

Tutorial for evaluation of eosinophils in healthy volunteers, in neoplastic diseases and in reactive situations.

Definition of normal eosinophils:

Marcel Bessis: *Living Blood Cells and Their Ultrastructure. Springer Verlag Berlin. Heidelberg New York. 1973.*
Eosinophils precursors and granulocytes. p 32,

« Usually the eosinophil granulocyte has a nucleus with two segments that may be poorly distinguishable because of the mass of cytoplasmic granules. » (He reported 6% non-lobed, 68% 2 lobes, 22% 3 lobes, and 4% 4 lobes).

Barbara Bain: *Blood Cells, A Practical Guide. Wiley Blackwell 2015, pp. 119-122:*

« The nucleus is usually bilobed but occasional nuclei are trilobed In females eosinophils may have a drumstick. Eosinophil granules are spherical ... they pack the cytoplasm and stain reddish-orange. Very occasional eosinophils in healthy subject contain some granules with basophilic staining characteristics.

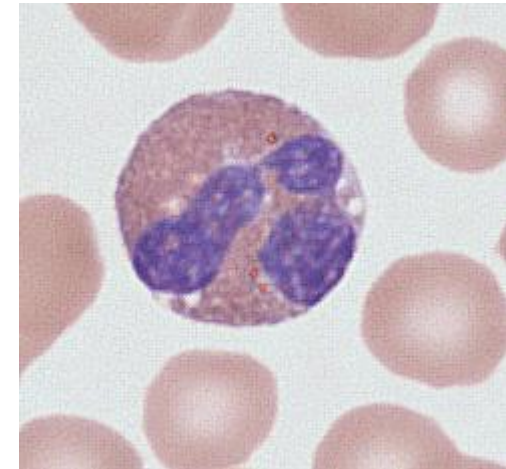
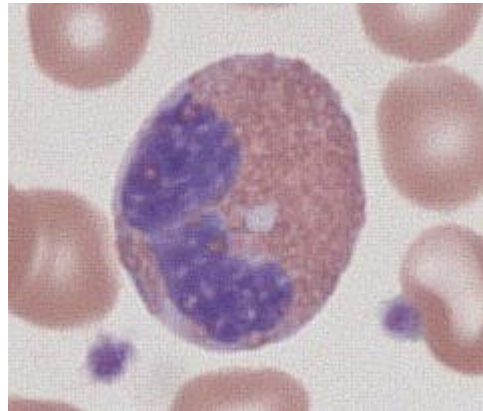
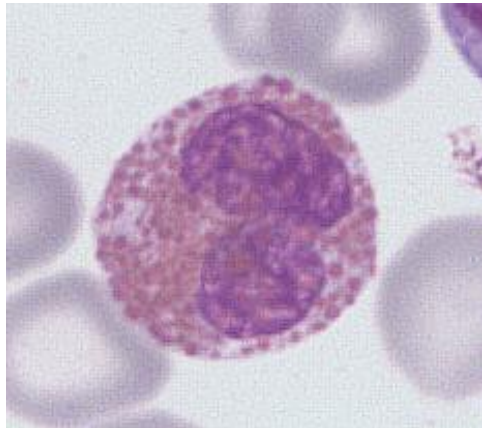
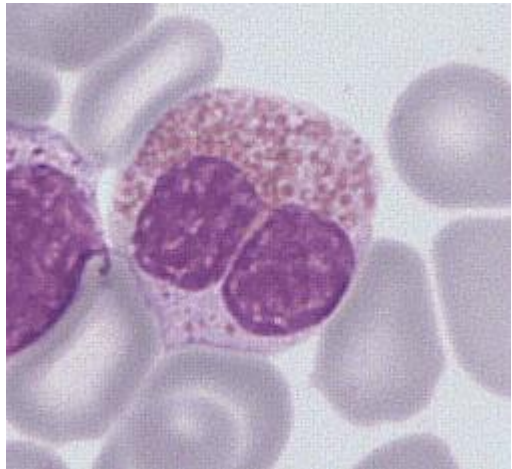
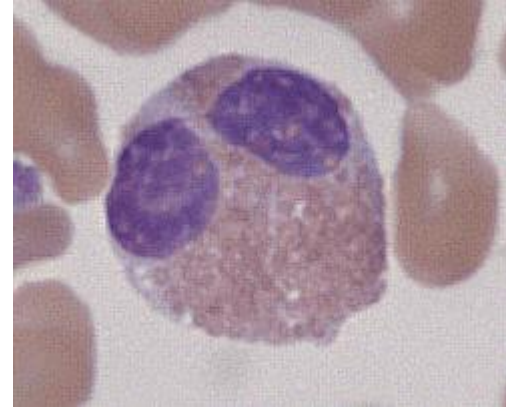
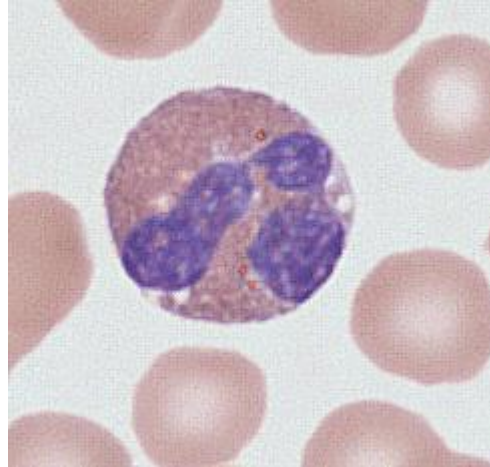
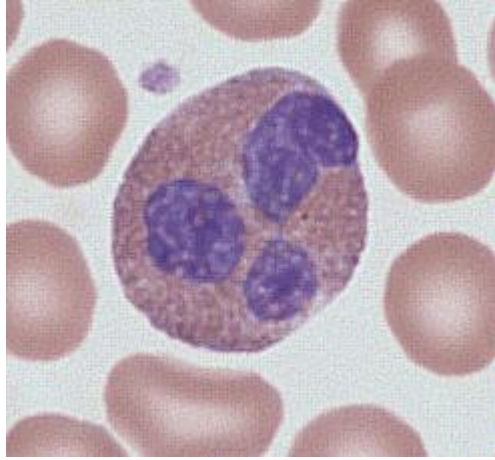
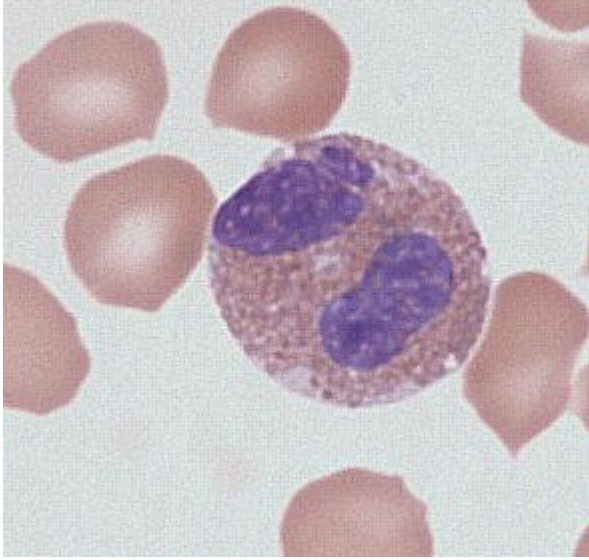
Codes to be used for the evaluation

