

**PharmGKB** (<http://www.pharmgkb.org>)

A comprehensive resource for pharmacogenomics

Clinically relevant information at PharmGKB:

- Drug dosing guidelines
- FDA drug label with PGx information highlighted
- Clinical interpretation of variants associated with drug response and genetic tests
- Genetic tests

***Welcome to the PharmGKB Tutorial  
-Clinical PGx domain***

**Beta update:** The clinical interpretations search box should now be functional. Enter a search term to find all relevant clinical data we have.

Also, gene and drug pages are a little slow. Page optimization is happening now and should be completed soon.

Tutorial 

Curators' Favorite Papers

No current papers of interest.

See [archives](#) for more.

**From Knowledge Acquisition to Clinical Applications**

Clinical PGx domain

**Find Data By Type**

**Genomic Variations**

**VKORC1, G3673A**  
Causative allele for the low dose phenotype  
Related drug: Warfarin  
**rs9923231**

- [Annotated SNPs by gene](#)
- [Annotated SNPs by drug](#)
- [Annotated SNPs by disease](#)
- [Genes with Haplotype Translations](#)



[examples](#)

hint: enter a gene, rsid, drug, disease

**Clinical Interpretations**



- [Clinical variant annotations](#)
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- [Genetic tests for PGx](#)



[examples](#)

hint: enter a gene, rsid, drug, disease

**Pathways**



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- [All pathways](#)
- [Pathways by therapeutic categories](#)



[examples](#)

hint: enter a gene, drug, disease

**Drugs & Small Molecules**

Related gene: **TPMT**  
disease: **Leukemia**  
**Mercaptopurine**

- [Drugs with genetic information](#)
- [Drugs with data](#)
- [Drugs by therapeutic categories](#)



[examples](#)


hint: enter a gene, rsid, drug, disease



Pharmacogenomics Research Network

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## Find Data By Type

### Genomic Variations

**VKORC1, G3673A**

**Causative allele for the low dose phenotype**

**Related drug: Warfarin**

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- [Annotated SNPs by gene](#)
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hint: enter a gene, rsid, drug, disease

### Pathways



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find pathways   [examples](#)

hint: enter a gene, drug, disease

### Clinical Interpretations



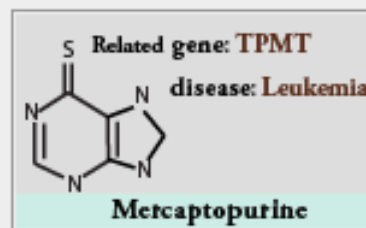
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Click for clinical info

azathioprine   [examples](#)

hint: enter a gene, rsid, drug, disease

### Drugs & Small Molecules



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find drugs   [examples](#)

hint: enter a gene, rsid, drug, disease

# Clinical Information Associated with Azathioprine Response

Search Clinical Information for



Drug Label: [FDA Label for azathioprine](#)

Gene: [TPMT](#)

Drug: [azathioprine](#)

Click for azathioprine dosing guideline

Dosing Guideline: [CPIC Dosing Guideline for azathioprine](#)

Gene: [TPMT](#)

Drug: [azathioprine](#)

Dosing Guideline: [Dutch Pharmacogenetics Working Group Guideline for azathioprine](#)

Gene: [TPMT](#)

Drug: [azathioprine](#)

Clinical Annotation: [Clinical Annotation for rs1800460](#)

Gene: [TPMT](#)

Drugs: [azathioprine](#), [mercaptopurine](#), [purine analogues](#), [thioguanine](#)

Clinical Annotation: [Clinical Annotation for rs1800462](#)

Drugs: [azathioprine](#), [mercaptopurine](#), [purine analogues](#), [thioguanine](#)

Genetic Test: [Prometheus TPMT Genetics](#)

Gene: [TPMT](#)

Drugs: [azathioprine](#), [mercaptopurine](#)

Genetic Test: [TPMT GenotypR](#)

Gene: [TPMT](#)

Drugs: [azathioprine](#), [mercaptopurine](#), [thioguanine](#)

