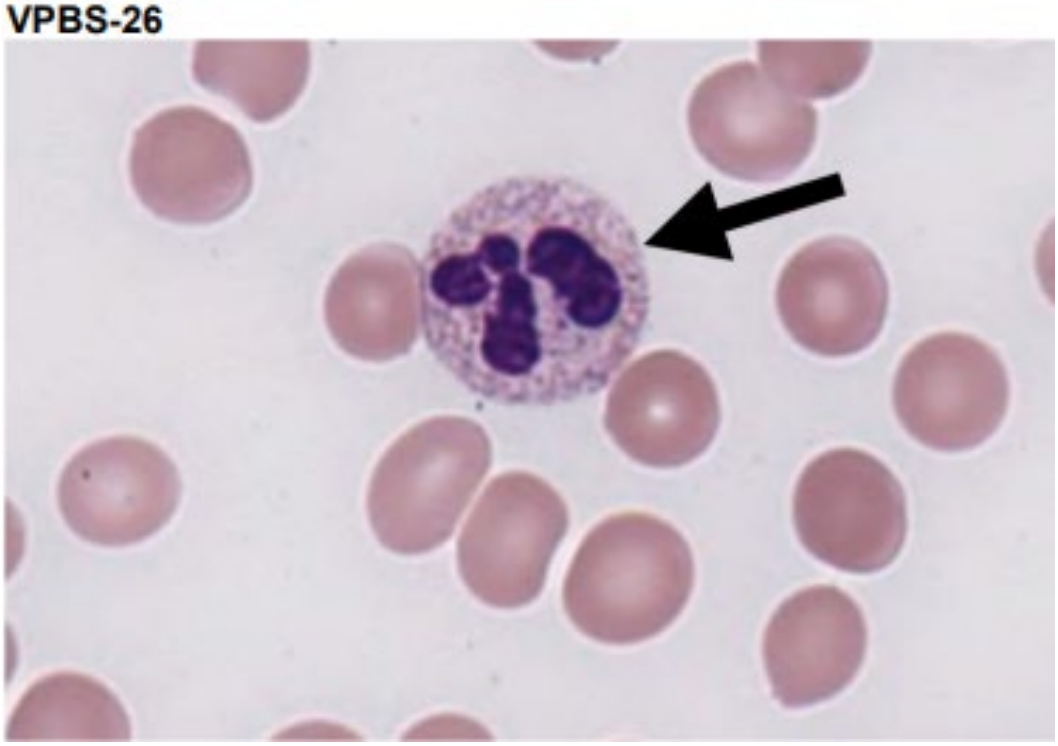
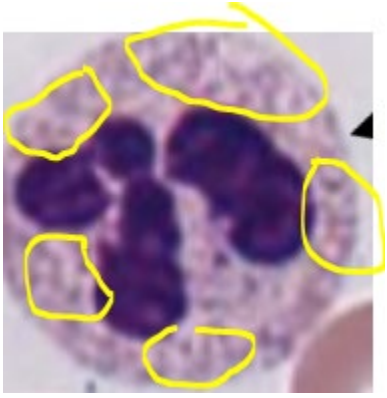
VPBS-B 2022 Education

We missed 1 image identification on VPBS-B 2022, so this document is the education associated with the incorrect identification.

Identify the cell in the image.



Obviously your first thought is Segmented Neutrophil. I agree, and most survey participants had the same first impression as well (70.2%). Unfortunately, this is not the intended answer. Let me blow up the cell more, and highlight some key features.



Notice 1st how dark and large some of these granules are.

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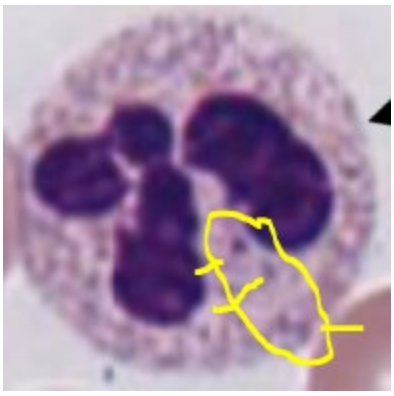

Notice 2nd these round blue "bodies." (hint hint)

Putting those two features together, and seeing the list of acceptable answers, what do you think the identification is now?

