Precision Medication Management Report

Patient Name:	Jane Doe	**Test Ordered Date:**	7/29/2021
Accession ID:	123455678	**Test Performed:**	Psychiatry Panel
Date of Birth:	1/11/1990	**Sample ID:**	AX180481
Sex:	Female	**Sample Type:**	Buccal Swab
Ethnicity:	Caucasian	**Sample Collection Date:**	7/29/2021
Ordering Provider:	Dr. Smith	**Sample Received Date:**	8/2/2021
Institution:	ABC Nursing Home	**Test Report Date:**	8/6/2021
Test Ordered:	CYP2D6	**Laboratory Used:**	PlexusDx, LLC

How to Read This Report

Pharmacogenomics is the study of how one's genes may impact response to certain medications. This report provides gene-based guidance and information on medications that are relevant to what the patient is currently prescribed (see **Currently Prescribed Medications**), and medications that the patient is not currently prescribed (see **Medication Recommendations**).
This report is intended for use by physicians, pharmacists, or other healthcare providers only and is indicated to aid in determining proper therapeutic guidance for their patient.

Dosing Recommendation Definitions

🟢	This medication can be prescribed at standard dosages as recommended in the medication's package insert.
🟡	An altered dosing recommendation is to be considered for this medication due to potential for decreased efficacy or increased risk of adverse events.
🔴	Consider an alternative therapy, as this medication may be associated with a highly increased risk of adverse events or lack of efficacy.

Evidence Strength Definitions

Strong	Recommendation is associated with evidence from the FDA or a therapeutic guideline.
Moderate	Recommendation is associated with evidence from a therapeutic guideline, but the guideline does not cite the recommendation as 'strong' or of the highest tier of evidence.
Informative	Recommendation is not associated with FDA or guideline guidance, but from evidence gathered from published analyses.

Phenotype Definitions

Ultrarapid Metabolizer	Significantly increased enzyme activity and quicker rates of drug metabolism compared to normal metabolizers
Normal Metabolizer	Expected enzyme activity and "normal" rate of drug metabolism.
Intermediate Metabolizer	Decreased enzyme activity and slower rates of drug metabolism compared to normal metabolizers, but not as pronounced as poor metabolizers
Poor Metabolizer	Significantly decreased enzyme activity and slower rates of drug metabolism compared to normal metabolizers.

Currently Prescribed Medications

This section displays medications that the patient is currently prescribed, as per the information provided to BASE10 Genetics through the Provider Portal.

Not all medications are associated with gene-based guidance; if the patient is on a medication this is not impacted by your genetic results, the statement "No pharmacogenetic dosing guidance is associated with this medication" will be displayed next to the medication name and dosage.

If the patient is currently taking a medicine that may be impacted by genetic results, the expected response to this medication based on your genetic makeup will be displayed.

		Evidence
Amlodipine	No pharmacogenetic dosing guidance is associated with this medication. Prescribe as usual per FDA label recommendations.	
Citalopram	This patient may be a **CYP2C19 Poor Metabolizer.** Greatly reduced metabolism of citalopram causing increased risk of adverse effects may be expected in this patient based on pharmacogenetic results. Consider a 50% reduction in the standard starting dose and titrate to response as needed, not to exceed a maximum recommended daily dose of 20 mg; or consider an alternative therapy not primarily metabolized by CYP2C19. Refer to the FDA label for further dosing considerations.	Strong
Clopidogrel	This patient may be a **CYP2C19 Poor Metabolizer.** Significantly reduced platelet inhibition is expected in this patient based on pharmacogenetic results. Consider an alternative therapy (i.e. prasugrel, ticagrelor). Refer to the FDA label for further dosing considerations.	Strong

Alternative Medications

The purpose of the Alternative Medications table is to provide an overview of which medications may require dose adjustments (portrayed with a yellow traffic circle), which medications perhaps shouldn't be prescribed due to genetic results (portrayed with a red traffic circle), and medications that may be used in place of drugs that require dose adjustments or for which an alternative therapy is recommended (portrayed with a green traffic circle).

