# SickKids® Pharmacogenomics Report

NAME: Sample Report
Physician Copy for:
DOB: 01/01/2019 Test report date: 21/11/2024
ID #: 1077 Case #: SK654321

## Consultation:

## Focus Drugs:

## Medication List:

## Drug Summary:

| Therapeutic Category | Use as directed | PGx dosing recommendation available | Consider alternatives |
|---|---|---|---|
| Anticoagulant | Clopidogrel (cardiovascular) | Warfarin | |
| | Clopidogrel (neurovascular) | | |
| Cardiovascular | Metoprolol | Atorvastatin | Fluvastatin |
| | Propafenone | Flecainide | Lovastatin |
| | | Pravastatin | Simvastatin |
| | | Rosuvastatin | |
| Dermatology | Abrocitinib | | |
| Gastroenterology | Metoclopramide | Dexlansoprazole | |
| | Ondansetron | Lansoprazole | |
| | | Omeprazole | |
| | | Pantoprazole | |
| Genetic disorder | Eliglustat | | |
| Immunology | Tacrolimus | Azathioprine | |
| Infectious Diseases | Efavirenz | Voriconazole | |

| Therapeutic Category | Use as directed | PGx dosing recommendation available | Consider alternatives |
|---|---|---|---|
| Neurology | Brivaracetam | Phenytoin/fosphenytoin | |
| | Clobazam | | |
| | Pitolisant | | |
| | Siponimod | | |
| | Tetrabenazine | | |
| Oncology | | Mercaptopurine | |
| | | Tamoxifen | |
| | | Thioguanine | |
| Pain | Oxycodone | Celecoxib | Piroxicam |
| | | Codeine | |
| | | Flurbiprofen | |
| | | Hydrocodone | |
| | | Ibuprofen | |
| | | Meloxicam | |
| | | Tramadol | |
| Psychiatry | Aripiprazole | Atomoxetine | Amitriptyline |
| | Brexpiprazole | Citalopram | Clomipramine |
| | Clozapine | Desipramine | Doxepin |
| | Fluvoxamine | Escitalopram | Imipramine |
| | Haloperidol | Nortriptyline | Trimipramine |
| | Perphenazine | Paroxetine | |
| | Risperidone | Pimozide | |
| | Sertraline | Zuclopenthixol | |
| | Thioridazine | | |
| | Venlafaxine | | |
| | Vortioxetine | | |

## Genetic results:

| Gene | Genotype | Phenotype | Status |
|---|---|---|---|
| CYP2C19 | *1/*17 | One functional allele and one increased-function allele | Rapid metabolizer |
| NUDT15 | 415C>T CT | One functional allele and one non-function allele | Reduced function |
| CYP2B6 | *1/*1 | Two functional alleles | Normal metabolizer |

| Gene | Genotype | Phenotype | Status |
|---|---|---|---|
| CYP2C9 | *2/*2 | Two reduced function alleles | Intermediate metabolizer |
| CYP2D6 | *2/*4 | One functional allele and one non-function allele | Intermediate metabolizer |
| CYP3A5 | *3/*3 | Two non-function alleles | Poor metabolizer |
| SLCO1B1 | *5/*5 | Two risk alleles | Poor function |
| TPMT | *2/*4 | Two non-function alleles | Poor metabolizer |
| VKORC1 | -1639 G>A AA | Two reduced function alleles | Poor function |

