

# MOLECULAR PATHOLOGY DIAGNOSTIC SERVICE

## Test Repertoire & Turnaround Times

MPDS utilizes a broad range of technologies including real time PCR, sequencing technologies (SANGER sequencing, pyrosequencing and NGS), FISH and IHC to provide comprehensive solid tumour testing. A detailed list of tests, technologies and turnaround times can be found in the tables below. MPDS utilizes a core range of tests to deliver routine testing. However, alternative techniques may be employed to deliver testing when required.

The laboratory tests fall under several different accreditation statuses, accreditation is to ISO 15189:2012. Regardless of the accreditation status (UKAS/ non-UKAS accredited), all tests are verified or validated to the same high standard.

### DEFINITIONS

| Accreditation Status        | Definition   |
|-----------------------------|--|
| Accredited                  | Tests that are on the laboratory's UKAS Scope                                    |
| Submitted for ETS           | Tests that are currently with UKAS for assessment as an extension to scope (ETS) |
| Awaiting ETS submission     | Validated tests, with plans to add to the laboratory's scope of accreditation    |
| Non-accredited to scope     | Validated tests but currently not planned to be submitted for extension to scope |
| Ongoing service development | Testing is offered as part of an ongoing service development                     |

## RAPID TESTING SERVICE

MPDS can offer rapid testing for the following mutations using real-time PCR on the Idylla testing platform.  
Please contact the laboratory if urgent testing is required.

| Test  | Turnaround Time | Accreditation Status |
|---|-----------------|----------------------|
| <b>BRAF (codon 600)</b>                                       | 24 hours        | Accredited           |
| <b>KRAS (codons 12,13,117,61,146)</b>                         | 24 hours        | Awaiting ETS         |
| <b>NRAS (codons 12,13,59,61,117,146)<br/>BRAF (codon 600)</b> | 24 hours        | Awaiting ETS         |

## TARGETED TESTS : qPCR and Pyrosequencing

| Gene                         | Test  | Mutation/Alteration Spectrum   | Turnaround                | Status                      |
|------------------------------|---|--|---------------------------|-----------------------------|
| <b>BRAF</b>                  | COBAS BRAF/NRAS Mutation  | G466/G469 V600E/D/K/R K601E  | >90% in 5-7 working days  | Accredited                  |
|                              | COBAS 4800 V600 Mutation  | V600E  | >90% in 5-7 working days  | Accredited                  |
| <b>KRAS</b>                  | COBAS KRAS Mutation   | Codons 12,13,59,61,117,146   | >90% in 5-7 working days  | Accredited                  |
|                              | Pyrosequencing  | Codons 12,13,59,61,117,146   | >90% in 7-10 working days | Accredited                  |
| <b>NRAS</b>                  | COBAS BRAF/NRAS Mutation  | Codons 12,13,18,59,61,117,146  | >90% in 5-7 working days  | Accredited                  |
|                              | Pyrosequencing  | Codons 12,13,61  | >90% in 7-10 working days | Accredited                  |
| <b>EGFR</b>                  | COBAS EGFR Mutation V2  | Deletions in exon 19, G719Xaa, S7681, L858R, L861Q, T790M, Exon20 insertions | >90% in 5-7 working days  | Accredited                  |
|                              | This test is accredited for use on solid tumour DNA and circulating tumour DNA from plasma. |  |                           |                             |
| <b>PIK3CA</b>                | COBAS PIK3CA Mutation   | Codons 88,345,450,542,545,546,1043,1047,1049                                 | >90% in 5-7 working days  | Accredited                  |
| <b>IDH1/IDH2</b>             | Therascreen IDH1/2 RGQ  | IDH1 codons 100,132<br>IDH2 codon 172  | >90% in 7-10 working days | Accredited                  |
| <b>MGMT</b>                  | Therascreen MGMT Methylation Pyrosequencing   | Methylation status of MGMT promoter  | >90% in 7-10 working days | Accredited                  |
| <b>MLH-1</b>                 | Methylation Pyrosequencing  | Methylation status of MLH-1 promoter   | >90% in 7-10 working days | Accredited                  |
| <b>HER-2 Mutation</b>        | AmoyDx HER-2 Mutation   | 13 mutations in the HER-2/ERBB2 gene   | Contact the laboratory    | Awaiting ETS                |
| <b>NTRK 1,2,3</b>            | AmoyDX NTRK Gene Fusion Detection Kit   | 109 fusions in NTRK 1,2, and 3 genes   | Contact the laboratory    | Ongoing service development |
| <b>MSI</b>                   | High Resolution Melt (IDYLLA)   | MSI loci ACVR2A, BTBD7, DIDO1, MRE11, RYR3, SEC31A, SULF2                    | Contact the laboratory    | Awaiting ETS                |
| <b>MET Exon 14 Mutations</b> | qRT-PCR (Idylla Gene Fusion cartridge)  | MET Exon 14 skipping transcript detection at the exon 13-exon 15 junction    | >90% in 5-7 working days  | Awaiting ETS                |
| <b>RET Fusion</b>            | qRT-PCR (Idylla Gene Fusion cartridge)  | 85% of RET fusion events as reported on COSMIC                               | >90% in 5-7 working days  | Awaiting ETS                |