Dosing Guideline: [CPIC Dosing Guideline for mercaptopurine](#)

Gene: [TPMT](#)

Drug: [mercaptopurine](#)

Dosing Guideline: [CPIC Dosing Guideline for thioguanine](#)

Gene: [TPMT](#)

Drug: [thioguanine](#)

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CPIC Dosing Guideline - [azathioprine](#), [TPMT](#)

Guidelines regarding the use of pharmacogenomic tests in dosing for azathioprine, thioguanine and mercaptopurine have been published in Clinical Pharmacology and Therapeutics by the Clinical Pharmacogenetics Implementation Consortium ([CPIC](#)).

Download: [article](#) and [supplement](#)

Excerpt from the thiopurine dosing guidelines:

Thiopurines are most commonly used to treat nonmalignant conditions but are also critical anticancer agents. The approach to dosing adjustments based on TPMT status may differ depending on the clinical indication and the propensity to initiate therapy at higher vs. lower starting doses. We and others advocate testing for TPMT status prior to initiating thiopurine therapy, so that starting dosages can be adjusted accordingly.

## Recommended dosing of azathioprine by TPMT phenotype

Phenotype (Genotype)	Examples of diplotypes	Implications for azathioprine pharmacologic measures	Dosing recommendations for azathioprine	Classification of recommendations
Homozygous wild-type or normal, high activity (two functional *1 alleles)	*1/*1	Lower concentrations of TGN metabolites, higher methylTIMP, this is the "normal" pattern	Start with normal starting dose (e.g., 2-3 mg/kg/d) and adjust doses of azathioprine based on disease-specific guidelines. Allow 2 weeks to reach steady state after each dose adjustment.	Strong
Heterozygote or intermediate activity (one functional allele - *1, plus one nonfunctional allele - *2, *3A, *3B, *3C, or *4)	*1/*2, *1/*3A, *1/*3B, *1/*3C, *1/*4	Moderate to high concentrations of TGN metabolites; low concentrations of methylTIMP	If disease treatment normally starts at the "full dose", consider starting at 30-70% of target dose (e.g., 1-1.5 mg/kg/d), and titrate based on tolerance. Allow 2-4 weeks to reach steady state after each dose adjustment.	Strong
Homozygous variant, mutant, low, or	*3A/*3A, *2/*3A,	Extremely high concentrations of TGN	Consider alternative agents. If using azathioprine start with drastically reduced doses (reduce daily	Strong

### Dutch Pharmacogenetics Working Group Guideline - [azathioprine](#), [TPMT](#)

The Royal Dutch Association for the Advancement of Pharmacy - Pharmacogenetics Working Group has evaluated therapeutic dose recommendations for azathioprine based on TPMT genotype (PMID:21412232). They recommend selecting an alternative drug or reducing the initial dose for patients carrying inactive alleles.

Phenotype (Genotype)	Therapeutic Dose Recommendation	Level of Evidence	Clinical Relevance
IM (one inactive allele: *2, *3, *4-*18)	Select alternative drug or reduce dose by 50%. Increase dose in response of hematologic monitoring and efficacy.	Published controlled studies of good quality* relating to phenotyped and/or genotyped patients or healthy volunteers, and having relevant pharmacokinetic or clinical endpoints.	Clinical effect (S): Failure of lifesaving therapy e.g. anticipated myelosuppression; prevention of breast cancer relapse; arrhythmia; neutropenia < 0.5x10 <sup>9</sup> /l; leucopenia < 1.0x10 <sup>9</sup> /l; thrombocytopenia < 25x10 <sup>9</sup> /l; life-threatening complications from diarrhea.
PM (two inactive alleles: *2, *3, *4-*18)	Select alternative drug or reduce dose by 90%. Increase dose in response of hematologic monitoring and efficacy.	Published controlled studies of good quality* relating to phenotyped and/or genotyped patients or healthy volunteers, and having relevant pharmacokinetic or clinical endpoints.	Clinical effect (S): death; arrhythmia; unanticipated myelosuppression.