The table includes both medications that have the potential to be impacted by genetic results and medications that are not known to be influenced by genetic make-up whatsoever. These 'non-PGx' medications are included in the table to be shown as potentially viable alternative medications that may be prescribed if altered dosing or an alternative therapy is recommended for a drug based on genetics-based guidance.
Medications that are associated with genetics-based guidance will have the appropriate traffic circle indication displayed depending on the patient's phenotype and therefore the affiliated dosing recommendation.

*Pharmacogenetics is only one factor to be considered when determining medication recommendations for a patient; it is the healthcare provider's responsibility to determine the most suitable course of treatment for the patient.

Medication Class	Medication	Standard Dosing	Altered Dosing	Alternative
ADHD Medications	**Amphetamine**	🟢		
	Atomoxetine	🟢		
Anticonvulsants	**Brivaracetam**		🟡	
Antidepressants	**Amitriptyline**			🔴
	Doxepin			🔴
	Bupropion		🟡	
	Citalopram		🟡	
	Fluoxetine	🟢		
	Escitalopram		🟡	
	Sertraline		🟡	
Antipsychotics	**Aripiprazole**	🟢		
	Aripiprazole lauroxil	🟢		
Benzodiazepines	**Clobazam**		🟡	

Medication Recommendations

The Medication Recommendations section encompasses gene-based guidance for all medications that are potentially impacted by the gene results included in this report. This information may be helpful to healthcare providers who want to prescribe any of these medications for the patient in the future.

Medication	Therapeutic Recommendation	Evidence
Amitriptyline 🔴	This patient may be a **CYP2C19 Poor Metabolizer.** Increased plasma concentrations of amitriptyline and decreased concentrations of the active secondary amine metabolite nortriptyline may lead to increased risk of adverse effects or decreased response based on pharmacogenetic results. For psychiatric indications: Consider selecting an alternative therapy that is not a tertiary amine tricyclic antidepressant. If amitriptyline use is warranted, consider decreasing the recommended amitriptyline starting dose by 50%. Use therapeutic drug monitoring to guide further dose adjustments. For treatment of neuropathic pain: Consider initiating therapy at the recommended starting dose. Monitor closely for adverse effects. If larger doses are warranted, consider following the dosing guidance above.	Strong

Doxepin	This patient may be a **CYP2C19 Poor Metabolizer.** Increased plasma concentrations of doxepin and decreased concentrations of the active secondary amine metabolite nortriptyline may lead to increased risk of adverse effects or decreased response based on pharmacogenetic results. For psychiatric indications: Consider selecting an alternative therapy that is not a tertiary amine tricyclic antidepressant. If doxepin use is warranted, consider decreasing the recommended doxepin starting dose by 50%. Use therapeutic drug monitoring to guide further dose adjustments. For treatment of neuropathic pain: Consider initiating therapy at the recommended starting dose. Monitor closely for adverse effects. If larger doses are warranted, consider following the dosing guidance above.	Strong
Brivaracetam	This patient may be a **CYP2C19 Poor Metabolizer.** Increased brivaracetam plasma concentration and an increased risk for adverse effects may be expected in this patient based on pharmacogenetic test results. Consider reducing the dose of brivaracetam. Refer to the FDA label for further dosing considerations.	Strong
Bupropion	This patient may be a **CYP2B6 Poor Metabolizer**. CYP2B6 converts bupropion to its active metabolite, hydroxybupropion, which is known to contribute to the medication's therapeutic efficacy. Significantly reduced plasma levels of hydroxybupropion and therefore decreased response to bupropion therapy may be expected in this patient based on pharmacogenetic results. Consider monitoring this patient for efficacy to ensure treatment goals are achieved. Refer to the FDA label for further dosing considerations.	Informative
Citalopram	This patient may be a **CYP2C19 Poor Metabolizer**. Greatly reduced metabolism of citalopram causing increased risk of adverse effects may be expected in this patient based on pharmacogenetic results. Consider a 50% reduction in the standard starting dose and titrate to response as needed, not to exceed a maximum recommended daily dose of 20 mg; or consider an alternative therapy not primarily metabolized by CYP2C19. Refer to the FDA label for further dosing considerations.	Moderate
Clobazam	This patient may be a **CYP2C19 Poor Metabolizer.** Increased plasma levels of clobazam's major active metabolite and increased risk for adverse events may be expected in this patient based on pharmacogenetic results.	Strong