## SEQUENCING

| Gene   | Test                             | Mutation Spectrum   | Turnaround              | Status                      |
|--|----------------------------------|---|-------------------------|-----------------------------|
| <b>KIT</b>   | Sanger Sequencing/NGS            | Exons 8,9,11,13,17  | >90% in 20 working days | Accredited                  |
| <b>PDGFRA</b>  | Sanger Sequencing/NGS            | Exons 12,14,18  | >90% in 20 working days | Accredited                  |
| <b>CTNNB1</b>  | Sanger Sequencing                | Exon 3  | >90% in 20 working days | Accredited                  |
| <b>GNAQ</b>  | Sanger Sequencing                | Exons 4 & 5   | >90% in 20 working days | Ongoing service development |
| <b>GNAS</b>  | Sanger Sequencing                | Exons 4 & 5   | >90% in 20 working days | Ongoing service development |
| <b>FOXL2</b>   | Sanger Sequencing                | Exon 1  | >90% in 20 working days | Ongoing service development |
| <b>POLE</b>  | Sanger Sequencing                | Exons 9-14  | >90% in 20 working days | Awaiting ETS                |
| <b>QIAGEN GeneRead DNaseq V2 Tumour Actionable Panel</b> | Next Generation Sequencing (NGS) | Hotspot panel (KRAS, NRAS, IDH1, IDH2, BRAF, EGFR, KIT, PDGFRA) | Contact the laboratory  | Accredited                  |
| <b>Archer FusionPlex® Sarcoma v2</b>                     | Next Generation Sequencing (NGS) | Sarcoma NGS Gene Fusion panel (63 Genes)                        | >90% in 21 working days | Awaiting ETS                |
| <b>Archer FusionPlex® Lung v2</b>                        | Next Generation Sequencing (NGS) | Lung NGS Gene Fusion panel (14 Genes)                           | >90% in 21 working days | Awaiting ETS                |

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| Gene          | Test  | Mutation/Alteration Spectrum         | Turnaround               | Status         |
|---------------|---|--------------------------------------|--------------------------|----------------|
| <b>ALK</b>    | D5F3 on Ventana Benchmark Ultra   | ALK Overexpression                   | >90% in 5-7 working days | Accredited     |
| <b>ROS-1</b>  | D4D6 on Ventana Benchmark Ultra   | ROS-1 Overexpression                 | >90% in 5-7 working days | Accredited     |
| <b>PD-L1</b>  | Agilent 22C3 on Dako Autostainer Link 48  | PD-L1 Expression                     | >90% in 5-7 working days | Accredited     |
|               | Agilent 28-8 on Dako Autostainer Link 48  | PD-L1 Expression                     | >90% in 5-7 working days | Accredited     |
|               | Roche SP-142 on Ventana Benchmark Ultra   | PD-L1 Expression                     | >90% in 5-7 working days | Accredited     |
|               | Roche SP-263 on Ventana Benchmark Ultra   | PD-L1 Expression                     | >90% in 5-7 working days | Non-Accredited |
| <b>HER-2</b>  | VENTANA anti-HER-2/neu (4B5) Ventana Benchmark Ultra  | HER-2 Overexpression                 | >90% in 5-7 working days | Accredited     |
| <b>NTRK</b>   | Pan-TRK on Ventana Benchmark Ultra  | TRK A, B & C Overexpression          | >90% in 5-7 working days | Awaiting ETS   |
| <b>MMR</b>    | Provided by the QEHB Cellular Pathology Department, under terms of MOU for service provision. |                                      |                          |                |
| <b>BRAF</b>   | BRAF V600E (VE1) on Ventana Benchmark Ultra   | BRAF V600E Mutant Isoform Expression | >90% in 5-7 working days | Awaiting ETS   |
| <b>SMARCA</b> | SMARCA4 on Ventana Benchmark Ultra  | SMARCA4 Loss of expression           | >90% in 5-7 working days | Non-Accredited |
| <b>C-Met</b>  | SP44 on Ventana Benchmark Ultra   | C-Met Overexpression                 | >90% in 5-7 working days | Non-Accredited |