## Drug/Dosing Recommendations:

### Anticoagulant

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| Warfarin |  | Moderately reduced CYP2C9 and significantly reduced VKORC1 enzyme activity. An appropriate dose estimation tool based on age group and ancestry should be used to guide warfarin dosing.<br><br>The Clinical Pharmacogenetics Implementation Consortium (CPIC) recommends that warfarin dosing follows either the Gage and/or IWPC algorithms, both of which drive the web-based algorithm found at warfarindosing.org. The genetic information below can be entered into the warfarindosing.org form to estimate the most appropriate therapeutic dose in patients new to warfarin. After filling in the "Required Patient Information", the following can be entered into the "Genetic Information" section of the form:<br>VKORC1-1639/3673 = AA<br>CYP4F2 V433M = Not available/Pending<br>GGCX rs11676382 = Not available/Pending<br>CYP2C9*2 = TT (Homozygous Mutant)<br>CYP2C9*3 = AA (Wildtype)<br>CYP2C9*5 = CC (Wildtype)<br>CYP2C9*6 = AA (Wildtype) |
| Clopidogrel (neurovascular) |  | Increased CYP2C19 enzyme activity may increase the conversion of clopidogrel to its active metabolite. Clinical guidelines do not contain dosing recommendations for CYP2C19 ultrarapid metabolizers due to the lack of scientific evidence. Initiate therapy with standard recommended starting dose. |
| Clopidogrel (cardiovascular) |  | Increased CYP2C19 enzyme activity may increase the conversion of clopidogrel to its active metabolite. There is no association with higher bleeding risk. Initiate therapy with standard recommended starting dose. |

### Cardiovascular

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| Flecainide |  | Reduced CYP2D6 enzyme activity may lead to elevated levels of active drug. This increases the probability of side effects. Reduction of standard recommended starting dose by 25% may be considered. Monitor according to standard practice. This recommendation does not apply to the flecainide provocation test to diagnose Brugada syndrome. |
| Metoprolol |  | Reduced CYP2D6 enzyme activity increases metoprolol exposure. Initiate therapy with standard recommended starting dose. This recommendation is specific to adults, exert caution when extrapolating to pediatric populations. |
| Propafenone |  | Reduced CYP2D6 enzyme activity. Initiate therapy with standard recommended starting dose. |

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| Atorvastatin |  | Significantly reduced SLCO1B1 transporter activity increases atorvastatin exposure, which may be related to an increased risk for statin-induced myopathy (muscle toxicity). In adults, if dose >20 mg is needed for desired efficacy, consider rosuvastatin or combination therapy. For children, no dosing recommendation is available. For dosing guidance follow disease-specific guidelines and algorithms from the American College of Cardiology, the American Heart Association and CPIC. |
| Simvastatin |  | Significantly reduced SLCO1B1 transporter activity increases simvastatin exposure, which may be related to an increased risk for statin-induced myopathy (muscle toxicity). In adults, prescribe an alternative statin depending on the desired potency. Follow disease-specific guidelines and algorithms from the American College of Cardiology, the American Heart Association and CPIC. This recommendation is specific to adults, however, preliminary data suggest that this guideline may be extrapolated to children. |
| Lovastatin |  | Significantly reduced SLCO1B1 transporter activity increases lovastatin exposure, which may be related to an increased risk for statin-induced myopathy (muscle toxicity). In adults, prescribe an alternative statin depending on the desired potency. For children, no dosing recommendation is available. Follow disease-specific guidelines and algorithms from the American College of Cardiology, the American Heart Association and CPIC. |
| Pravastatin |  | Significantly reduced SLCO1B1 transporter activity increases pravastatin exposure, which may be related to an increased risk for statin-induced myopathy (muscle toxicity), especially with doses >40 mg per day in adults. For children, no dosing recommendation is available. For dosing guidance follow disease-specific guidelines and algorithms from the American College of Cardiology, the American Heart Association and CPIC. This recommendation is specific to adults, however, preliminary data suggest that this guideline may be extrapolated to children. |
| Rosuvastatin |  | Significantly reduced SLCO1B1 transporter activity increases rosuvastatin exposure, which may be related to an increased risk for statin-induced myopathy (muscle toxicity). In adults, if dose >20 mg needed for desired efficacy, consider combination therapy. For dosing guidance follow disease-specific guidelines and algorithms from the American College of Cardiology, the American Heart Association and CPIC. This recommendation is specific to adults, however, preliminary data suggest that this guideline may be extrapolated to children. |
| Fluvastatin |  | Significantly reduced SLCO1B1 transporter activity and reduced CYP2C9 enzyme activity, which may be related to an increased risk for statin-induced myopathy (muscle toxicity). In adults, prescribe an alternative statin depending on the desired potency. For children, no dosing recommendation is available. Follow disease-specific guidelines and algorithms from the American College of Cardiology, the American Heart Association and CPIC. |