Code	Classification	Comment
0	Normal	Nucleus has two or three lobes, the cytoplasm is not degranulated and there are few if any vacuoles; any vacuoles are generally small.
1a	Non-lobated , band form	Mature eosinophil but with no lobation, nucleus in the form of a band.
1b	Non-lobated , round or oval nucleus	Mature eosinophil but with no lobation, nucleus round or oval.
2	Hyperlobated nucleus	Four or more nuclear lobes
3	Ring nucleus	A circular nucleus; be careful to exclude band forms with overlapping ends
4	Binuclearity	Cell clearly has two nuclei, not including cells with two round nuclear lobes close together with joining filament not clearly visualised
5	Moderately hypogranular	Moderately hypogranular but hypogranular cytoplasm less than 25% of cytoplasmic area
6	Markedly hypogranular	Agranular cytoplasm 25% or more of cytoplasmic area
7	Moderately vacuolated	Moderately vacuolated but vacuoles occupying less than 25% of cytoplasm
8	Markedly vacuolated	Vacuoles occupying 25% or more of cytoplasm
9	Basophilic granules	Some granules with basophilic (purplish) staining characteristics
Grade of cytological abnormality		Absent Mild Moderate Severe
Do you think the patient is likely to have a myeloid neoplasm?		Yes No
		Overall assessment after viewing all images

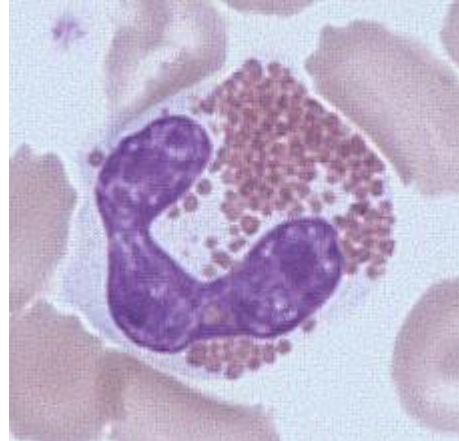
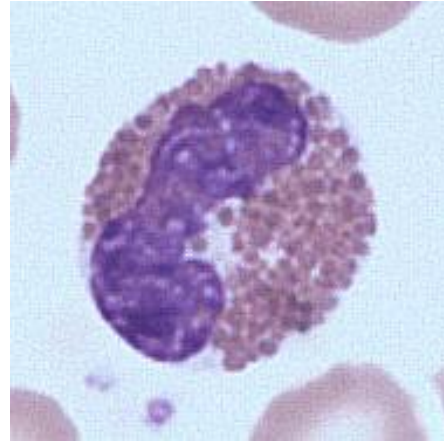
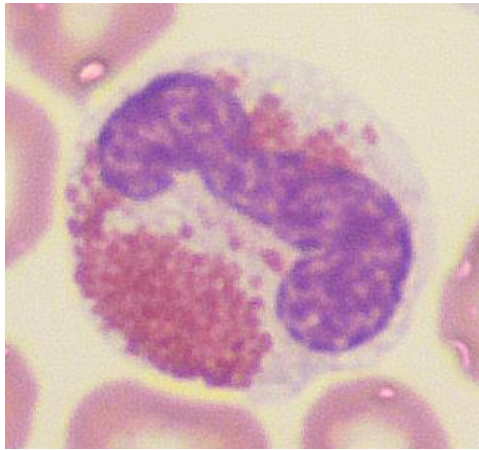
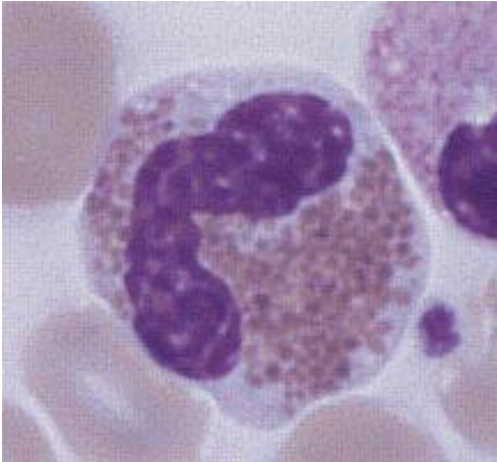
Code 0

