WHITEPAPER

# Meet the Marker: Ki-67

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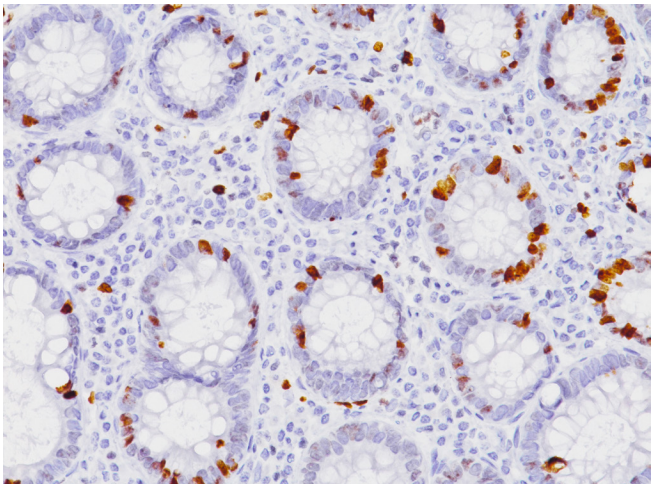
The Ki-67 antigen is associated with cell proliferation, making it a marker of interest in cases of cancer, where it is used to evaluate the proliferation rate of tumor cells in the body.[2,3] This utility has been applied to various types of cancer, including lymphoma, lung, gastrointestinal, and brain tumors.[1,6] In breast cancer, it has become a widely used marker to help determine prognosis, though its application remains a matter of debate.[2,4,5,6]

Ki-67 is a nuclear cortex protein encoded by the MKI67 gene that is expressed in the cell nucleus during the cell-division cycle.[2,6] This cycle consists of the G1 Phase, S Phase, G2 Phase, and M Phase, with Ki-67 expression increasing throughout the progression of the cycle.[1,2] In the resting (G0) phase, when the cell is not actively dividing, Ki-67 expression is absent or only faintly detectable.[2] Due to this, Ki-67 is used as an indicator of cell proliferation since it reflects the proportion of cells actively dividing within a tissue sample.[2] High Ki-67 expression is strongly associated with aggressive tumor behavior and is therefore associated with a poorer prognosis.[3,6]

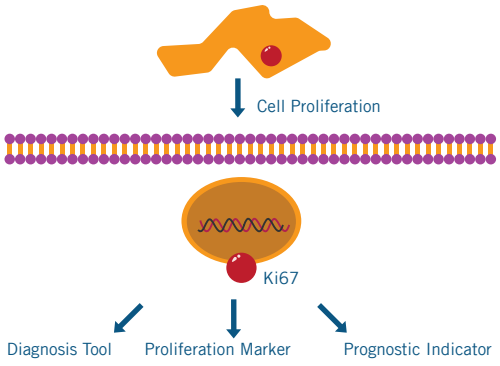
Clinically, Ki-67 has been incorporated into the diagnostic algorithms of neuroendocrine tumors of the gastrointestinal tract.[1] In lung cancer, Ki-67 has been suggested as a potential marker in determining the prognosis of non-small cell lung carcinoma (NSCLC) and a predictor of brain metastases in patients with lung adenocarcinoma, as well as an aid in the diagnosis, classification, and prognosis of pulmonary neuroendocrine tumors.[1] However, due to a lack of standardization in grading, it is currently not established for routine use in clinical practice.[1]

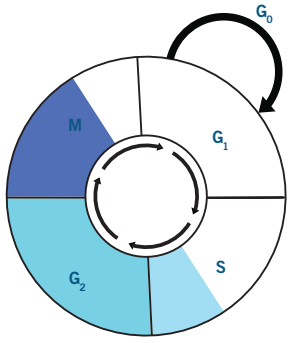
Breast cancer is known to be a heterogeneous disease with an array of subtypes varying in morphology, behavior, and responsiveness to treatment.[2,3,6] To distinguish these subtypes, clinicians will test for the expression of estrogen receptor (ER), progesterone receptor (PR), human epidermal growth factor receptor 2 (HER2), and Ki-67 in adherence to the recommendations of the American Society of Clinical Oncology (ASCO) and the College of American Pathologists (CAP).[3] These staining results may influence treatment decisions.[3]

## Ki-67 Stain and Illustrations



Normal colon adjacent to colon cancer stained with Ki-67 [MIB-1]




**$G_0$** – Resting phase, arrest of cell cycle
**$G_1$** – Duplication of all cell contents except chromosomes
**S** – DNA synthesis with dupication of each chromosome
**M** – Mitosis: Cell divides into 2 daughter cells
**$G_2$** – Repairs are made to erros in duplicated chromosomes

Increasing Ki-67 Expression

To learn more about Biocare Medical's offerings for Ki-67 staining, please visit our website at biocare.net or call 1-800-799-9499, option #3.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