anulocytes and Monocytes

208	Basophil, any stage
209	Eosinophil, any stage
117	Mast cell
236	Monocyte
237	Monocyte, immature (promonocyte, monoblast)
284	Neutrophil, segmented or band
259	Neutrophil, toxic (to include toxic granulation and/or Döhle bodies, and/or toxic vacuolization)
122	Neutrophil with hypersegmented nucleus
240	Neutrophil with Pelger-Huët nucleus (acquired or congenital)
161	Neutrophil, polyploid
239	Neutrophil with dysplastic nucleus and/or hypogranular cytoplasm
191	Neutrophil necrobiosis (degenerated neutrophil)
121	Neutrophil, giant band or giant metamyelocyte
112	Neutrophil, metamyelocyte
111	Neutrophil, myelocyte
241	Neutrophil, promyelocyte
238	Neutrophil, promyelocyte, abnormal with/without Auer rod(s)

The answer they were looking for was #259 – Neutrophil, toxic. (I think it was slightly unfair to expect that ID on this patient given the diagnosis of macrocytic anemia and nothing indicative of infection, but I can see why they want the given ID.) See final pages for the insert from the participant summary for the CAP explanation. However, first I would like to share a few additional images of Döhle bodies. I think we probably under-call Döhle bodies as a whole, so maybe this will help us look a little more closely. They are most often seen in either toxic or left shift situations.

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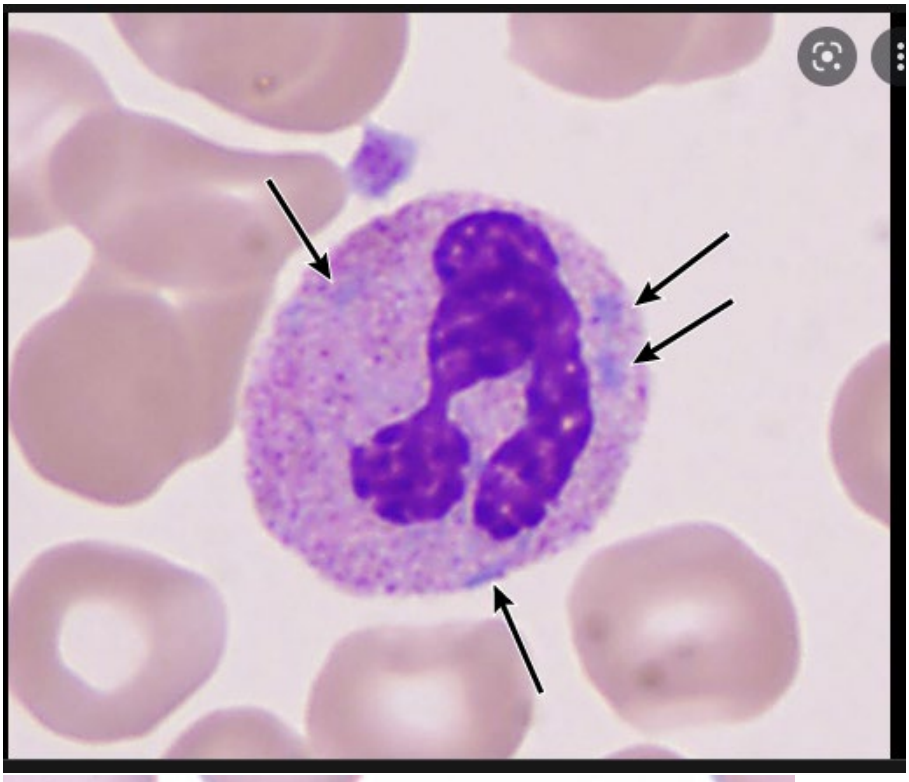

