ID: 000000000

Genetics for people

Pharmacogenetics

MyPharma

BASIC

PHARMACOLOGICAL COMPATIBILITY

The pharmacological compatibility according to gene-drug interaction for each of the drugs analysed in the test is shown below. The drugs were chosen following pharmacogenetic annotations approved by the major expert consortia: US Food and Drug Administration (FDA), European Medicines Agency (EMA), Swiss Agency of Therapeutic Products (Swissmedic), Pharmaceuticals and Medical Devices Agency, Japan (PMDA) and Health Canada (Santé Canada) (HCSC).
Note: Drugs categories contain other drugs not listed due to the absence of pharmacogenetic annotations.

In the table, the drugs considered for each category are classified according to their potential impact into ***'No associated impact'***, ***'Limited impact'***, ***'Moderate impact'*** and ***'High impact'***. Drugs classified as ***'No associated impact'*** are those in which no analysed risk variants have been found in the patient. It is recommended to pay special attention to clinical notes and therapeutic recommendations for those drugs classified as ***'Moderate impact'*** and ***'High impact'***, which may include a drug change or dose modification, among others.

Category	High impact	Moderate impact	Limited impact	No associated impact
NSAIs		Ketoprofen	Aspirin Celecoxib Ibuprofen	Diclofenac
Antimigraine				Sumatriptan
Opioids		Buprenorphine Fentanyl Methadone Morphine Oxycodone	Codeine Tramadol	
Local anaesthetics	Ketamine		Propofol Sevoflurane	Enflurane Halothane Methoxyflurane Desflurane Isoflurane Rocuronium
Corticosteroids		Dexamethasone		
Anti-infectives	Atazanavir Efavirenz	Isoniazid Ritonavir	Nevirapine Voriconazole	
Anxiolytics		Lorazepam		Alprazolam Nitrous oxide

Category	High impact	Moderate impact	Limited impact	No associated impact
Antidepressant	Sertraline	Fluoxetine Mirtazapine	Amitriptyline Citalopram Clomipramine Desipramine Duloxetine Escitalopram Fluvoxamine Nortriptyline Paroxetine Venlafaxine	Imipramine Trimipramine
Anti-epileptic		Valproic Acid Lamotrigine Oxcarbazepine Topiramate	Carbamazepine Phenytoin Gabapentin	Mephenytoin Pregabalin
Antipsychotic		Clozapine Thioridazine	Aripiprazole Haloperidol Olanzapine Quetiapine Risperidone	
ADHD			Methylphenid-ate	Dextroamphet-amine
Antiemetic			Ondansetron	
Tabaquism		Bupropion		
Antiarrhythmic		Digoxin		
Anticoagulant	Warfarin	Acenocoumarol Phenprocou-mon		
Antidiabetic			Metformin	Sitagliptin Vildagliptin
Antiplatelet			Clopidogrel	
Antihypertens-ives		Losartan	Enalapril	

Category	High impact	Moderate impact	Limited impact	No associated impact
Statins	Atorvastatin Fluvastatin Lovastatin Pitavastatin Pravastatin Rosuvastatin Simvastatin	Cerivastatin		
Beta blocking agents		Bisoprolol	Atenolol	
Respiratory		Salbutamol Triamcinolone	Montelukast	
Oncology	Fluorouracil	Imatinib	Cyclophosph-amide Cisplatin Doxorubicin	Thioguanine
Immunosup-pressants	Tacrolimus	Methotrexate	Mycophenolic Acid Azathioprine Cyclosporine Mercaptopurine Sirolimus	
Proton pump	Esomeprazole Lansoprazole Omeprazole	Rabeprazole		
Diuretics		Allopurinol Spironolactone	Hydro-chlorothiazide Furosemide	
Urological		Sildenafil		
Ophthalmologic		Latanoprost		

DETAILED RESULTS

All the drugs analysed that have been classified as **High impact**, **Moderate impact** **and** **Limited impact** by MyPharma Basic pharmacogenetic algorithm are shown in detail below.

Each drug is reported in a table containing the genes (**Gene**) and details of the single nucleotide variants (**SNP**) or haplotypes interacting with it (**Variant/Haplotype**). In addition, the column **Level of evidence** indicates the level of evidence for the drug-gene variant combination (1A, 1B, 2A, 2B, 3) from the Pharmacogenomics Knowledge Base (PharmGKB), drug regulatory agencies (FDA, EMA) and international pharmacogenetics consortia (CPIC and DPWG), followed by the **Affected parameter**: [E]Efficacy, [D]Dose, [T]Toxicity, [O]Other and [Pk]Pharmacokinetics. Finally, the specific **clinical annotations** for each affected variant are included, based on the recommendations in the PharmGKB database.

The therapeutic recommendation associated with each medicine is shown after the table, in accordance to the results and information provided.

	Ketamine			N° AFFECTED VARIANTS 1/2
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
CYP2B6	*6	3	D E T O **Pk**	Reduced drug elimination

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, and given its classification as a drug with a high risk impact, it is recommended to seek medical assessment.

	Atazanavir			N° AFFECTED VARIANTS 4/9
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
UGT1A1	*28	1A	D E **T** O Pk	Increased risk of hyperbilirubinemia
	rs887829	3	D E T **O** Pk	Increased risk of hyperbilirubinemia and bilirubin-related drug discontinuation
UGT1A7	rs7586110	3	D E **T** O Pk	Increased risk of hyperbilirubinemia
CYP3A5	*3	3	D E T O **Pk**	Decreased metabolism

Therapeutic recommendation: There are annotations for one or more affected variants where the CPIC recommends warning individuals carrying two reduced-activity UGT1A1 alleles of the substantial likelihood of developing jaundice, which may cause non-adherence, and to consider alternative agents if the risk of non-adherence due to jaundice is high.

Efavirenz				N° AFFECTED VARIANTS 8/16
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
ABCB1	rs1045642	3	D E T **O** Pk	Decreased clearance
	*6	1A	D E **T** O **Pk**	Decreased metabolism, increased risk of side effects and lower dose requirement
CYP2B6	rs8192709	3	D E T O **Pk**	Decreased metabolism
	rs8192719	3	D E T O **Pk**	Increased plasma drug concentrations
HNF4A	rs1884613	3	D E T O **Pk**	Increased plasma drug concentrations
HTR2A	rs6313	3	D E **T** O Pk	Decreased response to treatment
IL10	rs1800896	3	D E **T** O Pk	Increased risk of drug hypersensitivity
NR1I3	rs3003596	3	D E T O **Pk**	Increased plasma drug concentrations

Therapeutic recommendation: There are annotations for one or more affected variants where CPIC recommends starting efavirenz treatment at a reduced dose of 400 or 200 mg/day for patients who are slow CYP2B6 metabolisers and starting efavirenz treatment at a reduced dose of 400 mg/day for patients who are intermediate CYP2B6 metabolisers. The DPWG recommends to adjust the initial efavirenz dose for patients who are slow CYP2B6 metabolisers along with the consideration of age, weight and BMI and titrate the dose to plasma concentration if needed.

Sertraline				N° AFFECTED VARIANTS 6/10
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
ABCB1	rs2032583 rs4148739	3	D **E** T O Pk	Lower likelihood of remission
REEP5	rs153549 rs153560	3	D **E** T O Pk	Reduced response to treatment
SRP19	rs495794	3	D **E** T O Pk	Reduced response to treatment
CYP2B6	*6	1A	D E T O **Pk**	Increased serum drug concentration

Therapeutic recommendation: There are annotations for one or more affected variants where CPIC recommends a slower titration and lower than standard maintenance dose

in intermediate metabolisers. For slow metabolisers, it is recommended to initiate treatment with a reduced dose, a slower titration and a maintenance dose 25% lower than the standard dose or to use an alternative drug not metabolised by CYP2B6.

	Warfarin			N° AFFECTED VARIANTS 19/38
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
APOB	rs679899 rs13671117	3	D E **T** O Pk	Increased risk of bleeding
APOE	rs7412	3	D **E** T O Pk	Increased response time from the administration
CYP2C19	rs3814637	3	**D** E T O Pk	Need for higher dose
CYP2C9	rs4917639 rs10509680 rs4918758	3	**D** E T O Pk	Need for higher dose
CYP4F2	rs2108622	1A	**D** E T O Pk	Need for higher dose
	rs2189784	3	**D** E T O Pk	Increased time to achieve therapeutic international normalized ratio
EPHX1	rs1877724	3	**D** E T O Pk	Need for higher dose
GGCX	rs11676382	3	**D** E T O Pk	Need for higher dose
POR	rs41301394	3	**D** E T O Pk	Need for higher dose
STX1B	rs72800847	3	**D** E T O Pk	Need for higher dose
UGT1A1	rs887829	3	**D** E T O Pk	Increased maintenance dose
VKORC1	rs8050894 rs2359612	1B	**D** E T O Pk	Need for higher dose
	rs9934438	1B	**D E** T O Pk	Increased dose, shorter prothrombin time AUC (R)-warfarin / (S)-warfarin and increased INR time in therapeutic range (TTR)
	rs2884737	2A	**D** E T O Pk	Need for higher dose
	rs11150606	3	**D** E T O Pk	Need for higher dose

Therapeutic recommendation: There are annotations for one or more affected variants where the DPWG and CPIC recommend dose modification. For more information, **please read the specific Annex related to warfarin in detail.**

Atorvastatin				N° AFFECTED VARIANTS 20/40
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
ABCB1	rs1045642 rs2032582	3	D **E** T O Pk	Decreased response to treatment
ABCC2	rs717620	3	D **E** T O Pk	Lower decrease in triglycerides
ABCG8	rs11887534	3	D **E** T O Pk	Decreased response to treatment
APOE	rs7412	2B	D **E** T O Pk	Decreased response to treatment
BDKRB2	rs1799722	3	D E T O **Pk**	Decreased response to treatment
COQ2	rs6535454	3	D E **T** O Pk	Increased risk of statin intolerance
	rs4693075	3	D E **T** O Pk	Increased risk of statin-related muscle symptoms
CYP3A4	rs2242480	3	D **E** T O Pk	Decreased response to treatment
CYP3A5	rs17161788	3	D **E** T O Pk	Decreased response to treatment
	*3	3	D **E T** O Pk	Decreased response to treatment and increased risk of myalgia and a greater degree of muscle damage
MYLIP	rs9370867	3	D **E** T O Pk	Decreased ldl-c responses and less likely to achieve target ldl levels
PON1	rs662	3	D **E** T O Pk	Smaller increase in hdl cholesterol
POR	rs1057868	3	D **E** T O Pk	Smaller reduction in total cholesterol
RYR2	rs2819742	3	D E **T** O Pk	Increased risk of myalgia
SCARB1	rs5888	3	D **E** T O Pk	Decreased response to treatment

Atorvastatin				N° AFFECTED VARIANTS 20/40
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
SLCO1B1	*15	1A	D E T O **Pk**	Increased atorvastatin concentrations
	rs4149056	1A	D E **T** O **Pk**	Increased risk of myopathy and increased exposure
	rs4149036	3	D **E** T O Pk	Decreased response to treatment
CYP2D6	*60	3	D **E** T O Pk	There is no annotation for this drug-haplotype interaction. However, this haplotype does not have enzymatic activity, so it is recommended to consult your physician.

Therapeutic recommendation: There are annotations for one or more affected variants where the Royal Dutch Pharmacists Association recommends choosing an alternative for patients with the SLCO1B1 521 CC or TC genotype (rs4149056) and with ADDITIONAL SIGNIFICANT RISK FACTORS for statin-induced myopathy. For patients without additional significant risk factors for statin-induced myopathy, they advise contacting their physician in case of muscle symptoms.

Fluvastatin				N° AFFECTED VARIANTS 7/13
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
APOE	rs7412	3	D **E** T O Pk	Decreased response to treatment
CETP	rs4783961	3	D **E** T O Pk	Decreased response to treatment
CYP3A4	rs4986910	3	D **E** T O Pk	Smaller increase in hdl cholesterol
SLCO1B1	rs4149056	1A	D E **T** O **Pk**	Increased risk of myopathy and increased exposure
	*15	1A	D **E T** O **Pk**	Increased fluvastatin concentration and higher risk of myopathy
	rs11045819	3	D **E** T O Pk	Smaller reduction in ldl cholesterol
CYP2D6	*1	3	D **E** T O Pk	Decreased response to treatment

Therapeutic recommendation: There are annotations for one or more affected variants where the Royal Dutch Pharmacists Association recommends choosing an alternative for patients with the SLCO1B1 521 CC or TC genotype (rs4149056) and with ADDITIONAL SIGNIFICANT RISK FACTORS for statin-induced myopathy. For patients without additional significant risk factors for statin-induced myopathy, they advise contacting their physician in case of muscle symptoms.

