MLabs is a full-service reference laboratory and part of one of the largest health care complexes in the world, Michigan Medicine.

With 30+ years of reference laboratory experience, MLabs’ CLIA-certified/CAP accredited molecular laboratories offer state of the art clinical molecular services including testing, analyzing and interpreting complex data sets, issuing informative reports and providing consultations that aid in the delivery of precision medicine. MLab’s current molecular test portfolio includes over 100 genetic tests and we are continuously adding new molecular assays. Our highly experienced doctors, medical technologists, and bioinformaticians are dedicated to delivering the highest quality laboratory results to meet the needs of today’s patients in a cost effective and personalized manner.
MOLECULAR ONCOLOGY & GENETICS

CONSULTANTS

Aleodor Andea M.D.

Bryan Betz Ph.D.

Noah Brown M.D.

Arul M. Chinnaiyan M.D., Ph.D.

Rajan Dewar Ph.D., MBBS

David O. Ferguson M.D., Ph.D.

Thomas Giordano M.D., Ph.D.

Paul Harms M.D., Ph.D.

Jeffrey Innis M.D., Ph.D.

Lakshmi P. Kunju M.D.

David B. Lombard M.D., Ph.D.

Rohit Mehra M.D.

Marwan Tayeh Ph.D.

Aaron Udager M.D., Ph.D.

Thomas E. Wilson M.D., Ph.D.
SERVICES

MOLECULAR ONCOLOGY/GENETICS
Performing over 14,000 assays annually with an average turn-around-time of 4.1 days, our Molecular Oncology and Genetics Laboratory specializes in offering cutting-edge molecular tests to aid in cancer diagnosis, selection of therapy, determination of prognosis, and monitoring of residual disease. An expanding menu of tests are offered in disease-specific service lines to provide a comprehensive testing solution for each disease, including colorectal cancer, non-small cell lung cancer, melanoma, gastrointestinal stromal tumor, glioma, sarcoma, myeloproliferative neoplasms, acute myeloid leukemia, lymphoproliferative disorders, and others. The implementation of next generation sequencing technology to many tests and panels now provides the ability to detect mutations with excellent sensitivity and broad coverage while also preserving the ability to test small biopsies and challenging specimens with low neoplastic cell content.

MOLECULAR GENETICS
MLab's Molecular Genetics Laboratory has two ABMGG board certified Geneticists, Marwan Tayeh, PhD; Jeffry Innis, MD, PhD and a board certified Genetic Counselor. Molecular Genetics Laboratory offers comprehensive clinical testing for germline genetic diseases and is committed to assisting clinicians in identifying genetic aberrations to facilitate clinical diagnosis, management, and genetic counseling. Molecular Genetics offers a variety of NGS germline cancer panels including: Breast and Ovarian, Colorectal, Pancreatic, Renal, Endometrial/Uterine, Melanoma, Stomach, Prostate, and Paraganglioma. In addition, the laboratory offers Sanger sequencing for a long list of genes, SNP Chromosomal Microarray, mutation screening for cystic fibrosis, Methylation-Specific PCR for Prader-Willi/Angelman syndrome and Fragile X, MLPA for deletion/duplication detection of BRCA1, BRCA2, TP53, PTEN, MECP2, CFTR, and SMN1 exons 7 and 8 deletions.

TRANSLATIONAL PATHOLOGY
MLabs comprehensively characterize disease using novel bioinformatics approaches and high-throughput technologies. This work facilitates more accurate, early detection methods, assists in the prediction of prognosis, defines disease subtypes, as well as assists in the assessment of treatment efficacy. These efforts could result in the future development of targeted therapies.