Normal Eosinophil

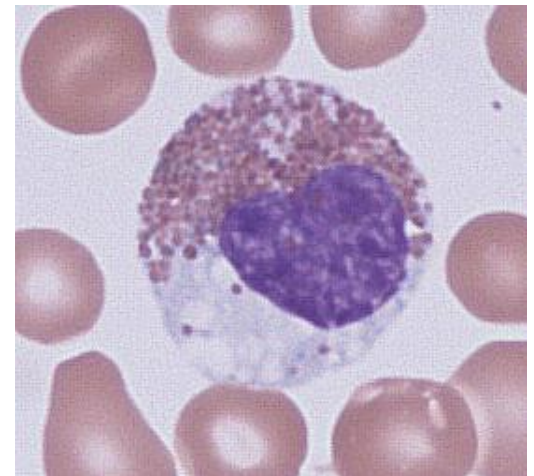
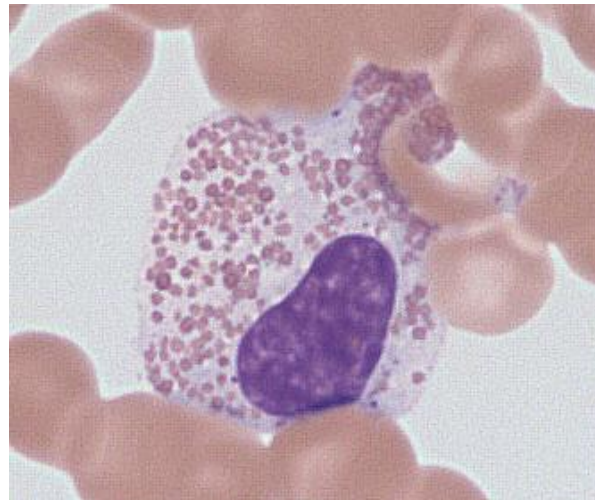
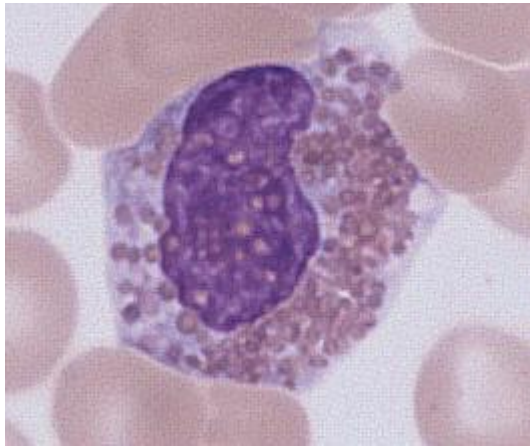
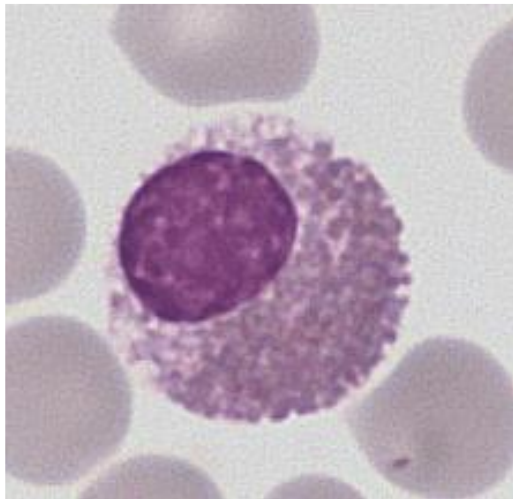
Nucleus has two or three lobes, the cytoplasm is not degranulated and there are few if any vacuoles; any vacuoles are generally small



Code 1a	Non-lobated nucleus, band form	Mature eosinophil but with no nuclear lobation, nucleus in the form of a band
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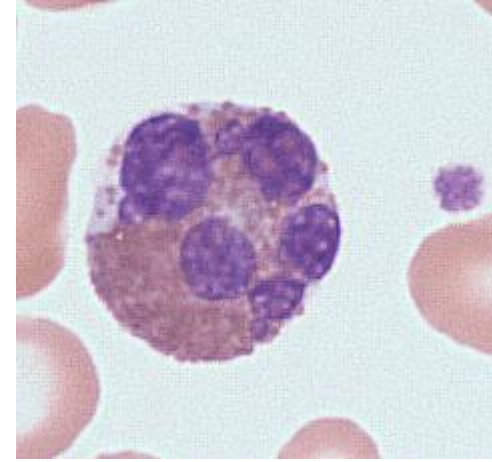
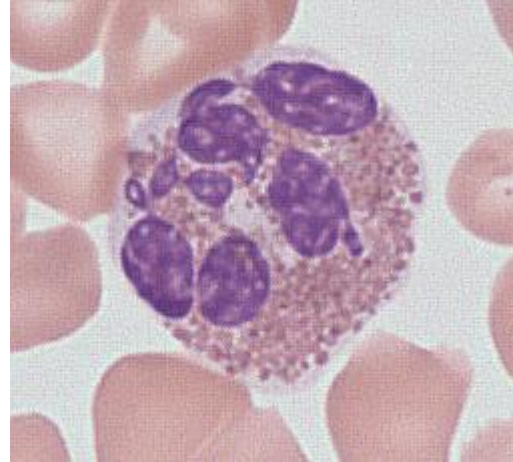
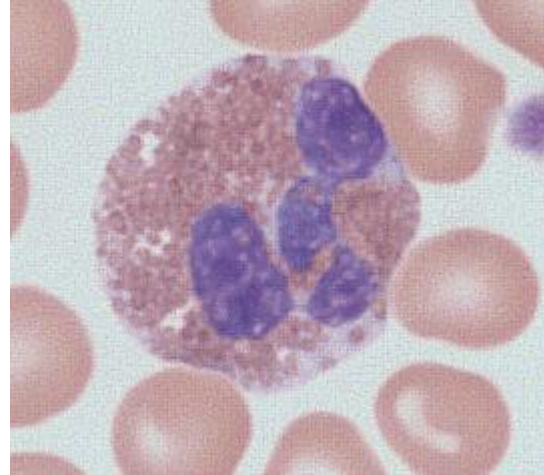
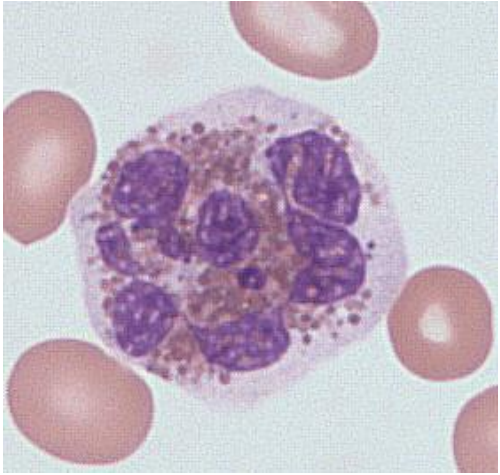
Code 1b	Non-lobated nucleus, round or oval nucleus	Mature eosinophil but with no nuclear lobation, nucleus round or oval
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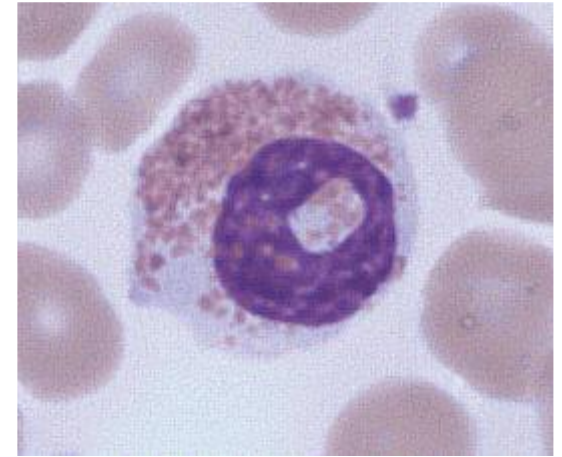
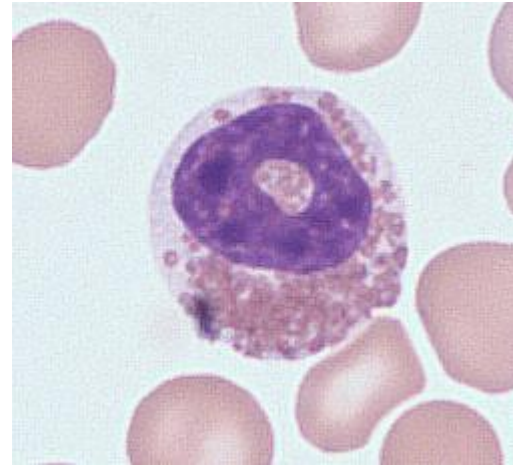
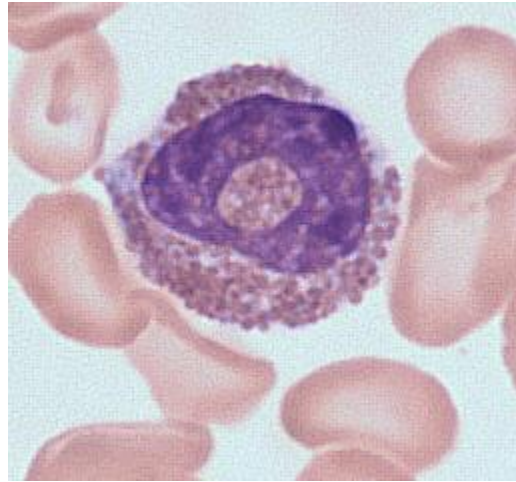
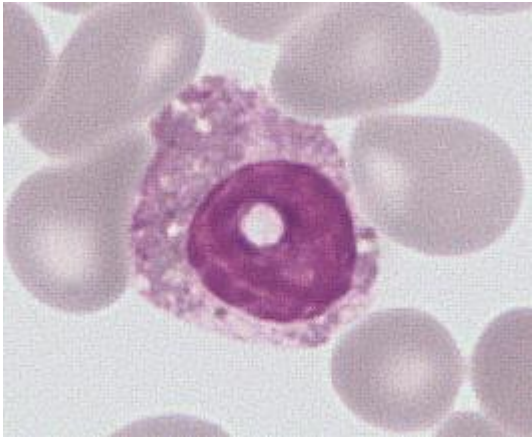