	Lovastatin			N° AFFECTED VARIANTS 5/8
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
CETP	rs708272	3	D **E** T O Pk	Decreased response to treatment
CYP3A5	rs776746	3	D **E** T O Pk	Decreased response to treatment
LDLR	rs688 rs5925	3	D **E** T O Pk	Smaller reduction in cholesterol
SLCO1B1	rs4149056	1A	D E **T** O **Pk**	Increased plasma drug concentration and increased likelihood of myopathy

Therapeutic recommendation: There are annotations for one or more affected variants where the Royal Dutch Pharmacists Association recommends choosing an alternative for patients with the SLCO1B1 521 CC or TC genotype (rs4149056) and with ADDITIONAL SIGNIFICANT RISK FACTORS for statin-induced myopathy. For patients without additional significant risk factors for statin-induced myopathy, they advise contacting their physician in case of muscle symptoms.

	Pitavastatin			N° AFFECTED VARIANTS 4/5
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
ABCC2	rs717620	3	D E T O **Pk**	Reduced drug elimination
SLCO1B1	*15	1A	D E T O **Pk**	Increased atorvastatin concentrations
	rs4149056	1A	D E T O **Pk**	Increased plasma drug concentrations
	rs2306283	3	D E T **O** Pk	Increased plasma concentrations

Therapeutic recommendation: There are annotations for one or more affected variants where CPIC recommends prescribing ≤20mg for slow metabolisers and ≤40mg to intermediate metabolisers as a starting dose. Adjust atorvastatin doses based on disease-specific guidelines. The prescriber should be aware of the potential increased risk of myopathy, especially for the 40mg dose.

Pravastatin				N° AFFECTED VARIANTS 10/21
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
ABCA1	rs2230806	3	D **E** T O Pk	Decreased response to treatment
ABCC2	rs113646094	3	D E T O **Pk**	Reduced drug elimination
ACE	rs4341	3	D **E** T O Pk	Decreased response to treatment
APOE	rs7412	3	D **E** T O Pk	Decreased response to treatment
LIPC	rs1800588	3	D **E** T O Pk	Smaller increase in hdl cholesterol
LPL	rs328	3	D **E** T O Pk	Decreased response to treatment
MMP3	rs35068180	3	D **E** T O Pk	Decreased response to treatment
NPC1L1	rs17655652	3	D **E** T O Pk	Decreased response to treatment
SLCO1B1	rs4149056	1A	D E **T** O **Pk**	Increased risk of myopathy and increased exposure
TLR4	rs4986790	3	D **E** T O Pk	Decreased response to treatment

Therapeutic recommendation: There are annotations for one or more affected variants where the Royal Dutch Pharmacists Association recommends choosing an alternative for patients with the SLCO1B1 521 CC or TC genotype (rs4149056) and with ADDITIONAL SIGNIFICANT RISK FACTORS for statin-induced myopathy. For patients without additional significant risk factors for statin-induced myopathy, they advise contacting their physician in case of muscle symptoms.

Rosuvastatin				N° AFFECTED VARIANTS 8/17
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
-	rs2808630	3	D **E** T O Pk	Decreased response to treatment
ABCG2	rs2231142	2A	D **E** T O Pk	Smaller reduction in ldl cholesterol
CETP	rs5882	3	D **E** T O Pk	Decreased response to treatment

Rosuvastatin				N° AFFECTED VARIANTS 8/17
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
COQ2	rs6535454	3	D E **T** O Pk	Increased risk of statin intolerance
	rs4693075	3	D E **T** O Pk	Increased risk of statin-related muscle symptoms
SLCO1B1	rs4149056	1A	D E **T** O **Pk**	Increased risk of myopathy and increased exposure
	*15	1A	D E **T** O **Pk**	Higher risk of myopathy and increased exposure to rosuvastatin
CYP2D6	*60	3	D **E** T O Pk	There is no annotation for this drug-haplotype interaction. However, this haplotype does not have enzymatic activity, so it is recommended to consult your physician.

Therapeutic recommendation: There are annotations for one or more affected variants where CPIC recommends prescribing ≤20mg as a starting dose and adjusting rosuvastatin doses based on disease- and population-specific guidelines for slow metabolisers of SLCO1B1 or ABCG2. If a dose higher than 20mg is needed to achieve the desired efficacy, consider combination therapy (i.e. rosuvastatin plus non-statin medical therapy according to guidelines). Slow metabolisers of ABCG2 and SLOC1B1 should be prescribed ≤10mg as a starting dose.

Simvastatin				N° AFFECTED VARIANTS 13/32
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
-	rs1346268	3	D E **T** O Pk	Increased risk of myopathy
ABCB1	rs2032582	3	D **E** **T** O Pk	Increased risk of myalgia and decreased response to treatment
	rs1128503	3	D **E** **T** O Pk	Smaller reduction in ldl and total cholesterol and increased risk of myalgia
	rs1045642	3	D E **T** O Pk	Increased risk of myalgia
CYBA	rs4673	3	D E T **O** Pk	Less likely to benefit from treatment

Simvastatin

N° AFFECTED VARIANTS 13/32

Gene	Variant	Level of evidence	Affected parameter	Variant annotation
F3	rs3917643	3	D **E** T O Pk	Decreased response to treatment
PON1	rs662	3	D **E** T O Pk	Smaller increase in hdl cholesterol
RYR2	rs2819742	3	D E **T** O Pk	Increased risk of myalgia
SCAP	rs12487736	3	D **E** T O Pk	Decreased response to treatment
SLCO1B1	rs4149056	1A	D E **T** O **Pk**	Increased risk of myopathy and increased exposure
	*15	1A	D E **T** O **Pk**	Increased simvastatin acid concentration and higher risk of myopathy
UGT1A9	rs2003569	3	D **E** T O Pk	Decreased response to treatment
CYP2D6	*60	3	D **E** T O Pk	There is no annotation for this drug-haplotype interaction. However, this haplotype does not have enzymatic activity, so it is recommended to consult your physician.

Therapeutic recommendation: There are annotations for one or more affected variants where CPIC recommends prescribing an alternative statin based on the desired potency for slow SLCO1B1 metabolisers. If treatment with simvastatin is warranted in slow SLCO1B1 metabolisers, limit the dose to <20mg/day.

Fluorouracil

N° AFFECTED VARIANTS 33/77

Gene	Variant	Level of evidence	Affected parameter	Variant annotation
-	rs2960436	3	D **E** T O Pk	Lower probability of survival
ABCB1	rs1045642	3	D **E** **T** O Pk	Shorter disease-free survival time and increased risk of anaemia
ABCC2	rs3740066	3	D E **T** O Pk	Increased likelihood of nausea
	rs2273697	3	D E **T** O Pk	Increased risk of anaemia

Fluorouracil				N° AFFECTED VARIANTS 33/77
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
ABCC5	rs3749438	3	D E **T** O Pk	Increased risk for grade 3–4 severe diarrhea
ABCG1	rs225440	3	D E **T** O Pk	Increased risk of neutropenia
ALDH3A1	rs2228100	3	D E **T** O Pk	Increased risk of leukopenia and anemia
CBR1	rs20572	3	D E T O **Pk**	Increased drug exposure
CYP1B1	rs1056836	3	D **E** T O Pk	Decreased response to treatment
	rs1056836	3	D E **T** O Pk	Increased likelihood of nausea
CYP2C19	rs12248560	3	D E **T** O Pk	Increased risk of leukopenia
DPYD	rs1801160	1A	D E **T O** Pk	Decreased gene activity in response to fluorouracil exposure and increased risk roxicity
	rs1801159	1A	D E **T** O Pk	Increased risk of toxicity
	rs115632870	3	D E T **O** Pk	Decreased gene activity in response to fluorouracil exposure
EGFR	rs2293347	3	D **E** T O Pk	Decreased response to treatment
ERCC1	rs11615	3	D **E T** O Pk	Increased risk of anaemia and shortened disease-free survival time
ERCC2	rs13181	3	D **E T** O Pk	Increased risk of toxicity and increased likelihood of relapse
GALNT14	rs9679162 rs12613732	3	D **E** T O Pk	Decreased response to treatment
HLA-G	rs17179108	3	D **E** T O Pk	Decreased response to treatment
MIR27A	rs895819	3	D E **T** O Pk	Increased risk of toxicity
MTHFR	rs1801133	3	D **E** T O Pk	Decreased response to treatment

Fluorouracil				N° AFFECTED VARIANTS 33/77
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
PON1	rs662	3	D **E** T O Pk	Decreased response to treatment
RGS5	rs1056515	3	D **E** T O Pk	Decreased response to treatment
SELE	rs3917412	3	D **E** T O Pk	Decreased response to treatment
SLC22A16	rs6907567	3	D **E** T O Pk	Need for higher doses
	rs714368	3	D **E T O** Pk	Increased likelihood of nausea
TYMS	rs2847153	3	D **E** T O Pk	Lower probability of survival
VEGFA	rs699947	3	D **E** T O Pk	Decreased response to treatment
WNT5B	rs2010851	3	D E T **O** Pk	Shorter time to relapse
XRCC1	rs1799782	3	D **E** T O Pk	Shorter survival time
	rs25487	3	D **E T** O Pk	Increased likelihood of nausea and reduced response to treatment
XRCC4	rs2075685	3	D **E** T O Pk	Decreased response to treatment

Therapeutic recommendation: There are annotations for one or more affected variants where the CPIC and DPWG recommend using an alternative drug other than tegafur for slow metabolisers of DPYD. If administered, it should be at a very low dose with therapeutic monitoring. For intermediate metabolisers, a dose reduction to 50% is recommended. Patients with the AA genotype at rs67376798 may also require a 50% dose reduction. The DPWG considers DPYD genotyping as 'essential' and recommends DPYD testing before initiating treatment with fluoropyrimidines.

Tacrolimus				N° AFFECTED VARIANTS 22/40
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
ABCB1	rs1128503 rs2032582	3	D **E** T O Pk	Decreased response to treatment
	rs1045642	3	D **E T** O **Pk**	Increased plasma concentrations, decreased absorption rate and increased estimated glomerular filtrarion rate (eGFR)
	rs9282564	3	D E T O **Pk**	Decreased response to treatment
ABCC2	rs3740066	3	D E T O **Pk**	Increased plasma drug concentrations
CTLA4	rs4553808	3	D E T O **Pk**	Reduced drug elimination
CYP3A4	rs2242480	2A	D E T O **Pk**	Decreased metabolism
	rs4646437	2A	D E T O **Pk**	Need for higher dose
	rs2740574	3	D E **T** O Pk	Greater likelihood of transplant rejection
CYP3A5	*3	1A	D E **T** O **Pk**	Decreased metabolism and increased risk of nephrotoxicity
	rs4646450	3	D E T O **Pk**	Decreased response to treatment
	rs15524	3	D E T O **Pk**	Need for higher dose
HSD11B1	rs846908 rs4844880 rs846910	3	D E T O **Pk**	Increased plasma drug concentrations
IL18	rs1946518	3	D E T O **Pk**	Decreased metabolism
IL3	rs181781	3	D E T O **Pk**	Reduced drug elimination
NOD2	rs2066844	3	D **E** T O Pk	Longer post-transplantation hospital stay
NR1I2	rs2276707	3	D E T O **Pk**	Need for higher dose
PPARA	rs4253728	3	D E **T** O Pk	Decreased response to treatment

Tacrolimus				N° AFFECTED VARIANTS 22/40
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
TCF7L2	rs290487	3	D E **T** O Pk	Increased risk of new-onset diabetes
TLR4	rs1927907	3	D E T **O** Pk	Increased dose adjusted trough concentration

Therapeutic recommendation: There are annotations for one or more affected variants where the CPIC and DPWG recommend increasing the starting dose by 1.5 to 2 times the recommended starting dose in patients who are normal or intermediate CYP3A5 metabolisers, although the total starting dose should not exceed 0.3 mg/kg/day.

Esomeprazole				N° AFFECTED VARIANTS 2/2
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
STAT6	rs1059513	3	D **E** T O Pk	Decreased likelihood of achieving a proton pump inhibitor-responsive esophageal eosinophilia outcome
CYP2C19	*1	3	D **E** T O Pk	Decreased response to treatment

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, and given its classification as a drug with a high risk impact, it is recommended to seek medical assessment.