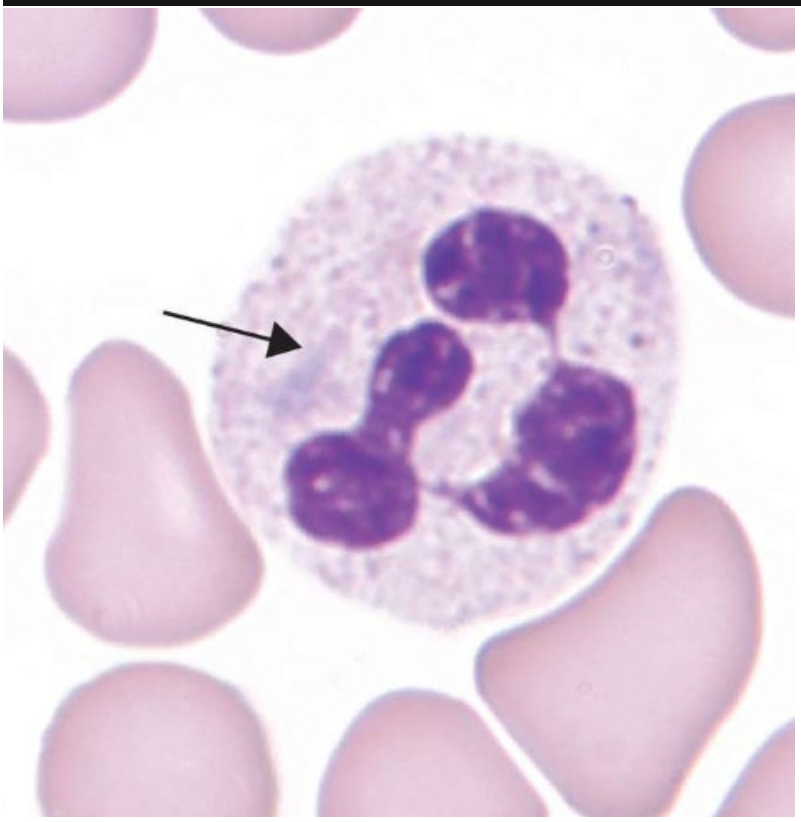

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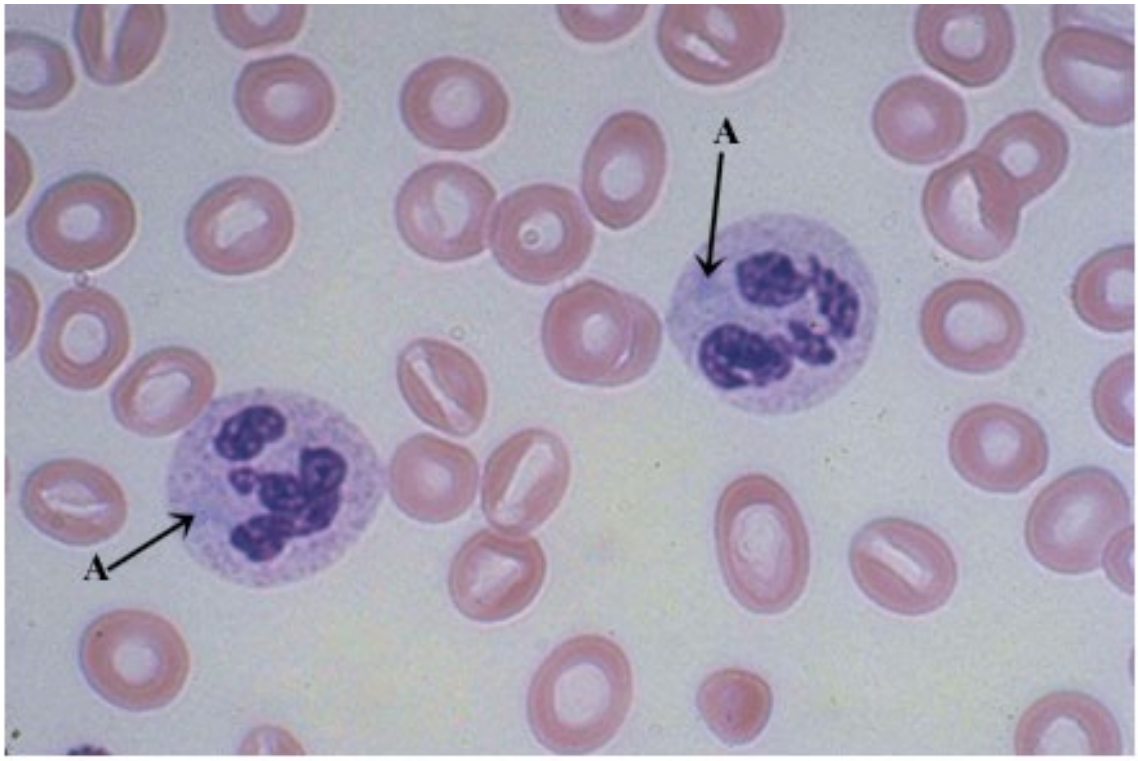