Code 2

Hyperlobated nucleus

Four or more nuclear lobes

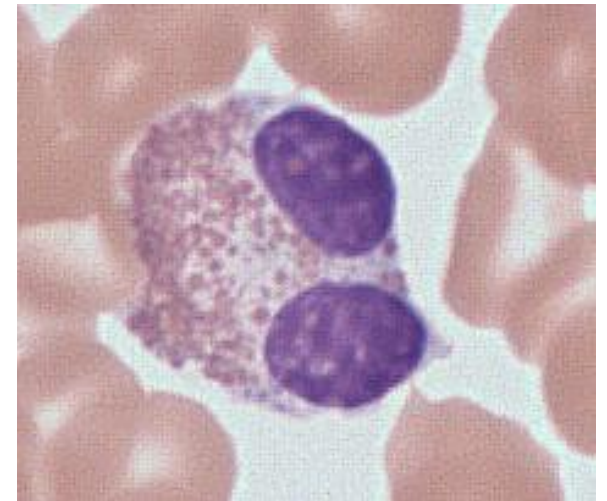
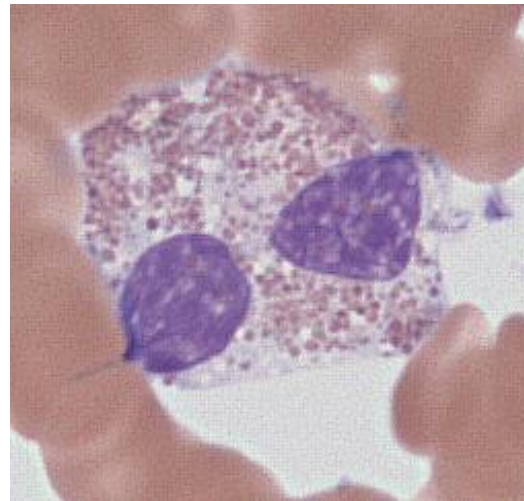
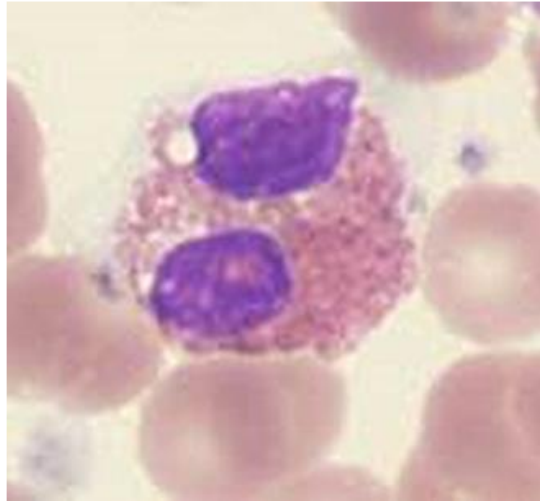
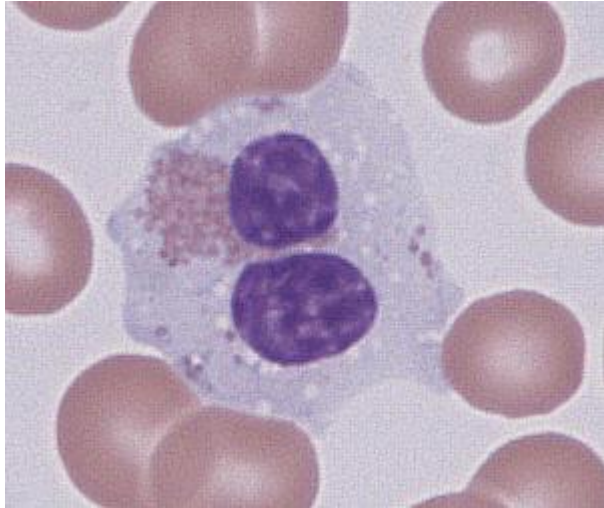