Lansoprazole				N° AFFECTED VARIANTS 2/2
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
ABCB1	rs1045642	3	D E T O **Pk**	Increased plasma drug concentrations
IL1B	rs16944	3	D **E** T O Pk	Increased chance of eradication failure

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, and given its classification as a drug with a high risk impact, it is recommended to seek medical assessment.

Omeprazole				N° AFFECTED VARIANTS 3/3
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
ABCB1	rs1045642	3	D **E** T O **Pk**	Decreased absorption rate
IL1B	rs16944	3	D **E** T O Pk	Increased chance of eradication failure
CYP2C19	*1	1A	D **E** T O Pk	Decreased response to treatment

Therapeutic recommendation: There are annotations for one or more affected variants where the CPIC recommends increasing the starting daily dose and monitoring efficacy in CYP2C19 ultrarapid metabolisers. For fast and normal CYP2C19 metabolisers in the treatment of *H. Pylori* infection and erosive oesophagitis, increase the dose after initiation to the standard starting daily dose. Recommendations for intermediate and slow metabolisers for chronic treatment is to consider a 50% daily dose reduction.

Ketoprofen				N° AFFECTED VARIANTS 2/3
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
CYP2C9	*1	3	D **E** T O Pk	Reduced response to treatment
CYP2D6	*60	3	D E **T** O Pk	There is no annotation for this drug-haplotype interaction. However, this haplotype does not have enzymatic activity, so it is recommended to consult your physician.

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, and given its classification as a drug with a moderate risk impact, it is recommended to seek medical assessment.

Buprenorphine				N° AFFECTED VARIANTS 5/8
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
COMT	rs4680	3	D E **T** O Pk	Increased risk of adverse effects and prenatal abstinence syndrome.
OPRD1	rs529520	3	D **E** T O Pk	Reduced response to treatment
	rs2234918	3	D E **T** O Pk	Increased risk of adverse effects

Buprenorphine				N° AFFECTED VARIANTS 5/8
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
OPRM1	rs1799971	3	D E **T** O Pk	Increased risk of adverse effects
UGT2B7	rs7662029	3	D E T O **Pk**	Lower drug concentration in plasma

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, and given its classification as a drug with a moderate risk impact, it is recommended to seek medical assessment.

Fentanyl				N° AFFECTED VARIANTS 12/23
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
-	rs11959113	3	**D** E T O Pk	Need for higher dose
ABCB1	rs1045642	3	**D** E T O Pk	Need for higher dose
ADRB2	rs1042718	3	D E **T** O Pk	Increased risk of hypotension when combined with propofol, sevofluorane or remifentanil.
ASTN2	rs958804	3	**D** E T O Pk	Need for higher dose
CACNA1E	rs3845446	3	**D** E T O Pk	Need for higher dose
CYP3A4	rs2242480	2A	**D E** T O Pk	Lower response to treatment and need for higher doses
KCNJ6	rs2835859	3	**D** E T O Pk	Need for higher dose
MYD88	rs6853	3	D E **T** O Pk	Increased risk of adverse effects
OPRD1	rs2234918	3	D E **T** O Pk	Increased risk of adverse effects
OPRM1	rs1799971	3	D **E** T O Pk	Reduced response to treatment
	rs9397685	3	D E **T** O Pk	Increased risk of adverse effects
CYP3A5	*3	3	D E **T** O **Pk**	Increased risk of adverse effects and reduced metabolism

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, and given its classification as a drug with a moderate risk impact, it is recommended to seek medical assessment.

Methadone				N° AFFECTED VARIANTS 30/42
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
ABCB1	rs1045642	3	**D** E T O **Pk**	Recommendation subject to other parameters, susceptible to dose increase.
	rs9282564	3	D E T O **Pk**	Increased plasma drug concentrations
ALDH5A1	rs2760118	3	D **E** T O Pk	Reduced response to opioid addiction treatment
CCL11	rs1129844	3	D E **T** O Pk	Increased risk of adverse effects in opioid addiction treatment
CNR1	rs806368	3	**D** E T O Pk	Need for higher doses for opioid addiction treatment
COMT	rs4680	3	D E **T** O Pk	Increased severity of Neonatal Abstinence Syndrome.
CYP2B6	*6	2A	D E T O **Pk**	Reduced drug elimination
	rs3745274	3	**D** E T O Pk	Need for higher doses for opioid addiction treatment
	rs2279343	3	**D** E **T** O Pk	Need for higher doses for the treatment of opioid addiction and risk of neonatal abstinence syndrome.
CYP3A4	rs2246709	3	D E **T** O Pk	Increased severity of adverse effects in opioid addiction treatment
DRD2	rs1799978 rs6275	3	**D** E T O Pk	Need for higher doses for opioid addiction treatment
GAD1	rs3749034	3	**D** E T O Pk	Need for higher doses for opioid addiction treatment

Methadone				N° AFFECTED VARIANTS 30/42
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
GNB3	rs5443	3	D E **T** O Pk	Increased risk of adverse effects in opioid addiction treatment
KCNJ6	rs2070995	3	D E T **O** Pk	Increased withdrawal symptoms in heroin addicts on methadone treatment
NGF	rs2239622	3	**D** E T O Pk	Need for higher doses for opioid addiction treatment
OPRD1	rs678849	3	D **E** T O Pk	Reduced response to opioid addiction treatment
	rs797397	3	D E T O **Pk**	Lower drug concentration in plasma
OPRM1	rs1799971	3	D E **T** O Pk	Increased risk of Neonatal Abstinence Syndrome.
UGT2B7	rs4554144 rs6600879 rs6600880 rs6600893 rs7438135 rs7662029 rs7668258	3	D **E** T O Pk	Reduced response to opioid addiction treatment
	rs7439366	3	D **E T** O **Pk**	Lower plasma drug concentration and lower response to opioid addiction treatment
	rs11940316	3	D **E T** O Pk	Increased risk of adverse effects and reduced response to opioid addiction treatment
CYP2D6	*1	3	**D E** T O Pk	Lower response to treatment and need for higher doses
	*60	3	D E T O **Pk**	There is no annotation for this drug-haplotype interaction. However, this haplotype does not have enzymatic activity, so it is recommended to consult your physician.

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, and given its classification as a drug with a moderate risk impact, it is recommended to seek medical assessment.

Morphine				N° AFFECTED VARIANTS 9/14
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
ABCB1	rs1045642	3	D **E** T O Pk	Reduced response to treatment
COMT	rs6269	3	D **E** T O Pk	Reduced response to treatment
FAAH	rs324420	3	D E **T** O Pk	Increased risk of adverse effects
	rs2295632 rs3766246 rs4141964	3	D E **T** O Pk	Increased risk of postoperative nausea and vomiting in children.
OPRK1	rs1051660	3	**D** E T O Pk	Need for higher dose
OPRM1	rs1799971	3	D E **T** O Pk	Increased risk and severity of adverse effects
SLC6A4	rs1042173	3	**D** E T O Pk	Need for higher dose

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, and given its classification as a drug with a moderate risk impact, it is recommended to seek medical assessment.

Oxycodone				N° AFFECTED VARIANTS 6/9
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
ABCB1	rs1045642	3	**D** E T O Pk	Need for higher dose
COMT	rs4680	3	D E **T** O Pk	Increased risk of vomiting in conjunction with naloxone
OPRM1	rs1799971	3	D E **T** O Pk	Increased risk of adverse effects in conjunction with naloxone
CYP2D6	*60	3	D E T O **Pk**	There is no annotation for this drug-haplotype interaction. However, this haplotype does not have enzymatic activity, so it is recommended to consult your physician.
	*1	3	D E **T** O Pk	Increased risk of opioid dependence
CYP3A5	*3	3	**D** E T O Pk	Need for higher doses

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, and given its classification as a drug with a moderate risk impact, it is recommended to seek medical assessment.

	Dexamethasone			N° AFFECTED VARIANTS 4/6
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
ABCB1	rs2229109	3	D **E** T O Pk	Decreased progression-free survival (PFS) in multiple myeloma
	rs1045642 rs2032582	3	D **E** T O Pk	Reduced survival in multiple myeloma
CTNNB1	rs4135385	3	D **E T** O Pk	Reduced response to treatment in multiple myeloma

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, and given its classification as a drug with a moderate risk impact, it is recommended to seek medical assessment.

	Isoniazid			N° AFFECTED VARIANTS 8/18
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
CYP2C19	rs4986893	3	D E **T** O Pk	Increased risk of adverse effects
CYP2C9	rs9332096	3	D E **T** O Pk	Increased risk of adverse effects
MAFK	rs4720833	3	D E **T** O Pk	Increased risk of hepatotoxicity
NAT2	*6A	1B	D E **T** O **Pk**	Increased risk of hepatotoxicity and reduced metabolism
	rs1041983	3	D E **T** O Pk	Increased risk of toxicity and hepatotoxicity
	rs1799930	3	D E **T** O Pk	Increased risk of toxicity in conjunction with phenytoin.
	rs4646244	3	D E **T** O **Pk**	Increased risk of hepatitis
CYP2B6	*1	3	D E **T** O Pk	Increased risk of hepatotoxicity

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, and given its classification as a drug with a moderate risk impact, it is recommended to seek medical assessment.

Ritonavir				N° AFFECTED VARIANTS 4/9
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
ABCB1	rs2032582	3	D E T O **Pk**	Increased plasma drug concentration
APOC3	rs2854116 rs5128	3	D E **T** O Pk	Increased severity of triglyceride elevation
UGT1A7	rs7586110	3	D E **T** O Pk	Increased risk of hyperbilirubinemia

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, and given its classification as a drug with a moderate risk impact, it is recommended to seek medical assessment.

Lorazepam				N° AFFECTED VARIANTS 1/1
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
UGT2B15	rs1902023	3	D E T O **Pk**	Reduced drug elimination

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, and given its classification as a drug with a moderate risk impact, it is recommended to seek medical assessment.

Fluoxetine				N° AFFECTED VARIANTS 9/15
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
ABCB1	rs4148739	3	D **E** T O Pk	Lower likelihood of remission
GSK3B	rs334558	3	D **E** T O Pk	Reduced response to treatment
HTR1A	rs6295	3	D **E** T O Pk	Reduced response to treatment
REEP5	rs153549 rs153560	3	D **E** T O Pk	Reduced response to treatment
SERPINE1	rs1799889 rs2227631	3	D **E** T O Pk	Reduced response to treatment
SRP19	rs495794	3	D **E** T O Pk	Reduced response to treatment

Fluoxetine				N° AFFECTED VARIANTS 9/15
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
CYP2D6	*60	3	D E T O **Pk**	There is no annotation for this drug-haplotype interaction. However, this haplotype does not have enzymatic activity, so it is recommended to consult your physician.

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, and given its classification as a drug with a moderate risk impact, it is recommended to seek medical assessment.

Mirtazapine				N° AFFECTED VARIANTS 4/10
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
SH2B1	rs3888190	3	D E **T** O Pk	Increased risk of adverse effects
TPH2	rs1487278	3	D **E** T O Pk	Reduced response to treatment
CYP2B6	*1	3	D **E** T **O** Pk	Lower response to treatment and lower metabolism
CYP2D6	*60	3	D E T O **Pk**	There is no annotation for this drug-haplotype interaction. However, this haplotype does not have enzymatic activity, so it is recommended to consult your physician.

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, and given its classification as a drug with a moderate risk impact, it is recommended to seek medical assessment.

Valproic Acid				N° AFFECTED VARIANTS 11/19
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
ANKK1	rs1800497	3	D E **T** O Pk	Increased risk of developing adverse effects
CYP1A1	rs2606345	3	D **E** T O Pk	Lower response to treatment in women

Valproic Acid				N° AFFECTED VARIANTS 11/19
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
GABRA1	rs2279020	3	D **E** T O Pk	Increased risk of experiencing drug resistance
GRIN2B	rs1019385	3	**D** E T O Pk	Need for higher dose
LEPR	rs1137101	3	D E **T** O Pk	Increased risk of developing adverse effects
SH2B1	rs3888190	3	D E **T** O Pk	Increased risk of developing adverse effects
UGT1A	rs2070959 rs6759892	3	**D** E T O Pk	Need for higher dose
UGT1A6	rs1105879	3	**D** E T O Pk	Need for higher dose
	*2E	3	**D** E T O Pk	There is no annotation for this drug-haplotype interaction. However, this haplotype has increased enzyme activity, so it is recommended to consult your physician.
CYP2C9	*1	3	**D** E T O **Pk**	Higher dose requirement

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, and given its classification as a drug with a moderate risk impact, it is recommended to seek medical assessment.

