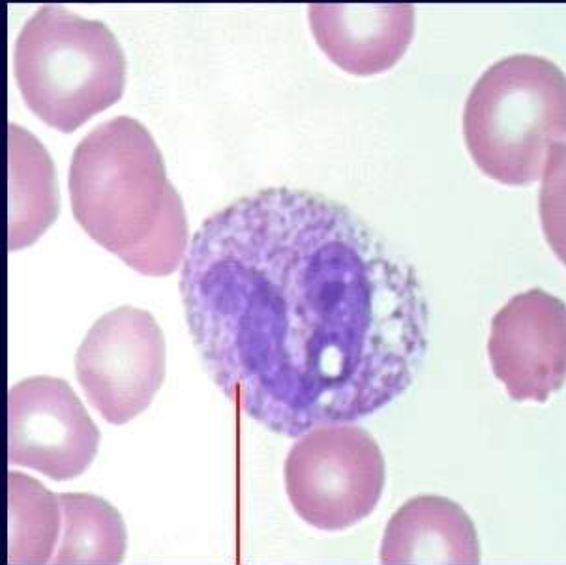


# Granulocyte Variations



**toxic neutrophil**

- Variations in granulocytes appearance may be caused by maturation defects, inflammation, and infections.
- Maturation defects are due to genetic or metabolic disorders.
- Bacterial infections can cause 'toxic' changes to neutrophils.