4

Binuclearity

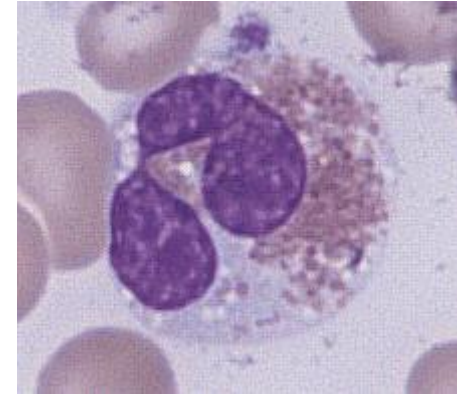
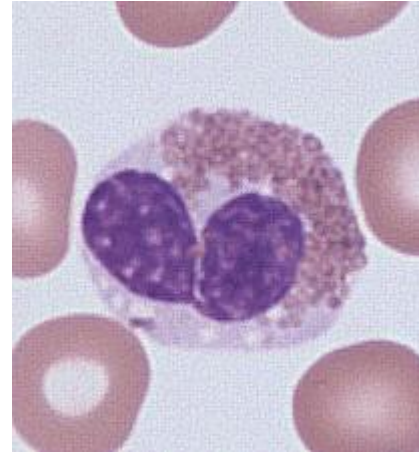
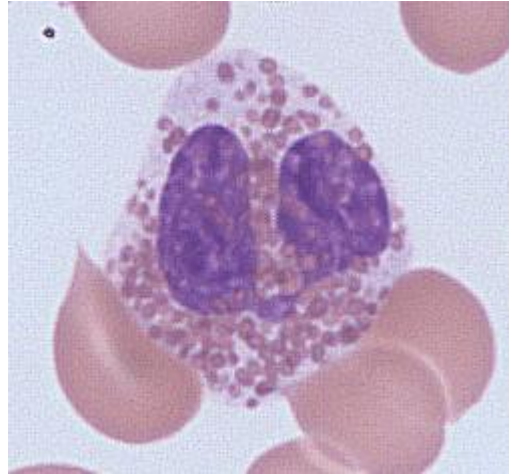
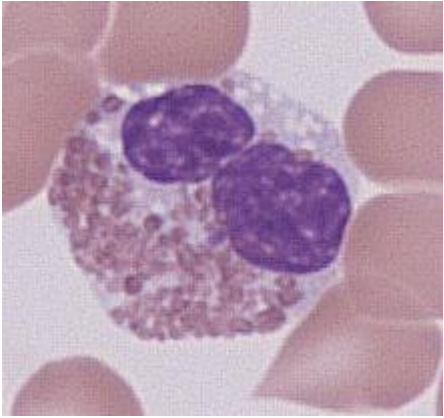
Cell clearly has two nuclei, not including cells with two round nuclear lobes close together with joining filament not clearly visualised