## FISH TESTING

| Gene                     | Test  | Mutation Spectrum   | Turnaround              | Status         |
|--------------------------|---|---|-------------------------|----------------|
| <b>ALK</b>               | Vysis, LSI ALK Dual-Colour Break Apart Rearrangement Probe    | Gene rearrangements involving the ALK gene region at 2p23             | >90% in 15 working days | Accredited     |
| <b>ROS-1</b>             | ZytoLight SPEC ROS-1 Dual-Colour Break Apart Probe            | Gene rearrangements involving the ROS-1 gene region at 6q22.1         | >90% in 15 working days | Accredited     |
| <b>MET</b>               | ZytoLight Dual-Colour, SPEC MET Probe                         | Amplification of the MET gene region at 7q31.2                        | >90% in 15 working days | Non-Accredited |
| <b>HER-2</b>             | Abbott PathVysion HER-2 Probe                                 | Amplification of the HER-2 gene region at 17q12                       | >90% in 10 working days | Accredited     |
| <b>MDM2</b>              | Vysis MDM2/CEP 12 FISH Probe Kit                              | Amplification of the MDM2 gene region at 12q15                        | >90% in 15 working days | Accredited     |
| <b>SS18</b>              | Vysis LSI SS18 (18q11) Break Apart Probe                      | Gene rearrangements involving the SS18 gene region at 18q11           | >90% in 10 working days | Accredited     |
| <b>1P19Q</b>             | Vysis 1p36/1q25 and 19q13/19p13 FISH Probe Kit                | Deletions involving 1p36 & 19q13                                      | >90% in 10 working days | Accredited     |
| <b>COL1A1-PDGFB FISH</b> | POSEIDON COL1A1/PDGFB) Dual-Colour, Single Fusion Probe       | COL1A1/PDGFB, t(17;22)(q21;q13) gene fusion                           | >90% in 10 working days | Non-Accredited |
| <b>EWSR1</b>             | Vysis LSI EWSR1 Break Apart Probe                             | Gene rearrangements involving the EWSR1 gene region at 22q12          | >90% in 10 working days | Accredited     |
| <b>NTRK 1</b>            | Zytovision ZytoLight SPEC NTRK1 Dual-Colour Break Apart Probe | Gene rearrangements involving the NTRK1 gene region at 1q22-q23       | >90% in 10 working days | Non-Accredited |
| <b>NTRK 2</b>            | Zytovision ZytoLight SPEC NTRK2 Dual-Colour Break Apart Probe | Gene rearrangements involving the NTRK2 gene region at 9q21.32-q21.33 | >90% in 10 working days | Non-Accredited |
| <b>NTRK 3</b>            | Zytovision ZytoLight SPEC NTRK3 Dual-Colour Break Apart Probe | Gene rearrangements involving the NTRK2 gene region at 15q25.3-q26.1  | >90% in 10 working days | Non-Accredited |
| <b>FUS</b>               | ZytoLight SPEC FUS Dual-Colour Break Apart Probe              | Gene rearrangements involving the FUS gene region at 16p.11.2         | >90% in 10 working days | Accredited     |
| <b>TFE3</b>              | ZytoLight SPEC TFE3 Dual-Colour Break Apart Probe             | Gene rearrangements involving the TFE3 gene region at Xp11.23         | >90% in 10 working days | Accredited     |
| <b>DDIT3</b>             | ZytoLight SPEC DDIT3 Dual-Colour Break Apart Probe            | Gene rearrangements involving the DDIT3 gene region at 12q13.3        | >90% in 10 working days | Accredited     |

