

Where to find guidance on using pharmacogenomics in psychiatric practice

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Parmacogenomics—the study of how genetic variability influences drug response—is increasingly being used to personalize pharmacotherapy. Used in the context of other clinical variables, genetic-based drug selection and dosing could help clinicians choose the right therapy for a patient, thus minimizing the incidence of treatment failure and intolerable side effects. Pharmacogenomics could be particularly useful in psychiatric pharmacotherapy, where response rates are low and the risk of adverse effects and nonadherence is high.

Despite the potential benefits of pharmacogenetic testing, many barriers prevent its routine use in practice, including a lack of knowledge about how to (1) order gene tests, (2) interpret results for an individual patient, and (3) apply those results to care. To help bridge this knowledge gap, we list practical, freely available pharmacogenomics resources that a psychiatric practitioner can use.

CPIC guidelines

The Clinical Pharmacogenetics Implementation Consortium (CPIC) is an international collaboration of pharmacogenomics experts

Table 1

Neuropsychiatric medications with CPIC dosing guidelines^a

Medication	Gene(s)
Amitriptyline	CYP2C19 CYP2D6
Nortriptyline	CYP2D6
Citalopram and escitalopram	CYP2C19
Fluvoxamine	CYP2D6
Paroxetine	CYP2D6
Sertraline	CYP2C19
Carbamazepine	HLA-B
Phenytoin	HLA-B CYP2C9

^aAs of August 2016
CPIC: Clinical Pharmacogenetics Implementation Consortium; CYP: cytochrome P450; HLA: human leukocyte antigen

that publishes clinical practice guidelines on using pharmacogenetic test results to optimize drug therapy.¹ Note: These guidelines do not address *when* tests should be ordered, but rather *how* results should be used to guide prescribing.

Each CPIC guideline includes a summary of the gene, the drug, and their pharmacogenetic relationship, as well as clear guidance on interpreting pharmacogenetic test results, including:

- how to convert genotype to phenotype
- how to modify drug selection or dosing based on these results
- the level of evidence for each recommendation.

CPIC guidelines and supplementary information are available on the CPIC Web site (<https://www.cpicpgx.org>) and are updated regularly. **Table 1** provides current CPIC guidelines for neuropsychiatric drugs.

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Genetic-based therapy minimizes the risk of treatment failure and adverse effects

Table 2

Additional online resources for pharmacogenetic information

Resource (URL)	Description
American Society of Health-System Pharmacists: Pharmacogenomics Resource Center ³ (www.ashp.org/menu/PracticePolicy/ResourceCenters/Emerging-Sciences/Pharmacogenomics.aspx)	List of pharmacogenomics resources, including articles, books, Web sites, presentations, and educational resources
FDA Genomics ⁴ (www.fda.gov/drugs/scienceresearch/researchareas/pharmacogenetics)	Information on genomics involved in drug labeling and approval
Genetics and Genomics Competency Center ⁵ (www.g-2-c-2.org)	Database of genetics/genomics resources for health care educators and practitioners
National Human Genome Research Institute ⁶ (www.genome.gov)	Resources on using genomics to provide care, including information on when to order genetic testing and how to use results of these tests
St. Jude Children's Research Hospital—Implementation Resources for Professionals ⁷ (www.stjude.org/research/clinical-trials/pg4kds-pharmaceutical-science/implementation-resources-for-professionals.html)	Compilation of relevant publications, presentations, videos, and competencies on applying pharmacogenomics to practice
University of Florida Center for Pharmacogenomics ⁸ (www.personalizedmedicine.ufhealth.org/snp-its/pharmacogenomics-study-summaries)	Summary of recent literature relevant to the implementation of pharmacogenomics in practice

PharmGKB

Providing searchable annotations of pharmacogenetic variants, PharmGKB summarizes the clinical implications of important pharmacogenes, and includes FDA drug labels containing pharmacogenomics information (https://www.pharmgkb.org).² The Web site also provides users with evidence-based figures illustrating the pharmacokinetic and pharmacodynamic pathways of drugs that have pharmacogenetic implications.

PharmGKB is an excellent resource to consult for a summary of available evidence when a CPIC guideline does not exist for a given gene or drug.

Other resources

Table 2³⁻⁸ lists other online resources for practitioners to aid in advancing pharmacogenomics knowledge as it relates to practice.

Putting guidance to best use

Familiarity with resources such as CPIC guidelines and PharmGKB can help ensure that patients with pharmacogenetic test results receive genetically tailored therapy

that is more likely to be effective and less likely to cause adverse effects.^{9,10}

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