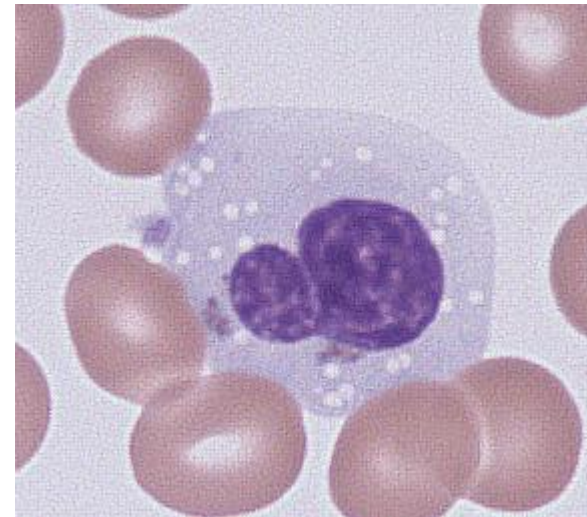
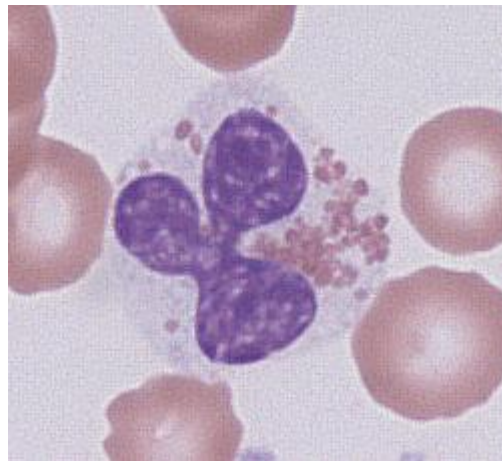
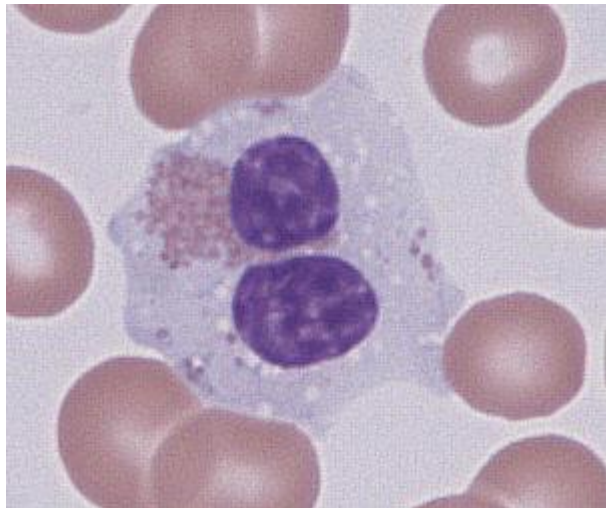
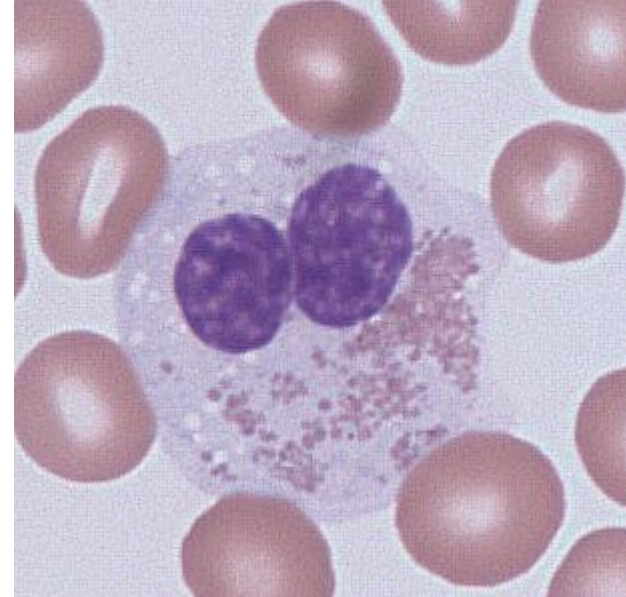
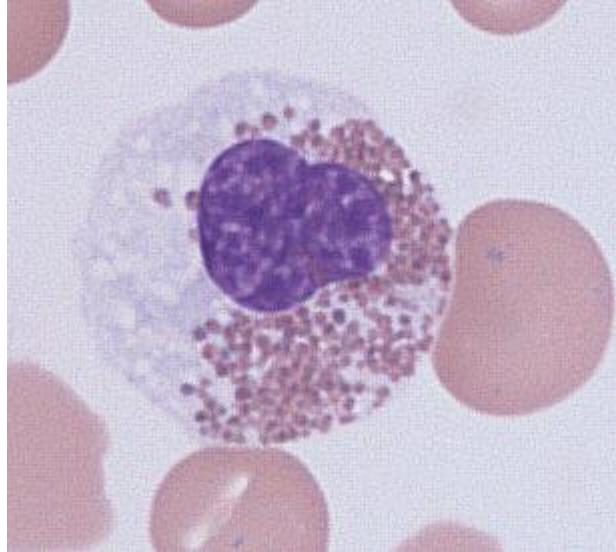
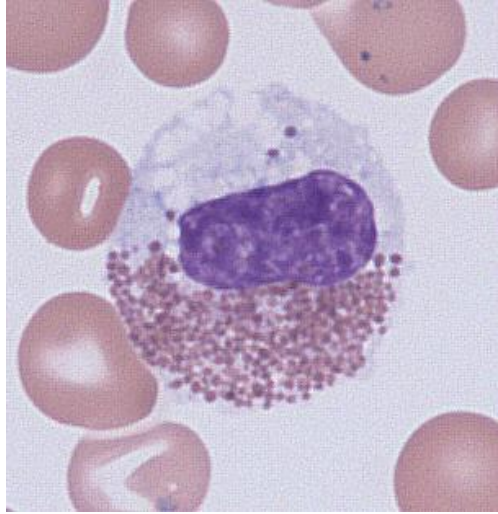


5

Moderately hypogranular

Agranular cytoplasm less than 25% of cytoplasmic area

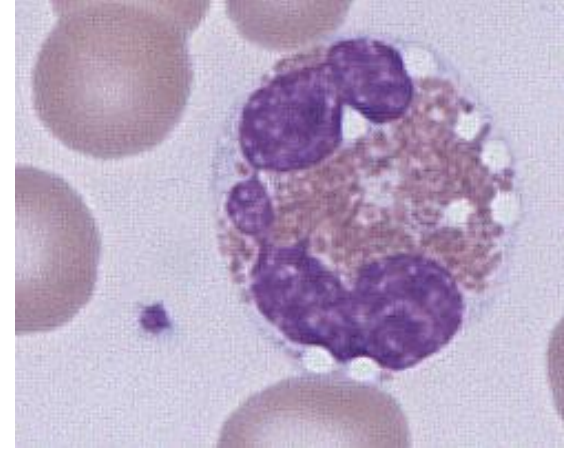
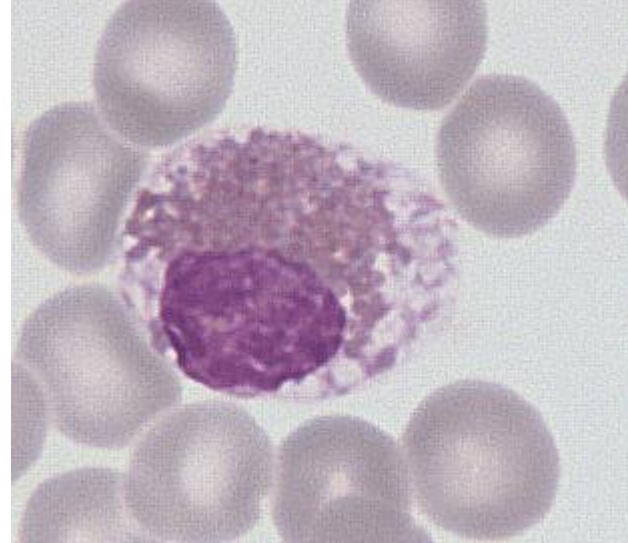
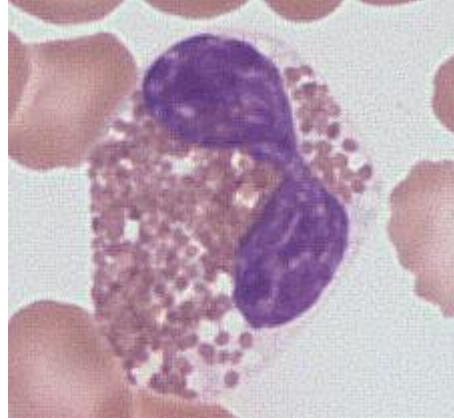
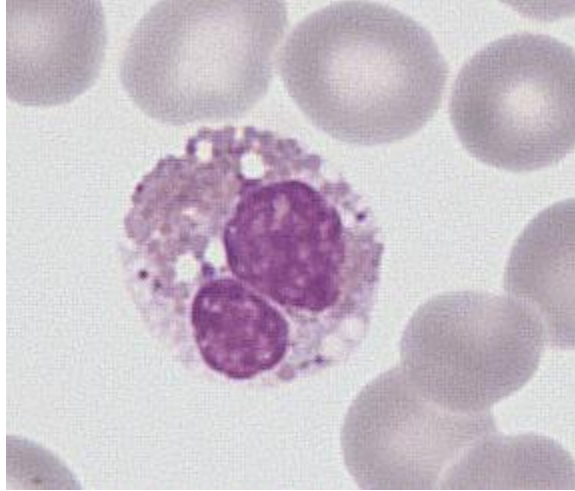