Lamotrigine				N° AFFECTED VARIANTS 3/5
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
ABCG2	rs3114020	3	D E T O **Pk**	Increased plasma drug concentrations
SCN2A	rs2304016	3	D **E** T O Pk	Increased risk of experiencing resistance to antiepileptic drugs
SLC22A1	rs628031	3	D E T O **Pk**	Increased plasma drug concentrations

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, and given its classification as a drug with a moderate risk impact, it is recommended to seek medical assessment.

Oxcarbazepine				N° AFFECTED VARIANTS 2/4
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
SCN2A	rs2304016	3	D **E** T O Pk	Increased risk of experiencing resistance to antiepileptic drugs
UGT2B7	rs7439366	3	D **E** T O Pk	Reduced response to treatment

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, and given its classification as a drug with a moderate risk impact, it is recommended to seek medical assessment.

Topiramate				N° AFFECTED VARIANTS 1/2
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
SCN2A	rs2304016	3	D **E** T O Pk	Increased risk of experiencing drug resistance

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, and given its classification as a drug with a moderate risk impact, it is recommended to seek medical assessment.

Clozapine				N° AFFECTED VARIANTS 15/27
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
ABCB1	rs10248420 rs7787082	3	D **E** T O Pk	Reduced response to treatment
CNR1	rs1049353 rs806378	3	D E **T** O Pk	Increased risk of adverse effects
COMT	rs4680	3	D **E** T O Pk	Reduced response to treatment
FAAH	rs324420	3	D E **T** O Pk	Increased risk of adverse effects
GCG	rs13429709	3	D E T **O** Pk	Increased risk of adverse effects
HTR2C	rs3813929	3	D E **T** O Pk	Increased risk of adverse effects
HTR3A	rs1062613 rs2276302	3	D **E** T O Pk	Reduced response to treatment

Clozapine				N° AFFECTED VARIANTS 15/27
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
ITIH3	rs2535629	3	D **E** T O Pk	Reduced response to treatment
SH2B1	rs3888190	3	D E **T** O Pk	Increased risk of adverse effects
TBC1D1	rs9852	3	D E **T** O Pk	Increased risk of adverse effects
CYP1A2	*1	3	D E T O **Pk**	Higher drug concentration
GSTT1	*D	3	D E **T** O Pk	Increased risk of neutropenia

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, and given its classification as a drug with a moderate risk impact, it is recommended to seek medical assessment.

Thioridazine				N° AFFECTED VARIANTS 1/2
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
CYP1A2	rs762551	3	D E **T** O Pk	Increased risk of having an increased QT interval

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, and given its classification as a drug with a moderate risk impact, it is recommended to seek medical assessment.

Bupropion				N° AFFECTED VARIANTS 8/16
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
ANKK1	rs1800497	3	D **E** T O Pk	Reduced response to treatment
CYP2B6	*6	2A	D E T O **Pk**	Lower metabolism
	rs2279343 rs3211371	3	D **E** T O Pk	Reduced response to treatment
DRD1	rs11746641 rs11749035 rs2168631	3	D **E** T O Pk	Reduced likelihood of abstinence

Bupropion				N° AFFECTED VARIANTS 8/16
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
HTR2A	rs2770296	3	D **E** T O Pk	Reduced response to treatment

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, and given its classification as a drug with a moderate risk impact, it is recommended to seek medical assessment.

Digoxin				N° AFFECTED VARIANTS 3/6
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
ADRB1	rs1801253	3	D **E** T O Pk	Increased risk of emergency department visits
NOS1AP	rs10494366	3	D E **T** O Pk	Smaller qt-interval shortening effect
NOS3	rs1799983	3	D **E** T O Pk	Increased risk of emergency department visits

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, and given its classification as a drug with a moderate risk impact, it is recommended to seek medical assessment.

Acenocoumarol				N° AFFECTED VARIANTS 2/8
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
VKORC1	rs9934438	2A	**D** E T O Pk	Need for higher dose
CYP2C9	*1	1B	**D** E T O Pk	Higher dose requirement

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, and given its classification as a drug with a moderate risk impact, it is recommended to seek medical assessment.

Phenprocoumon				N° AFFECTED VARIANTS 6/8
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
CYP2C9	rs4086116	3	**D** E T O Pk	Need for higher dose

Phenprocoumon				N° AFFECTED VARIANTS 6/8
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
CYP4F2	rs2108622	3	**D** E T O Pk	Need for higher dose
PPARA	rs4253728	3	**D** E T O Pk	Need for higher dose
PROC	rs1799808	3	**D** E T O Pk	Need for higher dose
STX4	rs10871454	3	**D** E T O Pk	Need for higher dose
VKORC1	rs9934438	2A	**D** E T O Pk	Need for higher dose

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, and given its classification as a drug with a moderate risk impact, it is recommended to seek medical assessment.

Losartan				N° AFFECTED VARIANTS 4/7
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
ABCB1	rs1045642	3	D **E** T O Pk	Decreased response to treatment
CAMK1D	rs10737062 rs10752271	3	D **E** T O Pk	Decreased response to treatment
STK39	rs6749447	3	D **E** T O Pk	Decreased response to treatment

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, and given its classification as a drug with a moderate risk impact, it is recommended to seek medical assessment.

Cerivastatin				N° AFFECTED VARIANTS 1/1
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
SLCO1B1	rs4149056	3	D E **T** O Pk	Increased risk of cerivastatin-related rhabdomyolysis

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, and given its classification as a drug with a moderate risk impact, it is recommended to seek medical assessment.

Bisoprolol				N° AFFECTED VARIANTS 1/1
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
-	rs12346562	3	D **E** T O Pk	Reduced response to treatment

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, and given its classification as a drug with a moderate risk impact, it is recommended to seek medical assessment.

Salbutamol				N° AFFECTED VARIANTS 3/3
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
CRHR2	rs7793837 rs2267715	3	D **E** T O Pk	Decreased response to treatment
DUSP1	rs881152	3	D **E** T O Pk	Decreased response to treatment

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, and given its classification as a drug with a moderate risk impact, it is recommended to seek medical assessment.

Triamcinolone				N° AFFECTED VARIANTS 2/2
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
HCG22	rs2523864 rs3873352	3	D E **T** O Pk	Increased risk of increased intraocular pressure

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, and given its classification as a drug with a moderate risk impact, it is recommended to seek medical assessment.

Imatinib				N° AFFECTED VARIANTS 12/24
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
ABCB1	rs2235040	3	D E **T** O Pk	Increased risk for periorbital edema
ABCC2	rs2273697	3	D **E** T O Pk	Shorter survival time

Imatinib				N° AFFECTED VARIANTS 12/24
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
ABCG2	rs2231137	3	**D** E T O Pk	Need for higher doses
	rs13120400 rs2725252	3	D **E** T O Pk	Decreased response to treatment
BCL2L11	rs724710	3	D **E** T O Pk	Decreased response to treatment
CYP3A5	rs776746	3	D E T O **Pk**	Increased trough concentrations of imatinib
NQO1	rs10517	3	D **E** T O Pk	Decreased survival time without disease progression
SLC22A1	rs628031	3	D **E** T O Pk	Decreased response to treatment
SLC22A4	rs1050152	3	D **E** T O Pk	Decreased response to treatment
SLC22A5	rs2631372	3	D **E** T O Pk	Decreased response to treatment
SLCO1A2	rs3764043	3	D E T O **Pk**	Decreased clearance

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, and given its classification as a drug with a moderate risk impact, it is recommended to seek medical assessment.

Methotrexate				N° AFFECTED VARIANTS 35/72
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
ABCB1	rs1045642	3	D **E T** O Pk	Increased risk of drug toxicity
ABCC1	rs3784864	3	D **E** T O Pk	Decreased response to treatment
	rs35592	3	D **E** T O Pk	Less likely to have improvement in psoriasis area and severity
	rs2238476	3	D **E T** O Pk	Decreased response to treatment and increased risk of toxicity
	rs246240	3	D E **T** O Pk	Increased risk of toxicity

Methotrexate				N° AFFECTED VARIANTS 35/72
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
ABCC2	rs717620	3	D **E** T O Pk	Decreased response to treatment
	rs17222723	3	D E **T** O Pk	Increased risk of leukopenia
	rs3740065	3	D E **T** O Pk	Increased risk of toxicity
ABCC4	rs9516519	3	D E **T** O Pk	Increased risk for toxicity and increased plasma level
ABCG2	rs13120400	3	D **E** T O **Pk**	Decreased clearance
	rs12505410	3	D E T O **Pk**	Reduced drug elimination
	rs2231142	3	D E **T** O Pk	Increased risk of adverse events
ADORA2A	rs2298383 rs5760410	3	D E **T** O Pk	Increased risk of adverse events
ARID5B	rs10821936	3	D E T **O** Pk	Lower methotrexate polyglutamate accumulation
	rs4948496	3	D E **T** O **Pk**	Increased risk of leukopenia and increased plasma concentrations
ATIC	rs4673993	2B	D **E** T O Pk	Decreased response to treatment
	rs2372536	3	D **E** T O Pk	Decreased response to treatment
	rs16853826	3	D E **T** O Pk	More likely to discontinue treatment due to toxicity
ATP5F1E	rs1059150	3	D **E** T O Pk	Decreased response to treatment
CCND1	rs9344	3	D **E** **T** O Pk	Increased risk of drug toxicity
ERCC2	rs13181	3	D E **T** O Pk	Increased risk of nephrotoxicity
FOXP3	rs3761548	3	D **E** T O Pk	Decreased response to treatment

Methotrexate				N° AFFECTED VARIANTS 35/72
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
FPGS	rs1544105	3	D **E** T O **Pk**	Lower response to treatment and lower plasma drug concentration
GGH	rs3758149	3	D **E** T O **Pk**	Decreased response to treatment
	rs719235	3	D E **T** O Pk	Increased risk of bone marrow toxicity
KLRC1	rs7301582	3	D **E** T O Pk	Decreased response to treatment
MTHFR	rs1801133	2A	D **E T** O **Pk**	Increased risk of graft vs host disease
MTR	rs1805087	3	D **E T** O Pk	Decreased response to treatment
MTRR	rs1801394	3	D **E T** O Pk	Increased risk of drug toxicity and decrased response to treatment
SLC16A7	rs3763980	3	D **E** T O Pk	Decreased response to treatment
SLC19A1	rs1051266	2A	D **E T** O Pk	Decreased response to treatment and increased risk of toxicity
	rs1051296	3	D E T O **Pk**	Increased plasma drug concentrations
SLCO1A2	rs4149009	3	D E T O **Pk**	Reduced drug elimination
SLCO1B1	rs4149056	3	D **E** T O **Pk**	Decreased response to treatment and decreased clearance

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, and given its classification as a drug with a moderate risk impact, it is recommended to seek medical assessment.

Rabeprazole				N° AFFECTED VARIANTS 1/1
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
IL1B	rs16944	3	D **E** T O Pk	Increased chance of eradication failure

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, and given its classification as a drug with a moderate risk impact, it is recommended to seek medical assessment.

Allopurinol				N° AFFECTED VARIANTS 5/8
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
AOX1	rs75995567 rs3731722	3	**D** E T O Pk	Need for higher dose
PSORS1C1	rs9263726	3	D E **T** O Pk	Increased risk of DRESS Syndrome or Stevens-Johnson Syndrome
	rs3131003	3	D E **T** O Pk	Increased risk of severe cutaneous adverse reactions
UGT1A	rs34650714	3	**D** E T O Pk	Need for higher dose

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, and given its classification as a drug with a moderate risk impact, it is recommended to seek medical assessment.

Spironolactone				N° AFFECTED VARIANTS 3/4
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
ADD1	rs4961	3	D **E** T O Pk	Decreased response to treatment
ADRB1	rs1801253	3	D **E** T O Pk	Increased risk of emergency room visits
NOS3	rs1799983	3	D **E** T O Pk	Increased risk of emergency room visits

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, and given its classification as a drug with a moderate risk impact, it is recommended to seek medical assessment.

Sildenafil				N° AFFECTED VARIANTS 3/4
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
ACE	rs4343	3	D **E** T O Pk	Decreased response to treatment
GNB3	rs5443	3	D **E** T O Pk	Decreased response to treatment
VEGFA	rs699947	3	D **E** T O Pk	Decreased response to treatment

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, and given its classification as a drug with a moderate risk impact, it is recommended to seek medical assessment.

Latanoprost				N° AFFECTED VARIANTS 2/3
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
ABCC4	rs11568658	3	D **E** T O Pk	Decreased response to treatment
PTGFR	rs3753380	3	D **E** T O Pk	Decreased response to treatment

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, and given its classification as a drug with a moderate risk impact, it is recommended to seek medical assessment.

