Pharmacogenomics Knowledgebase

PHARMGKB

&

Pharmacogenomics Clinical Annotation Tool

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PharmGKB: NIH/NHGRI/NICHD/NIDA U24 HG010615 PharmCAT: NIH/NHGRI U24 HG013077

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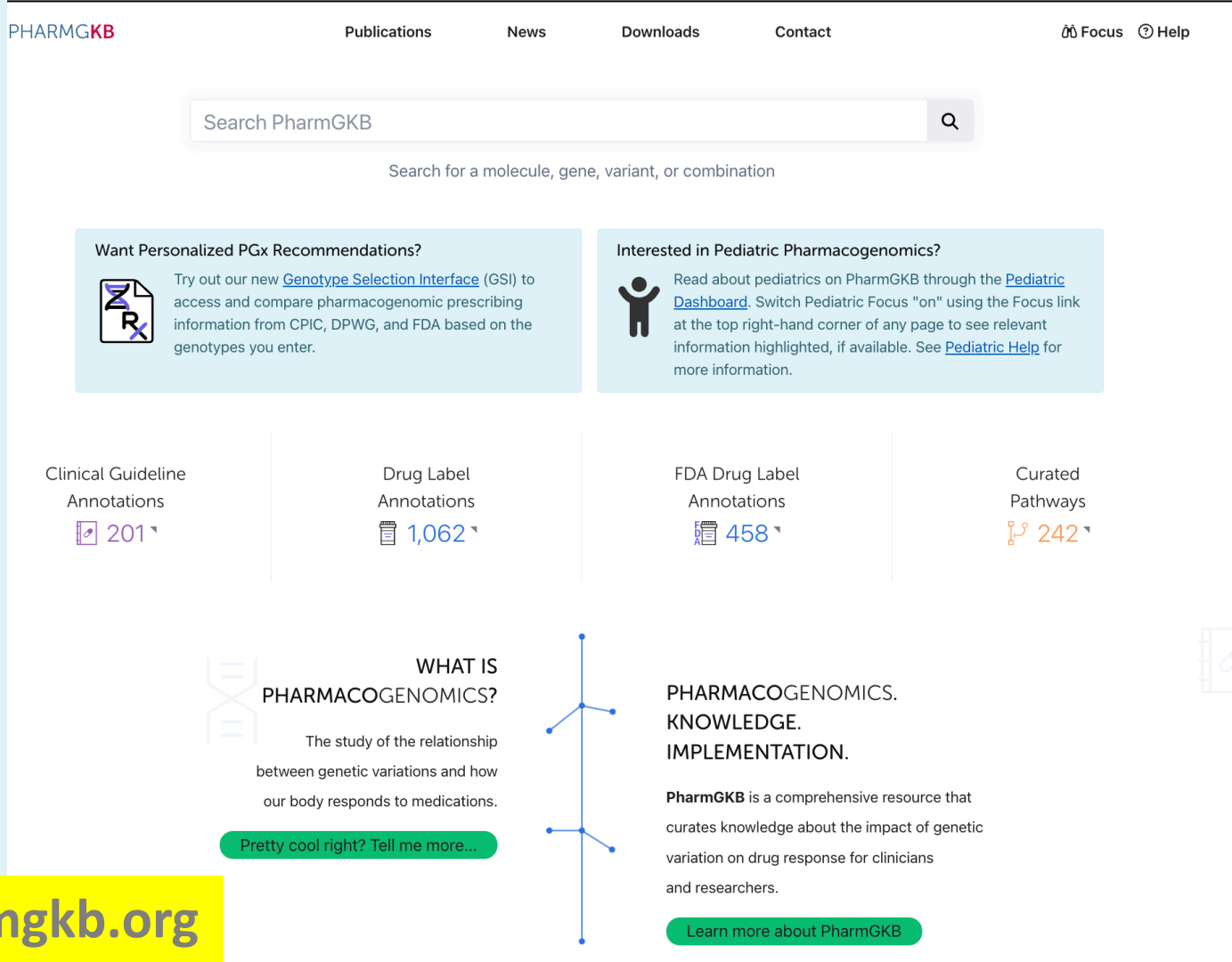
PharmGKB: NIH/NHGRI/NICHD/NIDA U24 HG010615 PharmCAT: NIH/NHGRI U24 HG013077

PHARMGKB

Pharmacogenomics Knowledgebase

https://www.pharmgkb.org



Usage & Content

550,000-650,00 page views/month
50,000-55,000 sessions/month

Pharmacokinetic & pharmacodynamic pathways

>240

PGx guideline annotations

>190 drugs

Drug label annotations

>1000 >450 FDA

Variant annotations

>27,600

>800 >8,120 >18,000

Clinical annotations

>5,170

>3,250 >640

New Content, Features, Tools

Curated literature

Past year:

About 1,000 new variant annotations

About 40 new and many updated clinical annotations

Staying current with updates
CPIC, DPWG, PharmVar, FDA

E.g. update all NAT2 annotations to new PharmVar nomenclature

Coordinate PharmVar updates across PharmGKB, CPIC, PharmCAT

Annotate labels with **gene** or **variant** information

Levels of PGx information

Definitions on PharmGKB: https://www.pharmgkb.org/page/drugLabelLegend

Annotate labels with **gene** or **variant** information

Levels of PGx information

Testing required

Testing recommended

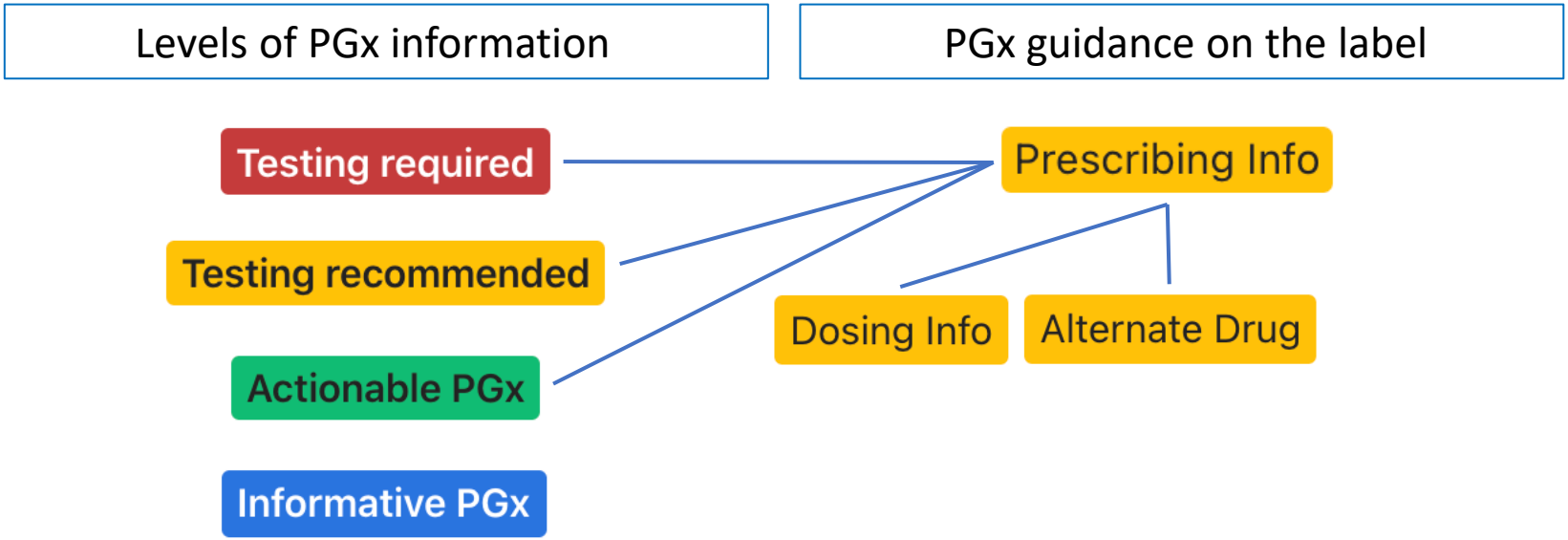
Actionable PGx → Contains information a clinician could consider when prescribing medication, including
- changes in efficacy, dosage, metabolism or toxicity OR
- contraindication of the drug

in a subset of patients with certain variants, genotypes, or phenotypes.

Informative PGx → All other labels on the FDA Biomarker table that do not meet the other criteria.

Definitions on PharmGKB: https://www.pharmgkb.org/page/drugLabelLegend

Drug Label Annotation Updates



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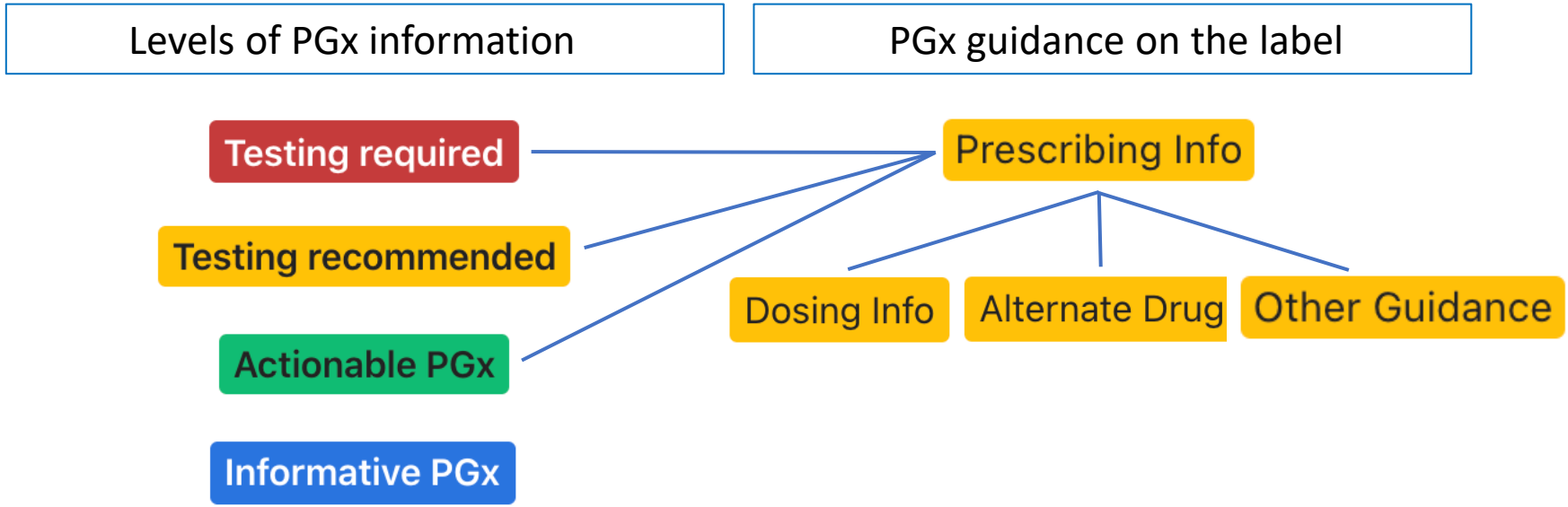
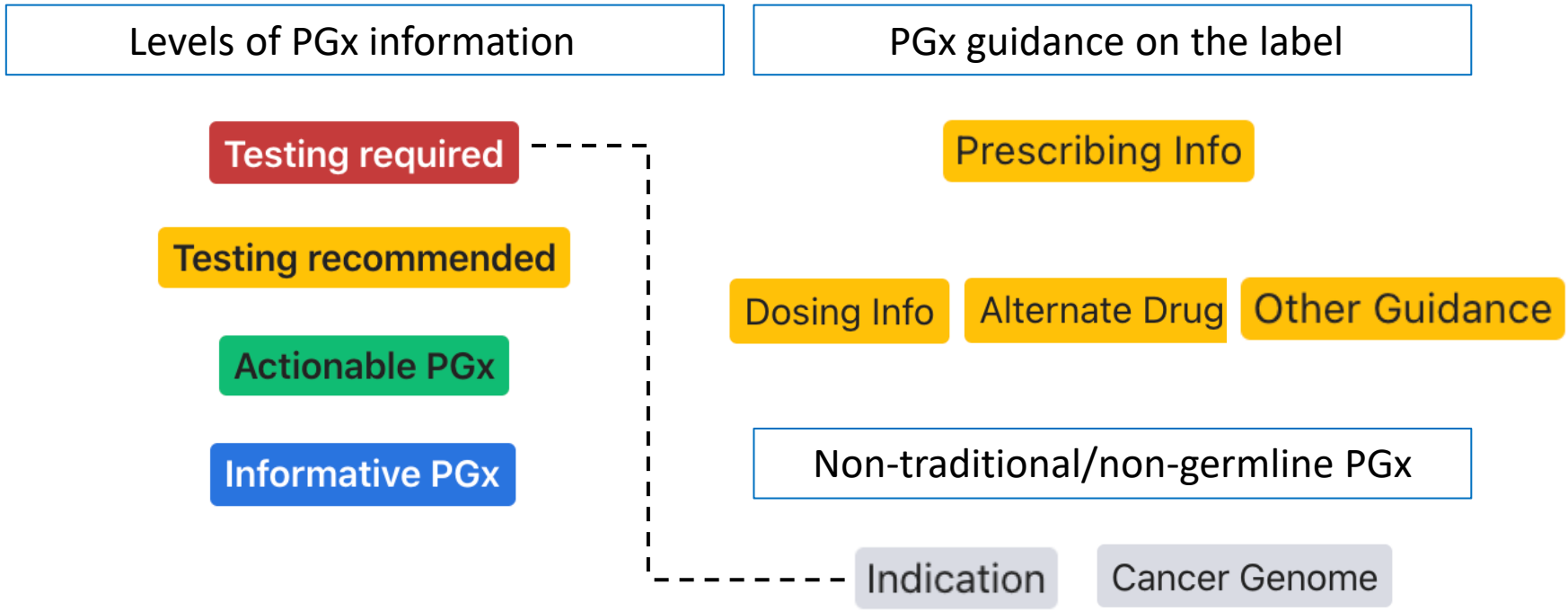
Drug Label Annotation Updates