7

Moderately vacuolated

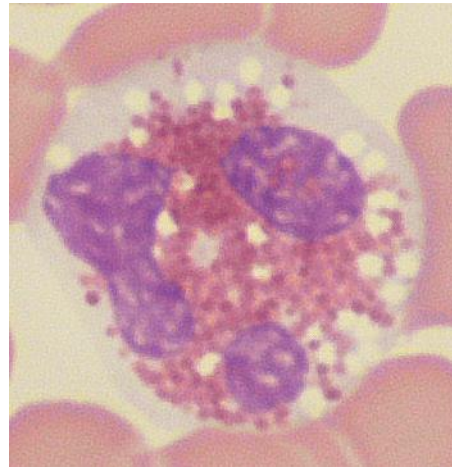
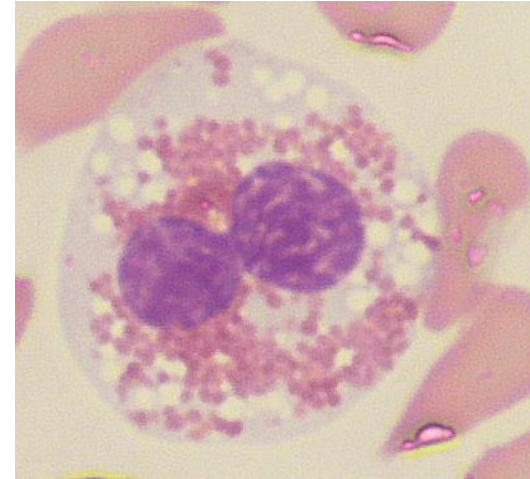
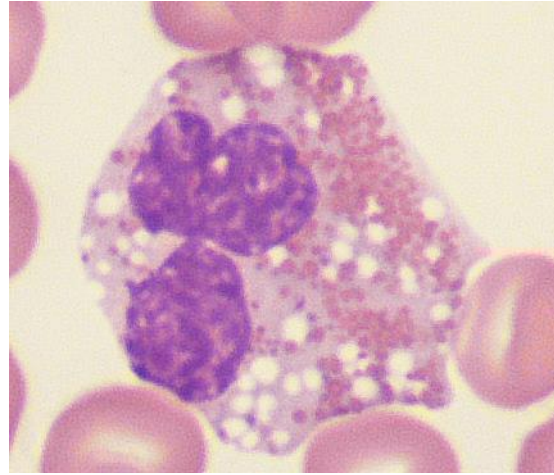
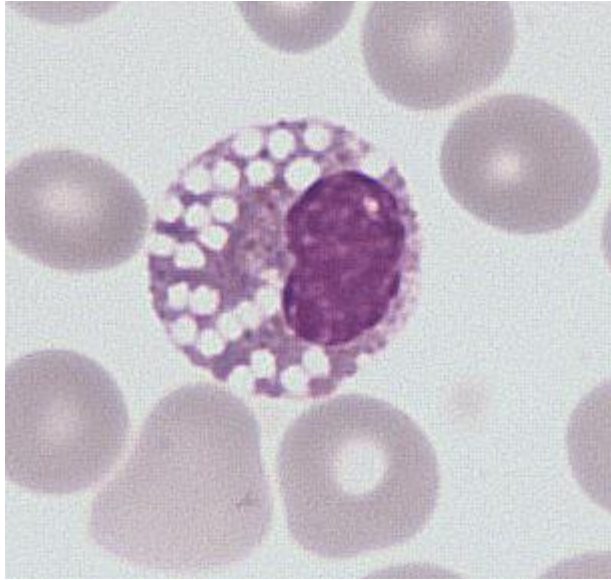
Vacuoles occupying less than 25% of cytoplasm

