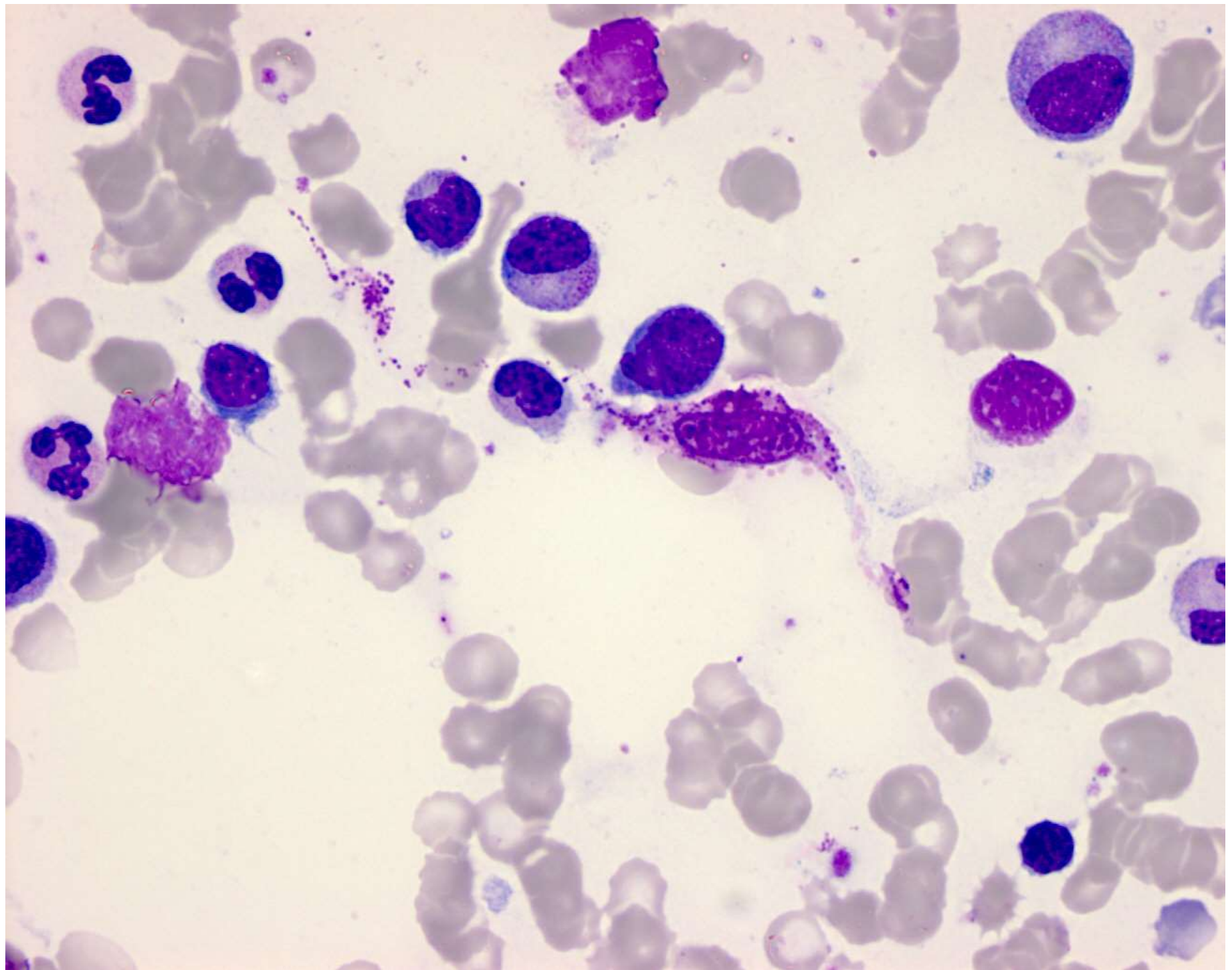




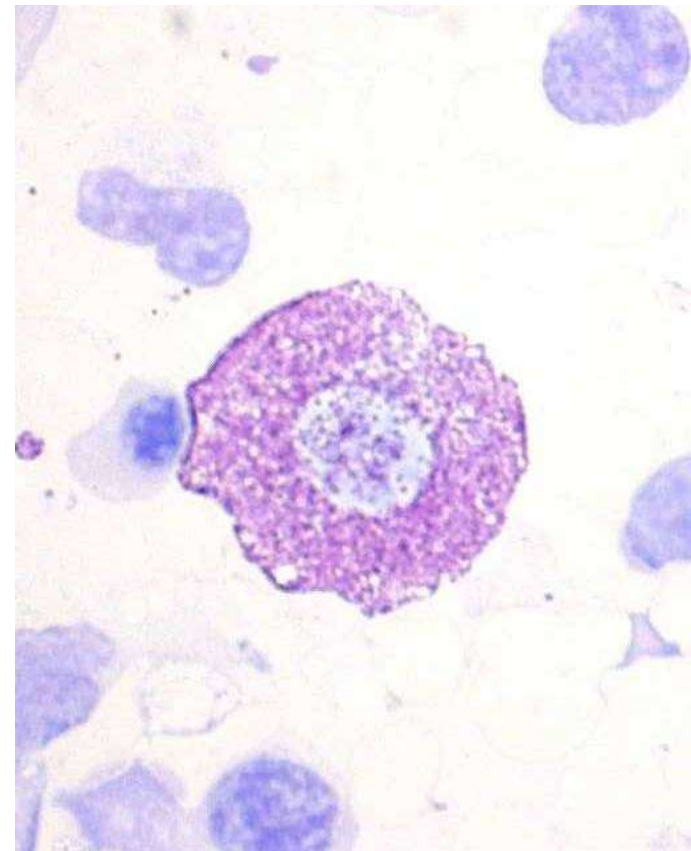