# Granulocyte Variations

**Hyposegmentation**

**Hypersegmentation**

**Auer rods**

**Toxic granulation**

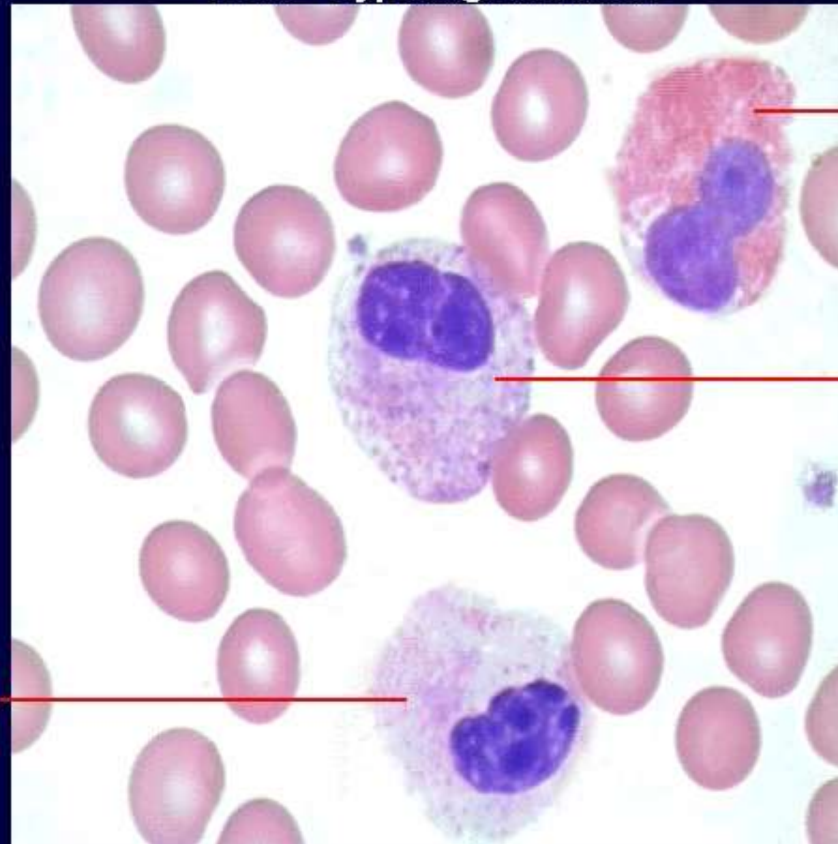
**Toxic vacuolation**

**Döhle bodies**

**Morphology:**  
granulocytes with one or two poorly segmented nuclear lobes

## WBC - Hyposegmentation

**hyposegmented neutrophil**



**hyposegmented eosinophil**

**hyposegmented neutrophil**

**Comment:** Hyposegmented neutrophils may be seen in patients with Pelger-Huet anomaly or myelodysplastic syndrome.

## Granulocyte Variations

Hyposegmentation

**Hypersegmentation**

Auer rods

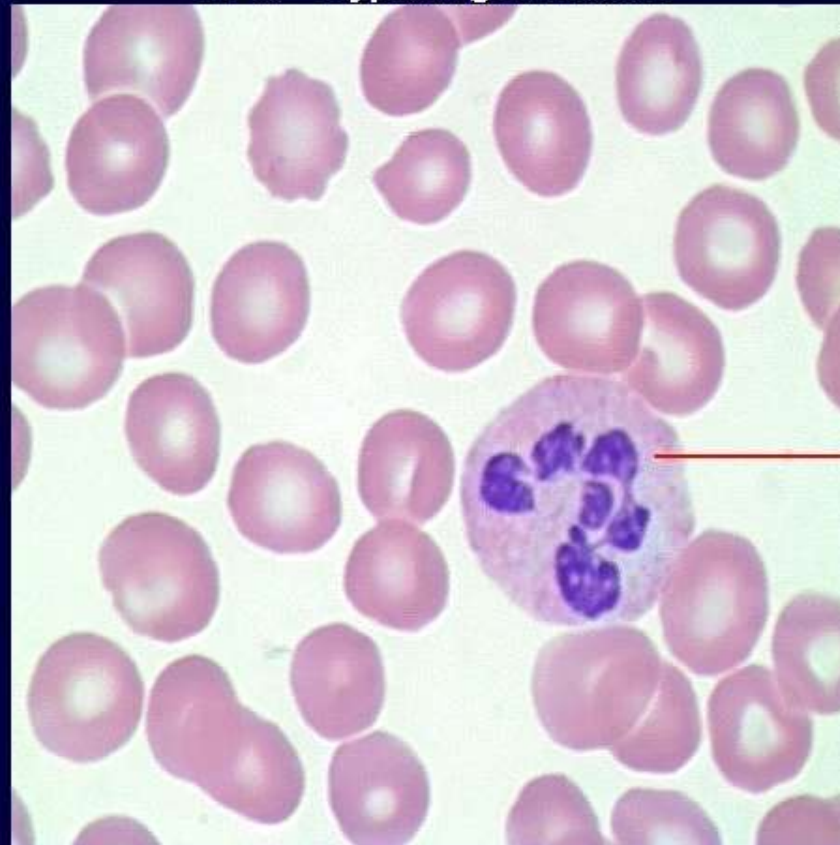