Definitions on PharmGKB: https://www.pharmgkb.org/page/drugLabelLegend

Annotate labels with **gene** or **variant** information



Definitions on PharmGKB: https://www.pharmgkb.org/page/drugLabelLegend

Annotate labels with **gene** or **variant** information

Levels of PGx information	PGx guidance on the label
Testing required	Prescribing Info
Testing recommended	Dosing Info, Alternate Drug, Other Guidance
Actionable PGx	
Informative PGx → Gene/variant not applicable or not clinically relevant	Non-traditional/non-germline PGx
Criteria Not Met → All other labels on the FDA Biomarker table that do not meet the other criteria.	Indication, Cancer Genome

Definitions on PharmGKB: https://www.pharmgkb.org/page/drugLabelLegend

FDA released in 2020
3 section table

Table of Pharmacogenetic Associations

Pharmacogenetic tests, along with other information about patients disease or condition, can play an important role in drug therapy. W care provider is considering prescribing a drug, knowledge of a pati genotype may be used to aid in determining a therapeutic strategy, an appropriate dosage, or assessing the likelihood of benefit or toxi

On this page:

Section 1: Pharmacogenetic Associations for which the Data Support Therapeutic Management Recommendations

Drug	Gene	Affected Subgroups+	Description of Gene-Drug Interaction
Abacavir	HLA-B	*57:01 allele positive	Results in higher adverse reaction risk (hypersensitivity reactions). Do not use abacavir in patients positive for HLA-B*57:01.
Abrocitinib	CYP2C19	poor metabolizers	Results in higher systemic concentrations and may result in higher adverse reaction risk. Dosage adjustment is recommended. Refer to FDA labeling for specific dosing

Section 2: Pharmacogenetic Associations for which the Data Indicate a Potential Impact on Safety or Response

Drug	Gene	Affected Subgroups+	Description of Gene-Drug Interaction
Allopurinol	HLA-B	*58:01 allele positive	Results in higher adverse reaction risk (severe skin reactions).
Carbamazepine	HLA-A	*31:01 allele	Results in higher adverse reaction risk (severe skin

Section 3: Pharmacogenetic Associations for which the Data Demonstrate a Potential Impact on Pharmacokinetic Properties Only

The impact of these genetic variants or genetic variant inferred phenotypes on the safety or response of the corresponding drug has not been established.

Drug	Gene	Affected Subgroups+	Description of Gene-Drug Interaction
Amitriptyline	CYP2D6	ultrarapid, intermediate, or poor metabolizers	May alter systemic concentrations.

FDA Table of Pharmacogenetic Associations

The FDA Table of Pharmacogenetic Associations was launched in 2020 and is periodically updated. PharmGKB has reprinted the information from this table below as a searchable, sortable list with links to gene and drug pages on the PharmGKB website.
Original source at FDA.

Sections

- Pharmacogenetic Associations for which the Data Support Therapeutic Management Recommendations (n=62)
- Pharmacogenetic Associations for which the Data Indicate a Potential Impact on Safety or Response (n=22)
- Pharmacogenetic Associations for which the Data Demonstrate a Potential Impact on Pharmacokinetic Properties Only (n=40)

Pharmacogenetic Associations for which the Data Support Therapeutic Management Recommendations

CHEMICAL	GENE	AFFECTED SUBGROUPS	DESCRIPTION OF GENE-DRUG INTERACTION
mivacurium	BCHE	intermediate or poor metabolizers	Results in higher systemic concentrations and higher adverse reaction risk (prolonged neuromuscular blockade). Avoid use in poor metabolizers.
succinylcholine	BCHE	intermediate or poor metabolizers	Results in higher systemic concentrations and higher adverse reaction risk (prolonged neuromuscular blockade). Avoid use in poor metabolizers. May administer test dose to assess sensitivity and administer cautiously via slow infusion.
pantoprazole	CYP2C19	intermediate or poor metabolizers	Results in higher systemic concentrations. Consider dosage reduction in children who are

Prescribing Info

PharmGKB PGx Prescribing Info encompasses annotations of clinical pharmacogenomic guidelines, prescribing information from FDA approved drug labels and information from the FDA Table of Pharmacogenetic Associations. This list indicates which drugs have Prescribing Info available from these three sources. The list is categorized in a drug hierarchy based on the Anatomical Therapeutic Chemical classification system, with each level prefixed by the ATC identifier, then the name.

Tag Legend

Guideline = has been annotated as part of a Clinical Guideline Annotation.
Label = has prescribing information annotated as part of an FDA Drug Label Annotation.
PGx Assoc = is listed on the FDA Table of Pharmacogenetic Associations.

A ALIMENTARY TRACT AND METABOLISM DRUGS
- A02 Drugs For Acid Related Disorders
  - A02B Drugs For Peptic Ulcer And Gastro-oesophageal Reflux Disease (gord)
    - A02BC Proton pump inhibitors for peptic ulcer and GORD
      - A02BC01 omeprazole Guideline PGx Assoc
      - A02BC02 pantoprazole Guideline Label PGx Assoc
      - A02BC03 lansoprazole Guideline PGx Assoc
      - A02BC04 rabeprazole PGx Assoc
      - A02BC05 esomeprazole PGx Assoc
      - A02BC06 dexlansoprazole Guideline PGx Assoc
- A03 Drugs For Functional Gastrointestinal Disorders
  - A03F Propulsives
    - A03FA Propulsives
      - A03FA01 metoclopramide Label PGx Assoc
- A04 Antiemetics And Antinauseants

Search PharmGKB

Search for a molecule, gene, variant, or combination

Want Personalized PGx Recommendations?

Try out our new Genotype Selection Interface (GSI) to access and compare pharmacogenomic prescribing information from CPIC, DPWG, and FDA based on the genotypes you enter.

Interested in Pediatric Pharmacogenomics?

Read about pediatrics on PharmGKB through the Pediatric Dashboard. Switch Pediatric Focus "on" using the Focus link at the top right-hand corner of any page to see relevant information highlighted, if available. See Pediatric Help for more information.

Clinical Guideline Annotations	Drug Label Annotations	FDA Drug Label Annotations	Curated Pathways
201	1,062	458	242

WHAT IS PHARMACOGENOMICS?

The study of the relationship between genetic variations and how our body responds to medications.

Pretty cool right? Tell me more...

PHARMACOGENOMICS. KNOWLEDGE. IMPLEMENTATION.

PharmGKB is a comprehensive resource that curates knowledge about the impact of genetic variation on drug response for clinicians and researchers.

Learn more about PharmGKB

GSI: Genotype Selection Interface

PharmGKB's **Genotype Selection Interface (GSI)** allows users to access and compare pharmacogenomic guideline recommendations from the Clinical Pharmacogenetics Implementation Consortium (CPIC) and the Dutch Pharmacogenetics Working Group (DPWG), and wording from FDA's approved drug labels and Table of Pharmacogenetic Associations, based on individual genotypes.

- Enter genotypes or phenotypes for one or more genes below and then click the "Make Report" button to see genotype-specific drug dosing recommendations from CPIC, DPWG and FDA.
- Two alleles are required for all genes except MT-RNR1, HLA-A/HLA-B, and G6PD.

Read the GSI documentation for more information. Major changes to the content are documented here.

Pick genotypes to see specific information

Gene	*Diplotype*		*or*	*Phenotype*	*Reset*
ABCG2	--	--	or	--	Reset
CACNA1S	--	--	or	--	Reset
CFTR	--	--	or	--	Reset
CYP2B6	--	--	or	--	Reset
CYP2C19	--	--	or	--	Reset
CYP2C9	--	--	or	--	Reset
CYP2D6	--	--	or	--	Reset
CYP3A4	--	--	or	--	Reset

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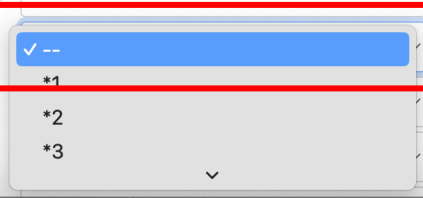
Pick genotypes to see specific information

Gene	*Diplotype*		*or*	*Phenotype*	*Reset*
ABCG2	--	--	or	--	Reset
CACNA1S	--	--	or	--	Reset
CFTR	--	--	or	--	Reset
CYP2B6	--	--	or	--	Reset
CYP2C19	--	--	or	--	Reset
CYP2C9	--	*9	or	--	Reset
CYP2D6	--	--	or	--	Reset
CYP3A4	--	--	or	--	Reset



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Gene	*Diplotype*		*or*	*Phenotype*	*Reset*
ABCG2	--	--	or	--	Reset
CACNA1S	--	--	or	--	Reset
CFTR	--	--	or	--	Reset
CYP2B6	--	--	or	--	Reset
CYP2C19	--	--	or	--	Reset
CYP2C9	*2	*9	or		Reset
CYP2D6	--	--	or		Reset
CYP3A4	--	--	or		Reset

-- (selected)
Rapid Metabolizer
Normal Metabolizer
Intermediate Metabolizer

GSI: Genotype Selection Interface

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Pick genotypes to see specific information

Gene	*Diplotype*		*or*	*Phenotype*	*Reset*
ABCG2	--	--	or	--	Reset
CACNA1S	--	--	or	--	Reset
CFTR	--	--	or	--	Reset
CYP2B6	--	--	or	--	Reset
CYP2C19	--	--	or	Intermediate Metabolizer	Reset
CYP2C9	*2	*9	or	--	Reset
CYP2D6	--	--	or	--	Reset
CYP3A4	--	--	or	--	Reset

GSI: Results

PharmGKB's **Genotype Selection Interface (GSI)** allows users to access and compare pharmacogenomic guideline recommendations from the Clinical Pharmacogenetics Implementation Consortium (CPIC) and the Dutch Pharmacogenetics Working Group (DPWG), and wording from FDA's approved drug labels and Table of Pharmacogenetic Associations, based on individual genotypes.