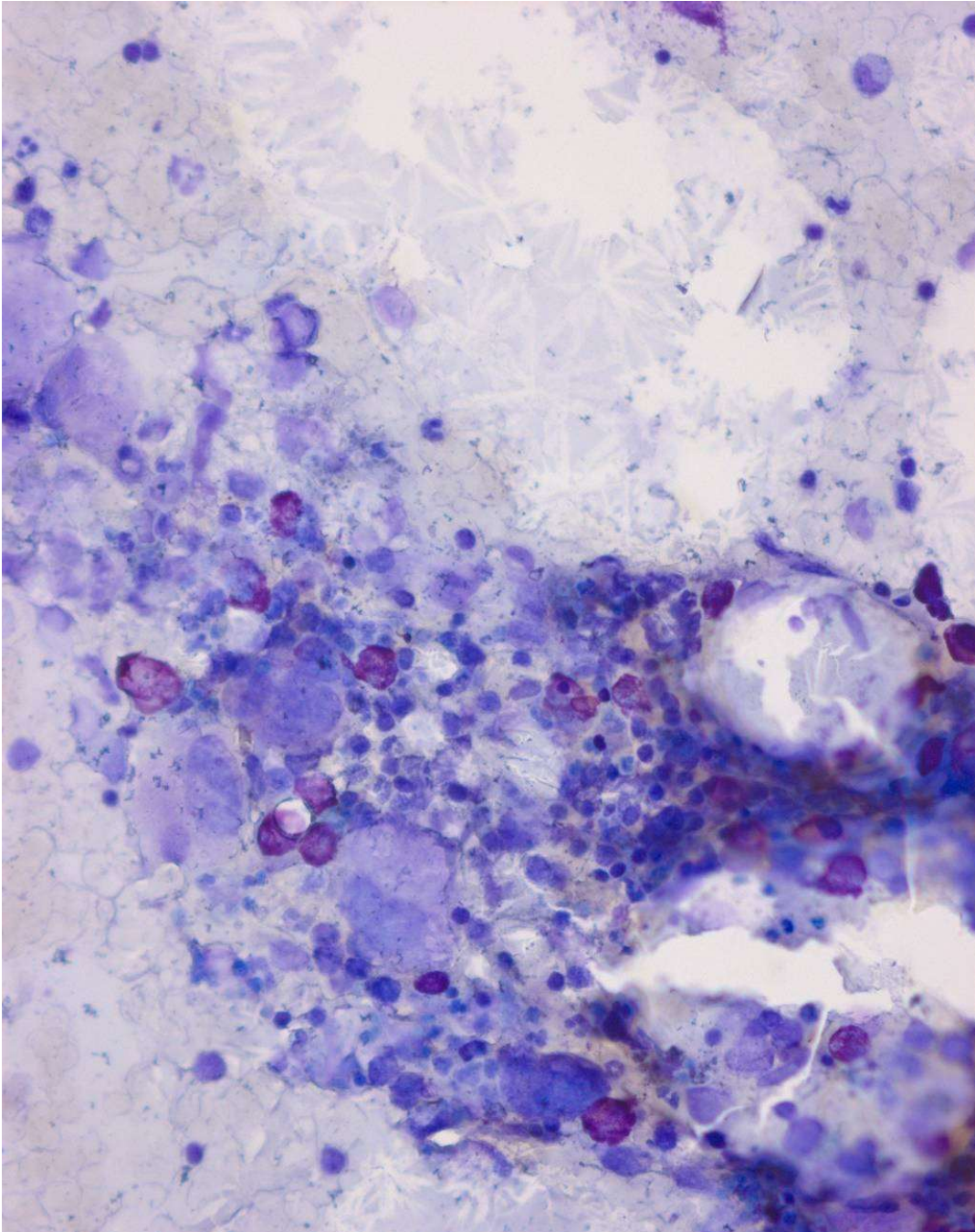
Beenmerg (Giemsa): macrofaag