Aspirin				N° AFFECTED VARIANTS 20/46
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
-	rs2768759	3	D **E** T O Pk	Reduced response to treatment
ACE	rs4291	3	D E **T** O Pk	Increased risk of adverse effects
CYP4F2	rs2108622	3	D **E** T **O** Pk	Increased platelet aggregation in conjunction with clopidogrel and epinephrine
FCER1G	rs11587213	3	D E **T** O Pk	Increased risk of adverse effects in the case of chronic urticaria.

Aspirin				N° AFFECTED VARIANTS 20/46
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
GP1BA	rs6065	3	D **E** T O Pk	Reduced response to treatment and increased risk of aspirin resistance
HNMT	rs1050891	3	D E **T** O Pk	Increased risk of adverse effects
IL1B	rs1143627	3	D E **T** O Pk	Increased risk of adverse effects
IL4	rs2243250	3	D E **T** O Pk	Increased risk of adverse effects
ITGA2	rs1062535 rs1126643	3	D **E** T O Pk	Reduced response to treatment
LTC4S	rs730012	3	D E **T** O Pk	Increased risk of adverse effects
NOS3	rs1799983	3	D E **T** O Pk	Increased risk of adverse effects
PTGER2	rs2075797	3	D E **T** O Pk	Increased risk of adverse effects
PTGER3	rs7551789	3	D E **T** O Pk	Increased risk of adverse effects
SLC6A12	rs557881	3	D E **T** O Pk	Increased risk of adverse effects
TBXA2R	rs1131882	3	D E **T** O Pk	Increased risk of mortality in patients with type 2 diabetes
TBXAS1	rs6962291	3	D E **T** O Pk	Increased risk of adverse effects
TGFB1	rs1800469	3	D E **T** O Pk	Increased risk of adverse effects
THRA	rs11819745	3	D E **T** O Pk	Increased risk of adverse effects
TLR3	rs3775291	3	D E **T** O Pk	Increased risk of adverse effects

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, it is recommended to seek medical assessment.

Celecoxib

N° AFFECTED VARIANTS 2/6

Gene	Variant	Level of evidence	Affected parameter	Variant annotation
ALOX12	rs11078659	3	D **E** **T** O Pk	Increased risk of adenoma recurrence in colorectal neoplasm.
PTGER4	rs4133101	3	D E **T** O Pk	Increased risk of adverse effects

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, it is recommended to seek medical assessment.

Ibuprofen

N° AFFECTED VARIANTS 1/3

Gene	Variant	Level of evidence	Affected parameter	Variant annotation
CYP2C8	*1	3	**D** E T O Pk	Need for higher doses

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, it is recommended to seek medical assessment.

Codeine

N° AFFECTED VARIANTS 3/6

Gene	Variant	Level of evidence	Affected parameter	Variant annotation
UGT2B7	rs7439366	3	**D** E T O Pk	Need for higher dose
CYP2D6	*60	3	D **E** T O **Pk**	There is no annotation for this drug-haplotype interaction. However, this haplotype does not have enzymatic activity, so it is recommended to consult your physician.
	*1	3	D E **T** O Pk	Increased risk of opioid dependence

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, it is recommended to seek medical assessment.

Tramadol				N° AFFECTED VARIANTS 6/12
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
ABCB1	rs2032582	3	D **E** T O Pk	Reduced response to treatment
	rs1045642	3	D **E T** O **Pk**	Increased drug elimination, risk of reduced efficacy and increased risk of developing dependence
	rs1128503	3	D E T O **Pk**	Increased drug elimination
OPRD1	rs2234918	3	D E **T** O Pk	Increased risk of adverse effects
OPRM1	rs1799971	3	D **E** T O Pk	Reduced response to treatment
CYP2D6	*60	3	**D E T** O **Pk**	There is no annotation for this drug-haplotype interaction. However, this haplotype does not have enzymatic activity, so it is recommended to consult your physician.

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, it is recommended to seek medical assessment.

Propofol				N° AFFECTED VARIANTS 1/3
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
ADRB2	rs1042718	3	D E **T** O Pk	Increased severity of hypotension in neurosurgery

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, it is recommended to seek medical assessment.

Sevoflurane				N° AFFECTED VARIANTS 4/45
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
ADRB2	rs1042718	3	D E **T** O Pk	Increased severity of hypotension in neurosurgery
FASTKD3	rs1801394	3	D **E** T **O** Pk	Lower response to treatment and higher risk of lowering mean arterial blood pressure
GABRA2	rs279858	3	D E T **O** Pk	Increased risk of decreased mean arterial pressure
KCNK3	rs1275988	3	D E T **O** Pk	Increased risk of increased mean arterial pressure

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, it is recommended to seek medical assessment.

Nevirapine				N° AFFECTED VARIANTS 3/14
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
-	rs6545803	3	D E **T** O Pk	Increased risk of drug-induced rash
ABCB1	rs1045642	3	D E **T** O Pk	Increased risk of hepatotoxicity
GSTM1	*D	3	D E **T** O Pk	Increased risk of Stevens-Johnson Syndrome/Toxic Epidermal Necrolysis (SJS/TEN)

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, it is recommended to seek medical assessment.

Voriconazole				N° AFFECTED VARIANTS 1/3
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
SLCO2B1	rs3781727	3	D E T O **Pk**	Reduced drug elimination

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, it is recommended to seek medical assessment.

Amitriptyline				N° AFFECTED VARIANTS 11/14
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
ABCB1	rs10248420 rs10280101 rs11983225 rs12720067 rs2032583 rs2235040 rs2235067 rs4148739 rs4148740 rs7787082	3	D **E** T O Pk	Lower likelihood of remission
CYP2D6	*60	3	D E **T** O **Pk**	There is no annotation for this drug-haplotype interaction. However, this haplotype does not have enzymatic activity, so it is recommended to consult your physician.

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, it is recommended to seek medical assessment.

Citalopram				N° AFFECTED VARIANTS 28/33
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
-	rs352428 rs585719	3	D **E** T O Pk	Reduced response to treatment
	rs4675690	3	D E **T** O Pk	Increased risk of suicidal ideation
ABCB1	rs10248420 rs10280101 rs11983225 rs12720067 rs2032583 rs2235040 rs2235067 rs4148739 rs4148740 rs7787082	3	D **E** T O Pk	Lower likelihood of remission
BDNF	rs7124442	3	D **E** T O Pk	Reduced response to treatment
CRHR2	rs2270007	3	D **E** T O Pk	Reduced response to treatment
ERICH3	rs11580409	3	D **E** T O Pk	Reduced response to treatment

Citalopram				N° AFFECTED VARIANTS 28/33
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
GLDC	rs10975641	3	D **E** T O Pk	Reduced response to treatment
GRIA3	rs4825476	3	D E **T** O Pk	Increased risk of suicidal ideation
GSK3B	rs334558	3	D **E** T O Pk	Reduced response to treatment
HTR1B	rs6296	3	D E **T** O Pk	Increased risk of adverse effects
HTR2A	rs6311 rs6313	3	D E **T** O Pk	Increased risk of adverse effects
NEDD4L	rs520210	3	D **E** T O Pk	Reduced response to treatment
REEP5	rs153549 rs153560	3	D **E** T O Pk	Reduced response to treatment
SRP19	rs495794	3	D **E** T O Pk	Reduced response to treatment
CYP2D6	*1	3	**D** E T O Pk	Need for higher doses
	*60	3	D E T O **Pk**	There is no annotation for this drug-haplotype interaction. However, this haplotype does not have enzymatic activity, so it is recommended to consult your physician.

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, it is recommended to seek medical assessment.

Clomipramine				N° AFFECTED VARIANTS 3/6
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
FKBP5	rs1360780	3	D E **T** O Pk	Increased risk of suicidal ideation
HTR1B	rs130058	3	D E **T** O Pk	Increased risk of suicidal ideation

Clomipramine				N° AFFECTED VARIANTS 3/6
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
CYP2D6	*60	3	D E **T** O **Pk**	There is no annotation for this drug-haplotype interaction. However, this haplotype does not have enzymatic activity, so it is recommended to consult your physician.

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, it is recommended to seek medical assessment.

Desipramine				N° AFFECTED VARIANTS 3/5
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
MC1R	rs2228478 rs2228479	3	D **E** T O Pk	Lower likelihood of remission
CYP2D6	*60	3	D E **T** O **Pk**	There is no annotation for this drug-haplotype interaction. However, this haplotype does not have enzymatic activity, so it is recommended to consult your physician.

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, it is recommended to seek medical assessment.

Duloxetine				N° AFFECTED VARIANTS 1/5
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
DRD3	rs963468	3	D **E** T O Pk	Reduced response to treatment

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, it is recommended to seek medical assessment.

Escitalopram				N° AFFECTED VARIANTS 9/16
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
-	rs352428	3	D **E** T O Pk	Reduced response to treatment
	rs2069521	3	D E T O **Pk**	Reduced metabolism
CYP1A2	rs4646425 rs4646427	3	D E T O **Pk**	Reduced metabolism
	rs2069526	3	D E T O **Pk**	Reduced metabolism
ERICH3	rs11580409	3	D **E** T O Pk	Reduced response to treatment
GLDC	rs10975641	3	D **E** T O Pk	Reduced response to treatment
HTR1B	rs11568817	3	D E **T** O Pk	Increased risk of adverse effects
IL11	rs1126757	3	D **E** T O Pk	Reduced response to treatment

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, it is recommended to seek medical assessment.

Fluvoxamine				N° AFFECTED VARIANTS 5/9
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
ABCB1	rs2032583	3	D **E** T O Pk	Lower likelihood of remission
FGF2	rs1449683	3	D **E** T O Pk	Reduced response to treatment
HTR1A	rs10042486 rs1364043	3	D **E** T O Pk	Reduced response to treatment
CYP2D6	*60	3	D E T O **Pk**	There is no annotation for this drug-haplotype interaction. However, this haplotype does not have enzymatic activity, so it is recommended to consult your physician.

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, it is recommended to seek medical assessment.

Nortriptyline				N° AFFECTED VARIANTS 2/6
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
GNB3	rs5443	3	D **E** T O Pk	Reduced response to treatment
CYP2D6	*60	3	D E **T** O **Pk**	There is no annotation for this drug-haplotype interaction. However, this haplotype does not have enzymatic activity, so it is recommended to consult your physician.

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, it is recommended to seek medical assessment.

Paroxetine				N° AFFECTED VARIANTS 28/35
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
ABCB1	rs10248420 rs10280101 rs11983225 rs12720067 rs2032583 rs2235040 rs2235067 rs4148739 rs4148740 rs7787082	3	D **E** T O Pk	Lower likelihood of remission
ADM	rs11042725	3	D **E** T O Pk	Reduced response to treatment
CYP1A2	rs762551	3	**D** E **T** O Pk	Increased risk of adverse effects and need for higher doses
	rs4646425 rs4646427	3	D **E** T O Pk	Increased response time from the administration
	rs2470890 rs2472304	3	D **E** T O Pk	Lower likelihood of remission
DRD3	rs6280	3	D **E** T O Pk	Reduced response to treatment
FKBP5	rs1360780	3	D E **T** O Pk	Increased risk of suicidal ideation
GDNF	rs2216711	3	D **E** T O Pk	Reduced response to treatment

Paroxetine				N° AFFECTED VARIANTS 28/35
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
HTR1A	rs10042486 rs1364043	3	D **E** T O Pk	Reduced response to treatment
HTR1B	rs130058	3	D E T **O** Pk	Increased risk of suicidal ideation
HTR2A	rs6311 rs6313	3	D E **T** O Pk	Increased risk of adverse effects
REEP5	rs153549 rs153560	3	D **E** T O Pk	Reduced response to treatment
SRP19	rs495794	3	D **E** T O Pk	Reduced response to treatment
CYP2D6	*60	3	D E T O **Pk**	There is no annotation for this drug-haplotype interaction. However, this haplotype does not have enzymatic activity, so it is recommended to consult your physician.

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, it is recommended to seek medical assessment.