		For patients with ≤30 kg body weight: Consider starting clobazam at 5 mg/day. Titrate dose slowly and according to weight up to 10 mg, as tolerated. If necessary and based on clinical response, titration to the maximum dose of 20 mg may be started on day 21. Refer to the FDA label for further dosing considerations. For patients with >30 kg body weight: Consider starting clobazam at 5 mg/day. Titrate dose slowly and according to weight up to 20 mg, as tolerated. If necessary and based on clinical response, titration to the maximum dose of 40 mg may be started on day 21. Refer to the FDA label for further dosing considerations.	
Escitalopram	🟡	This patient may be a **CYP2C19 Poor Metabolizer**. Greatly reduced metabolism of escitalopram causing increased risk of adverse effects may be expected in this patient based on pharmacogenetic results. Consider a 50% reduction in the standard starting dose and titrate to response as needed; or consider an alternative therapy not primarily metabolized by CYP2C19. Refer to the FDA label for further dosing considerations.	Moderate
Sertraline	🟡	This patient may be a **CYP2C19 Poor Metabolizer**. Greatly reduced metabolism of sertraline causing increased risk of adverse effects may be expected in this patient based on pharmacogenetic results. Consider a 50% reduction in the standard starting dose and titrate to response as needed; or consider an alternative therapy not primarily metabolized by CYP2C19. Refer to the FDA label for further dosing considerations.	Moderate
Amitriptyline	🟢	This patient may be a **CYP2D6 Normal Metabolizer.** Consider prescribing at the recommended starting dose. Refer to the FDA label for further dosing considerations.	Strong
Amphetamine	🟢	This patient may be a **CYP2D6 Normal Metabolizer.** Consider prescribing at the recommended starting dose. Refer to the FDA label for further dosing considerations.	Strong
Aripiprazole	🟢	This patient may be a **CYP2D6 Normal Metabolizer.** Consider prescribing at the recommended starting dose. Refer to the FDA label for further dosing considerations.	Strong
Aripiprazole Lauroxil	🟢	This patient may be a **CYP2D6 Normal Metabolizer.** Consider prescribing at the recommended starting dose. Refer to the FDA label for further dosing considerations.	Strong
Atomoxetine	🟢	This patient may be a **CYP2D6 Normal Metabolizer.** Currently available information suggests that atomoxetine clinical	Strong

		response is greater in poor metabolizers compared with non-poor metabolizers; therefore, this patient may experience a lack of efficacy of atomoxetine compared to CYP2D6 poor metabolizers. Consider initiating therapy at a dose of 40 mg/day and increase to 80 mg/day after 3 days. If no clinical response and in the absence of adverse events after 2 weeks, consider increasing the dose to 100 mg/day. If no clinical response is observed after 2 weeks, consider obtaining a peak plasma concentration (1–2 hours after dose administered). If < 200 ng/mL, consider a proportional increase in dose to approach 400 ng/mL. Dosages > 100 mg/day may be needed to achieve target concentrations. Refer to the FDA label for further dosing considerations.	
Brexpiprazole		This patient may be a **CYP2D6 Normal Metabolizer.** Consider prescribing at the recommended starting dose. Refer to the FDA label for further dosing considerations.	Strong
Clomipramine		This patient may be a **CYP2D6 Normal Metabolizer.** Consider prescribing at the recommended starting dose. Refer to the FDA label for further dosing considerations.	Strong
Clozapine		This patient may be a **CYP2D6 Normal Metabolizer.** Consider prescribing at the recommended starting dose. Refer to the FDA label for further dosing considerations.	Strong
Desipramine		This patient may be a **CYP2D6 Normal Metabolizer.** Consider prescribing at the recommended starting dose. Refer to the FDA label for further dosing considerations.	Strong
Deutetrabenazine		This patient may be a **CYP2D6 Normal Metabolizer.** Consider prescribing at the recommended starting dose. Refer to the FDA label for further dosing considerations.	Strong
Donepezil		This patient may be a **CYP2D6 Normal Metabolizer.** Consider prescribing at the recommended starting dose. Refer to the FDA label for further dosing considerations.	Strong
Doxepin		This patient may be a **CYP2D6 Normal Metabolizer.** Consider prescribing at the recommended starting dose. Refer to the FDA label for further dosing considerations.	Strong
Fluvoxamine		This patient may be a **CYP2D6 Normal Metabolizer.** Consider prescribing at the recommended starting dose. Refer to the FDA label for further dosing considerations.	Strong