- The report has sections below for the "Selected Genotypes" and the corresponding "Annotated Drugs", with columns CPIC guidelines, DPWG guidelines, FDA-approved drug labels and FDA's Table of Pharmacogenetic Associations.
- Read more about what the yellow boxes in the report mean.

Read the GSI documentation for more information.

Selected Genotypes

Gene	Genotype	Phenotype
CYP2C19	*unspecified*	Intermediate Metabolizer
CYP2C9	*2/*9	Intermediate Metabolizer

Change | Start Over

Annotated Drugs (21 unique)

Show 21 actionable drugs | Show all 69 drugs with guidance related to the genes selected

ALIMENTARY TRACT AND METABOLISM DRUGS	dexlansoprazole	dronabinol	lansoprazole	omeprazole	pantoprazole	
ANTIINFECTIVES FOR SYSTEMIC USE	voriconazole					
ANTINEOPLASTIC AND IMMUNOMODULATING AGENTS	siponimod					
BLOOD AND BLOOD FORMING ORGAN DRUGS	avatrombopag	clopidogrel	warfarin			
CARDIOVASCULAR SYSTEM DRUGS	fluvastatin	mavacamten				
MUSCULO-SKELETAL SYSTEM DRUGS	piroxicam					
NERVOUS SYSTEM DRUGS	brivaracetam	citalopram	clobazam	doxepin	escitalopram	fosphenytoin

Expand All | Collapse All | *Click the ⊞ icons to see more* ← **Can expand or collapse all annotations** | Copy Link to These Results | Print

CPIC	DPWG	FDA Label Annotations	FDA Table of Pharmacogenetic Associations
avatrombopag			
CPIC has no guidance for avatrombopag and the genes selected.	DPWG has no guidance for avatrombopag and the genes selected.	FDA Label provides no wording for avatrombopag and CYP2C9 *2/*9, after evaluating the evidence. see the annotation for more details	FDA Table of Pharmacogenetic Associations (PK Section) wording for avatrombopag and CYP2C9 *2/*9. ⊞ Other Guidance
brivaracetam			
CPIC has no guidance for brivaracetam and the genes selected.	DPWG has no guidance for brivaracetam and the genes selected.	FDA Label provides no wording for brivaracetam and CYP2C19 Intermediate Metabolizer, after evaluating the evidence. see the annotation for more details	FDA Table of Pharmacogenetic Associations (Recommendations Section) wording for brivaracetam and CYP2C19 Intermediate Metabolizer. ⊞ Dosing Info
citalopram			
CPIC recommended clinical action for citalopram and CYP2C19 Intermediate Metabolizer. ⊞ Dosing Info	DPWG recommended clinical action for citalopram and CYP2C19 Intermediate Metabolizer. ⊞ Dosing Info	FDA Label provides no wording for citalopram and CYP2C19 Intermediate Metabolizer, after evaluating the evidence. see the annotation for more details	FDA Table of Pharmacogenetic Associations (Recommendations Section) provides no wording for citalopram and CYP2C19 Intermediate Metabolizer. see the full table
clobazam			
CPIC has no guidance for clobazam and the genes selected.	DPWG has no guidance for clobazam and the genes selected.	FDA Label provides no wording for clobazam and CYP2C19 Intermediate Metabolizer, after evaluating the evidence. see the annotation for more details	FDA Table of Pharmacogenetic Associa (Recommendations Section) wording clobazam and CYP2C19 Intermediate Metabolizer. ⊞ Dosing Info

Expand All | Collapse All | *Click the ⊞ icons to see more*

Can expand or collapse all annotations

Copy Link to These Results

CPIC	DPWG	FDA Label Annotations	FDA Table of Pharmacogenetic Associa
avatrombopag			
CPIC has no guidance for avatrombopag and the genes selected.	DPWG has no guidance for avatrombopag and the genes selected.	FDA Label provides no wording for avatrombopag and CYP2C9 *2/*9, after evaluating the evidence. see the annotation for more details	FDA Table of Pharmacogenetic Associations (PK Section) wording for avatrombopag and CYP2C9 *2/*9. ⊞ Other Guidance
brivaracetam			
CPIC has no guidance for brivaracetam and the genes selected.	DPWG has no guidance for brivaracetam and the genes selected.	FDA Label provides no wording for brivaracetam and CYP2C19 Intermediate Metabolizer, after evaluating the evidence. see the annotation for more details	FDA Table of Pharmacogenetic Associations (Recommendations Section) wording for brivaracetam and CYP2C19 Intermediate Metabolizer. ⊞ Dosing Info
citalopram			
CPIC recommended clinical action for citalopram and CYP2C19 Intermediate Metabolizer. ⊞ Dosing Info	DPWG recommended clinical action for citalopram and CYP2C19 Intermediate Metabolizer. ⊞ Dosing Info	FDA Label provides no wording for citalopram and CYP2C19 Intermediate Metabolizer, after evaluating the evidence. see the annotation for more details	FDA Table of Pharmacogenetic Associations (Recommendations Section) provides no wording for citalopram and CYP2C19 Intermediate Metabolizer. see the full table
clobazam			
CPIC has no guidance for clobazam and the genes selected.	DPWG has no guidance for clobazam and the genes selected.	FDA Label provides no wording for clobazam and CYP2C19 Intermediate Metabolizer, after evaluating the evidence. see the annotation for more details	FDA Table of Pharmacogenetic Associa (Recommendations Section) wording clobazam and CYP2C19 Intermediate Metabolizer. ⊞ Dosing Info

Yellow boxes indicates the recommended prescribing change at a high level

clopidogrel

CPIC recommended clinical action for clopidogrel and CYP2C19 Intermediate Metabolizer.

- **Patients with cardiovascular indications of acute coronary syndrome (ACS) and/or percutaneous coronary intervention (PCI).**
  Alternate Drug
- **Patients with neurovascular indications.**
  Alternate Drug
- **Patients with non-acute coronary syndrome (non-ACS) and non-percutaneous coronary intervention (non-PCI) cardiovascular indications.**
  No Action

DPWG recommended clinical action for clopidogrel and CYP2C19 Intermediate Metabolizer.

Alternate Drug

FDA Label provides no wording for clopidogrel and CYP2C19 Intermediate Metabolizer, after evaluating the evidence.
see the annotation for more details

FDA Table of Pharmacogenetic Associations (Recommendations Section) wording for clopidogrel and CYP2C19 Intermediate Metabolizer.

Alternate Drug

clopidogrel

CPIC recommended clinical action for clopidogrel and CYP2C19 Intermediate Metabolizer.

Alternate Drug

Matched Phenotype
CYP2C19: Intermediate Metabolizer

Population
Patients with cardiovascular indications of acute coronary syndrome (ACS) and/or percutaneous coronary intervention (PCI).

Implications
CYP2C19: Reduced clopidogrel active metabolite formation; increased on-treatment platelet reactivity; increased risk for adverse cardiac and cerebrovascular events

Recommendation
Avoid standard dose (75 mg) clopidogrel if possible. Use prasugrel or ticagrelor at standard dose if no contraindication.

Other Considerations
For cardiovascular indications of acute coronary syndrome (ACS) and/or percutaneous coronary intervention (PCI). ACS and/or PCI includes patients undergoing PCI for an ACS or non-ACS (elective) indication.

Classification
Strong

read full annotation...

DPWG recommended clinical action for clopidogrel and CYP2C19 Intermediate Metabolizer.

Alternate Drug

Matched Phenotype
CYP2C19: Intermediate Metabolizer

Population
unspecified

Implications
The risk of serious cardiovascular and cerebrovascular events is increased in patients undergoing balloon angioplasty or stent placement (percutaneous coronary intervention) and in patients with a stroke or TIA, as the genetic variation reduces the activation of clopidogrel. No negative clinical consequences have been observed in other patients.

Recommendation
PERCUTANEOUS CORONARY INTERVENTION, STROKE or TIA: choose an alternative or double the dose to 150 mg/day (600 mg loading dose). Prasugrel, ticagrelor and acetylsalicylic acid/dipyridamole are not metabolised by CYP2C19 (or to a lesser extent). OTHER INDICATIONS: no action required

Classification
N/A

read full annotation...

FDA Label provides no wording for clopidogrel and CYP2C19 Intermediate Metabolizer, after evaluating the evidence.

see the annotation for more details

FDA Table of Pharmacogenetic Associations (Recommendations Section) wording for clopidogrel and CYP2C19 Intermediate Metabolizer.

Alternate Drug

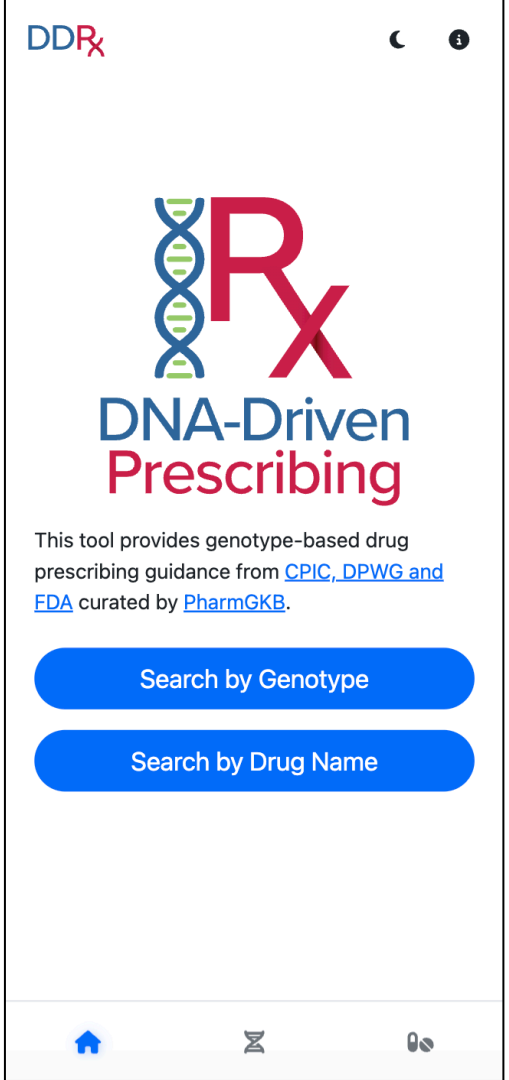
Matched Phenotype
CYP2C19: Intermediate Metabolizer

Population
Affected subgroup: CYP2C19 intermediate or poor metabolizers

Recommendation
"Results in lower systemic active metabolite concentrations, lower antiplatelet response, and may result in higher cardiovascular risk. Consider use of another platelet P2Y12 inhibitor."

read full annotation...