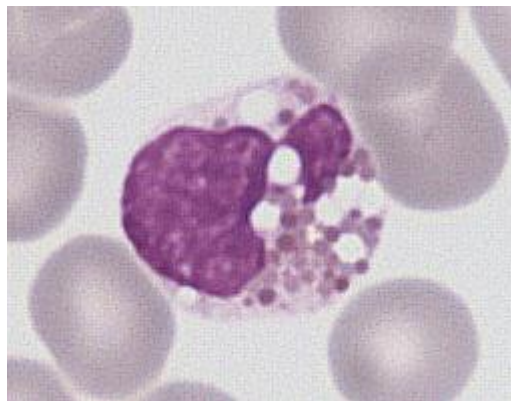
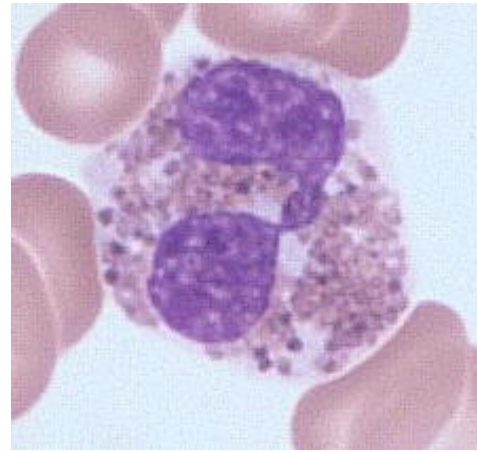
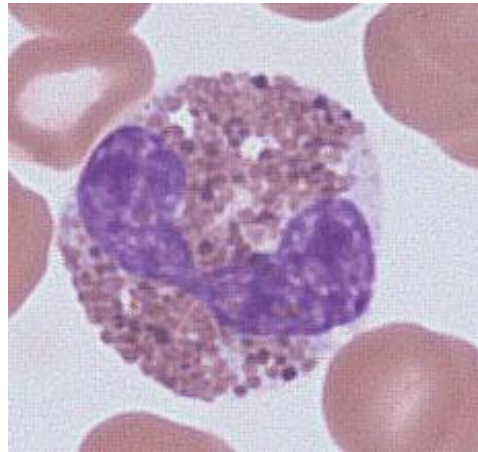
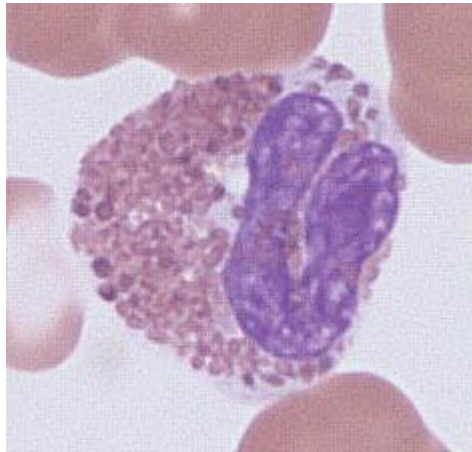
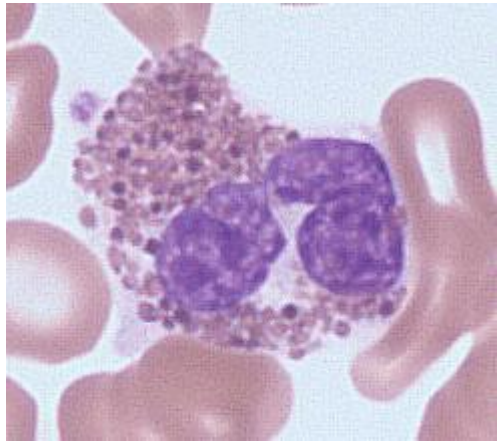


8

Markedly vacuolated

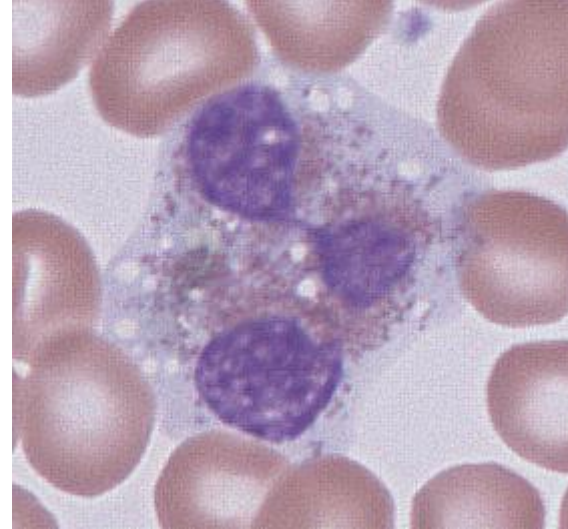
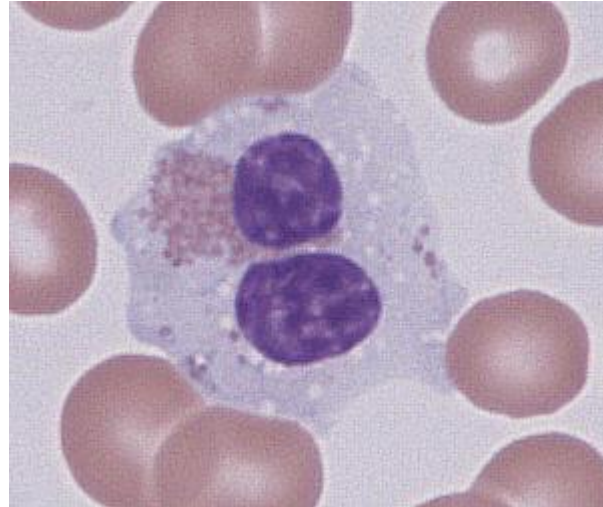
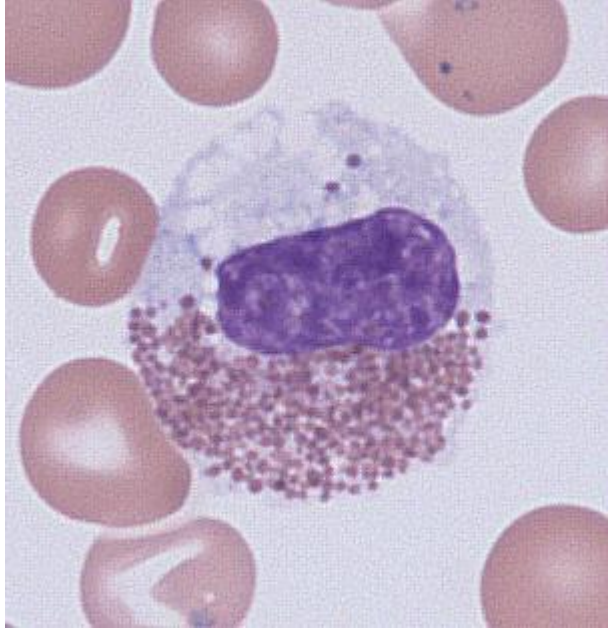
Vacuoles occupying 25% or more of cytoplasm





2 or 3 abnormalities
in the same cell

If a cell has more than one abnormality,
assign all relevant codes to it



Code: 1b 6 7

Code: 4 6 7

Code: 5 7

Caution: no comma no dot between two codes, only one letter space.

Grade of cytological abnormality

Absent

Mild

Moderate

Severe

This is an overall assessment of the case, after you have evaluated all eosinophils. It is a subjective assessment of the degree of cytological abnormality. It should take into account nuclear abnormalities (hyperlobated, non lobated, ring form), vacuolation and hypogranularity. The purpose of this assessment is to be able to compare the overall degree of cytological abnormality in reactive and neoplastic conditions