

GenOnc Colorectal Cancer Panel

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Introduction

GenOnc Colorectal Cancer Panel is a collection of multiplexed PCR primer assays for targeted enrichment of the coding (exonic) regions of the 38 genes most commonly mutated in human colorectal cancer samples. Mutations in these oncogenes and tumor suppressor genes are often relevant for tumor classification, and warrant extensive investigation to enhance the understanding of carcinogenesis. Colorectal cancer has an increased incidence in older patients, and is easily treated if detected at an early stage. There are 2 major mechanisms of colorectal cancer progression: microsatellite instability and chromosomal instability. Due to these mechanisms, multiple genes are commonly mutated in a colorectal tumor. For example, the tumor suppressor gene adenomatous polyposis coli (APC) is commonly mutated in colorectal cancer, dysregulating Wnt signaling. Each patient's tumor is different, and few present with identical APC mutations. In addition, Wnt signaling can also be dysregulated in colorectal cancer due to β -catenin (CTNNB1) mutation or mutations of genes further upstream in the signaling pathway. Therefore, a panel of key genes commonly mutated in colorectal cancer is an efficient way to research a tumor sample's potential carcinogenic mechanisms. This panel narrows the focus to the most relevant mutated genes in colorectal cancer, using a variety of resources such as recent whole genome/exome sequencing studies from scientific networks including the Cancer Genome Atlas. Curated databases such as the Cancer Gene Census and COSMIC (Catalogue of Somatic Mutations in Cancer) are also used.

GenOnc Colorectal Cancer Panel Genes

Adenoma:

APC, DMD, SMAD4, TCF7L2

Tubular:

BRAF, FBXW7, KRAS

Tubulovillous:

BRAF, CTNNB1, KRAS, NRAS, PIK3CA (p110 α)

Villous:

BRAF, KRAS

Carcinoid-Endocrine Tumor: APC, CTNNB1, TP53

Carcinoma:

Adenocarcinoma: ACVR1B, AKT1, APC, ATM, ATP6V0D2, BAX, BRAF, CASP8 (FLICE), CDC27, CTNNB1, DCC, DMD, EP300, ERBB2 (HER2), FBXW7, FZD3, GPC6, KRAS, MAP2K4 (JNKK1), MAP7, MIER3, MLH1, MSH2, MSH3, MSH6, MYO1B, NRAS, PIK3CA (p110 α), PIK3R1, PTPN12, SLC9A9, SMAD2, SMAD4, TCERG1, TCF7L2, TGFBR2, TP53, WBSR17

Neuroendocrine: BRAF, KRAS

Serrated Carcinoma: BRAF, PIK3CA (p110 α)

Squamous Cell: KRAS, TP53

Aberrant Crypt Foci:

APC

Hyperplastic:

BRAF, KRAS

Serrated Polyp:

Admixed Hyperplastic Polyp-Adenoma: BRAF, KRAS

Hyperplastic Polyp: BRAF, CTNNB1, KRAS

Serrated Adenoma: APC, BRAF, KRAS, WBSR17

Serrated Fibroblastic Polyp-Intramucosal Perineurioma: BRAF

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Other Tumors:

Borderline: KRAS

Hamartoma: CTNNB1

Juvenile Polyp: APC

Neoplasm: APC, KRAS

Peutz-Jeghers Polyp: APC