## Dermatology

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| Abrocitinib |  | Increased CYP2C19 enzyme activity. Initiate therapy with standard recommended starting dose. |

## Gastroenterology

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| Lansoprazole |  | Increased CYP2C19 enzyme activity may lead to reduced levels of active drug. This may affect clinical response. Consider increasing dose by 50-100% for the treatment of H. pylori infection and erosive esophagitis. Daily dose may be given in divided doses. Monitor for efficacy. |
| Omeprazole |  | Increased CYP2C19 enzyme activity may lead to reduced levels of active drug. This may affect clinical response. Consider increasing dose by 50-100% for the treatment of H. pylori infection and erosive esophagitis. Daily dose may be given in divided doses. Monitor for efficacy. |
| Pantoprazole |  | Increased CYP2C19 enzyme activity may lead to reduced levels of active drug. This may affect clinical response. Consider increasing dose by 50-100% for the treatment of H. pylori infection and erosive esophagitis. Daily dose may be given in divided doses. Monitor for efficacy. |
| Dexlansoprazole |  | Increased CYP2C19 enzyme activity may lead to reduced levels of active drug. This may affect response. Consider increasing dose by 50-100% for the treatment of H. pylori infection and erosive esophagitis. Daily dose may be given in divided doses. Monitor for efficacy. |
| Ondansetron |  | Reduced CYP2D6 enzyme activity. Insufficient data is available for this genotype. Initiate therapy with standard recommended starting dose. |
| Metoclopramide |  | Reduced CYP2D6 enzyme activity. Initiate therapy with standard recommended starting dose. |

## Genetic disorder

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| Eliglustat |  | Reduced CYP2D6 enzyme activity. Initiate therapy with standard recommended starting dose. |

## Immunology

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| Azathioprine |  | Significantly reduced TPMT and reduced NUDT15 enzyme activity may lead to altered levels of metabolites. This increases the risk of serious side effects, in particular myelosuppression and fatal toxicity. For malignancy, start with drastically reducing the standard recommended starting dose by 90% and reduce frequency to three times per week. Utilize frequent laboratory monitoring, degree of myelosuppression and disease-specific guidelines to guide dose adjustments. Allow 4-6 weeks to reach steady state after each dose adjustment. For nonmalignant conditions, consider alternative non-thiopurine immunosuppressant therapy. |
| Tacrolimus |  | CYP3A5 non-expressors have low enzyme activity, which is found in the majority of the population. Initiate therapy with standard recommended starting dose and utilize therapeutic drug monitoring to guide dose adjustments. |

## Infectious Diseases

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| Voriconazole |  | Increased CYP2C19 enzyme activity may lead to lower levels of active drug. CHILDREN (<18 years of age): This may increase the probability of therapeutic failure. Initiate therapy with standard recommended starting dose and utilize therapeutic drug monitoring to guide dose adjustments. Alternatively, consider an agent that is not affected by CYP2C19 metabolism. ADULTS: This increases the probability of therapeutic failure. Consider an alternative agent that is not affected by CYP2C19 metabolism. |

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| Efavirenz |  | Normal CYP2B6 enzyme activity. Initiate therapy with standard recommended starting dose. |