Our featured tests include PCA3 (Gen-Probe) test for prostate cancer detection and MiPS (Mi-Prostate Score (MiPS) an early detection test for prostate cancer that combines the amount of serum PSA, with the amounts of two genes in the urine. These two genes, TMPRSS2:ERG and PCA3, are specific for prostate cancer, meaning they are rarely present at high levels in the urine of men without prostate cancer.
**SELECT TEST MENU**

### Molecular Oncology

**ACUTE MYELOID LEUKEMIA**
- NPM1 Mutation (PCR)
- FLT3 Mutation (PCR)
- CEPBA Mutation (Sanger)
- IDH1 and IDH2 Mutation (Sanger)
- KIT D816V Mutation (PCR)
- KIT Mutation for AML - Exons 8, 17 (Sanger)
- PML/RARA t(15;17) Translocation Qualitative (PCR)

**MYELOPROLIFERATIVE NEOPLASMS**
- JAK2 V617F Mutation (PCR)
- JAK2 Exon 12 Mutation (PCR)
- CALR Mutation (PCR)
- MPL Mutation (PCR)
- KIT D816V Mutation (PCR)
- BCR/ABL1 Analysis, Quantitative (PCR)
- BCR/ABL1 Kinase Domain Mutation (Sanger)

**GASTROINTESTINAL STROMAL TUMOR**
- KIT Mutation - Exons 9,11,13,17 (Sanger)
- PDGFRA Mutation for GIST (Sanger)

**GENITOURINARY TUMOR**
- BRAF (7q34) Rearrangement (FISH)
- ERG Rearrangement (FISH)
- TFE3 (Xp11,2) Rearrangement (FISH) for Renal Cell CA & Other Tumors
- CIC (19q13) Rearrangement (FISH) for Renal Cell Carcinoma

**GLIOMA**
- BRAF (7q34) Rearrangement (FISH)
- IDH1 and IDH2 Mutations (Sanger)
- 1p/19q Deletion (FISH)
- BRAF V600E/V600K Mutations (PCR)
- MGMT Promoter Methylation (PCR)
- TERT Promoter Mutation (PCR)

**LUNG CANCER**
- Lung Cancer (NGS) Panel*
  - EGFR Mutation (NGS)
  - BRAF V600E/V600K Mutations (PCR)
  - KRAS Mutation (NGS)
  - ALK Rearrangement for NSCLC (FISH)
  - ROS1(6q22) Rearrangement (FISH)
  - RET (10q11) Rearrangement (FISH)
  - MET Amplification (FISH)

**MELANOMA**
- Melanoma (NGS) Panel*
  - BRAF (7q34) Rearrangement (FISH)
  - BRAF V600E/V600K Mutations (PCR)
  - KIT Mutation for Melanoma - Exons 11,13,17 (Sanger)
  - NRAS Mutation (NGS)
  - Chromosomal (Microarray) for Melanoma
  - Multiprobe (FISH) for Melanoma
  - TERT Promoter Mutation (PCR)

**PROSTATE CANCER**
- Prostate Cancer Antigen 3 (PCA3)
- MiPS (Mi-Prostate Score)

**SARCOMA**
- SYT/SSX Translocation (PCR)
- PAX/FOXO1 Translocation (PCR)
- EWSR1/WT1 Translocation (PCR)
- EWSR1/ATF1 Translocation (PCR)
- EWSR1/FLI1 & EWSR1/ERG Translocation (PCR)
- EWSR1 (22q12) Rearrangement (FISH)
- MDM2 Amplification (FISH)
- CIC (19q13) Rearrangement (FISH)

**THYROID CANCER**
- BRAF V600 E/V600K Mutations (PCR)
- BRAF (7q34) Rearrangement (FISH)
- TERT Promoter Mutation (PCR)

**MISCELLANEOUS**
- Solid Tumor (NGS) Panel*
  - Biliary Tract Malignancy (FISH)
  - Bone Marrow Transplant Engraftment Analysis (PCR)
  - Circulating Tumor Cells for Breast, Colorectal and Prostate Cancer
  - HER2 (FISH)
  - UGT1A1 Promoter Genotyping (PCR)
  - UroVysion™ (FISH) (Bladder Cancer)

*NGS Panels include: mutations (35 genes), amplification (19 genes) and gene fusion (21 genes)