Links to read the full guideline, label or table annotations



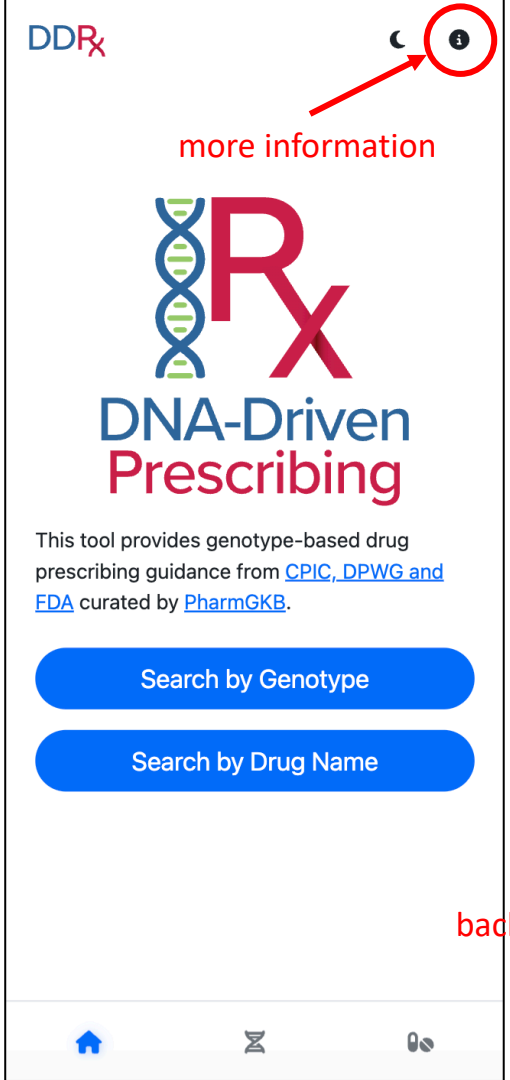
Introducing the DDRx Mobile App!

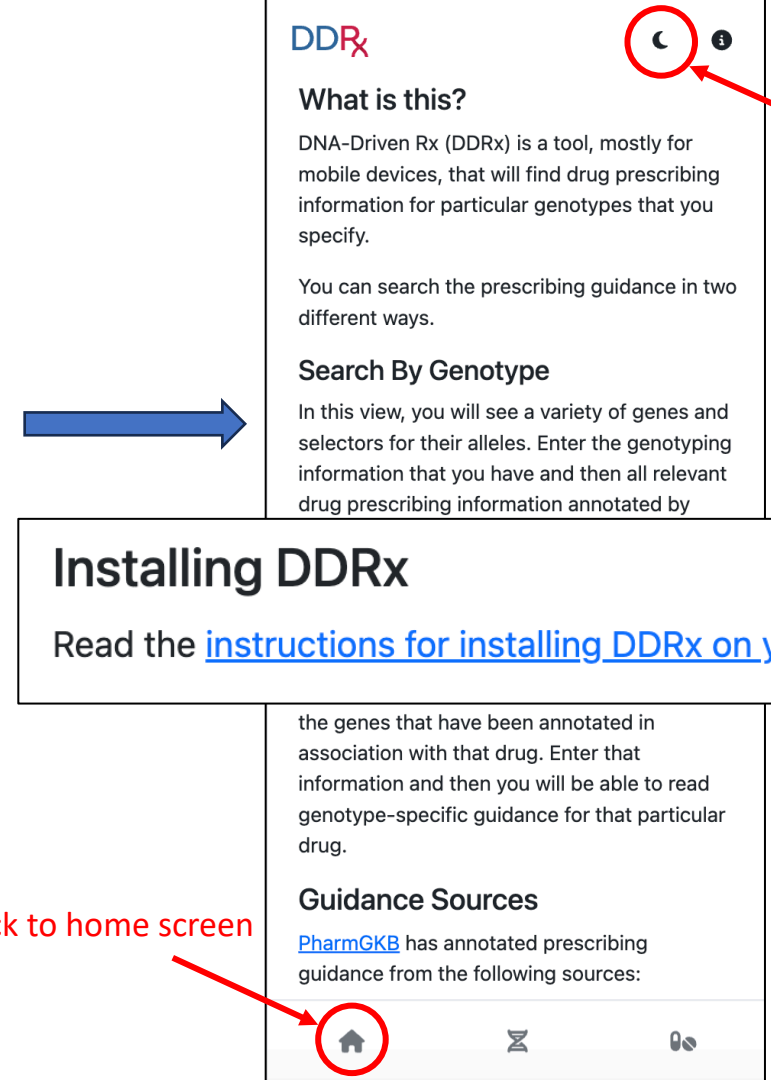
Powered by PHARMGKB

(Pre-release)

Funded by the Center of Excellence for Precision Health and Pharmacogenomics in the Department of Biomedical Data Science at Stanford University via Scott Penberthy (Google)

