

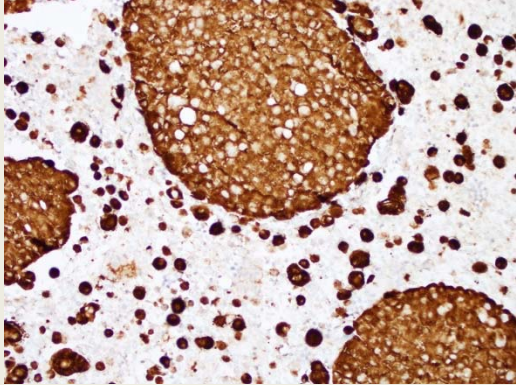
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Geisinger IHC's New Predictive and Mutation-Specific Markers

ALK IHC



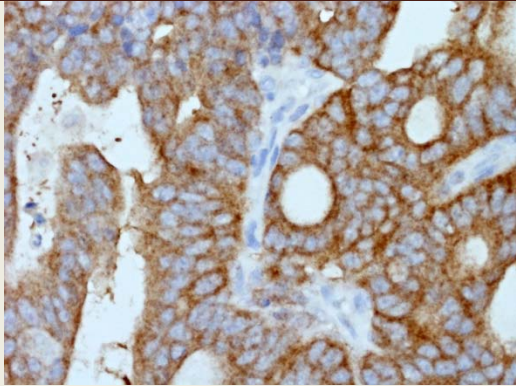
Positive ALK IHC stain in NSCLC (stain performed on a cell block from an FNA sample)

ALK IHC is a cost-effective screening test to select non-small-cell lung carcinoma (NSCLC) patients for crizotinib (an ALK tyrosine kinase inhibitor, ALK TKI) therapy. Only 3-4% of NSCLC patients have the ALK gene rearrangement, but they are extremely responsive to the treatment. Screening all NSCLC patients with FISH testing is expensive and time-consuming. Recent studies have promoted the use of ALK IHC test as an effective triage step. According to the current CAP/ASCO guideline for molecular testing in lung cancer, only ALK IHC-positive patients need further FISH analysis to confirm ALK gene rearrangement, sparing the vast majority of ALK IHC-negative patients from unnecessary tests and reducing laboratory cost and turnaround time.

References:

1. Lindeman NI, Cagle PT, Beasley MB, et al. *Arch Pathol Lab Med.* 2013;137(6):828-860.
2. Wynes MW, Sholl LM, Dietel M, et al. *J Thorac Oncol.* 2014;9(5):631-638.

BRAF V600E



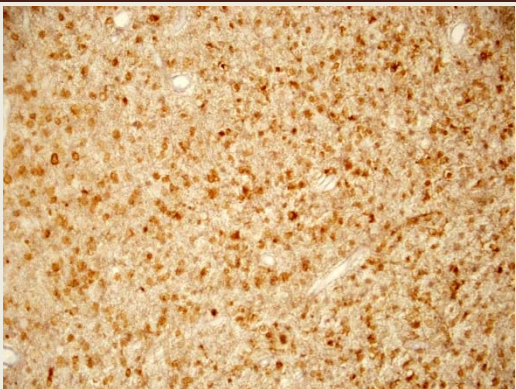
Positive BRAF V600E in a microsatellite instable (MSI) colon cancer

BRAF V600E is the most common BRAF mutation in colorectal cancer (CRC) and accounts for greater than 90% of BRAF mutations in melanoma and papillary thyroid carcinoma (PTC). Using IHC to detect this specific mutation is a new development. Recent studies have demonstrated that a carefully validated IHC test can achieve similar sensitivity and specificity to molecular detection methods. Advantages of IHC over molecular tests are its low cost and quick turnaround time. The IHC test has two proposed clinical applications. It can be: 1) incorporated into a universal screening algorithm for Lynch syndrome by mismatch repair protein (MMR) IHC method, replacing expensive molecular testing for tumors showing an MLH1/PMS2 concurrent loss phenotype; and 2) used as a predictive marker for selective BRAF inhibitor therapy in patients with advanced PTC and melanoma.

References:

1. Sinicrope FA, Smyrk TC, Tougeron D, et al. *Cancer.* 2013;119(15):2765-2770.
2. Toon CW, Chou A, Desilva K, et al. *Mod Pathol.* 2014;27(5):644-650.

IDH1 R132H



Positive IDH1 R132H in a glioma

IDH1 R132H is a common mutation in low-grade diffuse gliomas, anaplastic gliomas, secondary glioblastomas and other tumors. Using IHC to detect this specific mutation is a recent development, and comparative studies have shown good concordance with DNA sequencing results. The IHC test is particularly useful in the diagnosis and risk stratification of gliomas; for example, it can help differentiate diffusely infiltrating tumor cells in a low-grade diffuse glioma from surrounding reactive gliosis and identify tumor cells in post-therapy specimens with extensive background reactive changes.

References:

1. Capper D, Zentgraf H, Bals J, et al. *Acta Neuropathol.* 2009;118(5):599-601.
2. Preusser M, Wöhrer A, Stary S, et al. *J Neuropathol Exp Neurol.* 2011; 70(8):715-723.