Toxic granulation

Toxic vacuolation

Döhle bodies

**Morphology:** neutrophil with six or more nuclear segments

### WBC - Hypersegmentation



hypersegmented neutrophil

**Comment:** Hypersegmented neutrophils are seen in patients with anemia due to Vitamin B12 or folate deficiency.



## Granulocyte Variations

Hyposegmentation

Hypersegmentation

**Auer rods**

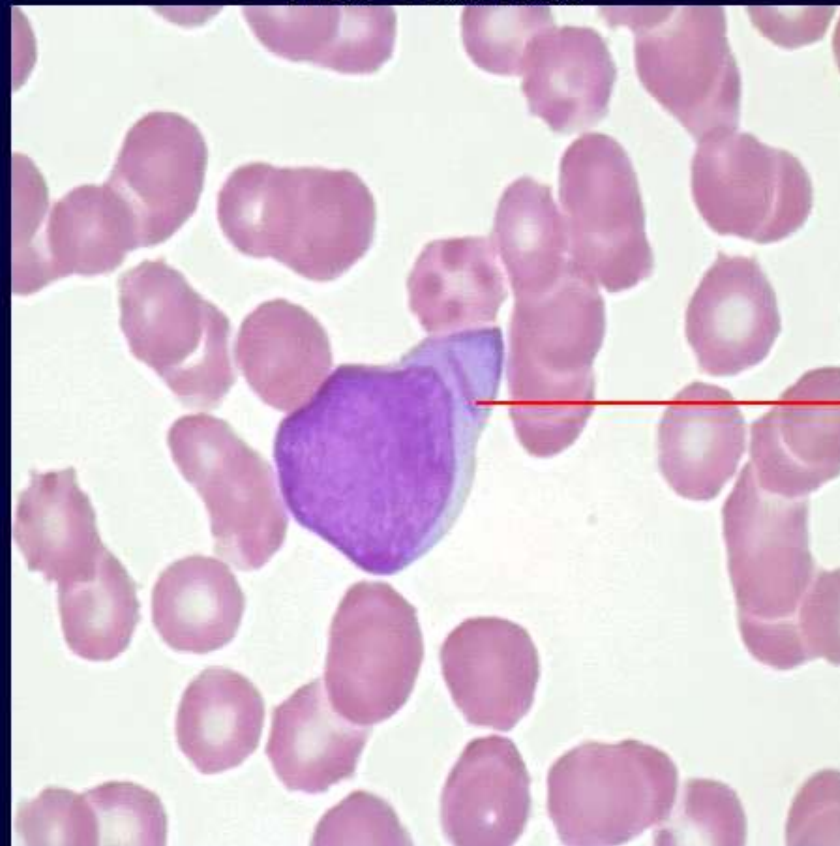
Toxic granulation

Toxic vacuolation

**Döhle bodies**

### WBC - Auer rods

**Morphology:** pink, rod-shaped inclusions in myeloblast cytoplasm



**Auer rod**

**Comment:** Auer rods may be seen in myeloblasts from patients with acute myelogenous leukemia.