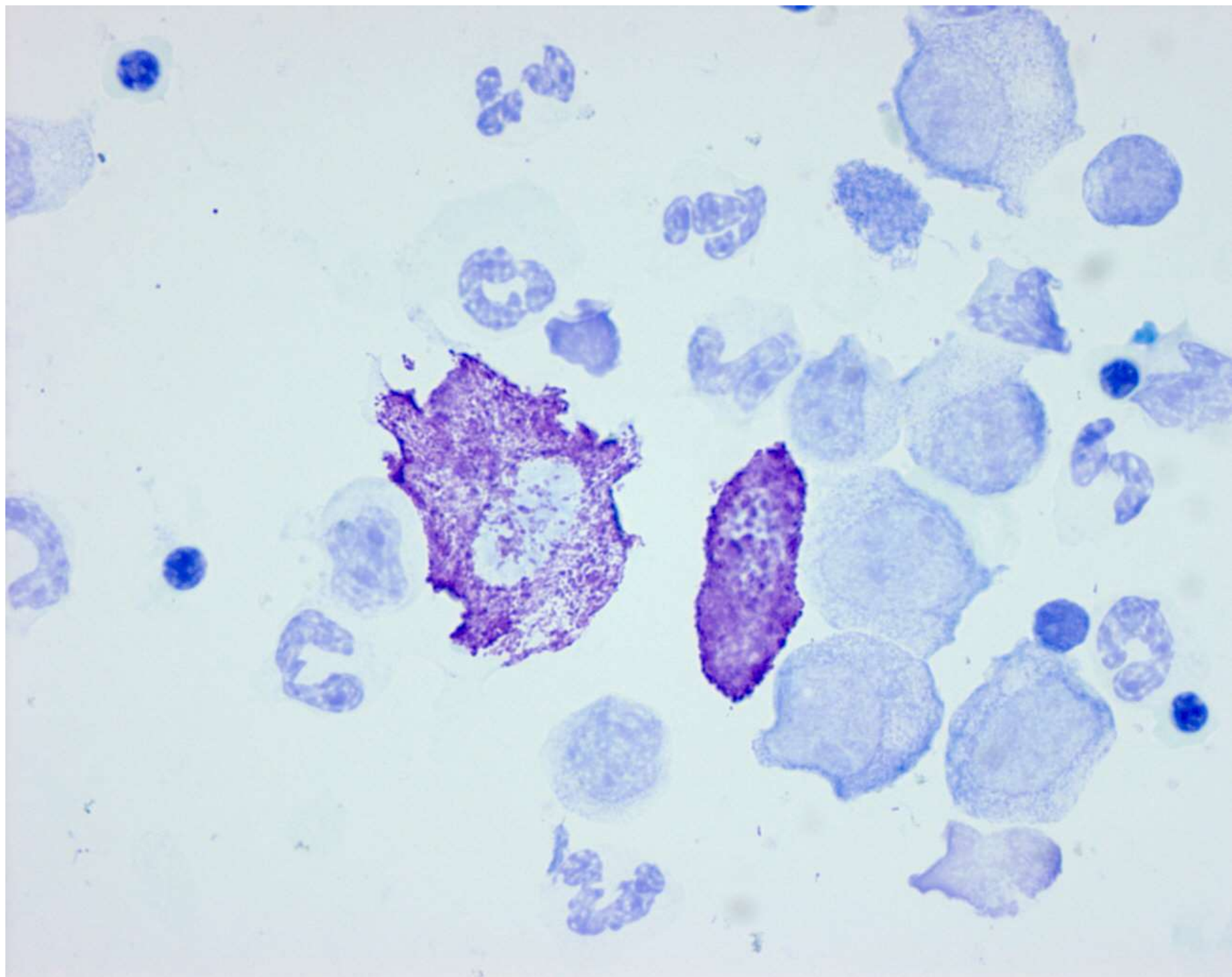


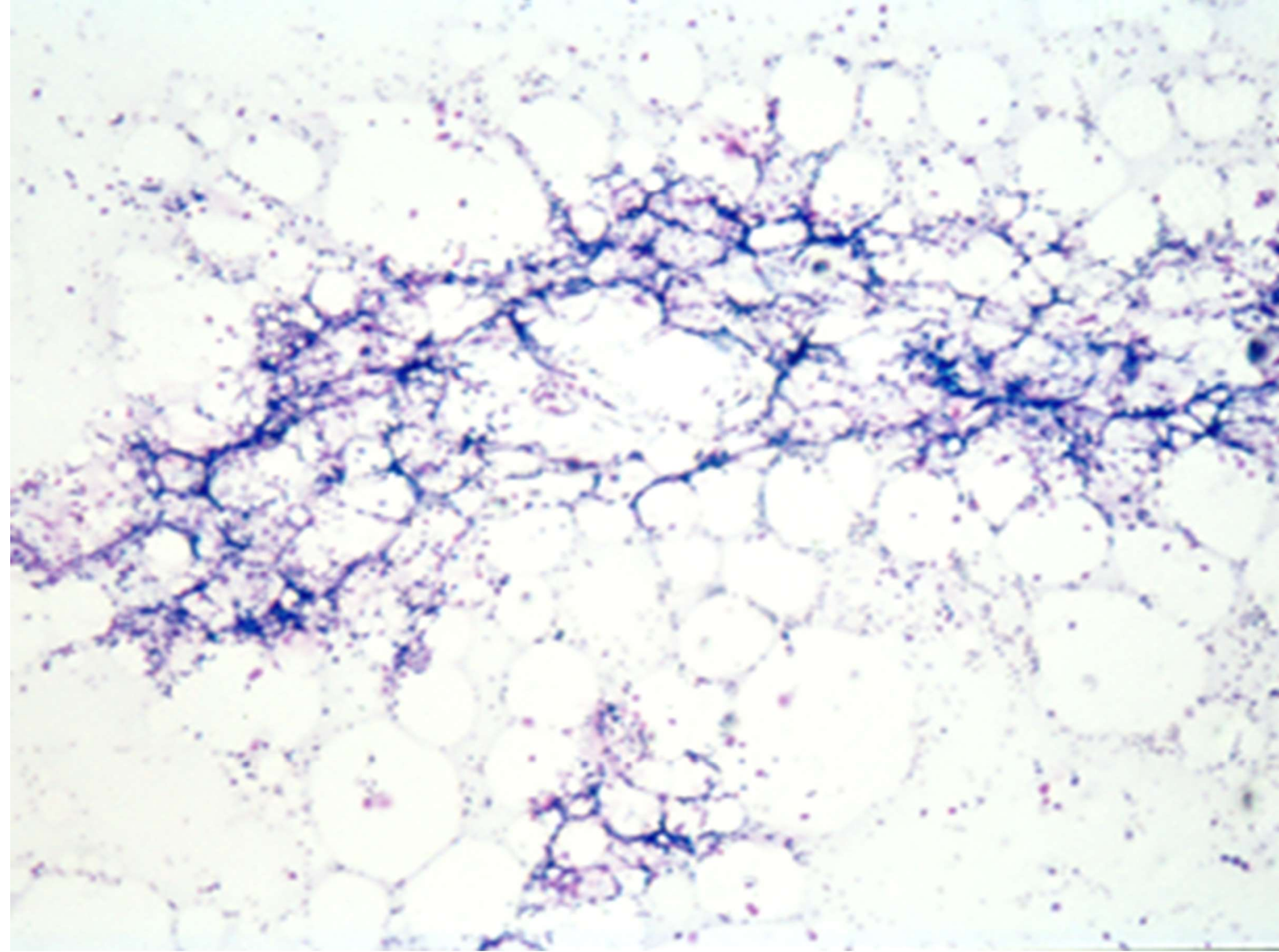




Toluidine blauw kleuring