**TEST LISTING CONTINUED ON BACK**
### Genetics (Germline)

**AUTISM SPECTRUM DISORDERS/ INTELLECTUAL DISABILITY**
- Chromosomal Microarray Analysis
- Fragile X Syndrome Mutation
- Prader-Willi / Angelman Syndrome
- CDKL5 Gene Sequencing
- GD1 Gene Sequencing
- MBD5 Gene Sequencing
- MEF2C Gene Sequencing
- NLGN3 Gene Sequencing
- NLGN4X Gene Sequencing
- SHANK2 Gene Sequencing
- SHANK3 Gene Sequencing
- SLC9A6 Gene Sequencing
- TCF4 Gene Sequencing
- UBE3A Gene Sequencing
- MECP2 (RETT SYNDROME)
  - MECP2 Gene Sequencing
  - MECP2 Targeted Sequencing Familial
- PTEN HAMARTOMA TUMOR SYNDROME
  - PTEN Gene Sequencing
  - PTEN Deletion/Duplication
  - PTEN Targeted Sequencing Familial
- BREAST AND OVARIAN CANCER
  - BRCA1 and BRCA2 Gene Sequencing
  - BRCA1 and BRCA2 Targeted Sequencing, Familial
  - BRCA1 and BRCA2 Deletion/Duplication
  - BRCA Ashkenazi Jewish Founder Mutations
- Hereditary Breast and Ovarian Cancer (HBOC) Comprehensive Germline NGS Panel
- Hereditary Breast and Ovarian Cancer (HBOC) High-Moderate Risk Germline NGS Panel
- NOONAN SYNDROME
  - PTPN11 Gene Sequencing
  - KRAS Gene Sequencing
  - RAF1 Gene Sequencing
  - SOS1 Gene Sequencing
- FRAGILE X SYNDROME
  - Fragile X Syndrome Mutation Detection
- LI-FRAUMENI SYNDROME
  - TP53 Gene Sequencing
  - TP53 Deletion/Duplication
- NEUROFIBROMATOSIS
  - NF1 Gene Sequencing
- SPINAL MUSCULAR ATROPHY
  - SNM1 and SNM2 Deletion/Duplication
- MISCELLANEOUS
  - Apolipoprotein E Genotyping
  - Factor V Leiden Mutation
  - Hereditary Hemochromatosis Mutation
  - Prothrombin 20210 Mutation

### COLORECTAL CANCER
- Colorectal Cancer Germline NGS Panel
  - MSH2 Gene Sequencing
- CYSTIC FIBROSIS
- Cystic Fibrosis Carrier Screening
- Cystic Fibrosis Full Gene Sequencing
- Cystic Fibrosis Deletion/Duplication
- Cystic Fibrosis Diagnostic Mutation Detection
- Cystic Fibrosis Targeted Sequencing Familial
- HEARING LOSS
  - GJB2 (Connexin 26) Mutation Analysis
  - GJB2 (Connexin 26) Targeted Sequencing Familial
  - GJB6 (Connexin 30) Deletion Analysis
  - WFS1 (Wolfram Syndrome) Gene Sequencing
- NOONAN SYNDROME
  - PTPN11 Gene Sequencing
  - KRAS Gene Sequencing
  - RAF1 Gene Sequencing
  - SOS1 Gene Sequencing
- NEUROFIBROMATOSIS
  - NF1 Gene Sequencing
- SPINAL MUSCULAR ATROPHY
  - SNM1 and SNM2 Deletion/Duplication
  - TCF4 Gene Sequencing
  - UBE3A Gene Sequencing
- MECP2 (RETT SYNDROME)
  - MECP2 Gene Sequencing
  - MECP2 Targeted Sequencing Familial
  - PTEN HAMARTOMA TUMOR SYNDROME
  - PTEN Gene Sequencing
  - PTEN Deletion/Duplication
  - PTEN Targeted Sequencing Familial
- BREAST AND OVARIAN CANCER
  - BRCA1 and BRCA2 Gene Sequencing
  - BRCA1 and BRCA2 Targeted Sequencing, Familial
  - BRCA1 and BRCA2 Deletion/Duplication
  - BRCA Ashkenazi Jewish Founder Mutations
- Hereditary Breast and Ovarian Cancer (HBOC) Comprehensive Germline NGS Panel
- Hereditary Breast and Ovarian Cancer (HBOC) High-Moderate Risk Germline NGS Panel
- Melanoma Cancer Germline NGS Panel
  - 6 Genes: BRCA1, BRCA2, CDKN2A, CDK4, TP53, PTEN
- Neurofibromatosis Germline NGS Panel
  - 3 Genes: NF1, NF2, SPRED1
- Pancreatic Cancer Germline NGS Panel
  - 18 Genes: APC, ATM, BRCA1, BRCA2, CDKN2A, EPCAM, MLH1, MSH2, MSH6, PALB2, PMS2, STK11, TP53, CDK4, BMPR1A, SMAD4, VHL, XRCC2
- Paraganglioma Cancer Germline NGS Panel
  - 12 Genes: SDHAF2, MAX, TMEM127, FH, MEN1, NF1, RET, VHL, SDH, SDHC, SDHD, SDHA
- Prostate Cancer Germline NGS Panel
  - 6 Genes: BRCA1, BRCA2, CHEK2, HOXB13, NBN, TP53
- Renal Cancer Germline NGS Panel
  - 19 Genes: VHL, PMS2, PTEN, TP53, EPCAM, FH, FLCN, MET, MLH1, MSH2, MSH6, SDHB, SDHC, SDHD, SDHA, BAP1, TSC1, TSC2, MITF
- Stomach Cancer Germline NGS Panel
  - 11 Genes: MLH1, MSH2, MSH6, EPCAM, PMS2, APC, TP53, STK11, CDH1, BMPR1A, SMAD4