## Neurology

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| Phenytoin/fosphenytoin |  | Moderately reduced CYP2C9 enzyme activity may lead to elevated levels of active drug. This increases the probability of side effects. Initiate therapy with standard recommended starting dose. Consider reducing maintenance dose by 25% and monitor according to clinical standard practice. |
| Clobazam |  | Increased CYP2C19 enzyme activity may lead to altered levels of clobazam and its active metabolite. Initiate therapy with standard recommended starting dose. |
| Tetrabenazine |  | Reduced CYP2D6 enzyme activity. Initiate therapy with standard recommended starting dose. |
| Siponimod |  | Reduced CYP2C9 enzyme activity may lead to elevated levels of active drug. Initiate therapy with the standard recommended starting dose. |
| Brivaracetam |  | Increased CYP2C19 enzyme activity. Initiate therapy with standard recommended starting dose. |
| Pitolisant |  | Reduced CYP2D6 enzyme activity. Initiate therapy with standard recommended starting dose. |

## Oncology

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| Tamoxifen |  | Reduced CYP2D6 enzyme activity decreases the conversion of tamoxifen to its active metabolite (e.g., endoxifen). This can result in reduced clinical effect. Consider an alternative treatment (e.g., aromatase inhibitors in post-menopausal women), or increase the standard recommended starting dose 1.5 to 2-fold and utilize therapeutic drug monitoring of endoxifen. |
| Mercaptopurine |  | Significantly reduced TPMT and reduced NUDT15 enzyme activity may lead to altered levels of metabolites. This increases the risk of serious side effects, in particular myelosuppression and fatal toxicity. For malignancy, start with drastically reducing the standard recommended starting dose by 90% and reduce frequency to three times per week. Utilize frequent laboratory monitoring, degree of myelosuppression and disease-specific guidelines to guide dose adjustments. Allow 4-6 weeks to reach steady state after each dose adjustment. In setting of myelosuppression, emphasis should be on reducing mercaptopurine over other agents. For nonmalignant conditions, consider alternative non-thiopurine immunosuppressant therapy. |
| Thioguanine |  | Significantly reduced TPMT and reduced NUDT15 enzyme activity may lead to altered levels of metabolites. This increases the risk of serious side effects, in particular myelosuppression and fatal toxicity. Start with drastically reducing the standard recommended starting dose by 90% and reduce frequency to three times per week. Utilize frequent laboratory monitoring, degree of myelosuppression and disease-specific guidelines to guide dose adjustments. Allow 4-6 weeks to reach steady state after each dose adjustment. In setting of myelosuppression, emphasis should be on reducing thioguanine over other agents. For nonmalignant conditions, consider alternative non-thiopurine immunosuppressant therapy. |