Plasmacellen

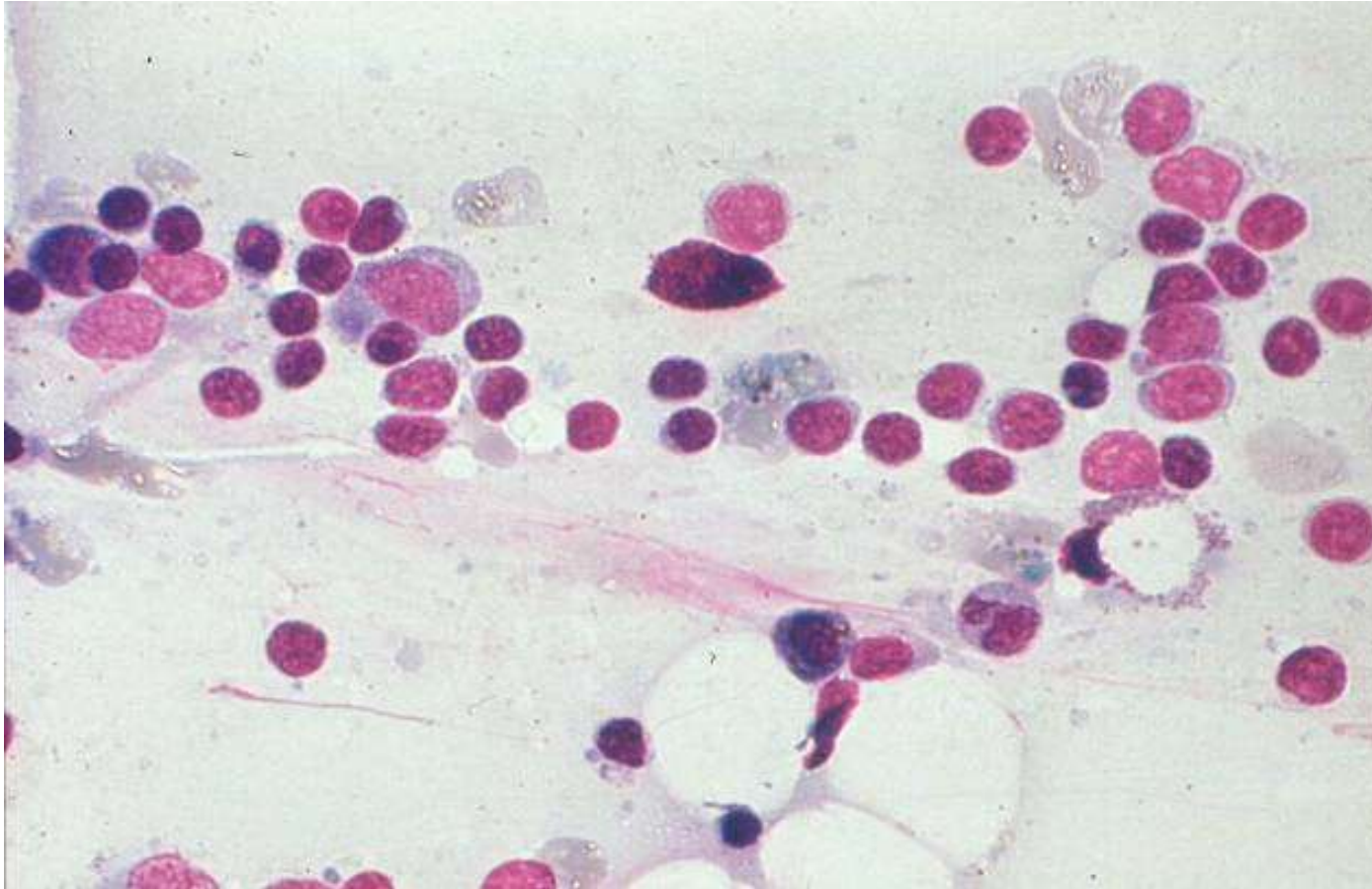
Lymfocyten

Macrofagen