Venlafaxine				N° AFFECTED VARIANTS 18/27
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
ABCB1	rs10248420 rs10280101 rs11983225 rs12720067 rs2032583 rs2235040 rs2235067 rs4148739 rs4148740 rs7787082	3	D **E** T O Pk	Lower likelihood of remission
COMT	rs4680	3	D **E** T O Pk	Lower response in depressive disorders
FKBP5	rs1360780	3	D E **T** O Pk	Increased risk of suicidal ideation
GRIA3	rs3761554 rs502434	3	D **E** T O Pk	Reduced response to treatment

Venlafaxine				N° AFFECTED VARIANTS 18/27
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
HTR1B	rs130058	3	D E **T** O Pk	Increased risk of suicidal ideation
SLC6A2	rs2242446	3	D **E** T O Pk	Reduced response to treatment
TPH2	rs1487278	3	D **E** T O Pk	Reduced response to treatment
CYP2D6	*60	3	D E **T** O **Pk**	There is no annotation for this drug-haplotype interaction. However, this haplotype does not have enzymatic activity, so it is recommended to consult your physician.

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, it is recommended to seek medical assessment.

Carbamazepine				N° AFFECTED VARIANTS 15/27
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
ABCB1	rs4148739 rs4148740	3	D E T O **Pk**	Reduced metabolism
ABCC2	rs4148386	3	D E T O **Pk**	Reduced drug elimination
	rs3740066	3	D E T O **Pk**	Reduced metabolism
CYP1A1	rs2606345	3	D **E** T O Pk	Reduced response to treatment
CYP1A2	rs762551	3	D E T O **Pk**	Reduced drug elimination
EPHX1	rs2234922	3	**D** E T O Pk	Need for higher dose
	rs1051740	3	D E T O **Pk**	Reduced metabolism
GABRA1	rs2279020	3	D **E** T O Pk	Increased risk of experiencing resistance to antiepileptic drugs
HSPA1A	rs1043620	3	D E **T** O Pk	Increased risk of developing severe hypersensitivity

Carbamazepine				N° AFFECTED VARIANTS 15/27
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
HSPA1L	rs2227956	3	D E **T** O Pk	Increased risk of developing severe hypersensitivity
NR1I2	rs2461817 rs7643645	3	D E T O **Pk**	Reduced metabolism
SCN1A	rs3812718	2B	**D** E T O Pk	Need for higher dose
SCN2A	rs2304016	3	D **E** T O Pk	Increased risk of experiencing resistance to antiepileptic drugs

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, it is recommended to seek medical assessment.

Phenytoin				N° AFFECTED VARIANTS 10/18
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
CYP1A1	rs2606345	3	D **E** T O Pk	Lower response to treatment in women
CYP2C9	rs71486745	3	**D** E T O Pk	Need for higher dose
	rs12782374	3	**D** E T O **Pk**	Reduced metabolism and need for higher doses
EPHX1	rs1051740 rs2234922	3	D E **T** O Pk	Increased risk of having a child with a craniofacial anomaly
GABRA1	rs2279020	3	D **E** T O Pk	Increased risk of experiencing resistance to antiepileptic drugs
NAT2	rs1041983 rs1799930	3	D E **T** O Pk	Increased risk of toxicity in conjunction with isoniazid
SCN1A	rs3812718	3	**D** E T O Pk	Need for higher dose
SCN2A	rs2304016	3	D **E** T O Pk	Increased risk of experiencing resistance to antiepileptic drugs

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, it is recommended to seek medical assessment.

Gabapentin				N° AFFECTED VARIANTS 1/1
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
SLC7A5	rs4240803	3	D **E** T O Pk	Lower response to treatment

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, it is recommended to seek medical assessment.

Aripiprazole				N° AFFECTED VARIANTS 6/11
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
ANKK1	rs1800497	3	D **E** T O Pk	Reduced response to treatment
CNR1	rs1049353	3	D E **T** O Pk	Increased risk of adverse effects
DRD2	rs2514218	3	D E **T** O Pk	Increased risk of adverse effects
FAAH	rs324420	3	D E **T** O Pk	Increased risk of adverse effects
SH2B1	rs3888190	3	D E **T** O Pk	Increased risk of adverse effects
CYP2D6	*60	3	D E T O **Pk**	There is no annotation for this drug-haplotype interaction. However, this haplotype does not have enzymatic activity, so it is recommended to consult your physician.

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, it is recommended to seek medical assessment.

Haloperidol				N° AFFECTED VARIANTS 3/8
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
CNR1	rs1049353	3	D E **T** O Pk	Increased risk of adverse effects
FAAH	rs324420	3	D E **T** O Pk	Increased risk of adverse effects

Haloperidol				N° AFFECTED VARIANTS 3/8
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
CYP2D6	*60	3	D E T O **Pk**	There is no annotation for this drug-haplotype interaction. However, this haplotype does not have enzymatic activity, so it is recommended to consult your physician.

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, it is recommended to seek medical assessment.

Olanzapine				N° AFFECTED VARIANTS 28/57
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
ABCB1	rs4728709	3	D E **T** O Pk	Increased risk of adverse effects
AHR	rs4410790	3	D E T O **Pk**	Reduced metabolism
ANKK1	rs1800497	3	D E T O **Pk**	Reduced drug exposure
BDNF	rs6265	3	D **E** T O Pk	Reduced response to treatment
CNR1	rs1049353 rs806378	3	D E **T** O Pk	Increased risk of adverse effects
CYP1A1	rs2472297	3	D E T O **Pk**	Reduced metabolism
CYP3A43	rs472660	3	D E T O **Pk**	Reduced drug elimination
DRD2	rs1799978	3	D **E** T O Pk	Increased response time from the administration
	rs1076560	3	D **E** T O Pk	Reduced response to treatment
	rs1124493	3	D E T **O** Pk	Lower prolactin concentration in serum
DRD3	rs6280	3	D **E** T O Pk	Reduced response to treatment
FAAH	rs324420	3	D E **T** O Pk	Increased risk of adverse effects
FMO3	rs2266780	3	D E T **O** Pk	Reduced drug exposure

Olanzapine				N° AFFECTED VARIANTS 28/57
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
GCG	rs13429709	3	D E T **O** Pk	Increased risk of adverse effects
GIPR	rs10423928	3	D E **T** O Pk	Increased risk of adverse effects
GNB3	rs5443	3	D E **T** O Pk	Increased risk of adverse effects
HTR2C	rs2497538 rs3813929 rs518147	3	D E **T** O Pk	Increased risk of adverse effects
	rs1414334	3	D E **T** O Pk	Increased risk of adverse effects in women
PMCH	rs7973796	3	D E **T** O Pk	Increased risk of adverse effects
RGS4	rs951439	3	D **E** T O Pk	Lower response than to quetiapine and ziprasidone
	rs2842030	3	D **E** T O Pk	Reduced response to treatment
SH2B1	rs3888190	3	D E **T** O Pk	Increased risk of adverse effects
TBC1D1	rs9852	3	D E **T** O Pk	Increased risk of adverse effects
CYP2D6	*60	3	D E **T** O Pk	There is no annotation for this drug-haplotype interaction. However, this haplotype does not have enzymatic activity, so it is recommended to consult your physician.
UGT1A1	*28	3	D E **T** O Pk	Increased risk of adverse effects

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, it is recommended to seek medical assessment.

Quetiapine				N° AFFECTED VARIANTS 7/16
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
CNR1	rs1049353	3	D E **T** O Pk	Increased risk of adverse effects
COMT	rs4818 rs5993883 rs6269	3	D **E** T O Pk	Reduced response to treatment
CYP3A5	rs776746	3	D E T O **Pk**	Reduced metabolism
FAAH	rs324420	3	D E **T** O Pk	Increased risk of adverse effects
SH2B1	rs3888190	3	D E **T** O Pk	Increased risk of adverse effects

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, it is recommended to seek medical assessment.

Risperidone				N° AFFECTED VARIANTS 30/48
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
-	rs1805054	3	D E **T** O Pk	Increased risk of adverse effects
ABCB1	rs1128503	3	D **E** T O Pk	Reduced response to treatment
ADRB2	rs1042713	3	D E **T** O Pk	Increased risk of adverse effects
AKT1	rs2494732 rs3803300	3	D **E** T O Pk	Reduced response to treatment
ANKK1	rs1800497	3	D **E** T O Pk	Reduced response to treatment
CCL2	rs2857657 rs4586 rs4795893	3	D **E** T O Pk	Reduced response to treatment
CNR1	rs1049353 rs806378	3	D E **T** O Pk	Increased risk of adverse effects
COMT	rs165599 rs9606186	3	D **E** T O Pk	Reduced response to treatment
DRD2	rs1799978	3	D **E** T O Pk	Increased response time from the administration

Risperidone				N° AFFECTED VARIANTS 30/48
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
DRD3	rs6280	3	D **E** T O Pk	Reduced response to treatment
FAAH	rs324420	3	D E **T** O Pk	Increased risk of adverse effects
GRIN2B	rs1806201	3	D E **T** O Pk	Increased risk of adverse effects
GRM7	rs2069062	3	D **E** T O Pk	Reduced response to treatment
HRH3	rs3787430	3	D **E** T O Pk	Reduced response to treatment
HRH4	rs4483927	3	D **E** T O Pk	Reduced response to treatment
HTR2A	rs6311 rs6313	3	D **E** T O Pk	Reduced response to treatment
HTR2C	rs3813929	3	D E **T** O Pk	Increased risk of adverse effects
LEP	rs7799039	3	D E **T** O Pk	Increased risk of adverse effects
NR1I2	rs1523130 rs2276707	3	D E T O **Pk**	Reduced drug elimination
SH2B1	rs3888190	3	D E **T** O Pk	Increased risk of adverse effects
UGT1A1	rs10929302 rs887829	3	D E **T** O Pk	Increased risk of hyperprolactinemia
CYP2D6	*60	3	D E T O **Pk**	There is no annotation for this drug-haplotype interaction. However, this haplotype does not have enzymatic activity, so it is recommended to consult your physician.

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, it is recommended to seek medical assessment.

Methylphenidate				N° AFFECTED VARIANTS 2/11
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
DRD3	rs6280	3	D E **T** O Pk	Increased risk of adverse effects
CYP2D6	*60	3	D E T O **Pk**	There is no annotation for this drug-haplotype interaction. However, this haplotype does not have enzymatic activity, so it is recommended to consult your physician.

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, it is recommended to seek medical assessment.

Ondansetron				N° AFFECTED VARIANTS 4/6
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
ABCB1	rs1045642 rs2032582	3	D **E** T O Pk	Increased likelihood of nausea and vomiting
CYP3A5	rs776746	3	D E T **O** Pk	Decreased metabolism
CYP2D6	*60	3	D **E** T O Pk	There is no annotation for this drug-haplotype interaction. However, this haplotype does not have enzymatic activity, so it is recommended to consult your physician.

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, it is recommended to seek medical assessment.

Metformin				N° AFFECTED VARIANTS 7/17
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
FMO5	rs7541245	3	D **E** T O Pk	Decreased response to treatment

Metformin				N° AFFECTED VARIANTS 7/17
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
SLC22A1	rs628031	3	D **E** **T** O Pk	Decreased response to treatment and increased risk of gastrointestinal toxicity
	rs2282143	3	D E T O **Pk**	Decreased response to treatment
	rs202220802	3	D E T O **Pk**	Increased trough metformin steady-state concentration
SLC22A3	rs2076828	3	D **E** T O Pk	Decreased response to treatment
SLC47A2	rs12943590	3	D E T O **Pk**	Decreased clearance
SP1	rs784888	3	D **E** T O **Pk**	Decreased clearance

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, it is recommended to seek medical assessment.

Clopidogrel				N° AFFECTED VARIANTS 8/22
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
B4GALT2	rs1061781	3	D **E** T O Pk	Increased on-treatment platelet reactivity
CYP4F2	rs2108622	3	D E T **O** Pk	Increased risk of adverse cardiac events
ITGA2	rs1126643	3	D **E** T O Pk	Decreased response to treatment
	rs1062535	3	D **E** T O Pk	Increased on-treatment platelet reactivity
NOS3	rs1799983	3	D E **T** O Pk	Increased risk of in-stent restenosis
P2RY12	rs6787801	3	D **E** T O Pk	Increased on-treatment platelet reactivity
	rs2046934	3	D **E** T O Pk	Increased risk of adverse cardiac events
PEAR1	rs57731889	3	D **E** T O Pk	Increased on-treatment platelet reactivity

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, it is recommended to seek medical assessment.

Enalapril				N° AFFECTED VARIANTS 2/6
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
BDKRB2	rs1799722	3	D E **T** O Pk	Increased likelihood of cough
SLCO1B1	rs4149056	3	D E **T** O Pk	Increased likelihood of cough

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, it is recommended to seek medical assessment.