## Granulocyte Variations

Hyposegmentation

Hypersegmentation

Auer rods

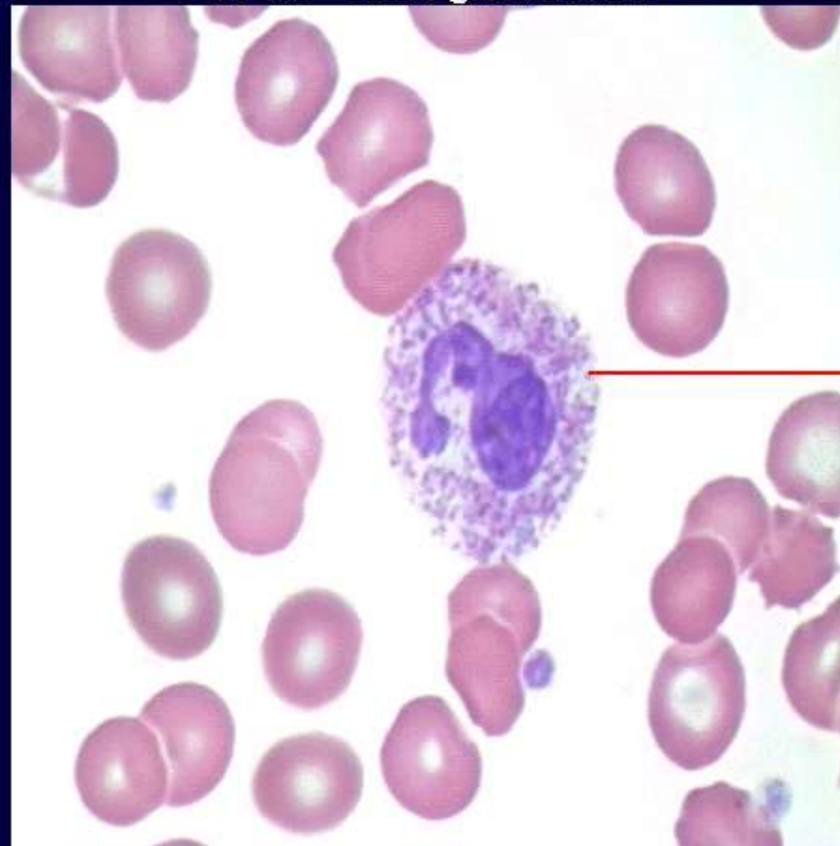
**Toxic granulation**

Toxic vacuolation

Döhle bodies

**Morphology:** neutrophil with increased dark granules in its cytoplasm

WBC - Toxic granulation



toxic granulation

**Comment:** Toxic granulation is seen in patients with severe bacterial infections.

## Granulocyte Variations

Hyposegmentation

Hypersegmentation

Auer rods

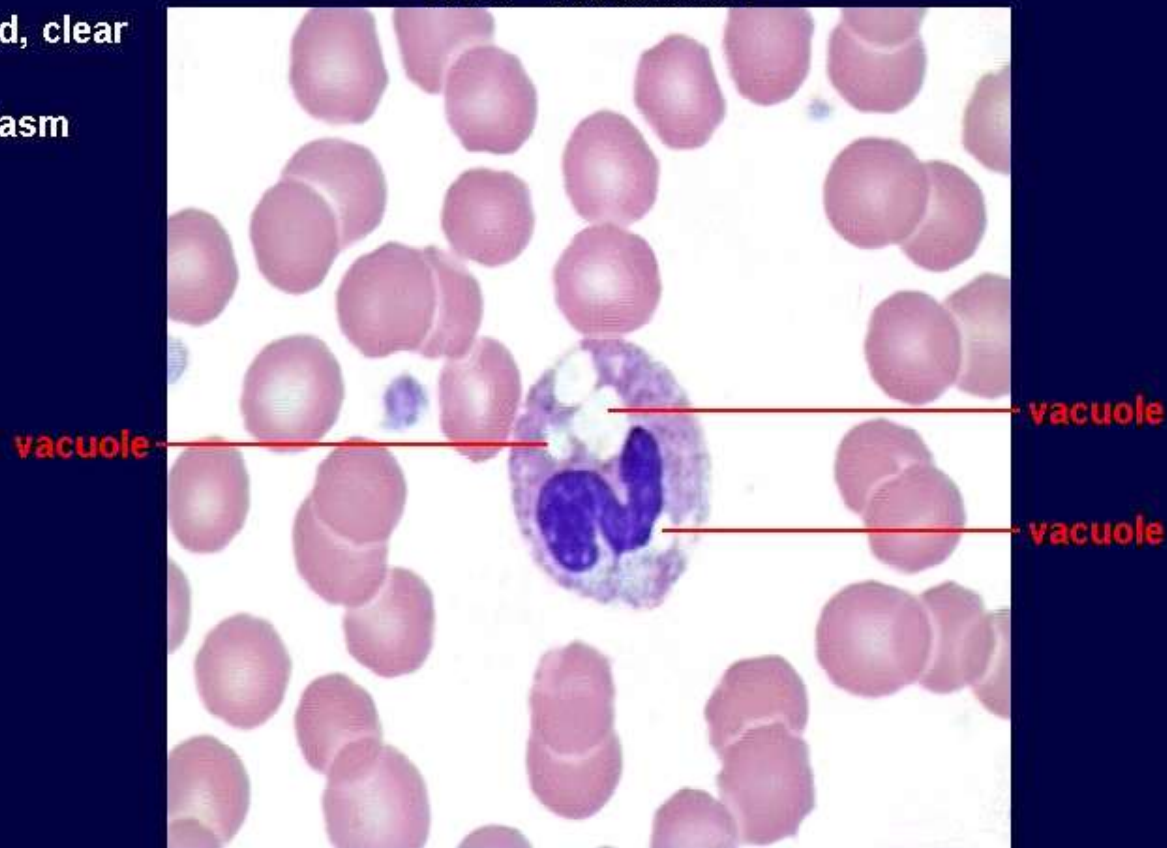
Toxic granulation