## Pain

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| Codeine |  | Reduced CYP2D6 enzyme activity decreases the conversion of codeine to its more potent metabolite. This may have an effect on analgesia. Initiate therapy with standard recommended starting dose. If codeine is not effective, consider a dose increase or an alternative treatment that is not affected by CYP2D6 metabolism (e.g., acetaminophen, NSAID, morphine and non-opioid analgesics). |
| Oxycodone |  | Reduced CYP2D6 enzyme activity. Limited data is available to associate this variation with a weaker analgesic effect. Be alert to symptoms of insufficient pain relief. NOTE: Codeine and tramadol are NOT good alternatives because their metabolism is also affected by CYP2D6 activity. |
| Tramadol |  | Reduced CYP2D6 enzyme activity may decrease the conversion of tramadol to its more potent metabolite. This may have an effect on analgesia. Initiate therapy with standard recommended starting dose. If tramadol is not effective select an alternative treatment that is not affected by CYP2D6 metabolism (e.g., acetaminophen, NSAID, morphine and non-opioid analgesics). NOTE: Codeine, hydrocodone and oxycodone are NOT good alternatives because their metabolism is also affected by CYP2D6 activity. |
| Celecoxib |  | Moderately reduced CYP2C9 enzyme activity may lead to elevated levels of active drug. This may increase the probability of toxicities. Initiate therapy with lowest recommended starting dose. Titrate dose upward to clinical effect or maximum recommended dose with caution. |
| Flurbiprofen |  | Moderately reduced CYP2C9 enzyme activity may lead to elevated levels of active drug. This may increase the probability of toxicities. Initiate therapy with the lowest recommended starting dose. Titrate dose upward to clinical effect or the maximum recommended dose with caution. |
| Piroxicam |  | Moderately reduced CYP2C9 enzyme activity may lead to elevated levels of active drug. This may increase the probability of toxicities. Select an alternative drug that is not affected by CYP2C9 metabolism or choose an NSAID metabolized by CYP2C9 but with a shorter half-life. |
| Ibuprofen |  | Moderately reduced CYP2C9 enzyme activity may lead to elevated levels of active drug. This may increase the probability of toxicities. Initiate therapy with the lowest recommended starting dose. Titrate dose upward to clinical effect or the maximum recommended dose with caution. |
| Meloxicam |  | Moderately reduced CYP2C9 enzyme activity may lead to elevated levels of active drug. This may increase the probability of toxicities. Initiate therapy with 50% of the lowest recommended starting dose. Titrate upward to clinical effect to a maximum of 50% of the recommended dose. Upward dose titration should not occur until after steady state is reached (at least 7 days). Alternatively, consider a different drug that is not affected by CYP2C9 metabolism or an NSAID metabolized by CYP2C9 but with a shorter half-life. |
| Hydrocodone |  | Reduced CYP2D6 enzyme activity. Limited data is available to associate this variation with a weaker analgesic effect. Initiate therapy with standard recommended starting dose. If hydrocodone is not effective, consider an alternative treatment that is not affected by CYP2D6 metabolism (e.g., acetaminophen, NSAID, morphine and non-opioid analgesics). |

## Psychiatry

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| Amitriptyline |  | Increased CYP2C19 and reduced CYP2D6 enzyme activity may lead to altered levels of active drug and its metabolites. This may affect response or side effects. Consider an alternative tricyclic antidepressant that is not affected by CYP2C19 metabolism (e.g., desipramine, nortriptyline). If amitriptyline cannot be avoided, utilize therapeutic drug monitoring to guide dose adjustments. This recommendation only applies to higher initial doses, for example used in conditions such as depression. |
| Citalopram |  | Increased CYP2C19 enzyme activity may lead to lower levels of active drug. This may affect response. Initiate therapy with recommended starting dose. If adequate efficacy is not achieved at standard maintenance dosing, consider titrating to a higher maintenance dose or switching to an alternative antidepressant not predominantly metabolized by CYP2C19. |
| Clomipramine |  | Increased CYP2C19 and reduced CYP2D6 enzyme activity may lead to altered levels of active drug and its metabolites. This may affect response or side effects. Consider an alternative tricyclic antidepressant that is not affected by CYP2C19 metabolism (e.g., desipramine, nortriptyline). If clomipramine cannot be avoided, utilize therapeutic drug monitoring to guide dose adjustments. This recommendation only applies to higher initial doses, for example used in conditions such as depression. |
| Desipramine |  | Reduced CYP2D6 enzyme activity may lead to elevated levels of active drug. This increases the probability of side effects. Consider reducing the starting dose by 25%. Utilize therapeutic drug monitoring to guide dose adjustments. This recommendation only applies to higher initial doses, for example used in conditions such as depression. |
| Doxepin |  | Increased CYP2C19 and reduced CYP2D6 enzyme activity may lead to altered levels of active drug and its metabolites. This may affect response or side effects. Consider an alternative tricyclic antidepressant that is not affected by CYP2C19 metabolism (e.g., desipramine, nortriptyline). If doxepin cannot be avoided, utilize therapeutic drug monitoring to guide dose adjustments. This recommendation only applies to higher initial doses, for example used in conditions such as depression. |
| Escitalopram |  | Increased CYP2C19 enzyme activity may lead to lower levels of active drug. This may affect response. Initiate therapy with recommended starting dose. If adequate efficacy is not achieved at standard maintenance dosing, consider titrating to a higher maintenance dose or switching to an alternative antidepressant not predominantly metabolized by CYP2C19. |
| Fluvoxamine |  | Reduced CYP2D6 enzyme activity may lead to elevated levels of active drug. This may increase the probability of side effects. Initiate therapy with standard recommended starting dose. |
| Imipramine |  | Increased CYP2C19 and reduced CYP2D6 enzyme activity may lead to altered levels of active drug and its metabolites. This may affect response or side effects. Consider an alternative tricyclic antidepressant that is not affected by CYP2C19 metabolism (e.g., desipramine, nortriptyline). If imipramine cannot be avoided, utilize therapeutic drug monitoring to guide dose adjustments. This recommendation only applies to higher initial doses, for example used in conditions such as depression. |
| Nortriptyline |  | Reduced CYP2D6 enzyme activity may lead to elevated levels of active drug. This increases the probability of side effects. Consider reducing the starting dose by 25%. Utilize therapeutic drug monitoring to guide dose adjustments. This recommendation only applies to higher initial doses, for example used in conditions such as depression. |