https://ddrx.pharmgkb.org



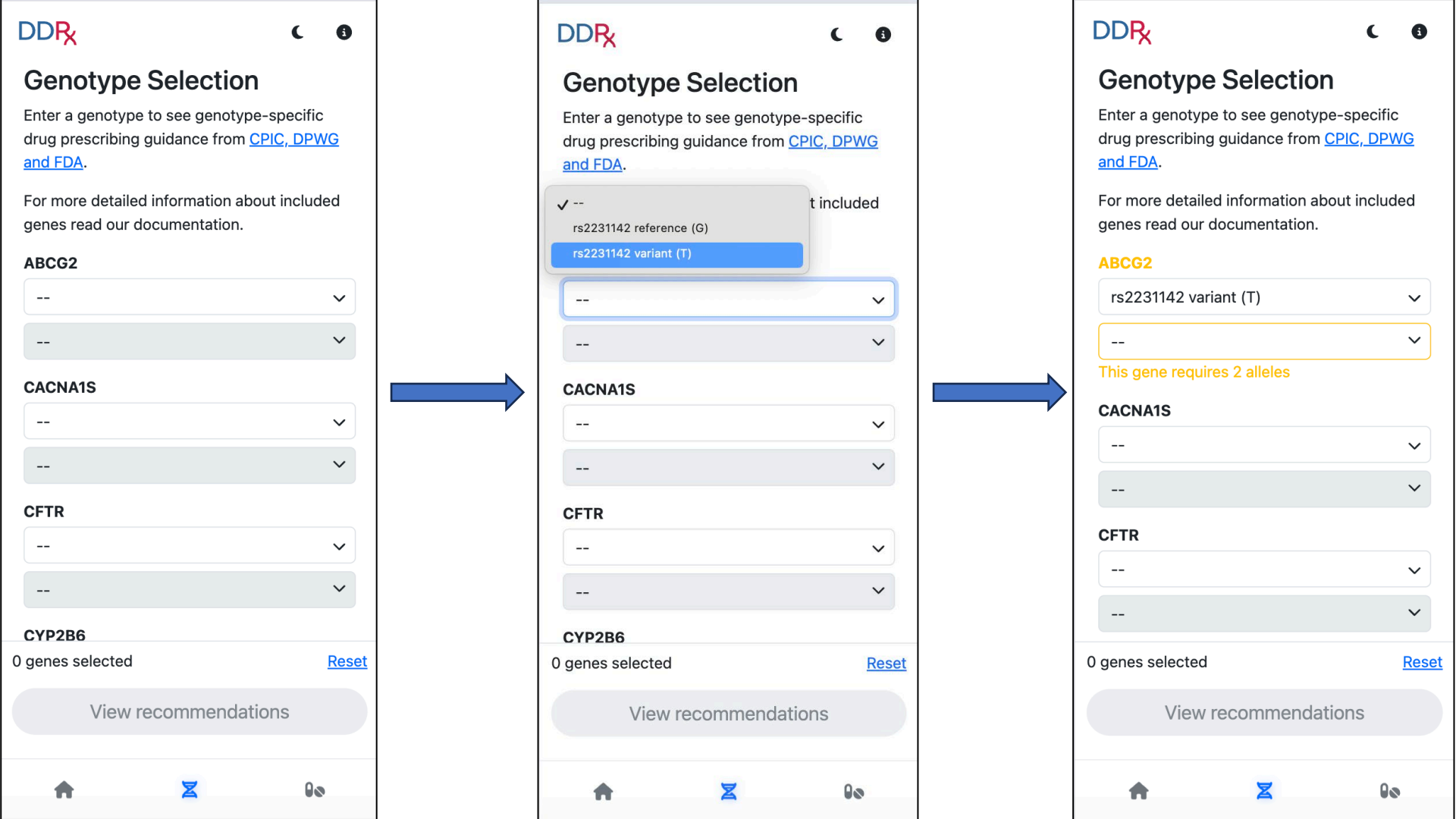


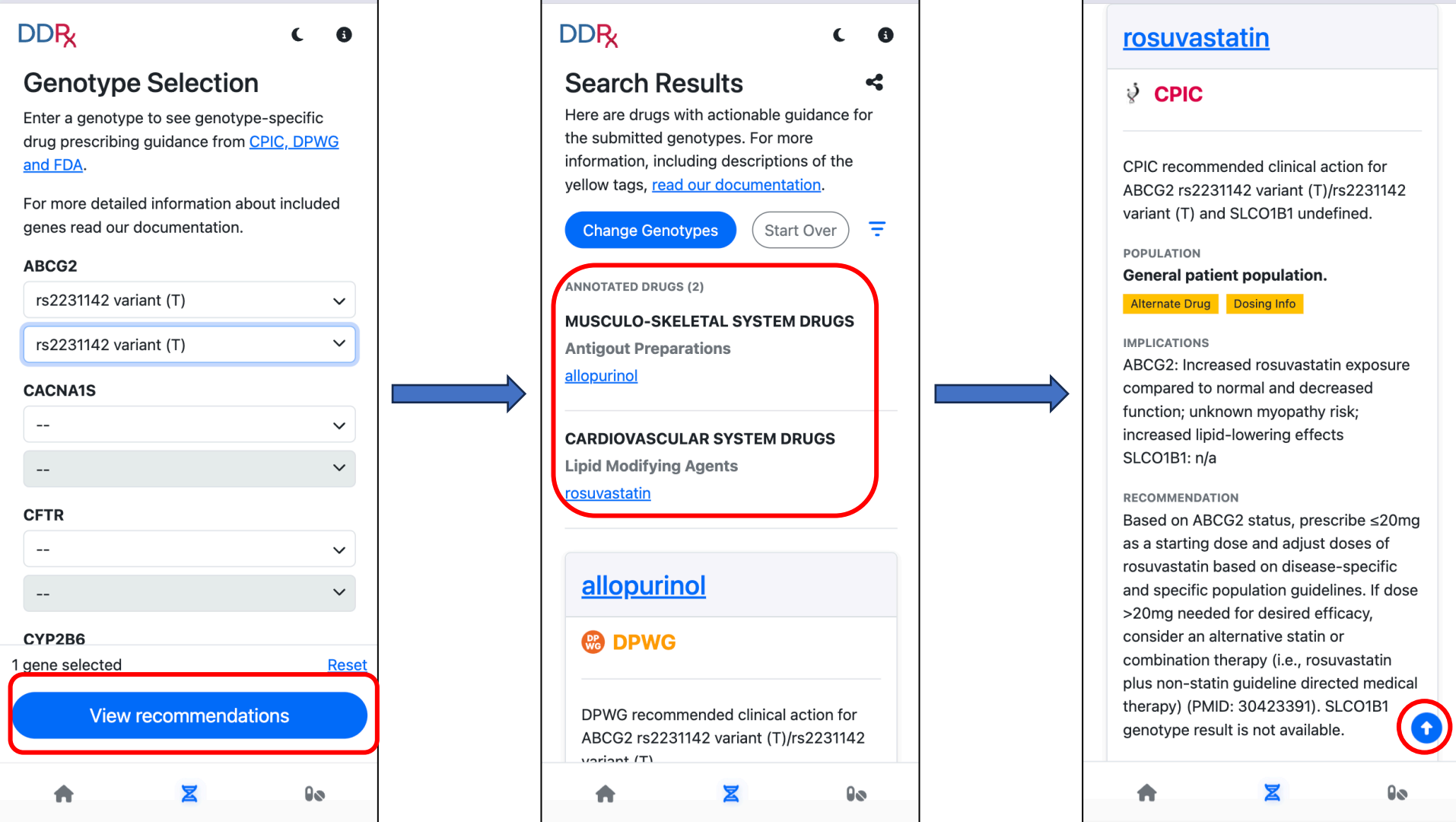
Installing DDRx

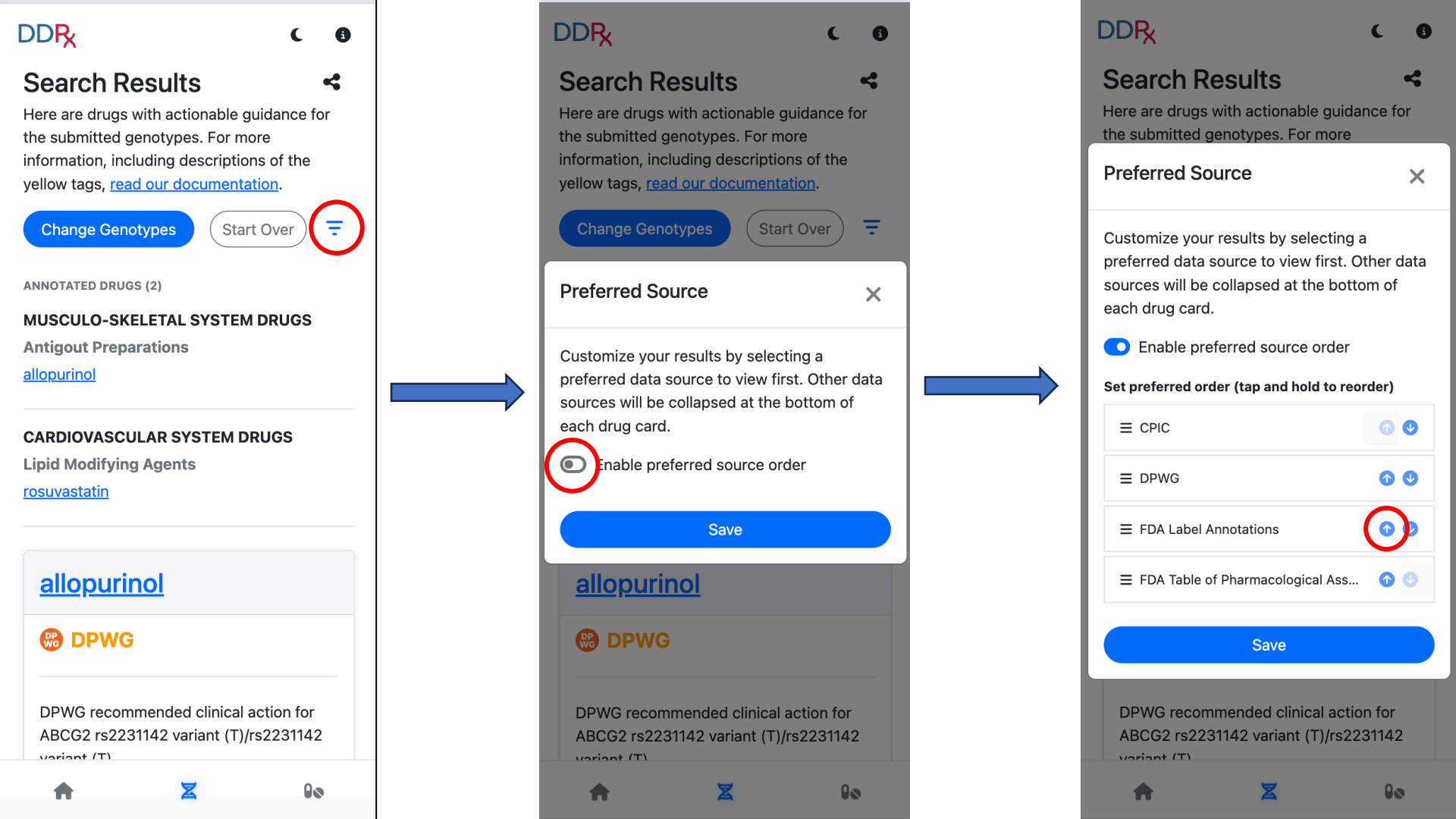
Read the instructions for installing DDRx on your device.