Atenolol				N° AFFECTED VARIANTS 12/27
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
-	rs1104514 rs12346562	3	D **E** T O Pk	Reduced response to treatment
ADRB2	rs1042713	3	D **E** T O Pk	Reduced response to treatment
DPYS	rs2669429	3	D E **T** O Pk	Increased risk of adverse effects
EDN1	rs5370	3	D **E** T O Pk	Reduced response to treatment
FTO	rs9940629	3	D E **T** O Pk	Increased reduction of HDL-C
GALNT2	rs2144300	3	D E T **O** Pk	Increased reduction of HDL-C
	rs2144297	3	D E **T** O Pk	Increased reduction of HDL-C
GNB3	rs2301339	3	D **E** T O Pk	Lower response to treatment in women
	rs5443	3	D **E** T O Pk	Reduced response to treatment
PROX1	rs340874	3	D E **T** O Pk	Increased risk of adverse effects
TBX2	rs8068318	3	D **E** T O Pk	Reduced response to treatment

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, it is recommended to seek medical assessment.

Montelukast				N° AFFECTED VARIANTS 3/11
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
ABCC1	rs119774	3	D **E** T O Pk	Decreased response to treatment
ABCC9	rs704212	3	D E T O **Pk**	Decreased response to treatment
CYP2C8	*1	3	D E T O **Pk**	Increased plasma drug concentration

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, it is recommended to seek medical assessment.

Cyclophosphamide				N° AFFECTED VARIANTS 32/59
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
ABCB1	rs2032582	3	D **E** T **O** Pk	Shorter disease-free survival time
	rs1045642	3	D **E** **T** O Pk	Shorter disease-free survival time and increased risk of anaemia
ABCC2	rs717620	3	D **E** T O Pk	Decreased response to treatment
	rs3740066	3	D E **T** O Pk	Increased likelihood of nausea
	rs2273697	3	D E **T** O Pk	Increased risk of anaemia
	rs8187710 rs17222723	3	D E **T** O Pk	Increased risk of cardiotoxicity
ADH1C	rs698	3	D **E** T O Pk	Decreased response to treatment
AKR1C3	rs1937840	3	D **E** T **O** Pk	Loss of leukocytes and neutrophils after treatment
ALDH3A1	rs2228100	3	D E **T** O Pk	Increased risk of leukopenia and anemia

Cyclophosphamide				N° AFFECTED VARIANTS 32/59
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
CBR1	rs9024	3	**D** E T O **Pk**	Increased drug exposure
	rs20572	3	D E T O **Pk**	Increased drug exposure
CTNNB1	rs4135385	3	D **E** **T** O Pk	Decreased response to treatment
CXCL12	rs1801157	3	D **E** T O Pk	Decreased response to treatment
CYP1B1	rs1056836	3	D **E** T O Pk	Decreased response to treatment
	rs1056836	3	D E **T** O Pk	Increased likelihood of nausea
CYP2C19	rs12248560	3	D E **T** O Pk	Increased risk of leukopenia
CYP2E1	rs2070676	3	D **E** **T** O Pk	Increased likelihood of nausea
CYP3A4	rs2740574	3	D E **T** O Pk	Shorter period of time before chemotherapy-induced ovarian failure
ERCC1	rs11615	3	D E **T** O Pk	Increased risk of anaemia
ERCC2	rs13181	3	D E **T** O Pk	Increased risk of nephrotoxicity
LIG3	rs1052536	3	D E **T** O Pk	Increased risk of neutropenia
MUTYH	rs3219484	3	D E **T** O Pk	Increased risk of neutropenia
NOS3	rs1799983	3	D **E** T O Pk	Improved response to chemotherapy if cyclophosphamide is used as an adjuvant
NQO2	rs1143684	3	D **E** T O Pk	Decreased response to treatment
PNPLA3	rs738409	3	D E **T** O Pk	Increased risk of hepatotoxicity
RAC2	rs13058338	3	D E **T** O Pk	Increased risk of toxicity

Cyclophosphamide				N° AFFECTED VARIANTS 32/59
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
SLC22A16	rs6907567	3	D **E** T O Pk	Need for higher doses
	rs714368	3	D **E T O** Pk	Increased likelihood of nausea
	rs12210538	3	D E **T** O Pk	Increased risk of toxicity
SOD2	rs4880	3	D **E** T O Pk	Shorter survival time
XRCC1	rs25487	3	D E **T** O Pk	Increased likelihood of nausea

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, it is recommended to seek medical assessment.

Cisplatin				N° AFFECTED VARIANTS 33/64
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
-	rs17661089	3	D **E** T O Pk	Shorter survival time
ABCB1	rs1045642	3	D **E T** O Pk	Shorter disease-free survival time and increased risk of anaemia
ABCC2	rs717620	3	D **E** T O Pk	Decreased response to treatment
ADH1C	rs698	3	D **E** T O Pk	Decreased response to treatment
COMT	rs4646316	3	D E **T** O Pk	Increased risk of hearing loss
CYP2E1	rs2070676	3	D **E T** O Pk	Increased likelihood of nausea
ERCC1	rs11615	3	D **E T** O Pk	Decreased response to treatment and increased risk of toxicity
ERCC2	rs1799793	3	D E **T** O Pk	Increased risk of anaemia
	rs238406	3	D E **T** O Pk	Increased risk of leukopenia
	rs13181	3	D E **T** O Pk	Increased risk of nephrotoxicity

Cisplatin				N° AFFECTED VARIANTS 33/64
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
ESR1	rs2207396	3	D E **T** O Pk	Decreased response to treatment
GALNT14	rs9679162 rs12613732	3	D **E** T O Pk	Decreased response to treatment
LIG3	rs1052536	3	D E **T** O Pk	Increased risk of neutropenia
MAP3K1	rs726501 rs16886403	3	D **E** T O Pk	Shorter survival time
MLLT3	rs10964552	3	D **E** T O Pk	Decreased response to treatment
MTR	rs1805087	3	D **E** T O Pk	Decreased response to treatment
MUTYH	rs3219484	3	D E **T** O Pk	Increased risk of neutropenia
RAF1	rs11710163	3	D **E** T O Pk	Shorter survival time
RARS	rs244898	3	D **E** T O Pk	Decreased response to treatment
REV1	rs3087403	3	D **E** T O Pk	Decreased response to treatment
REV3L	rs462779	3	D **E** T O Pk	Decreased response to treatment
RRM1	rs232043 rs720106 rs2284449	3	D **E** T O Pk	Decreased response to treatment
SLC16A5	rs4788863	3	D E **T** O Pk	Increased risk of ototoxicity
SLC22A2	rs316019	3	D E **T** O Pk	Increased risk of ototoxicity
SLC31A1	rs7851395	3	D **E** T O Pk	Shorter survival time
	rs10981694	3	D E **T** O Pk	Increased risk of ototoxicity
UBE2I	rs9597	3	D **E** T O Pk	Decreased response to treatment
XPC	rs2228001	3	D E **T** O Pk	Increased risk of neutropenia

Cisplatin				N° AFFECTED VARIANTS 33/64
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
XRCC1	rs1799782	3	D **E** T O Pk	Shorter survival time

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, it is recommended to seek medical assessment.

Doxorubicin				N° AFFECTED VARIANTS 23/38
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
ABCB1	rs2032582	3	D **E** T **O** Pk	Shorter disease-free survival time
	rs1045642	3	D **E** **T** O Pk	Shorter disease-free survival time and increased risk of anaemia
ABCC2	rs717620	3	D **E** T O Pk	Decreased response to treatment
	rs3740066	3	D E **T** O Pk	Increased likelihood of nausea
	rs2273697	3	D E **T** O Pk	Increased risk of anaemia
	rs8187710 rs17222723	3	D E **T** O Pk	Increased risk of cardiotoxicity
ABCC4	rs9561778	3	D E **T** O Pk	Increased risk of toxicity
AKR1C3	rs1937840	3	D **E** T **O** Pk	Loss of leukocytes and neutrophils after treatment
ALDH3A1	rs2228100	3	D E **T** O Pk	Increased risk of leukopenia and anemia
CBR1	rs9024	3	**D** E T O **Pk**	Increased drug exposure
	rs20572	3	D E T O **Pk**	Increased drug exposure
CYP1B1	rs1056836	3	D E **T** O Pk	Increased likelihood of nausea
CYP2C19	rs12248560	3	D E **T** O Pk	Increased risk of leukopenia
ERCC1	rs11615	3	D E **T** O Pk	Increased risk of anaemia

Doxorubicin				N° AFFECTED VARIANTS 23/38
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
ERCC2	rs13181	3	D E **T** O Pk	Increased risk of nephrotoxicity
NOS3	rs1799983	3	D **E** T O Pk	Improved response to chemotherapy if cyclophosphamide is used as an adjuvant
NQO2	rs1143684	3	D **E** T O Pk	Decreased response to treatment
RAC2	rs13058338	3	D E **T** O Pk	Increased risk of toxicity
SLC22A16	rs6907567	3	D **E** T O Pk	Need for higher doses
	rs714368	3	D **E T O** Pk	Increased likelihood of nausea
	rs12210538	3	D E **T** O Pk	Increased risk of toxicity
XRCC1	rs25487	3	D E **T** O Pk	Increased likelihood of nausea

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, it is recommended to seek medical assessment.

Mycophenolic Acid				N° AFFECTED VARIANTS 4/6
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
ABCC2	rs3740066	3	D E T O **Pk**	-
	rs2273697	3	D E T O **Pk**	Reduced drug elimination
SLCO1B3	rs4149117 rs7311358	3	D **E** T O Pk	Lower survival rate after lung transplantation

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, it is recommended to seek medical assessment.

Azathioprine				N° AFFECTED VARIANTS 1/9
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
FTO	rs16952570	3	D E **T** O Pk	Increased risk of leukopenia and neutropenia

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, it is recommended to seek medical assessment.

Cyclosporine				N° AFFECTED VARIANTS 8/15
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
ABCB1	rs1128503	3	**D** E **T** O Pk	Need for higher dose and risk of neurotoxicity
ABCC2	rs717620 rs2273697	3	D E T O **Pk**	Increased drug exposure
CTLA4	rs231775	3	D E **T** O Pk	Increased risk of adverse events
CYP3A4	rs4646437	3	D **E** T O **Pk**	Increased risk for biopsy-proven acute rejection (BPAR) at 12 month post-transplant
	rs28371759	3	D E T **O** Pk	Increased drug metabolism
	rs2740574	3	D E **T** O Pk	Increased likelihood of kidney transplant rejection
POR	rs1057868	3	D E T O **Pk**	Increased trough concentrations of cyclosporine

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, it is recommended to seek medical assessment.

Mercaptopurine				N° AFFECTED VARIANTS 2/17
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
FTO	rs16952570	3	D E **T** O Pk	Increased risk of leukopenia and neutropenia

Mercaptopurine				N° AFFECTED VARIANTS 2/17
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
SLCO1B1	rs11045879	3	D E **T** O Pk	Decreased response to treatment

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, it is recommended to seek medical assessment.

Sirolimus				N° AFFECTED VARIANTS 1/9
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
CYP3A5	*3	3	D E T O **Pk**	Decreased metabolism

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, it is recommended to seek medical assessment.

Hydrochlorothiazide				N° AFFECTED VARIANTS 10/18
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
CSK	rs1378942	3	D **E** T O Pk	Decreased response to treatment
DOT1L	rs2269879	3	D **E** T O Pk	Decreased response to treatment
HMGCS2	rs9943291	3	D E **T** O Pk	Increased risk of diabetes
PLCE1	rs932764	3	D **E** T O Pk	Decreased response to treatment
PRKAG2	rs10224002	3	D **E** T O Pk	Decreased response to treatment
TCF7L2	rs4132670 rs4506565 rs7917983	3	D E **T** O Pk	Increased risk of diabetes
WNK1	rs880054	3	D **E** T O Pk	Smaller reduction in blood pressure
YEATS4	rs7297610	3	D **E** T O Pk	Decreased response to treatment

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, it is recommended to seek medical assessment.

Furosemide				N° AFFECTED VARIANTS 1/5
Gene	**Variant**	**Level of evidence**	**Affected parameter**	**Variant annotation**
SLC12A3	rs1529927	3	D **E** T O Pk	Decreased response to treatment

Therapeutic recommendation: The expert consortia does not contain genotype-based clinical guidance for the affected variants. Despite this, it is recommended to seek medical assessment.