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| Paroxetine |  | Reduced CYP2D6 enzyme activity may lead to elevated levels of active drug. This may increase the probability of side effects. Consider a lower starting dose and slower titration schedule. |
| Trimipramine |  | Increased CYP2C19 and reduced CYP2D6 enzyme activity may lead to altered levels of active drug and its metabolites. This may affect response or side effects. Consider an alternative tricyclic antidepressant that is not affected by CYP2C19 metabolism (e.g., desipramine, nortriptyline). If trimipramine cannot be avoided, utilize therapeutic drug monitoring to guide dose adjustments. This recommendation only applies to higher initial doses, for example used in conditions such as depression. |
| Venlafaxine |  | Reduced CYP2D6 enzyme activity. Clinical guidelines do not contain dosing recommendations for CYP2D6 intermediate metabolizers due to the lack of scientific evidence. Initiate therapy with standard recommended starting dose. |
| Aripiprazole |  | Reduced CYP2D6 enzyme activity. Initiate therapy with standard recommended starting dose. |
| Atomoxetine |  | Reduced CYP2D6 enzyme activity may lead to elevated levels of active drug. This increases the probability of side effects. Initiate therapy with standard recommended starting dose and monitor according to clinical standard practice. Consider to reduce the dose in case side effects occur and monitor for persistence of clinical effect. |
| Haloperidol |  | Reduced CYP2D6 enzyme activity. Initiate therapy with standard recommended starting dose. |
| Risperidone |  | Reduced CYP2D6 enzyme activity. Initiate therapy with standard recommended starting dose. |
| Thioridazine |  | Reduced CYP2D6 enzyme activity. Initiate therapy with standard recommended starting dose. |
| Brexpiprazole |  | Reduced CYP2D6 enzyme activity may lead to increased levels of active drug. Current evidence suggests that the probability of side effects or clinical effect is not influenced by this genotype. Initiate therapy with standard recommended starting dose. |
| Clozapine |  | Reduced CYP2D6 enzyme activity. Initiate therapy with standard recommended starting dose. |
| Pimozide |  | Reduced CYP2D6 enzyme activity may lead to elevated levels of active drug. This may increase the probability of side effects. Inconsistent recommendations are available. As per DPWG, do not exceed 80% of the standard recommended starting dose. As per product monograph, initiate therapy with standard recommended starting dose. |
| Vortioxetine |  | Reduced CYP2D6 enzyme activity. Initiate therapy with standard recommended starting dose. |
| Zuclopenthixol |  | Reduced CYP2D6 enzyme activity may lead to elevated levels of active drug. As per DPWG, a reduction of the standard recommended starting dose by 25% may be considered. Titrate the dose based on clinical effect. |
| Perphenazine |  | Reduced CYP2D6 enzyme activity. Initiate therapy with standard recommended starting dose. |
| Sertraline |  | Increased CYP2C19 and normal CYP2B6 enzyme activity. Initiate therapy with standard recommended starting dose. |