\*See paper for definition of "good quality."

S: statistically significant difference.

Clinical PGx

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Click for FDA drug label

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**CPIC Dosing Guideline - [azathioprine](#), [TPMT](#)**

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Heterozygote or intermediate activity (one functional allele - *1, plus one nonfunctional allele - *2, *3A, *3B, *3C, or *4)	*1/*2, *1/*3A, *1/*3B, *1/*3C, *1/*4	Moderate to high concentrations of TGN metabolites; low concentrations of methylTIMP	If disease treatment normally starts at the "full dose", consider starting at 30-70% of target dose (e.g., 1-1.5 mg/kg/d), and titrate based on tolerance. Allow 2-4 weeks to reach steady state after each dose adjustment.	Strong
Homozygous variant, mutant, low, or	*3A/*3A, *2/*3A,	Extremely high concentrations of TGN	Consider alternative agents. If using azathioprine start with drastically reduced doses (reduce daily	Strong

DRUG/SMALL MOLECULE:  
**azathioprine**

Clinical PGx | PGx Research | Overview | Properties | **Click for clinical annotations**

**Dosing Guidelines** | **Drug Labels** | **Clinical Annotations** | Genetic Tests

Information regarding PGx on FDA drug labels is derived from the FDA's [Table of Pharmacogenomic Biomarkers in Drug Labels](#). Excerpts from the label and downloadable highlighted label PDFs are manually curated by PharmGKB

**FDA Label - [azathioprine, TPMT](#)**

The FDA recommends, but does not require genetic or phenotypic testing for TPMT.

Excerpt from the azathioprine drug label:

"It is recommended that consideration be given to either genotype or phenotype patients for TPMT."

Patients with low or absent TPMT activity who are treated with conventional doses of azathioprine are at increased risk for severe, life-threatening myelosuppression resulting from treatment with azathioprine. Patients with intermediate TPMT activity may be at increased risk of myelotoxicity when given conventional azathioprine doses. Physicians may consider alternative therapies for patients homozygous for non-functional TPMT alleles (most commonly associated with the alleles TPMT\*2, TPMT\*3A, and TPMT\*3C), and dose reduction is recommended for heterozygous TPMT activity. Approximately 10% of Caucasians and African Americans carry one non-functional TPMT allele, while 0.3% are homozygous for non-functional TPMT alleles, yielding low or absent TPMT activity.

**Click for complete FDA drug label**

For the complete drug label text with sections containing pharmacogenetic information highlighted, see the [Azathioprine drug label](#).

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azathioprine

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Clinical Variants that meet the highest level of criteria (manually curated by PharmGKB) are shown below. To see more Clinical Variants with lower levels of criteria, click the button at the bottom of the table.

Position ?	Gene ?	Relevance ?	Strength of Evidence ?
<a href="#">rs1800460</a>	<a href="#">TPMT</a>	more likely to cause toxicity	
<a href="#">rs1800462</a>	<a href="#">TPMT</a>	more likely to cause toxicity	

[Click for more clinical annotations](#)

[Show lower-evidence Clinical Annotations](#)

[Download a summary of all Clinical Annotations available.](#)

Disclaimer: The PharmGKB's clinical annotations reflect expert consensus based on clinical evidence and peer-reviewed literature available at the time they are written and are intended only to assist clinicians in decision-making and to identify questions for further research. New evidence may have emerged since the time an annotation was submitted to the PharmGKB. The annotations are limited in scope and are not applicable to interventions or diseases that are not specifically identified.

The annotations do not account for individual variations among patients, and cannot be considered inclusive of all proper methods of care or exclusive of other treatments. It remains the responsibility of the health-care provider to determine the best course of treatment for a patient. Adherence to any guideline is voluntary, with the ultimate determination regarding its application to be made solely by the clinician and the patient. PharmGKB assumes no responsibility for any injury or damage to persons or property arising out of or related to any use of the PharmGKB clinical annotations, or for any errors or omissions.