### CANCER GERMLINE NGS PANELS
- (64 GENES)
  - Colorectal Cancer Germline NGS Panel
    - 19 Genes: MLH1, MSH2, MSH6, MUTYH, PMS2, EPCAM, APC, TP53, PTEN, STK11, SMAD4, BMPR1A, CDH1, CHEK2, GREM1, POLD1, POLE, ATM, AXIN2
  - Endometrial/Uterine Cancer Germline NGS Panel
    - 13 Genes: BRCA1, BRCA2, CHEK2, EPCAM, MLH1, MSH2, MSH6, MUTYH, PMS2, PTEN, TP53, STK11, POLD1
  - Hereditary Breast and Ovarian Cancer Comprehensive Germline NGS Panel
    - 21 Genes: ATM, BARD1, BRAC1, BRAC2, BRIP1, CDH1, STK11, CHEK2, EPCAM, MLH1, MSH2, MSH6, NBN, PALB2, PMS2, PTEN, RAD51C, RAD51D, TP53, FANCC, XRCC2
  - Hereditary Breast and Ovarian Cancer High-Moderate Risk Germline NGS Panel
    - 9 Genes: ATM, BRAC1, BRAC2, BRIP1, CDH1, CHEK2, PALB2, PTEN, TP53
  - Melanoma Cancer Germline NGS Panel
    - 6 Genes: BRCA1, BRCA2, CDKN2A, CDK4, TP53, PTEN
  - Neurofibromatosis Germline NGS Panel
    - 3 Genes: NF1, NF2, SPRED1
  - Pancreatic Cancer Germline NGS Panel
    - 18 Genes: APC, ATM, BRCA1, BRCA2, CDKN2A, EPCAM, MLH1, MSH2, MSH6, PALB2, PMS2, STK11, TP53, CDK4, BMPR1A, SMAD4, VHL, XRCC2
  - Paraganglioma Cancer Germline NGS Panel
    - 12 Genes: SDHAF2, MAX, TMEM127, FH, MEN1, NF1, RET, VHL, SDH, SDHC, SDHD, SDHA
  - Prostate Cancer Germline NGS Panel
    - 6 Genes: BRCA1, BRCA2, CHEK2, HOXB13, NBN, TP53
  - Renal Cancer Germline NGS Panel
    - 19 Genes: VHL, PMS2, PTEN, TP53, EPCAM, FH, FLCN, MET, MLH1, MSH2, MSH6, SDHB, SDHC, SDHD, SDHA, BAP1, TSC1, TSC2, MITF
  - Stomach Cancer Germline NGS Panel
    - 11 Genes: MLH1, MSH2, MSH6, EPCAM, PMS2, APC, TP53, STK11, CDH1, BMPR1A, SMAD4