## Legend:

| | | |
|---|---|---|
|  | Use as directed | Use label recommended dosage and administration |
|  | Use with caution | Use with caution - read detailed recommendation for potential dose adjustment |
|  | Consider alternatives | Select alternative treatment if possible -read detailed recommendation for details. |

### DISCLAIMER

Genotyping of CYP2B6, CYP2C19, CYP2C9, CYP2D6, CYP3A5, NUDT15, SLCO1B1, TPMT and VKORC1 will be carried out using the Agena MassARRAY® platform. DNA samples are normalized to a concentration of 10 ng/uL, and 2uL per well is used for PCR amplification and primer extension with iPLEX, iPLEX Veridose Core, and Veridose CYP2D6 CNV reagents. A thermal cycler, Biorad C1000, is used for amplification. The extension products are dispensed onto a CPM 384 spectrochip Array using the Agena 384 chip prep module and detected using a MassARRAY MALDI-TOF mass spectrometer which provides genotyping and quantification. Haplotype reports are automatically generated using the Typer software and the ADME PGx Pro software, according to the manufacturer's standard protocols. Results are processed to generate SNP calls automatically, using the MassARRAY® TyperAnalyzer software (Agena Biosciences, San Diego, CA, USA), and then manually reviewed by the operator to validate the allele calls. Automatic SNP calls that are of concern will be removed.

Variants tested predict the following genotypes/haplotypes: CYP2D6 *1,*2,*3,*4*,*5,*6,*7,*8,*9,*10,*11,*12,*14A,*14B,*15,*17,*18,*19,*20,*29,*41,*69; CYP2D6 Copy Number Variant (CNV) analysis is performed using the Agena Veridose CYP2D6 CNV panel, which detects both CNV's and hybrid alleles and includes 22 assays to interrogate 7 regions (5', exon 1, intron 2, intron 4, intron 6, intron 7 and exon 9) of the CYP2D6 gene; CYP2B6 *1, *4, *6, *9, *18; CYP2C19 *1,*2,*3,*4A,*4B,*5,*6,*7,*8,*17,*22,*35; CYP2C9 *1,*2,*3*4,*5,*6,*8,*11,*12,*13,*15,*25,*27; CYP3A5 *1,*2,*3*6,*7; NUDT15 rs116855232 (415C>T); SLCO1B1 *1, *5 (rs4149056); TPMT *1, *2, *3A, *3B, *4; and VKORC1 *1,*2 (-1639G>A).

Genetic variants not tested by this assay can contribute to an individual's efficiency of drug metabolism. This report is based on the technology and testing of certain variants listed above and may not fully take into account other factors that may affect drug sensitivity or efficacy such as co-medication, physical conditions, diet, smoking or the clinical context of the patient. The interpretation of this test may be affected by DNA rearrangements, blood transfusion, bone marrow transplantation or other rare events; these events can affect the testing and could cause false positive or false negative results. The interpretive report provided focuses on medications and genes with published pharmacogenomic practice guidance by professional organizations such as CPIC: Clinical Pharmacogenetics Implementation Consortium, DPWG: Dutch Pharmacogenetics Working Group, CPNDS: Canadian Pharmacogenomics Network for Drug Safety and FDA: U.S. Food and Drug Administration. The test used to prepare this report is a clinical investigational test; the test results are to be used for clinical research purposes only. Pharmacogenetic testing does not replace the need for therapeutic drug and clinical monitoring. It should be noted that the data interpretation outlined in this report is based on current understanding of genes and variants at the time of reporting. Patients are responsible for obtaining updates of this report, as necessary, in the future. The treating physician has ultimate responsibility for a patient's treatment plan, including treatment decisions made on the basis of this report. Neither the Hospital for Sick Children nor its employees or agents, shall have any liability to any person or entity with regard to claims, loss, damage arising, or alleged to arise, directly or indirectly, from the use of information contained in this report.