? = Mouse-over for quick help

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Click rsID to see full clinical annotation and variant annotation

Position	Gene	Relevance	Strength of Evidence <sup>?</sup>
<a href="#">rs1800460</a>	<a href="#">TPMT</a>	more likely to cause toxicity	1
<a href="#">rs1800462</a>	<a href="#">TPMT</a>	more likely to cause toxicity	1
<a href="#">rs1142345</a>	<a href="#">NHLRC1</a> <a href="#">TPMT</a>	more likely to cause hematological toxicity	3
<a href="#">rs1127354</a>	<a href="#">DDRGK1</a> <a href="#">ITPA</a>	more likely to work	3

Hide lower-evidence Clinical Annotations

[Download a summary of all Clinical Annotations available.](#)

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<sup>?</sup> = Mouse-over for quick help

VARIANT:  
rs1800460 at chr6:18139228 in TPMT (VIP)

Alleles  
A/G

Amino Acid Translation  
Ala153Thr

Alternate Names:  
c.460G>A, g.18247207C>T, g.21147G>A, p.Ala154Thr

Haplotypes  
This variant is used to determine: TPMT\*3A, TPMT\*3B, TPMT\*3D

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User login required to view full clinical annotation

### Clinical Annotations

To see the clinical annotation for this variant please [register or sign in.](#)

#### Sign In

PharmGKB accounts are required for both Pooled and summary data can be viewed. You are being asked to sign in with your U

User Id

Password

[Sign In](#)

[Have you registered?](#)

[Did you forget your password?](#)

VARIANT:

rs1800460 at chr6:18139228 in [TPMT](#) (VIP)

### Alleles

A/G

### Amino Acid Translation

Ala153Thr

### Alternate Names:

c.460G>A, g.18247207C>T, g.21147G>A, p.Ala154Thr

### Haplotypes

This variant is used to determine: [TPMT\\*3A](#), [TPMT\\*3B](#), [TPMT\\*3D](#)

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## Clinical Annotations

PharmGKB clinical annotations provide information about variant-drug pairs based on a summary of the individual variant annotations in the database. Therefore, each clinical annotation could represent information from a single paper or multiple papers. The rating system used to assign "Strength of Evidence" levels is described [here](#). Manually curated by PharmGKB.

All alleles are displayed on the positive chromosomal strand.

Strength of Evidence: Level 1

**Drugs:** [azathioprine](#), [mercaptopurine](#), [purine analogues](#), [thioguanine](#)

CC	Patients with the CC genotype may have a different clinical response compared to patients with the CT or TT genotype. Patients with the CC genotype may have a different clinical response compared to patients with the CT or TT genotype. Other genetic and clinical factors may also influence the clinical response.
CT	Patients with the CT genotype may have an intermediate clinical response compared to patients with the CC or TT genotype.
TT	Patients with the TT genotype may have an intermediate clinical response compared to patients with the CC or CT genotype.

Race: Unknown

Type: Toxicity/ADR

## Assigning "Strength of Evidence"

### Strength of Evidence Criteria

1. Replication
2. Population size
3. P-value of association (after Bonferroni correction)
4. In vitro or PK evidence

### Strength of Evidence Levels

- Level 1: Requires replication in populations of at least 1000 cases and 1000 controls of the same ethnicity and p-values <0.05 after correction.
- Level 2: Requires p-values <0.05 after correction and at least one population =>100, may or may not be replicated.
- Level 3: Does not meet the criteria for Level 2 because of population size or p-value, or the association is based on in vitro/PK evidence **only**.

VARIANT:  
rs1800460 at chr6:18139228 in TPMT (VIP)

Alleles  
A/G

Amino Acid Translation  
Ala154Thr

Alternate Names:  
TPMT\*3B, c.460G>A, p.18247207C>T, p.21147G>A, p.Ala154Thr

Haplotypes  
This variant is used

Click for article-level variant annotation

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All alleles are displayed on the positive chromosomal strand.