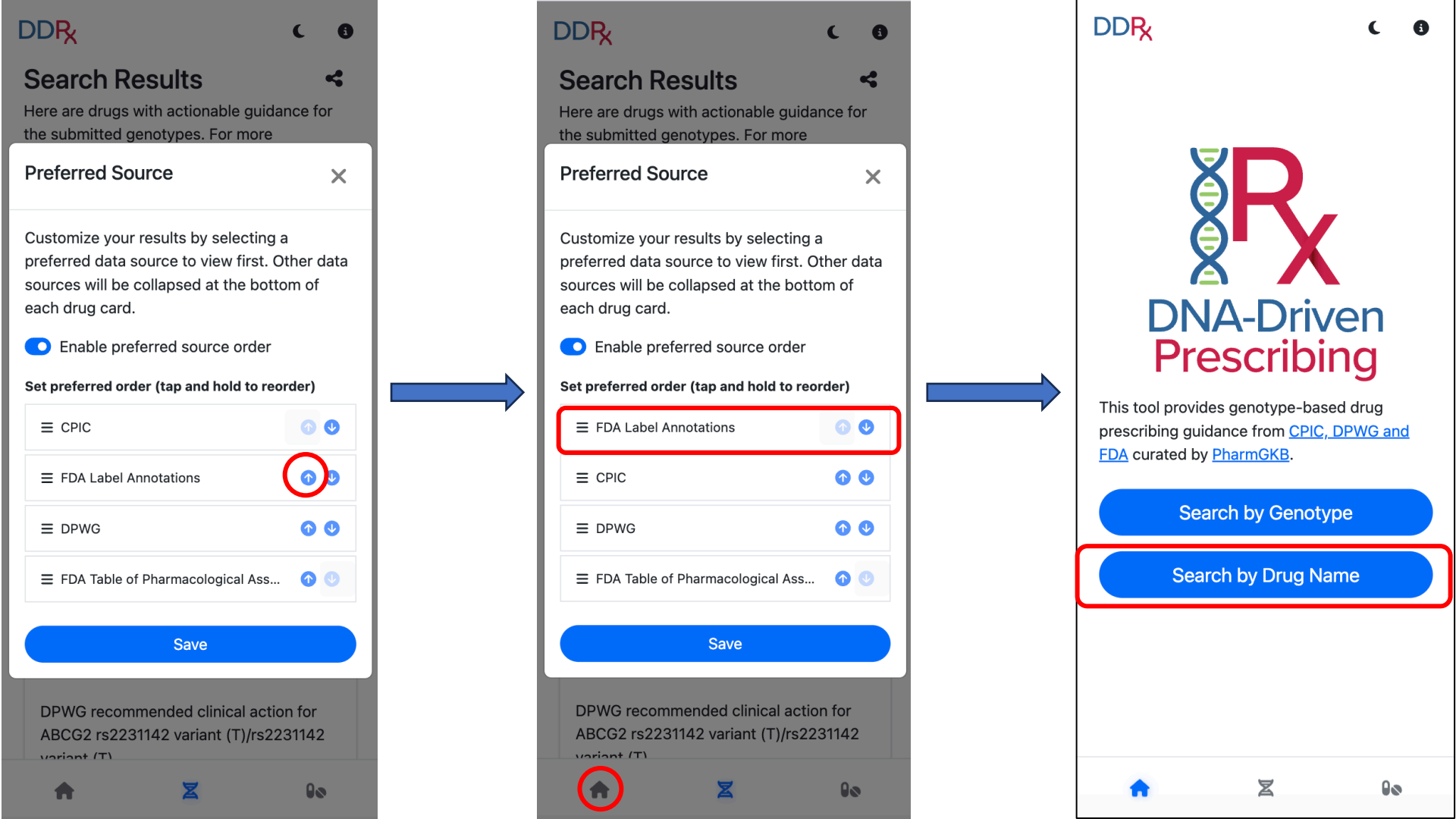
DNA-Driven Prescribing

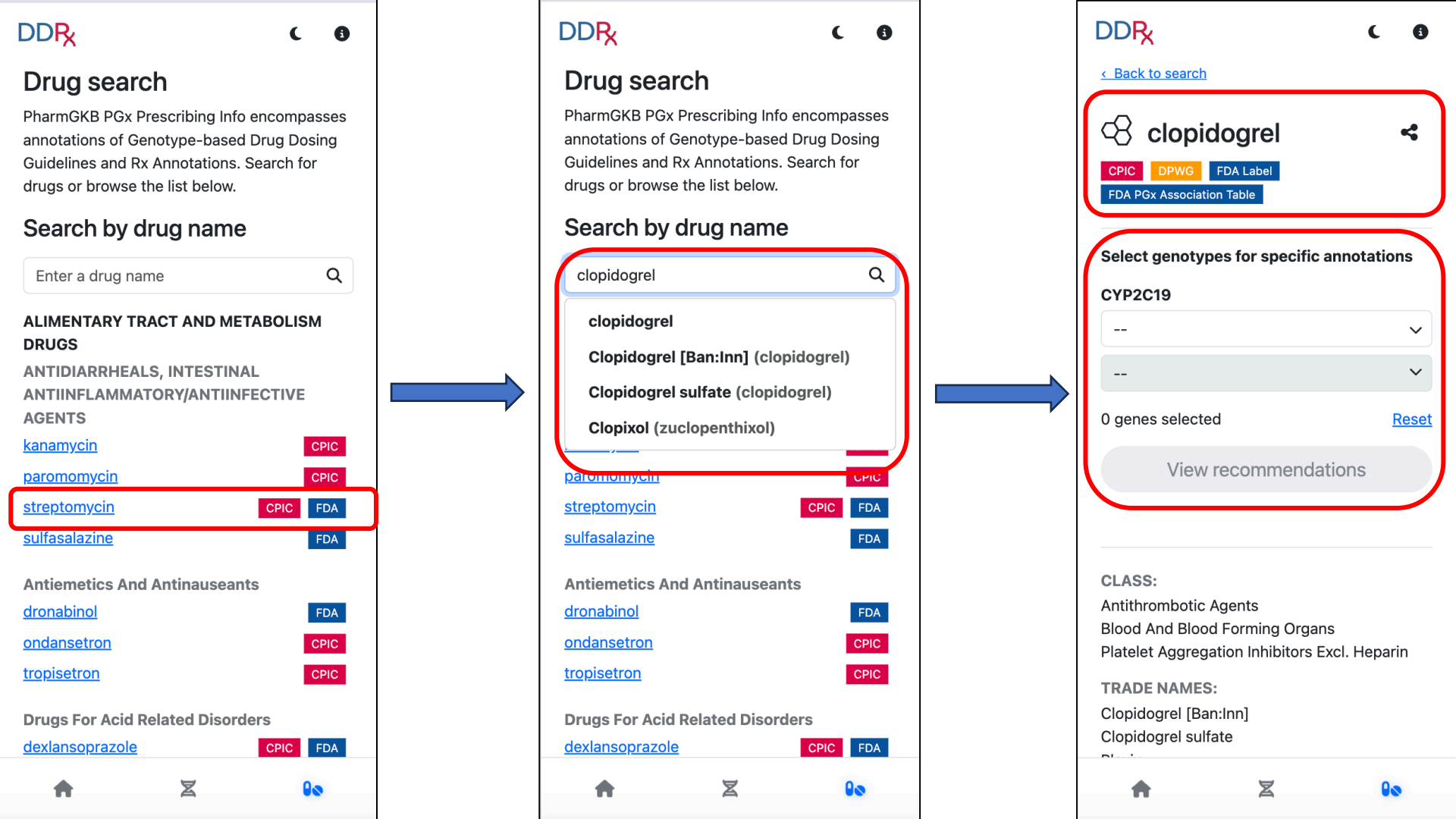
Powered by PHARMGKB

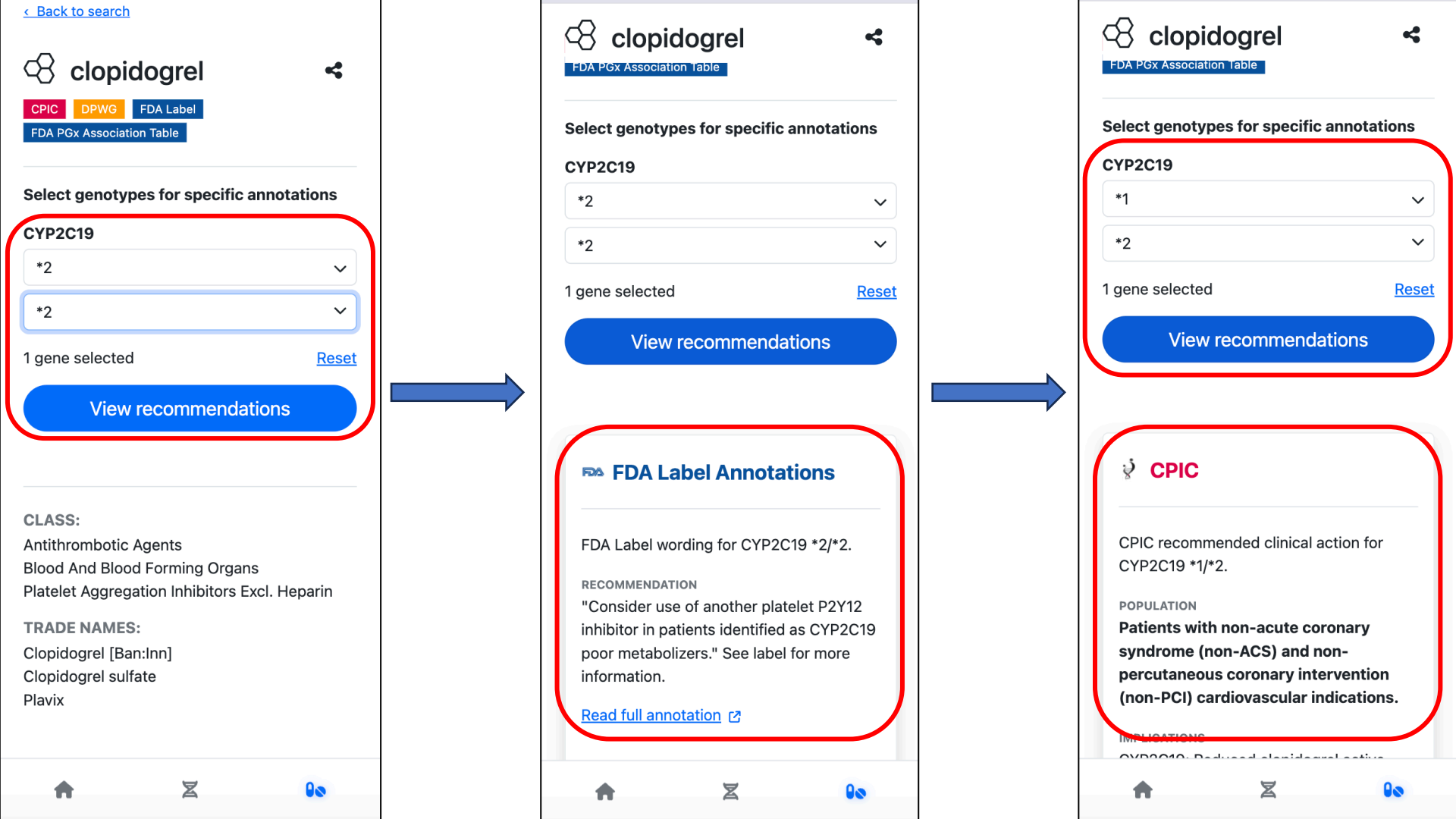

DDRx
Genotype Selection
Enter a genotype to see genotype-specific drug prescribing guidance from CPIC, DPWG and FDA.
For more detailed information about included genes read our documentation.
ABCG2
--
--
CACNA1S
--
--
CFTR
--
--
CYP2B6
0 genes selected
Reset
View recommendations
DDRx
Genotype Selection
Enter a genotype to see genotype-specific drug prescribing guidance from CPIC, DPWG and FDA.
t included
--
rs2231142 reference (G)
rs2231142 variant (T)
--
--
CACNA1S
--
--
CFTR
--
--
CYP2B6
0 genes selected
Reset
View recommendations
DDRx
Genotype Selection
Enter a genotype to see genotype-specific drug prescribing guidance from CPIC, DPWG and FDA.
For more detailed information about included genes read our documentation.
ABCG2
rs2231142 variant (T)
--
This gene requires 2 alleles
CACNA1S
--
--
CFTR
--
--
0 genes selected
Reset
View recommendations


DDRx
Genotype Selection
Enter a genotype to see genotype-specific drug prescribing guidance from CPIC, DPWG and FDA.
For more detailed information about included genes read our documentation.
ABCG2
rs2231142 variant (T)
rs2231142 variant (T)
CACNA1S
--
--
CFTR
--
--
CYP2B6
1 gene selected
Reset
View recommendations
DDRx
Search Results
Here are drugs with actionable guidance for the submitted genotypes. For more information, including descriptions of the yellow tags, read our documentation.
Change Genotypes
Start Over
ANNOTATED DRUGS (2)
MUSCULO-SKELETAL SYSTEM DRUGS
Antigout Preparations
allopurinol
CARDIOVASCULAR SYSTEM DRUGS
Lipid Modifying Agents
rosuvastatin
allopurinol
DPWG
DPWG recommended clinical action for ABCG2 rs2231142 variant (T)/rs2231142
rosuvastatin
CPIC
CPIC recommended clinical action for ABCG2 rs2231142 variant (T)/rs2231142 variant (T) and SLCO1B1 undefined.
POPULATION
General patient population.
Alternate Drug
Dosing Info
IMPLICATIONS
ABCG2: Increased rosuvastatin exposure compared to normal and decreased function; unknown myopathy risk; increased lipid-lowering effects
SLCO1B1: n/a
RECOMMENDATION
Based on ABCG2 status, prescribe ≤20mg as a starting dose and adjust doses of rosuvastatin based on disease-specific and specific population guidelines. If dose >20mg needed for desired efficacy, consider an alternative statin or combination therapy (i.e., rosuvastatin plus non-statin guideline directed medical therapy) (PMID: 30423391). SLCO1B1 genotype result is not available.


DDRx
Search Results
Here are drugs with actionable guidance for the submitted genotypes. For more information, including descriptions of the yellow tags, read our documentation.
Change Genotypes
Start Over
ANNOTATED DRUGS (2)
MUSCULO-SKELETAL SYSTEM DRUGS
Antigout Preparations
allopurinol
CARDIOVASCULAR SYSTEM DRUGS
Lipid Modifying Agents
rosuvastatin
allopurinol
DPWG
DPWG recommended clinical action for ABCG2 rs2231142 variant (T)/rs2231142
Preferred Source
Customize your results by selecting a preferred data source to view first. Other data sources will be collapsed at the bottom of each drug card.
Enable preferred source order
Save
Set preferred order (tap and hold to reorder)
CPIC
DPWG
FDA Label Annotations
FDA Table of Pharmacological Ass...

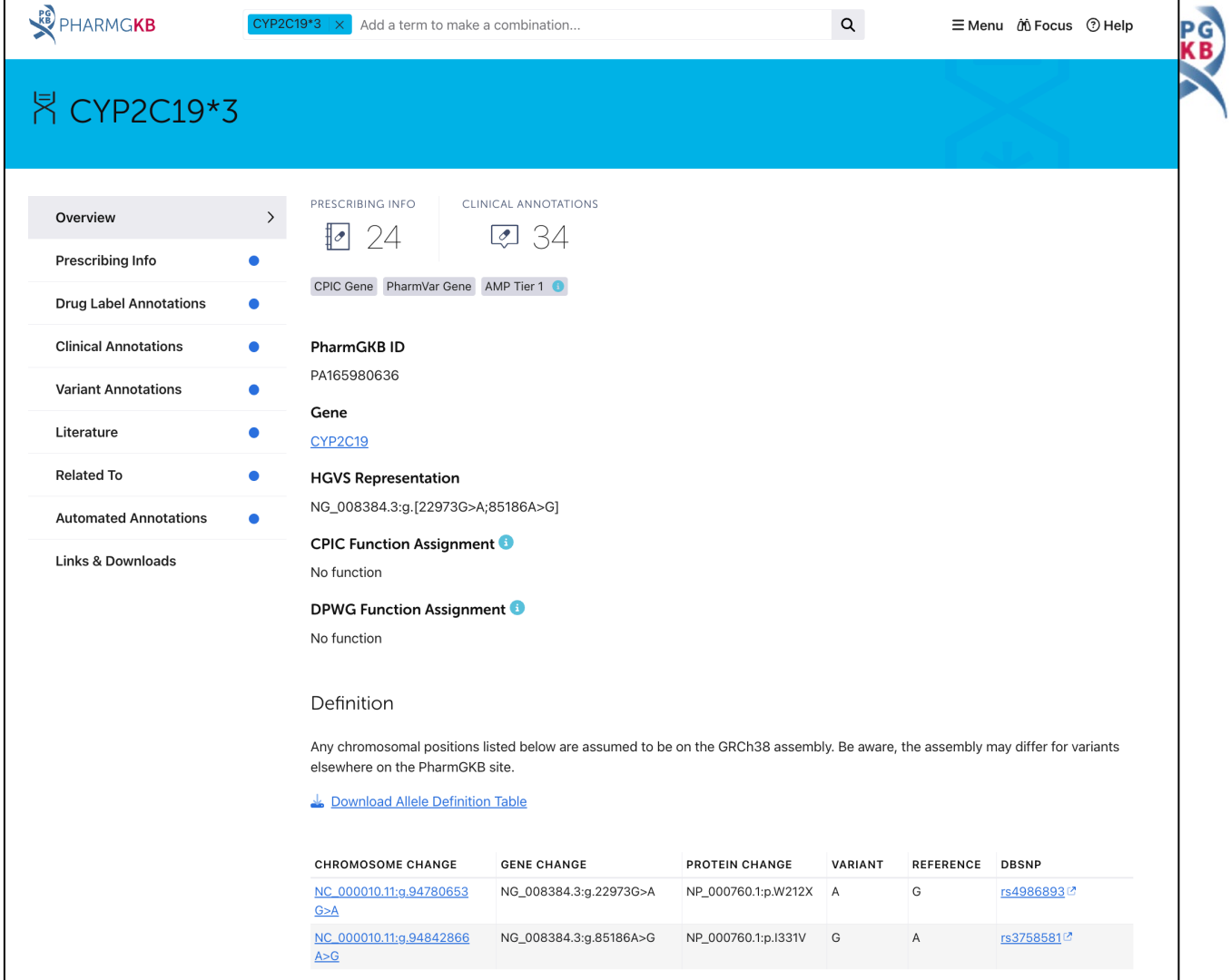

DDRx
Search Results
Here are drugs with actionable guidance for the submitted genotypes. For more
Preferred Source
Customize your results by selecting a preferred data source to view first. Other data sources will be collapsed at the bottom of each drug card.
Enable preferred source order
Set preferred order (tap and hold to reorder)
CPIC
FDA Label Annotations
DPWG
FDA Table of Pharmacological Ass...
Save
DPWG recommended clinical action for ABCG2 rs2231142 variant (T)/rs2231142
DDRx
Search Results
Here are drugs with actionable guidance for the submitted genotypes. For more
Preferred Source
Customize your results by selecting a preferred data source to view first. Other data sources will be collapsed at the bottom of each drug card.
Enable preferred source order
Set preferred order (tap and hold to reorder)
FDA Label Annotations
CPIC
DPWG
FDA Table of Pharmacological Ass...
Save
DPWG recommended clinical action for ABCG2 rs2231142 variant (T)/rs2231142
DDRx
Rx
DNA-Driven Prescribing
This tool provides genotype-based drug prescribing guidance from CPIC, DPWG and FDA curated by PharmGKB.
Search by Genotype
Search by Drug Name