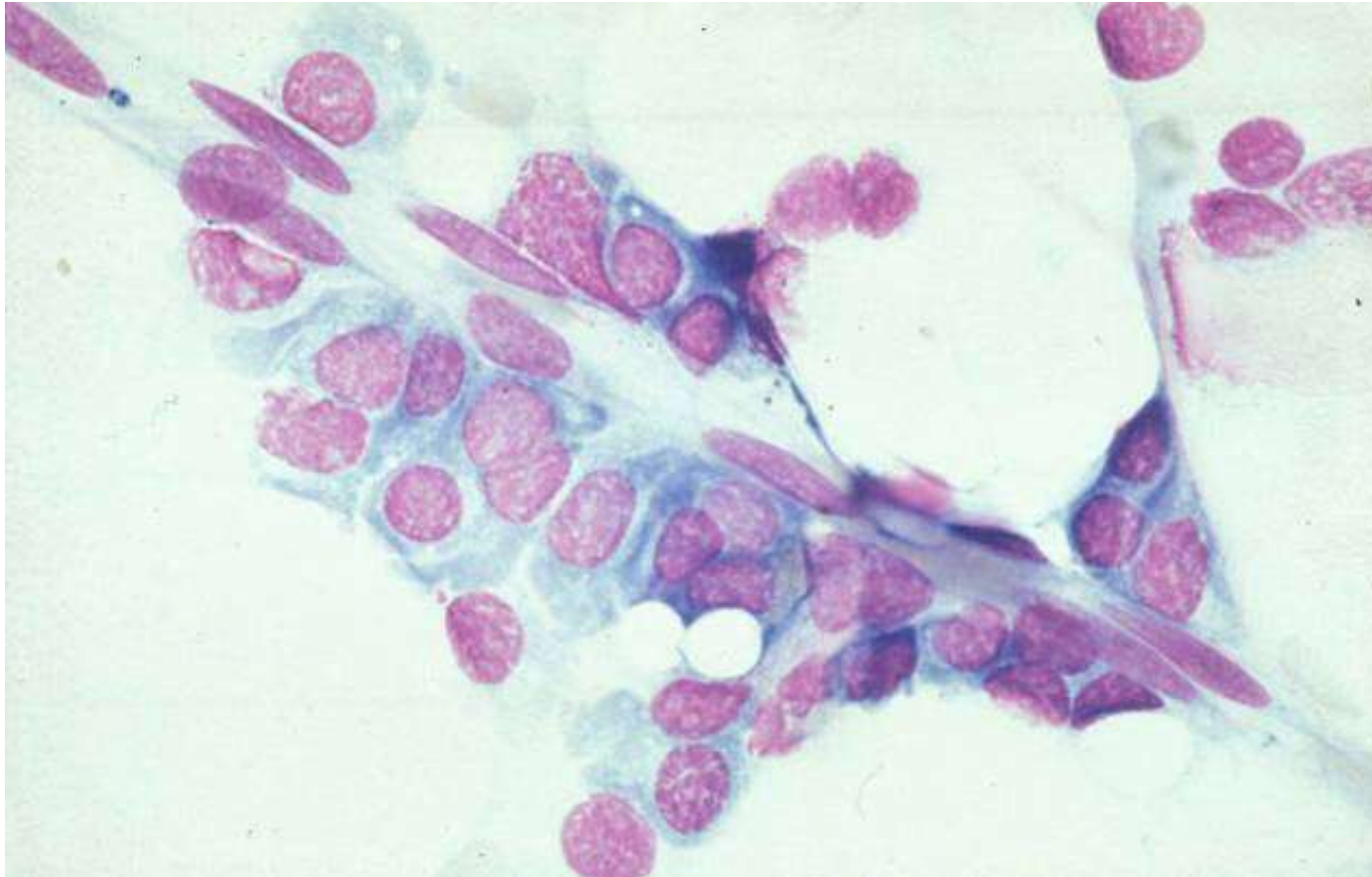
Mestcellen

Stromacellen

Beenmerg: aplasie met lymfocytinfiltraat