Strength of Evidence: Level 1

Drugs: [azathioprine](#), [mercaptopurine](#), [purine analogues](#), [thioguanine](#)

CC	Patients with the CC genotype may have a decreased risk for toxicity with thiopurine drugs and purine analogues as compared to patients with the CT or TT genotype. Patients with the CC genotype may still be at risk for toxicity when taking thiopurine drugs and purine analogues based on their genotype. Other genetic and clinical factors may also influence a patient's risk for toxicity.
CT	Patients with the CT genotype may have an increased risk for toxicity with thiopurine drugs and purine analogues as compared to patients with the CC genotype.
TT	Patients with the TT genotype may have a decreased risk for toxicity with thiopurine drugs and purine analogues as compared to patients with a CC genotype.

Clinical annotations is tagged with associated drugs, diseases, race and category (tox, efficacy or dosage) information.

Race: Unknown  
Type: Toxicity/ADR

VARIANT:

rs1800460 at chr6:18139228 in [TPMT](#) (VIP)

### Alleles

A/G

### Amino Acid Translation

Ala154Thr

### Alternate Names:

TPMT\*3B, c.460G>A, g.18247207C>T, g.21147G>A, p.Ala154Thr

### Haplotypes

This variant is used to determine: [TPMT\\*3A](#), [TPMT\\*3B](#), [TPMT\\*3D](#)

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## Variant Annotations

PharmGKB variant annotations provide information about variant-drug pairs based on individual PubMed publications. Therefore, each annotation represents information from a single paper and the goal is to report the information that the author states, not an interpretation of the paper. Manually curated by PharmGKB.

Allele T is associated with increased risk of Deafness when treated with cisplatin in people with Neoplasms as compared to allele C . [disease] [disease]

Associated Drugs: [cisplatin](#)

Evidence: [19898482](#)

Study Size (cases/controls)	Allele Frequency	OMB Race Category ?	Population Characteristics	Association P-value
53 /		Unknown	Age Group: pediatric	0.022
/109		Unknown	Age Group: pediatric	0.046

Paper Discusses:

PD

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**azathioprine**

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Genetic Tests

A non-comprehensive list of genetic tests for specific variants, including descriptions of and links to individual tests; manually curated by PharmGKB. The information listed is provided for educational purposes only and does not constitute an endorsement of any listed test or manufacturer.

PGx Test	Variants Assayed	Gene <sup>?</sup>
<a href="#">Prometheus TPMT Genetics</a>	Not available	<a href="#">TPMT</a>
<a href="#">TPMT GenotypR</a>	<a href="#">rs1142345</a> , <a href="#">rs1800460</a> , <a href="#">rs1800462</a>	<a href="#">TPMT</a>

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Causative allele for the low dose phenotype

Related drug: Warfarin

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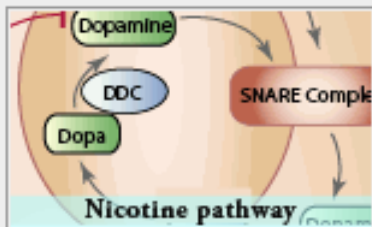
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[examples](#)

hint: enter a gene, rsid, drug, disease

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[examples](#)

hint: enter a gene, drug, disease

### Clinical Interpretations



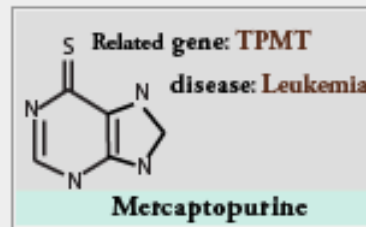
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hint: enter a gene, rsid, drug, disease

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hint: enter a gene, rsid, drug, disease

## Level 1 Clinical Annotations

These clinical variants meet the highest level of criteria (manually curated by PharmGKB). The highest level of criteria requires independent replication of the association in populations of at least 1000 cases and 1000 controls of the same ethnicity and p-values  $<0.05$  after correction. Occasional exceptions are made by curators for associations that are widely accepted in the pharmacogenetics community and for which large studies are not feasible. A [complete list of clinical variants](#) is available for download. Please read the [strength of evidence documentation](#) for a complete description of the different levels of criteria.