Haloperidol	This patient may be a **CYP2D6 Normal Metabolizer.** Consider prescribing at the recommended starting dose. Refer to the FDA label for further dosing considerations.	Strong
Iloperidone	This patient may be a **CYP2D6 Normal Metabolizer.** Consider prescribing at the recommended starting dose. Refer to the FDA label for further dosing considerations.	Strong
Imipramine	This patient may be a **CYP2D6 Normal Metabolizer.** Consider prescribing at the recommended starting dose. Refer to the FDA label for further dosing considerations.	Strong
Nortriptyline	This patient may be a **CYP2D6 Normal Metabolizer.** Consider prescribing at the recommended starting dose. Refer to the FDA label for further dosing considerations.	Strong
Paroxetine	This patient may be a **CYP2D6 Normal Metabolizer.** Consider prescribing at the recommended starting dose. Refer to the FDA label for further dosing considerations.	Strong
Perphenazine	This patient may be a **CYP2D6 Normal Metabolizer.** Consider prescribing at the recommended starting dose. Refer to the FDA label for further dosing considerations.	Strong
Phenytoin	This patient may be a **CYP2D6 Normal Metabolizer.** Consider prescribing at the recommended starting dose. Refer to the FDA label for further dosing considerations.	Strong
Pimozide	This patient may be a **CYP2D6 Normal Metabolizer.** Consider prescribing at the recommended starting dose. Refer to the FDA label for further dosing considerations.	Strong
Risperidone	This patient may be a **CYP2D6 Normal Metabolizer.** Consider prescribing at the recommended starting dose. Refer to the FDA label for further dosing considerations.	Strong
Tetrabenazine	This patient may be a **CYP2D6 Normal Metabolizer.** Consider prescribing at the recommended starting dose. Refer to the FDA label for further dosing considerations.	Strong
Thioridazine	This patient may be a **CYP2D6 Normal Metabolizer.** Consider prescribing at the recommended starting dose. Refer to the FDA label for further dosing considerations.	Strong
Trimipramine	This patient may be a **CYP2D6 Normal Metabolizer.** Consider prescribing at the recommended starting dose. Refer to the FDA label for further dosing considerations.	Strong

Valbenazine	This patient may be a **CYP2D6 Normal Metabolizer.** Consider prescribing at the recommended starting dose. Refer to the FDA label for further dosing considerations.	Strong
Venlafaxine	This patient may be a **CYP2D6 Normal Metabolizer.** Consider prescribing at the recommended starting dose. Refer to the FDA label for further dosing considerations.	Strong

Genetic Details

The Genetic Details table shows the gene(s) this patient was tested for and the associated genotype and phenotype for each gene. The genotype represents the genetic state of the gene, taking into account any genetic variants that are present on either copy of the gene. The phenotype is determined by the genotype and represents how one may metabolize certain medications.

Gene	Genotype	Phenotype
CYP2B6	*1/*6	Intermediate Metabolizer
CYP2C19	*2/*3	Poor Metabolizer
CYP2C9	*1/*1	Normal Metabolizer
CYP2D6	*1/*1	Normal Metabolizer

Methods and Limitations

This test will not detect all the known alleles that result in altered enzyme activities, and therefore does not account for all individual variations in the individual tested. Absence of a detectable genetic variant does not rule out the possibility that a patient has different phenotypes than what is reported due to the presence of an undetected polymorphism or due to other factors such as drug-drug interactions, comorbidities and lifestyle habits.
Recommendations in this report are considered by genotype only. Before prescribing any other medications, other health factors should be considered.

Methodology: ThermoFisher TaqMan-based qPCR assays.