DDRx
Drug search
PharmGKB PGx Prescribing Info encompasses annotations of Genotype-based Drug Dosing Guidelines and Rx Annotations. Search for drugs or browse the list below.
Search by drug name
Enter a drug name
ALIMENTARY TRACT AND METABOLISM DRUGS
ANTIDIARRHEALS, INTESTINAL ANTIINFLAMMATORY/ANTIINFECTIVE AGENTS
kanamycin CPIC
paromomycin CPIC
streptomycin CPIC FDA
sulfasalazine FDA
Antiemetics And Antinauseants
dronabinol FDA
ondansetron CPIC
tropisetron CPIC
Drugs For Acid Related Disorders
dexlansoprazole CPIC FDA
DDRx
Drug search
PharmGKB PGx Prescribing Info encompasses annotations of Genotype-based Drug Dosing Guidelines and Rx Annotations. Search for drugs or browse the list below.
Search by drug name
clopidogrel
clopidogrel
Clopidogrel [Ban:Inn] (clopidogrel)
Clopidogrel sulfate (clopidogrel)
Clopixol (zuclopenthixol)
streptomycin CPIC FDA
sulfasalazine FDA
Antiemetics And Antinauseants
dronabinol FDA
ondansetron CPIC
tropisetron CPIC
Drugs For Acid Related Disorders
dexlansoprazole CPIC FDA
DDRx
‹ Back to search
clopidogrel
CPIC DPWG FDA Label
FDA PGx Association Table
Select genotypes for specific annotations
CYP2C19
--
--
0 genes selected
Reset
View recommendations
CLASS:
Antithrombotic Agents
Blood And Blood Forming Organs
Platelet Aggregation Inhibitors Excl. Heparin
TRADE NAMES:
Clopidogrel [Ban:Inn]
Clopidogrel sulfate


‹ Back to search
clopidogrel
CPIC
DPWG
FDA Label
FDA PGx Association Table
Select genotypes for specific annotations
CYP2C19
*2
*2
1 gene selected
Reset
View recommendations
CLASS:
Antithrombotic Agents
Blood And Blood Forming Organs
Platelet Aggregation Inhibitors Excl. Heparin
TRADE NAMES:
Clopidogrel [Ban:Inn]
Clopidogrel sulfate
Plavix
clopidogrel
FDA PGx Association Table
Select genotypes for specific annotations
CYP2C19
*2
*2
1 gene selected
Reset
View recommendations
FDA Label Annotations
FDA Label wording for CYP2C19 *2/*2.
RECOMMENDATION
"Consider use of another platelet P2Y12 inhibitor in patients identified as CYP2C19 poor metabolizers." See label for more information.
Read full annotation
clopidogrel
FDA PGx Association Table
Select genotypes for specific annotations
CYP2C19
*1
*2
1 gene selected
Reset
View recommendations
CPIC
CPIC recommended clinical action for CYP2C19 *1/*2.
POPULATION
Patients with non-acute coronary syndrome (non-ACS) and non-percutaneous coronary intervention (non-PCI) cardiovascular indications.

Variant and Star Allele Frequencies

- CPIC
- UKBB/PharmCAT
- All of Us/PharmCAT



Variant and Star Allele Frequencies

- CPIC
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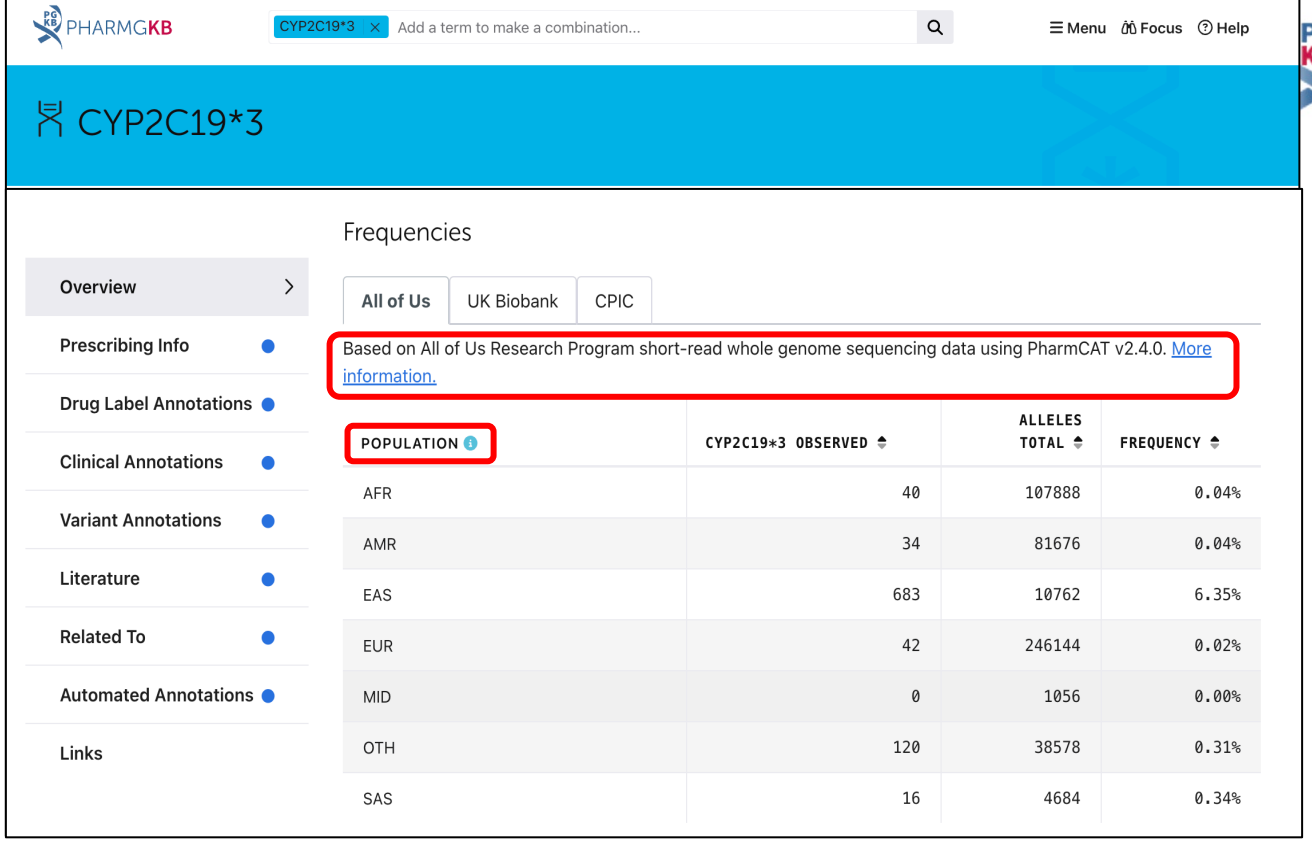
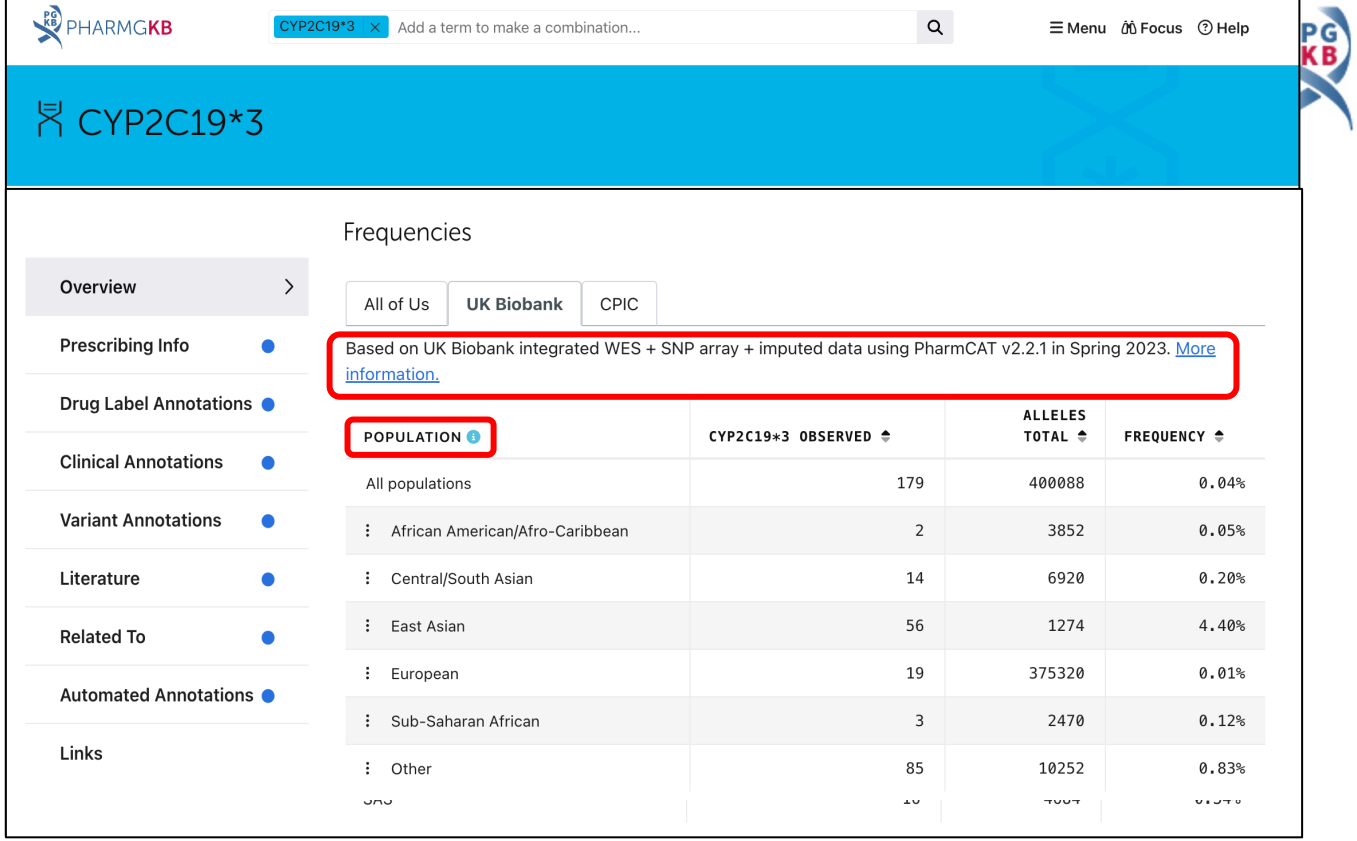
- All of Us/PharmCAT