### [Clinical Annotation for rs1800460](#)

Related To: [azathioprine mercaptopurine purine analogues therapy](#) the TPMT

### [Clinical Annotation for rs1800462](#)

Related To: [azathioprine mercaptopurine purine analogues therapy](#) the

### [Clinical Annotation for rs776746](#)

Related To: [cyclosporine](#)

### [Clinical Annotation for rs12248560](#)

Related To: [clopidogrel](#)

### [Clinical Annotation for rs4244285](#)



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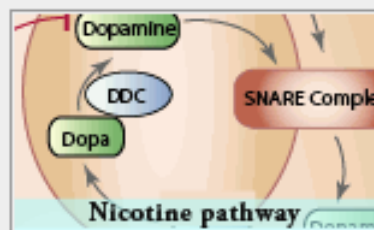
**rs9923231**

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hint: enter a gene, rsid, drug, disease

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hint: enter a gene, drug, disease

### Clinical Interpretations

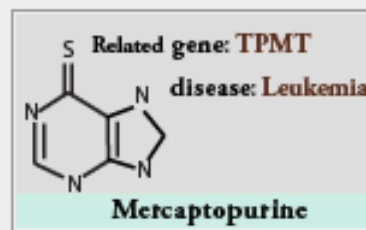


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hint: enter a gene, rsid, drug, disease

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hint: enter a gene, rsid, drug, disease

## Dosing Guidelines

These dosing guidelines have been published by the [Clinical Pharmacogenetics Implementation Consortium \(CPIC\)](#) or the [Royal Dutch Association for the Advancement of Pharmacy – Pharmacogenetics Working Group \(DPWG\)](#) (manually curated by PharmGKB).

Types Available	Drug - Gene Pair
DPWG	<a href="#">abacavir</a> - <a href="#">HLA-B</a>
DPWG	<a href="#">acenocoumarol</a> - <a href="#">CYP2C9</a>
DPWG	<a href="#">acenocoumarol</a> - <a href="#">VKORC1</a>
DPWG	<a href="#">amitriptyline</a> - <a href="#">CYP2D6</a>
DPWG	<a href="#">aripiprazole</a> - <a href="#">CYP2D6</a>
DPWG	<a href="#">atomoxetine</a> - <a href="#">CYP2D6</a>
CPIC DPWG	<a href="#">azathioprine</a> - <a href="#">TPMT</a>
DPWG	<a href="#">capecitabine</a> - <a href="#">DPYD</a>
DPWG	<a href="#">carvedilol</a> - <a href="#">CYP2D6</a>
DPWG	<a href="#">citalopram</a> - <a href="#">CYP2C19</a>
DPWG	<a href="#">clomipramine</a> - <a href="#">CYP2D6</a>
CPIC DPWG	<a href="#">clopidogrel</a> - <a href="#">CYP2C19</a>
DPWG	<a href="#">clozapine</a> - <a href="#">CYP2D6</a>
DPWG	<a href="#">codeine</a> - <a href="#">CYP2D6</a>
DPWG	<a href="#">doxepin</a> - <a href="#">CYP2D6</a>
DPWG	<a href="#">duloxetine</a> - <a href="#">CYP2D6</a>
DPWG	<a href="#">escitalopram</a> - <a href="#">CYP2C19</a>
DPWG	<a href="#">esomeprazole</a> - <a href="#">CYP2C19</a>
DPWG	<a href="#">flecainide</a> - <a href="#">CYP2D6</a>
DPWG	<a href="#">fluorouracil</a> - <a href="#">DPYD</a>
DPWG	<a href="#">flupenthixol</a> - <a href="#">CYP2D6</a>
DPWG	<a href="#">glibenclamide</a> - <a href="#">CYP2C9</a>
DPWG	<a href="#">gliclazide</a> - <a href="#">CYP2C9</a>

