CELL MORPHOLOGY GRADING

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PURPOSE

To provide standardization for grading cellular morphology for CBC slide reviews or manual differentials.

SPECIMEN

Slide prepared from EDTA-specimen and stained with Wright or Wright-Giemsa stain.

RELATED DOCUMENTS

R-W-HEM1326 Hematology Slide Review Procedure
J-W-HEM-2010 Cellavision – Reviewing and Editing Results

INSTRUCTIONS

1. Using 100X oil-immersion objective, scan slide for cellular morphology.

    - Note: For Cellavision use: Review morphology grading generated by the instrument and scan the digital fields for additional morphology.

2. Scan 10 microscopic fields in different areas of the slide with evenly dispersed blood cells for morphology evaluation.

3. Assess the number of cells seen for each morphology type and refer to the tables below for resulting.

REPORTING RESULTS

- Cell Morphology is reported in the LIS using standardized grading that compares results from manual slide review, CBC instrument indices and differential analyzer morphology categorization.

- Red Cell morphology is graded as the number of cells per high-power field. Some are reported as Present.

- Platelet morphology is graded as a percentage of the total platelet count. Some being reported as Present.

- WBC morphology is graded as a percentage of the specific WBC cell type. Most involve neutrophils. However, other cells may be affected. Note: Smudge cells are reported as a percentage of the reported lymphocytes.

    - Example: Divide the number of hypersegmented neutrophils by the total number of neutrophils and multiply by 100.
    - Example: Five smudge cells are seen when counting the differential. Forty five lymphocytes were counted. The percentage of smudge cells would be 11%.
    - Example: Three degenerated WBC's in 100 WBC's would be 3%.

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- Schistocytes include Blister, Bite, Helmet cells, and fragmented RBC's and are reported per high power field.

REFERENCE RANGE

- Graded morphologies: 2+ or greater is flagged abnormal, except for Schistocytes and Spherocytes which flag at 1+ or higher.
- Non-graded morphology is abnormal when reported as "Seen", or "Present".

CELL MORPHOLOGY GRADING TABLES

RBC MORPH GRADED PER HPF	NORMAL	FEW / 1+	MOD / 2+	MANY / 3+
ANISOCYTOSIS	0-4	5-10 (RDW 15-19)	11-20 (RDW 20-24)	>20 (RDW >25)
HYPOCHROMIA	0-4	5-10 (MCHC 32-33)	11-20 (MCHC 30-31)	>20 (MCHC <30)
MACROCYTES	0-4	5-10 (MCV 95-108)	11-20 (MCV 109-	>20 (MCV >120)
MICROCYTES	0-4	5-10 (MCV 76-79)	11-20 (MCV 66-75)	>20 (MCV <66)
POIKILOCYTOSIS	0-2	3-4	5-20	>20
POLYCHROMASIA	0-2	3-4	5-20	>20

RBC MORPH GRADED PER HPF	NORMAL	FEW / 1+	MOD / 2+	MANY / 3+
ACANTHOCYTES	0-1	2-4	5-20	>20
BASOPHILIC STIPPLING	0-1	2-4	5-20	>20
BURR CELLS	0-1	2-4	5-20	>20
CRENATED CELLS	0-1	2-4	5-20	>20
ELLIPTOCYTES	0-1	2-4	5-20	>20
OVALOCYTES	0-1	2-4	5-20	>20
SCHISTOCYTES	0	1	1-2	>2
SPHEROCYTES	0-1	2-4	5-20	>20
STOMATOCYTES	0-1	2-4	5-20	>20
TARGET CELLS	0-1	2-4	5-20	>20
TEAR DROP CELLS	0-1	2-4	5-20	>20
WBC MORPH GRADED AS %	**NORMAL**	**FEW / 1+**	**MOD / 2+**	**MANY / 3+**
DEGRANULATED NEUTROPHILS	0	1-2	3-4	>4
DEGENERATED WBC'S	0	1-2	3-4	>4
DOHLE BODIES	0	1-2	3-4	>4
HYPERSEGMENTED NEUTROPHILS	0	1-3	4-8	>8
SMUDGE CELLS	0-1	1-3	4-8	>8
TOXIC GRANULATION	0	1-3	4-8	>8
VACUOLATED NEUTROPHILS	0	1-3	4-8	>8
PLATELET MORPH GRADED AS %	**NORMAL**	**FEW / 1+**	**MOD / 2+**	**MANY / 3+**
AGRANULAR PLATELETS	0	1-3	4-8	>8
LARGE/GIANT PLATELETS	0-5	5-10	11-20	>20
MEGAKARYOCYTE FRAGMENTS	0	1	2	>2

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NON GRADED MORPHOLOGY

RARE MORPH, NON-GRADED	NORMAL	Positive result reported as:
MALARIA PARASITES	Absent	Seen
HGB C CRYSTALS	Absent	Present
HOWELL-JOLLY BODIES	Absent	Present
PAPPENHEIMER BODIES	Absent	Present
ROULEAUX	Absent	Present
SICKLE CELLS	Absent	Present
AUER RODS	Absent	Present
PLATELET CLUMPS	Absent	Present
SATELLITOSIS	Absent	Present
CABOT RINGS	Absent	Do not use LIS grades. Add comment: Cabot Rings present.
PLASMA CELLS	Absent	Do not use LIS grades. Count as "Other" in Differential. Add comment.

CALCULATION OF PERCENTAGES

$$\frac{\text{\# cells}}{\text{Total cells counted}} \times 100 = \%$$

Round results to a whole number.

See examples of calculations in the Reporting Results Section above.

REFERENCES

1. McFadden, Stephanie L., ICSH Morphology Panel Co-chair, Recommendations for the Standardization of Nomenclature and Grading of Peripheral Blood Cell Morphological Features, International Journal of Laboratory Hematology, June, 2015.

2. Rodak, Bernadette, and Carr, Jacqueline, Clinical Hematology Atlas, 4th edition, 2013.

3. O'Connor, Barbara H., M.S., S.H. (ASCP), A Color Atlas and Instruction Manual of Peripheral Blood Cell Morphology, 1984.

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5. Wyckoff, Debbie, BS, MS, CLS (NCA), MT(ASCP), Review of White Blood Cell Morphology, lecture,

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