Variant and Star Allele Frequencies

- CPIC
- UKBB/PharmCAT
- All of Us/PharmCAT



Variant and Star Allele Frequencies

- CPIC
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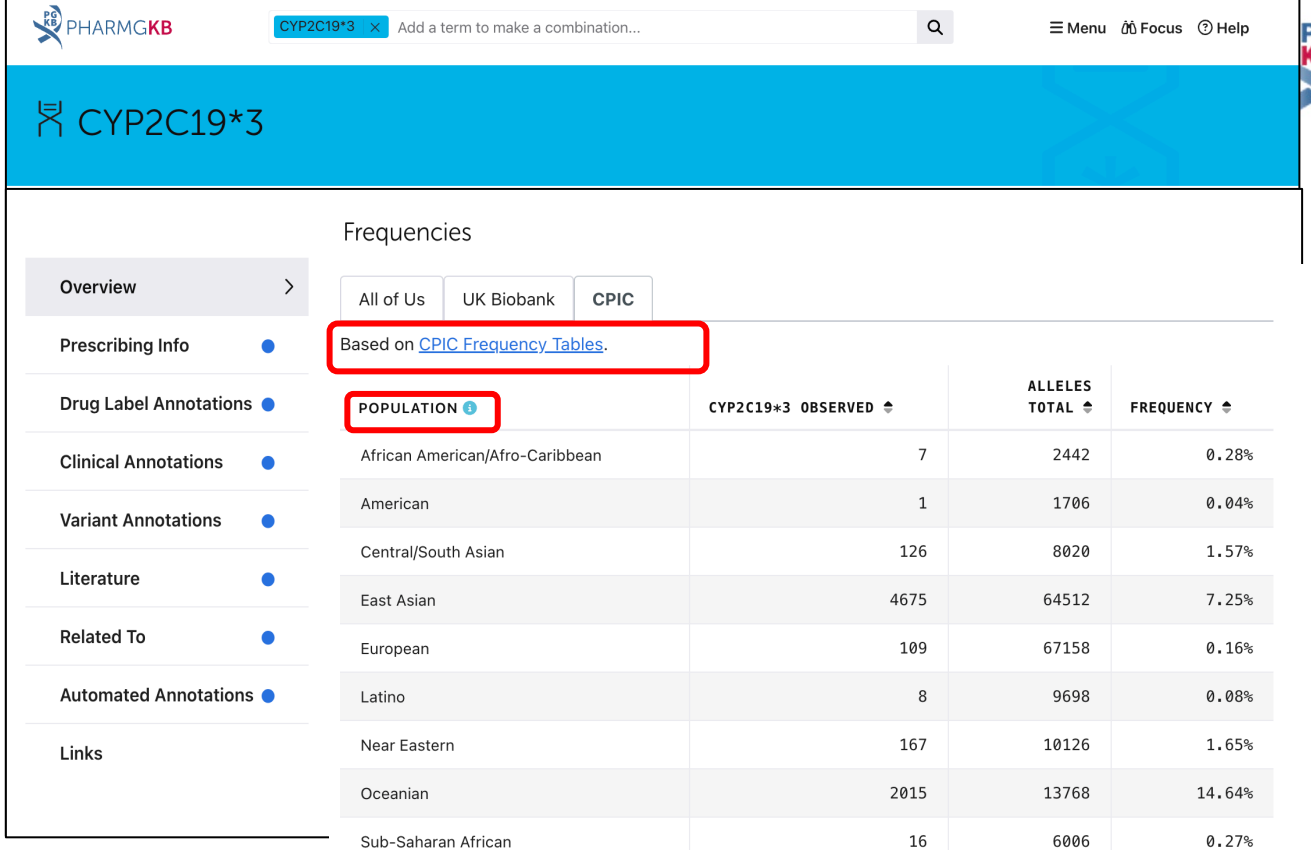
- All of Us/PharmCAT



Variant and Star Allele Frequencies

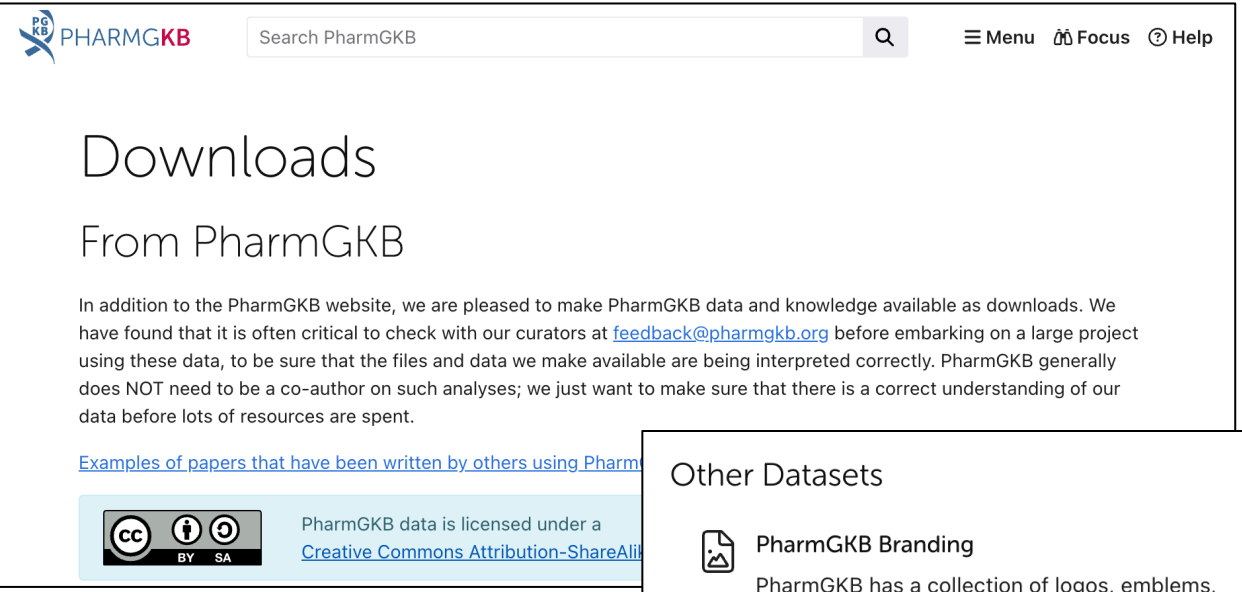
- CPIC downloads by gene

PGx Gene-specific Information Tables

- ABCG2
- CACNA1S
- CYP2B6
- CYP2C19
- CYP2C9
- CYP2D6
- CYP3A5
- CYP4F2
- CFTR
- DPYD
- G6PD
- HLA-A/B
- IFNL3
- MT-RNR1
- NUDT15
- RYR1
- SLCO1B1
- TPMT
- UGT1A1
- VKORC1

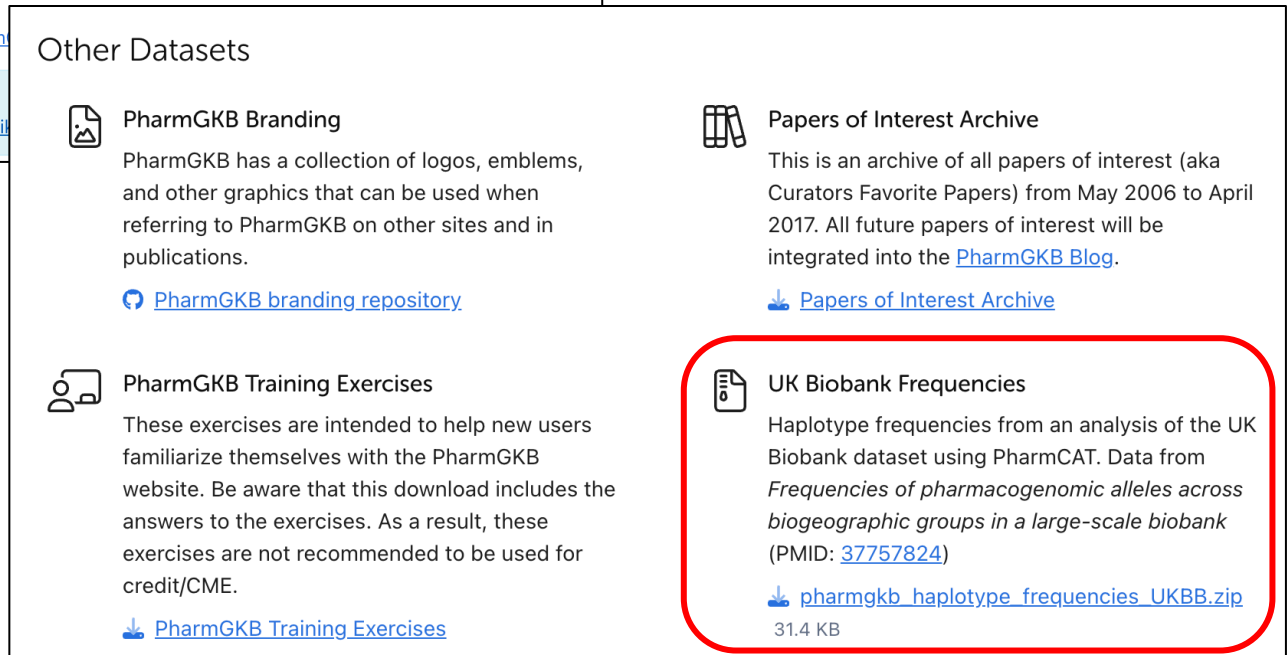
The above gene links lead to information tables created by PharmGKB and CPIC. The files support CPIC guidelines, but are also general resources for these PGx genes. The following types of files are provided by gene, as available:

- Allele Definition Table
  - Information about what variants define star (*) or named alleles
  - Mapping of variants to the human genome GRCh38, the RefSeq Gene sequence and protein sequence, and provides rsIDs, if available
- Allele Functionality Table
  - Allele function assignments using CPIC standardized terms
  - References for the allele function
- Phenotype Table
  - Mapping allele function combinations to phenotypes
- Diplotype-Phenotype Table
  - Mapping of each diplotype to phenotype
- Example CDS Table
  - Mapping of possible phenotype to EHR priority result notation and consultation text
- Workflow Diagram
  - Possible implementation workflow diagram
- Frequency Table
  - Calculated allele frequency by PharmGKB biogeographical groups based on frequencies reported by references. Further details about the biogeographical grouping system can be found here or in [Article:30506572]
- Gene Resource Mappings
  - Mapping of gene to ID or code for HGNC, NCBI, Ensembl and PharmGKB



Variant and Star Allele Frequencies

- UKBB bulk download



PharmCAT: Pharmacogenomics Clinical Annotation Tool

Download v2.13.0 View on GitHub

An active area of genomic medicine implementation at many healthcare organizations and academic medical centers includes development of decision support and return of results around pharmacogenomics. One of the challenges in implementing pharmacogenomics is the representation of the information in clinical dosing guidelines, including star-allele haplotypes, and extracting these variants and haplotypes from genetic datasets. In a collaboration between the Pharmacogenomics ase (PharmGKB) and the former PGRN Statistical Analysis Resource (P-STAR), with input roups, we are developing a software tool to extract guideline variants from a genetic

Pharmacogenomics Clinical Annotation Tool

New Content & Features

- CPIC and PharmVar updates
  - E.g. DPYD HapB3 and RYR1 updates
- DPWG guidance and updates
  - E.g. F5 was removed
- FDA PGx guidance
  - Table of PGx Associations
  - PharmGKB label annotations
- Multiple pre-processor updates for improved performance

Pharmacogenomics Clinical Annotation Tool

New Content & Features

- 175 drugs with 18 genes
- Accommodate 4 additional genes
  - HLA-A, HLA-B, CYP2D6 & MT-RNR1
- Outreach
  - Increased website documentation
  - “How-to” videos on YouTube channel
  - Published tutorial paper (2022)
  - PharmCAT mailing list for releases/news/updates
  - Address user feedback through email and GitHub issues

Pharmacogenomics Clinical Annotation Tool

Recent & Upcoming Projects

- UKBB allele frequencies
  - CYP4F2 allele frequencies
  - HapB3 observations
  - PMID: 37757824
- Stanford Health Care implementation
- Collaborations for inclusion of diverse populations
  - China Medical University Hospital, Taiwan
  - Galatea Bio
  - gnomAD/Broad
  - To be available on PharmGKB

DDRx Mobile App

DNA-Driven Prescribing

Powered by PHARMGKB

Funded by the Center of Excellence for Precision Health and Pharmacogenomics in the Department of Biomedical Data Science at Stanford University via Google/Scott Penberthy