## Find Data By Type

### Genomic Variations

**VKORC1, G3673A**

**Causative allele for the low dose phenotype**

**Related drug: Warfarin**

**rs9923231**

- [Annotated SNPs by gene](#)
- [Annotated SNPs by drug](#)
- [Annotated SNPs by disease](#)
- [Genes with Haplotype Translations](#)

[examples](#)

hint: enter a gene, rsid, drug, disease

### Clinical Interpretations

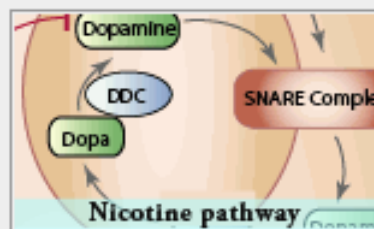


- [Clinical variant annotations](#)
- [Dosing guidelines](#)
- [Drug labels](#)
- [Genetic tests for PGx](#)

[examples](#)

hint: enter a gene, rsid, drug, disease

### Pathways



- [Pharmacokinetic pathways](#)
- [Pharmacodynamic pathways](#)
- [All pathways](#)
- [Pathways by therapeutic categories](#)

[examples](#)

hint: enter a gene, drug, disease

### Drugs & Small Molecules

**Related gene: TPMT**

**disease: Leukemia**

**Mercaptopurine**

- [Drugs with genetic information](#)
- [Drugs with data](#)
- [Drugs by therapeutic categories](#)

[examples](#)

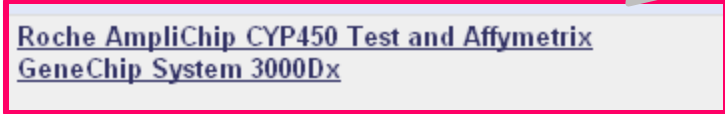
hint: enter a gene, rsid, drug, disease

### List Genetic Tests

This is a **non-comprehensive list** of genetic tests with pharmacogenetics relevance (manually curated by PharmGKB). The information listed is provided for educational purposes only and **does not** constitute an endorsement of any listed test or manufacturer. If you would like to suggest a test to add, please send email to [feedback](#).

Genetic Test	Gene	Related Drugs
<a href="#">BCR-ABL Quantitation; ABL Kinase Domain Sequencing</a>	<a href="#">BCR</a>	<a href="#">imatinib</a> <a href="#">Nilotinib</a>
<a href="#">Roche AmpliChip CYP450 Test and Affymetrix GeneChip System 3000Dx</a>	<a href="#">CYP2C19</a> <a href="#">CYP2D6</a>	<a href="#">clopidogrel</a> <a href="#">codeine</a> <a href="#">esomeprazole</a> <a href="#">fluoxetine</a> <a href="#">metoprolol</a> <a href="#">omeprazole</a> <a href="#">phenytoin</a> <a href="#">risperidone</a> <a href="#">tamoxifen</a>
<a href="#">Infiniti CYP450 2C19</a>	<a href="#">CYP2C19</a>	<a href="#">clopidogrel</a> <a href="#">esomeprazole</a> <a href="#">omeprazole</a> <a href="#">phenytoin</a>
<a href="#">TrimGen Corporation eQ-PCR LC Warfarin Genotyping Kit</a>	<a href="#">CYP2C9</a> <a href="#">VKORC1</a>	<a href="#">warfarin</a>
<a href="#">TheraGuide 5-FU</a>	<a href="#">DPYD</a> <a href="#">TYMS</a>	<a href="#">capecitabine</a> <a href="#">fluorouracil</a>
<a href="#">therascreen EGFR PCR Kit - EUROPE</a>	<a href="#">EGFR</a>	<a href="#">erlotinib</a> <a href="#">gefitinib</a>
<a href="#">PathVysion HER-2 DNA Probe Kit</a>	<a href="#">ERBB2</a>	<a href="#">trastuzumab</a>
<a href="#">PGxPredict:RITUXIMAB</a>	<a href="#">FCGR3A</a>	<a href="#">rituximab</a>
<a href="#">HLA-B*5701 Test</a>	<a href="#">HLA-B</a>	<a href="#">abacavir</a>
<a href="#">HLA-B*1502 Carbamazepine Sensitivity</a>	<a href="#">HLA-B</a>	<a href="#">carbamazepine</a> <a href="#">phenytoin</a>
<a href="#">Pgx Predict: CLOZAPINE</a>	<a href="#">HLA-DQB1</a>	<a href="#">clozapine</a>
<a href="#">Therascreen- KRAS Mutation Detection Kit -EUROPE</a>	<a href="#">KRAS</a>	<a href="#">cetuximab</a> <a href="#">panitumumab</a>
<a href="#">KRAS Mutation Detection Kit - Mutector II</a>	<a href="#">KRAS</a>	<a href="#">cetuximab</a> <a href="#">panitumumab</a>
<a href="#">Prometheus TPMT Genetics</a>	<a href="#">TPMT</a>	<a href="#">azathioprine</a> <a href="#">mercaptopurine</a>
<a href="#">TPMT GenotypR</a>	<a href="#">TPMT</a>	<a href="#">azathioprine</a> <a href="#">mercaptopurine</a> <a href="#">thioguanine</a>