|                     |  |   |                         |                |
|---------------------|--|---|-------------------------|----------------|
| <b>NR4A3</b>        | ZytoLight SPEC NR4A3 Dual-Colour Break Apart Probe       | Gene rearrangements involving the NR4A3 gene region at 9q22.33-q31.1        | >90% in 10 working days | Accredited     |
| <b>USP6</b>         | ZytoLight SPEC USP6 Dual-Colour Break Apart Probe        | Gene rearrangements involving the USP6 gene region at 17p13.2               | >90% in 10 working days | Accredited     |
| <b>WWTR1</b>        | ZytoLight SPEC WWTR1 Dual-Colour Break Apart Probe       | Gene rearrangements involving the WWTR1 gene region at 3q25.1               | >90% in 10 working days | Accredited     |
| <b>CDK4</b>         | ZytoLight SPEC CDK4/CEN 12 Dual-Colour Break Apart Probe | Gene rearrangements involving the CDK4 gene region at 12q13.3-q14.1         | >90% in 10 working days | Accredited     |
| <b>MYC</b>          | ZytoLight SPEC MYC Dual-Colour Break Apart Probe         | Gene rearrangements involving the MYC gene region at 8q24                   | >90% in 10 working days | Awaiting ETS   |
| <b>IGH/MYC</b>      | Agilent (DAKO) Dual colour, Dual fusion IGH/MYC probe    | IGK/MYC t(8;14)(q24;q32) gene fusion  | >90% in 10 working days | Non-Accredited |
| <b>IGK/IGL/MYC</b>  | Cytocell Tri-colour, dual fusion IGK/IGL/MYC probe       | IGK/MYC t(2;8)(p11;q24) gene fusion and IGL/MYC t(8;22)(q24;11) gene fusion | >90% in 10 working days | Non-Accredited |
| <b>BCL2</b>         | Vysis LSI BCL-2 Dual-Colour, Break Apart Probe           | Gene rearrangements involving the BCL2 gene region at 18q21                 | >90% in 10 working days | Awaiting ETS   |
| <b>BCL6</b>         | Vysis LSI BCL-6 Dual-Colour, Break Apart Probe           | Gene rearrangements involving the BCL6 gene region at 3q27                  | >90% in 10 working days | Awaiting ETS   |
| <b>IRF4/ DUSP22</b> | ZytoLight SPEC IRF4,DUSP22 Dual-Colour Break Apart Probe | Gene rearrangements involving the IRF4,DUSP22 gene region at 6p25.3         | >90% in 10 working days | Awaiting ETS   |
| <b>TP63</b>         | Empire Genomics TP63 Dual Colour, Breakapart probe       | Gene rearrangements involving the TP63 gene at 3q28                         | >90% in 10 working days | Non-Accredited |
| <b>MALT1</b>        | Vysis MALT1 Dual Colour, Breakapart probe                | Gene rearrangements involving the MALT1 gene region at 18q21.3              | >90% in 15 working days | Awaiting ETS   |
| <b>CCND1</b>        | Vysis CCND1 Dual Colour, Breakapart probe                | Gene rearrangements involving the CCND1 gene region at 11q13                | >90% in 15 working days | Awaiting ETS   |
| <b>IGH</b>          | Vysis IGH Dual Colour, Breakapart probe                  | Gene rearrangements involving the IGH gene region at 14q32                  | >90% in 15 working days | Awaiting ETS   |
| <b>CIC</b>          | ZytoLight SPEC NR4A3 Dual-Colour Break Apart Probe       | Gene rearrangements involving the CIC gene region at 19q13.2. A             | >90% in 10 working days | Accredited     |

|                 |  |   |                         |                             |
|-----------------|--|---|-------------------------|-----------------------------|
| <b>FOXO1</b>    | ZytoLight SPEC NR4A3 Dual-Colour Break Apart Probe | Gene rearrangements involving the FOXO1 gene region at 13q14      | >90% in 10 working days | Accredited                  |
| <b>FGFR2</b>    | ZytoLight SPEC FGFR2 Dual-Colour Break Apart Probe | Gene rearrangements involving the FGFR2 gene region at 10q26.13   | >90% in 10 working days | Non-Accredited              |
| <b>CDKN2A/B</b> | Vysis LSI CDKN2A/B Dual Colour, Break Apart Probe  | Deletions involving the CDKN2A/B (p16) gene region at 9p21        | >90% in 10 working days | Non-Accredited              |
| <b>MAML2</b>    | Zytolight MAML2 dual colour, breakapart probe      | Gene rearrangements involving the MAML2 gene region at 11q21      | >90% in 10 working days | Ongoing service development |
| <b>MYB</b>      | Zytolight MYB dual colour, breakapart probe        | Gene rearrangements involving the MYB gene region at 6q23.2-q23.3 | >90% in 10 working days | Ongoing service development |

## ISH TESTING

| Gene        | Test                               | Mutation Spectrum   | Turnaround             | Status         |
|-------------|------------------------------------|---|------------------------|----------------|
| <b>EBER</b> | Ventana Inform EBER Probe          | Expression of Epstein Barr virus encoded RNA  | Contact the laboratory | Non-Accredited |
| <b>HPV</b>  | Inform HPV III Family 16 Probe (8) | Probe cocktail demonstrating expression of the following genotypes 16, 18, 31, 33, 35, 45, 52, 56, 58, 66 | Contact the laboratory | Non-Accredited |