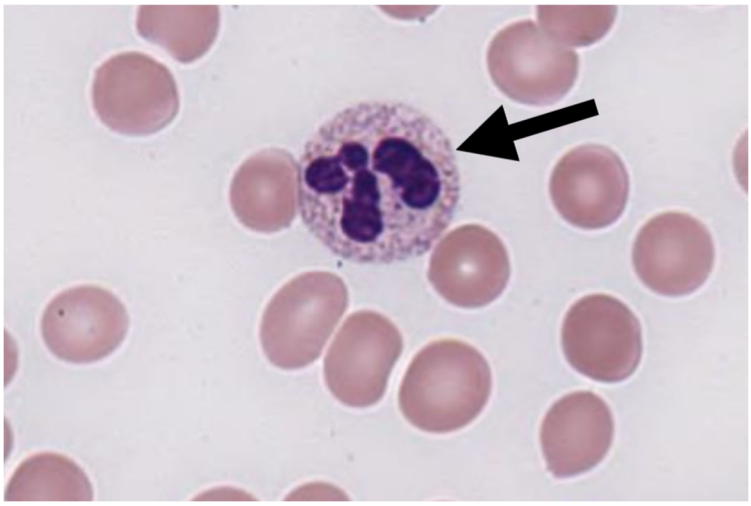
Neutrophil with toxic granulations and Dohle body:
dohle bodies (A) are gray-blue cytoplasmic inclusions of ribosomal RNA that are seen in infection

There are images within a quiz attached to this educational activity. Please answer to your best ability (they will not all be toxic neutrophil pictures and some are from the CAP slides).

See next page for the CAP participant summary explanation.

Cell Identification

VPBS-26



Identification	Participants Freq	%	Evaluation
Neutrophil, toxic (to include toxic granulation and/or Döhle bodies, and/or toxic vacuolization)	289	22.2	Educational
Neutrophil, segmented or band	913	70.2	Educational
Neutrophil with hypersegmented nucleus	84	6.5	Educational
Neutrophil, polyploid	4	0.3	Educational
Eosinophil, any stage	3	0.2	Educational
Neutrophil with dysplastic nucleus and/or hypogranular cytoplasm	3	0.2	Educational
Neutrophil necrobiosis (degenerated neutrophil)	3	0.2	Educational
Basket cell/smudge cell	1	0.1	Educational

The arrowed cell is a toxic neutrophil, as correctly identified by 22.2% of participants. Toxic changes in neutrophils include toxic granulation, Döhle bodies, and toxic vacuolization. Toxic granulation is defined by the presence of large, purple or dark blue cytoplasmic granules in neutrophils, bands, and metamyelocytes. Toxic granules are typically larger and darker staining than normal neutrophil granules. Döhle bodies represent parallel strands of rough endoplasmic reticulum and appear as single or multiple blue or gray-blue cytoplasmic inclusions of various sizes, typically located near the plasma membrane. Vacuoles within the cytoplasm of these same cells define toxic vacuolization. The vacuoles are variable in size and may coalesce, sometimes distorting the neutrophil cytoplasm to form pseudopodia. Toxic granulation and Döhle bodies each may be present in an individual cell without the other finding. Either change alone is sufficient to designate a neutrophil as toxic. Isolated vacuolation should not be considered evidence of toxic change, as it may be the result of degeneration artifact and should not be labeled as toxic vacuoles unless accompanied by other toxic changes. Toxic changes result from the action of cytokines released in response to infection, burns, trauma, and granulocyte colony stimulating factor (G-CSF), and they indicate a shortened maturation time and activation of post-mitotic neutrophil precursors.

The arrowed cell was incorrectly identified as a neutrophil, segmented or band by 70.2% of participants. Neutrophils should have a pale pink cytoplasmic appearance, unlike the arrowed cell in this case which has purplish granules signifying toxic change. In addition, there is a small gray-blue inclusion at the periphery of

the cytoplasm, which represents a Döhle body. The distinction between normal neutrophils and one with toxic changes can be challenging, however, close morphologic evaluation should aid in this distinction.

This cell was incorrectly identified as a neutrophil with hypersegemented nucleus by 6.5% of participants. Hypersegmentation of a neutrophil is defined as a nucleus with six or more lobes. These lobes should be separated by a thin filament that contains no internal chromatin, giving it the appearance of a solid, thread-like line. The arrowed cell demonstrates only three distinct lobes, and thus should not be considered hypersegmented.