Click for test specific info



**GENETIC TEST:****Roche AmpliChip CYP450 Test and Affymetrix Gene**[Click for specific product info](#)For more detailed information on this genetic test, please consult the [manufacturer's page](#) on this test.**Variants Assayed**

Gene	Variants Assayed	Related Drugs
<a href="#">CYP2C19</a>	<a href="#">rs11188072</a>	<a href="#">clopidogrel</a> , <a href="#">esomeprazole</a> , <a href="#">omeprazole</a> , <a href="#">phenytoin</a>
<a href="#">CYP2D6</a>	<a href="#">rs1135840</a> , CYP2D6*1, CYP2D6*2ABD, CYP2D6*3, CYP2D6*4ABDJK, CYP2D6*5, CYP2D6*6ABC, CYP2D6*7, CYP2D6*8, CYP2D6*9, CYP2D6*10AB, CYP2D6*11, CYP2D6*15, CYP2D6*17, CYP2D6*19, CYP2D6*20, CYP2D6*29, CYP2D6*35, CYP2D6*36, CYP2D6*40, CYP2D6*41, CYP2D6*1XN, CYP2D6*2XN, CYP2D6*4XN, CYP2D6*10XN, CYP2D6*17XN, CYP2D6*35XN, CYP2D6*41XN, [HAP : CYP2D6*7][HAP : CYP2D6*8][HAP : CYP2D6*9][HAP : CYP2D6*11][HAP : CYP2D6*15][HAP : CYP2D6*19][HAP : CYP2D6*20][HAP : CYP2D6*29][HAP : CYP2D6*35][HAP : CYP2D6*36][HAP : CYP2D6*40]	<a href="#">codeine</a> , <a href="#">fluoxetine</a> , <a href="#">metoprolol</a> , <a href="#">risperidone</a> , <a href="#">tamoxifen</a>

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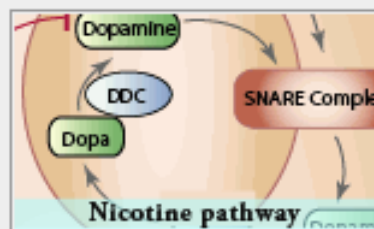


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- [Drug labels](#) ←
- [Genetic tests for PGx](#)

azathioprine   [examples](#)

hint: enter a gene, rsid, drug, disease

### Pathways

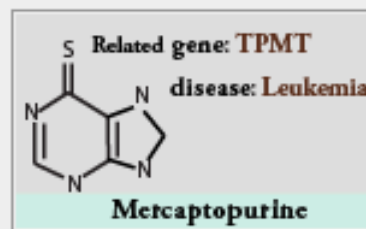


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find pathways   [examples](#)

hint: enter a gene, drug, disease

### Drugs & Small Molecules



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find drugs   [examples](#)

hint: enter a gene, rsid, drug, disease



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