Beenmerg capillair en plasmacellen

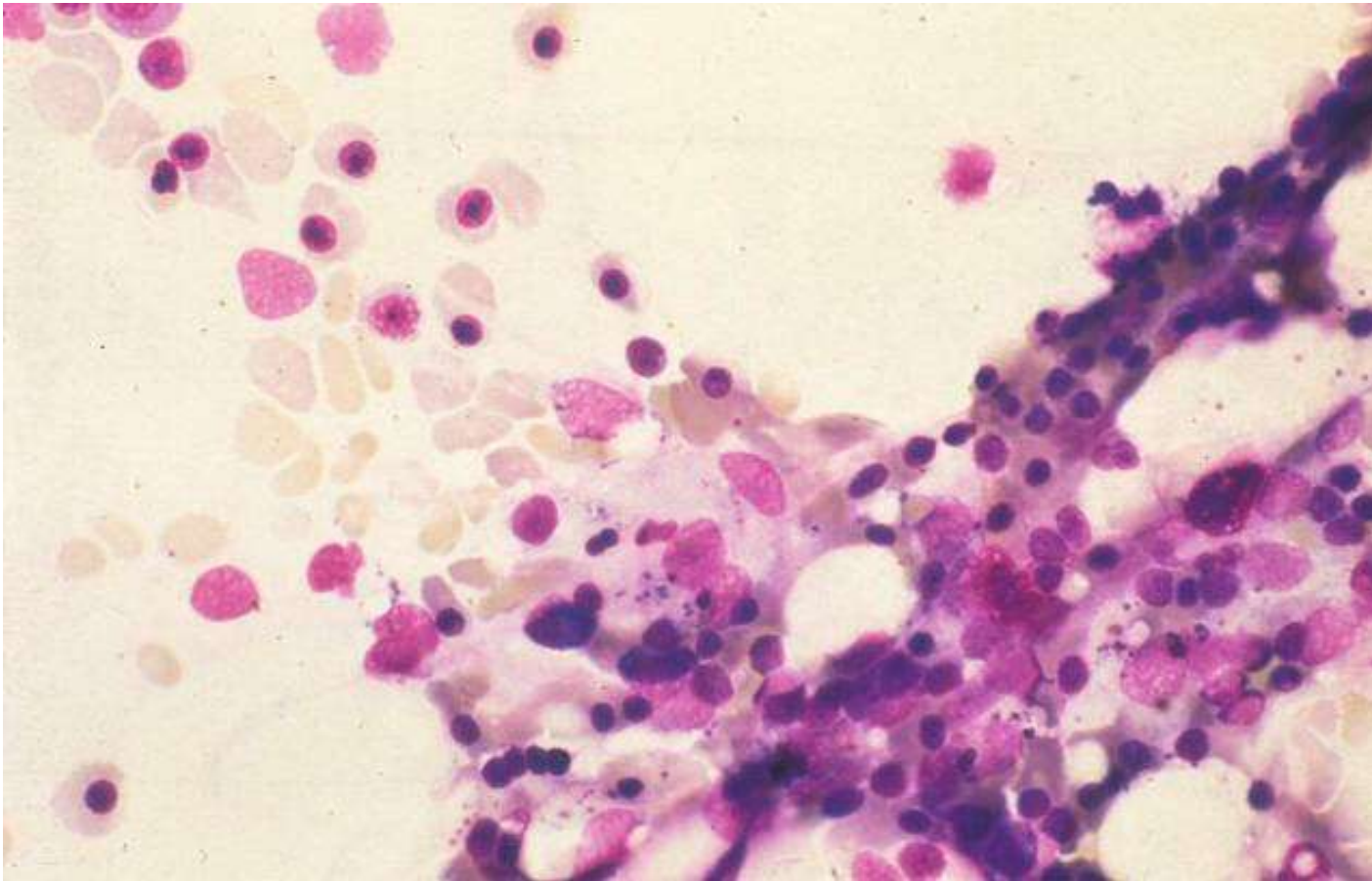


Botbiopt: aplastische anemie, hot spot



Beenmergaspiraalt: aplastische anemie, hot spot

Cave: sampling error!!



Valkuil: Folliculair lymfoom (FCL)