**Toxic vacuolation**

Döhle bodies

**Morphology:** round, clear spaces within granulocyte cytoplasm

### WBC - Vacuolation



**Comment:** Toxic vacuolation may be seen in patients with severe bacterial infections.

## Granulocyte Variations

Hyposegmentation

Hypersegmentation

Auer rods

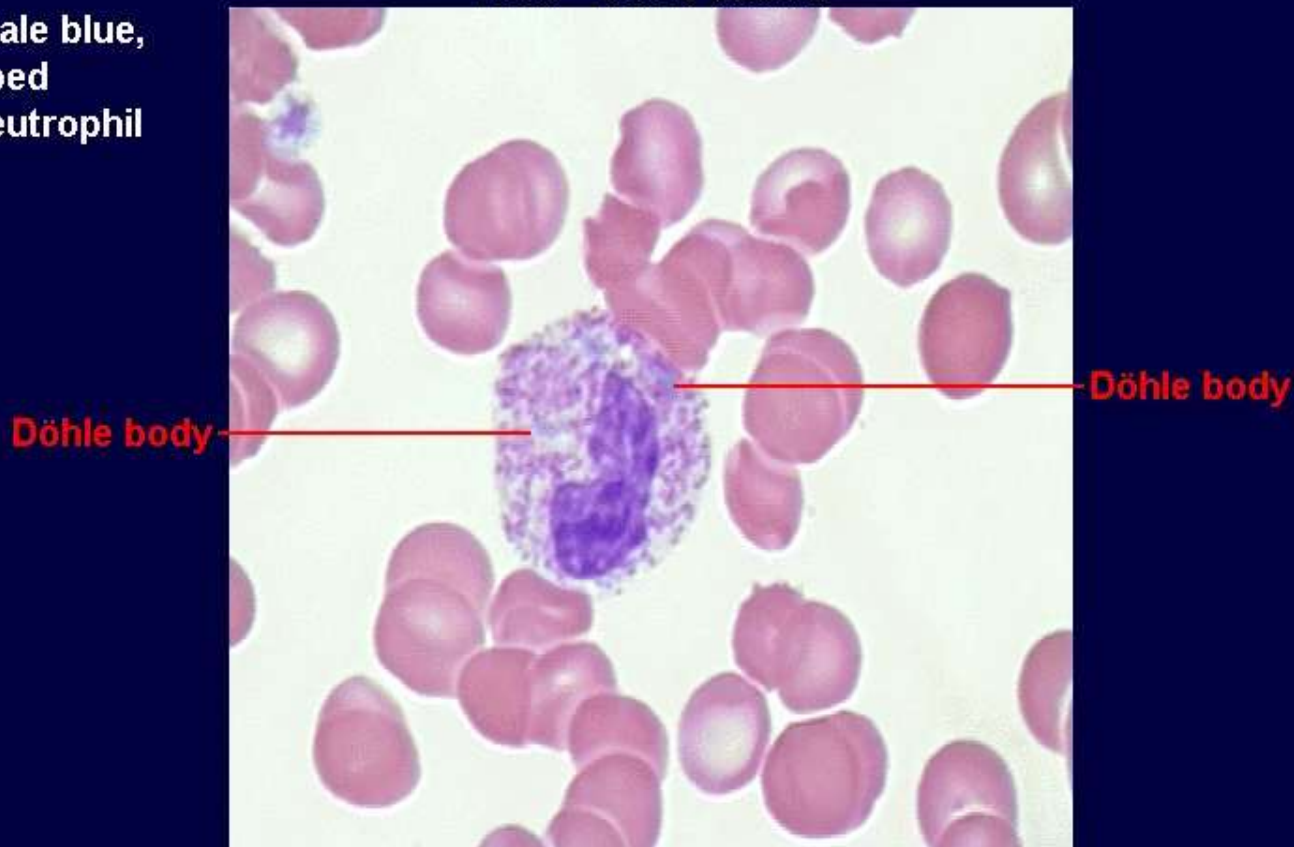
Toxic granulation

Toxic vacuolation

**Döhle bodies**

**Morphology:** pale blue, irregularly shaped inclusions in neutrophil cytoplasm

WBC - Döhle bodies



**Comment:** Döhle bodies consist of ribosomes and/or rough endoplasmic reticulum and are seen in severe bacterial infections.