

# Molecular Diagnostics Oncology Laboratory (MODL) – Solid Tumor DNA/RNA Biomarkers

## Background and Context:

As part of the OH-CCO (Ontario Health-Cancer Care Ontario) program to provide expanded NGS (Next Generation Sequencing) for solid tumors, MODL is licensed to perform the OncoPrint Comprehensive Assay v3 (OCAv3).

OCAv3 is a targeted NGS assay that allows for the simultaneous detection of genomic variants.

- OCAv3 is an amplicon based NGS assay that analyzes DNA and RNA extracted from FFPE (formalin fixed paraffin embedded) cancer specimens. Note that testing is limited to tumor tissue and cannot be used to determine the presence or absence of germline genetic variants.
- The RNA portion of OCAv3 is performed only if gene fusion and/or exon skipping detection is desired.
- Sequencing is performed on an Ion Torrent S5 system.
- Bioinformatic analysis is performed on the Ion Reporter (version 5.18) using the hg19 reference genome.
- Variant filtering is performed to exclude germline variants and artifacts of sequencing.
- Variants are only reviewed for the subset of genes listed in the table below (note that the gene list is dependent on the tumor site).
- Variants are reported into templates based on CAP (College of American Pathologists) worksheets.

## Panels of Biomarkers:

The following panels are part of the “Molecular Diagnostics for Solid Tumors” order set which can be found in the EPIC health information system (HIS).

Panel	OH- CCO Testing Indication	PowerPath Order Code	Reported Biomarkers	Testing Method	Additional Comments
Bladder NGS Panel	Reflex testing on newly diagnosed tumours with advanced/metastatic bladder carcinoma.	MOLBLADDER	FGFR1, FGFR2, FGFR3 (gene fusions)	NGS	
Breast NGS Panel	Testing on advanced/metastatic breast cancer where PIK3CA directed therapy is being considered.	MOLBREAST	PIK3CA (DNA variants) ESR1 (DNA variants associated with resistance to endocrine therapy)	NGS	
Colorectal NGS Panel	Reflex testing on newly diagnosed cases advanced*/metastatic colorectal or small bowel carcinoma. <i>*For biomarker testing purposes, advanced is considered CRC/Small Bowel tumours Stage III and above</i>	MOLCOLORECTAL	BRAF, KRAS, NRAS, PIK3CA (DNA variants)	NGS	
ctDNA NGS Panel	N/A	N/A	Biomarkers on Canexia Follow-It assay	NGS	This is a send out test to Canexia.

Endometrial NSG Panel	Reflex testing on newly diagnosed tumours with invasive endometrial carcinoma.	MOLENDOMETRIAL	POLE CTNNB1 KRAS PIK3CA PTEN TP53 (DNA variants)	NGS	
Glial Tumor NGS Panel	Testing as per CCO guidelines	MOLCNSNGS	BRAF H3F3A (H3-3A, H3-K27M) TERT promoter IDH1 IDH2 TP53 (DNA variants) EGFR copy number gain EGFRvIII variant (RNA analysis)	NGS	
Lung NGS Panel	Reflex testing on newly diagnosed cases of NSCLC (adenocarcinoma/non-squamous).	MOLLUNGNGS	EGFR, KRAS, BRAF, HER2 (ERBB2), KRAS, PIK3CA (DNA variants) ALK, ROS1, RET, NTRK1, NTRK2, NTRK3 (gene fusions) MET (exon 14 skipping)  Note that other clinically actionable gene fusions will be reviewed for reporting, ex. NRG1 fusions.	NGS	
Melanoma NGS Panel	Reflex testing on newly diagnosed cases of advanced*/metastatic Melanoma  <i>*For biomarker testing purposes, advanced is considered any melanoma &gt;2mm in depth (pT3)</i>	MOLMELANOMA	BRAF, NRAS, KIT (DNA variants)	NGS	
Ovarian NGS Panel	High grade ovarian carcinoma, fallopian tube, primary peritoneal carcinoma	MOLOVARIANNGS	BRCA1, BRCA2 (DNA variants)	NGS	

Prostate NGS Panel	Reflex testing on newly diagnosed tumours with advanced/metastatic prostate carcinoma.	MOLPROSTATE	BRCA1, BRCA2, ATM, PALB2 (DNA variants)	NGS	
Thyroid NGS Panel	Reflex testing on all metastatic thyroid cancer, including sporadic medullary and radio-iodine refractory well differentiated thyroid cancer.	MOLTHYROID	BRAF, HRAS, KRAS, NRAS, RET (DNA variants) NTRK1, NTRK2, NTRK3, PPARG, RET (gene fusions)	NGS	
Other NGS Panel	This will require justification and prior approval	N/A	As needed	NGS	

**Creation Date:** October 1, 2022

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**Version:** 2.0