GENETIC RESULTS

HAPLOTYPES

Gene	Reference haplotype	Haplotype	Type of Metaboliser
CYP1A2	*1/*1	*1/*1M	RAPID
CYP2B6	*1/*1	*1/*6	INTERMEDIATE
CYP2C19	*38/*38	*1/*1	NORMAL
CYP2C8	*1/*1	*1/*1	NORMAL
CYP2C9	*1/*1	*1/*1	NORMAL
CYP2D6	*1/*1	*1/*60	SLOW
CYP3A4	*1/*1	*1/*1	NORMAL
CYP3A5	*1/*1	*3/*3	SLOW
CYP3A7	*1A/*1A	*1A/*1A	NORMAL
GSTM1	*I/*I	*D/*D	SLOW
GSTT1	*I/*I	*D/*D	SLOW
NAT2	*4/*4	*6A/*6A	SLOW
NUDT15	*1/*1	*1/*1	NORMAL
SLCO1B1	*1/*1	*15/*37	INTERMEDIATE
TPMT	*1/*1	*1/*1	NORMAL
UGT1A1	*1/*1	*28/*28	SLOW
UGT1A3	*1/*1	*2/*2	SLOW
UGT1A6	*1A/*1A	*2E/*2E	ULTRARAPID

VARIANTS

Gene	Marker	Genotype	Gene	Marker	Genotype
-	rs2734583	AA	-	rs2768759	CC
-	rs2965667	TT	-	rs10739150	TG
-	rs1104514	GG	-	rs12346562	CC
-	rs2647087	AA	-	rs2498804	AA
-	rs12118636	GG	-	rs17661089	AG
-	rs352428	AG	-	rs585719	CC
-	rs4675690	CT	-	rs11636687	TT
-	rs2069521	GG	-	rs11959113	AA
-	rs2952768	TC	-	rs2960436	GG
-	rs2292997	GG	-	rs2433320	GG
-	rs11065987	AA	-	rs578427	CT

Gene	Marker	Genotype	Gene	Marker	Genotype
-	rs9345389	AA	-	rs4888024	AA
-	rs1786929	AG	-	rs6545803	GG
-	rs1805054	CC	-	rs2808630	TT
-	rs1346268	TT	-	rs11265572	GG
-	rs2769605	TT	-	rs12777823	GG
ABCA1	rs12003906	GG	ABCA1	rs2230806	CC
ABCB1	rs10248420	AA	ABCB1	rs10280101	AA
ABCB1	rs11983225	TT	ABCB1	rs12720067	CC
ABCB1	rs2032583	AA	ABCB1	rs2235015	CA
ABCB1	rs2235040	CC	ABCB1	rs2235067	CC
ABCB1	rs4148739	TT	ABCB1	rs4148740	AA
ABCB1	rs7787082	GG	ABCB1	rs2032582	CC
ABCB1	rs10267099	AA	ABCB1	rs3213619	AA
ABCB1	rs1045642	GG	ABCB1	rs1128503	GG
ABCB1	rs2229109	CC	ABCB1	rs3842	TT
ABCB1	rs9282564	TT	ABCB1	rs4728709	GG
ABCB4	rs1202283	GA	ABCB5	rs17143212	CC
ABCC1	rs45511401	GG	ABCC1	rs28364006	AA
ABCC1	rs35592	TC	ABCC1	rs3784864	GA
ABCC1	rs2238476	GG	ABCC1	rs246240	AA
ABCC1	rs119774	CC	ABCC1	rs212091	TT
ABCC10	rs2125739	TC	ABCC11	rs7194667	TT
ABCC2	rs717620	CT	ABCC2	rs3740066	CT
ABCC2	rs4148386	GG	ABCC2	rs2273697	GG
ABCC2	rs8187710	GA	ABCC2	rs17222723	TA
ABCC2	rs3740065	AG	ABCC2	rs113646094	CC
ABCC3	rs4148416	CC	ABCC3	rs1051640	AA
ABCC3	rs9895420	TT	ABCC4	rs3765534	CC
ABCC4	rs9561778	GG	ABCC4	rs17268282	GG
ABCC4	rs9561765	GG	ABCC4	rs11568658	CC
ABCC4	rs7317112	AG	ABCC4	rs9516519	TT
ABCC5	rs10937158	TC	ABCC5	rs3749438	GA
ABCC9	rs704212	CC	ABCG1	rs225440	CT
ABCG2	rs2231142	GG	ABCG2	rs2231137	CC
ABCG2	rs12505410	TG	ABCG2	rs13120400	TT

Gene	Marker	Genotype	Gene	Marker	Genotype
ABCG2	rs2725252	AA	ABCG2	rs3114020	TC
ABCG2	rs17731538	GG	ABCG2	rs2231135	AA
ABCG8	rs11887534	GG	ACE	rs4291	AA
ACE	rs4341	CC	ACE	rs4343	AA
ACSS2	rs17309872	AA	ACYP2	rs1872328	GG
ADAMTS1	rs428785	GG	ADD1	rs4961	GT
ADGRL3	rs1355368	GG	ADGRL3	rs6551665	GG
ADGRL3	rs6813183	CC	ADGRL3	rs734644	CC
ADH1C	rs698	TC	ADM	rs11042725	CC
ADORA1	rs16851030	CT	ADORA1	rs2228079	TG
ADORA2A	rs2298383	TT	ADORA2A	rs3761422	CC
ADORA2A	rs2267076	CC	ADORA2A	rs2236624	CC
ADORA2A	rs5760410	GG	ADRA2A	rs1800545	GG
ADRB1	rs1801253	CC	ADRB2	rs1042713	GA
ADRB2	rs1042714	CC	ADRB2	rs1042718	CA
ADRB2	rs1045280	CT	ADRB3	rs4994	AA
AGT	rs5050	TT	AGT	rs5051	CT
AGT	rs699	AG	AGTR1	rs5186	AA
AHR	rs4410790	TC	AKR1C3	rs1937840	GG
AKT1	rs2494752	GG	AKT1	rs1130214	CA
AKT1	rs2494732	CC	AKT1	rs3803300	CC
ALDH3A1	rs2228100	GG	ALDH5A1	rs2760118	CT
ALOX12	rs11078659	GA	ALOX5	rs2115819	AG
AMHR2	rs784892	GG	ANKK1	rs1800497	GG
AOX1	rs75995567	TT	AOX1	rs3731722	AA
AOX1	rs55754655	AA	APOA5	rs662799	AA
APOB	rs679899	GG	APOB	rs13671117	GA
APOC3	rs2854116	TT	APOC3	rs5128	CC
APOE	rs7412	CC	AQP1	rs28362731	GG
ARID5B	rs10821936	TT	ARID5B	rs10994982	GG
ARID5B	rs4948496	CC	ARRB2	rs1045280	CT
ASTN2	rs958804	TT	ATIC	rs4673993	TT
ATIC	rs2372536	CC	ATIC	rs16853826	GG
ATM	rs1801516	GG	ATP5F1E	rs1059150	TT
B4GALT2	rs1061781	CC	BACH1	rs2070401	AA

Gene	Marker	Genotype	Gene	Marker	Genotype
BAG6	rs750332	TT	BCL2L11	rs724710	TC
BDKRB2	rs1799722	CT	BDNF	rs6265	CT
BDNF	rs7124442	TT	BDNF	rs61888800	GG
BDNF	rs962369	TT	BLMH	rs1050565	TT
BMP5	rs41271330	GG	C5orf56	rs12521868	TT
CA10	rs967676	TC	CACNA1C	rs1051375	GA
CACNA1E	rs3845446	TT	CACNA1S	rs1800559	CC
CACNA1S	rs772226819	GG	CALU	rs1043550	AG
CALU	rs339097	AA	CAMK1D	rs10737062	AA
CAMK1D	rs10752271	AA	CAPN10	rs3792269	AA
CAPN10	rs5030952	CC	CBR1	rs9024	GG
CBR1	rs20572	CC	CCHCR1	rs130072	CC
CCHCR1	rs746647	AA	CCHCR1	rs1265112	TT
CCL11	rs1129844	GA	CCL2	rs2857657	GC
CCL2	rs4586	TT	CCL2	rs4795893	GG
CCND1	rs9344	GA	CEP68	rs7572857	GG
CES1P1	rs3785161	AA	CETP	rs4783961	GA
CETP	rs708272	GG	CETP	rs5882	AA
CHIA	rs3818822	GG	CHRNA5	rs16969968	GA
CHRNA5	rs2036527	GA	CHRNA5	rs503464	TA
CHST1	rs9787901	GG	CMPK1	rs4492666	AC
CNR1	rs1049353	CC	CNR1	rs806378	CT
CNR1	rs806368	TT	COL1A1	rs1800012	CC
COMT	rs4680	AA	COMT	rs165599	AA
COMT	rs4646316	CC	COMT	rs9332377	CC
COMT	rs933271	TC	COMT	rs6269	AA
COMT	rs4818	CC	COMT	rs5993883	TG
COMT	rs9606186	CG	COQ2	rs4693075	GG
COQ2	rs6535454	AA	CRHR1	rs242941	CC
CRHR2	rs2270007	CC	CRHR2	rs7793837	AT
CRHR2	rs2267715	GA	CRP	rs1205	CT
CRTC2	rs8450	GA	CSK	rs1378942	CA
CTH	rs1021737	GT	CTLA4	rs231775	AG
CTLA4	rs4553808	AA	CTNNB1	rs4135385	AG
CXCL12	rs1801157	CT	CYBA	rs4673	GG

Gene	Marker	Genotype	Gene	Marker	Genotype
CYCSP5	rs3099844	CC	CYP1A1	rs2606345	AA
CYP1A1	rs2472297	CC	CYP1A2	rs762551	CA
CYP1A2	rs2069526	TT	CYP1A2	rs4646425	CC
CYP1A2	rs4646427	TT	CYP1A2	rs2470890	CT
CYP1A2	rs2472304	GA	CYP1B1	rs1056836	CC
CYP2A6	rs28399433	AA	CYP2B6	rs2279343	AG
CYP2B6	rs3211371	CC	CYP2B6	rs12721655	AA
CYP2B6	rs7254579	TT	CYP2B6	rs8192709	CC
CYP2B6	rs2279345	TC	CYP2B6	rs35303484	AA
CYP2B6	rs8192719	CT	CYP2B6	rs3745274	GT
CYP2B6	rs28399499	TT	CYP2C19	rs4244285	GG
CYP2C19	rs12248560	CC	CYP2C19	rs4986893	GG
CYP2C19	rs11188072	CC	CYP2C19	rs145119820	GG
CYP2C19	rs28399504	AA	CYP2C19	rs3814637	CC
CYP2C9	rs1057910	AA	CYP2C9	rs9332096	CC
CYP2C9	rs1934969	AA	CYP2C9	rs4086116	CC
CYP2C9	rs71486745	II	CYP2C9	rs12782374	GG
CYP2C9	rs4917639	AA	CYP2C9	rs10509680	GG
CYP2C9	rs4918758	TT	CYP2D6	rs1065852	GG
CYP2D6	rs28371706	GG	CYP2D6	rs1080985	GG
CYP2E1	rs2070676	GC	CYP2E1	rs3813867	GG
CYP2E1	rs2031920	CC	CYP3A4	rs35599367	GG
CYP3A4	rs2740574	TT	CYP3A4	rs2242480	CC
CYP3A4	rs4646437	GG	CYP3A4	rs28371759	AA
CYP3A4	rs4986910	AA	CYP3A4	rs2246709	AG
CYP3A4	rs3735451	TT	CYP3A4	rs4646440	GG
CYP3A43	rs472660	GG	CYP3A5	rs776746	CC
CYP3A5	rs17161788	TT	CYP3A5	rs15524	AA
CYP3A5	rs4646450	GG	CYP4F2	rs2108622	CT
CYP4F2	rs2189784	AA	CYP7A1	rs3808607	TT
DBH	rs1611115	TC	DHFR	rs442767	GG
DHFR	rs1650723	CC	DNMT3A	rs2304429	CT
DOT1L	rs2269879	CC	DPYD	rs72549306	CC
DPYD	rs72549303	II	DPYD	rs72549309	II
DPYD	rs1801266	GG	DPYD	rs1801268	CC

Gene	Marker	Genotype	Gene	Marker	Genotype
DPYD	rs148994843	CC	DPYD	rs59086055	GG
DPYD	rs67376798	TT	DPYD	rs78060119	CC
DPYD	rs3918290	CC	DPYD	rs115232898	TT
DPYD	rs75017182	GG	DPYD	rs55886062	AA
DPYD	rs1801160	CT	DPYD	rs56038477	CC
DPYD	rs17376848	AA	DPYD	rs2297595	TT
DPYD	rs1801265	AA	DPYD	rs1801159	TC
DPYD	rs115632870	CC	DPYD	rs72728438	TC
DPYS	rs2669429	AG	DRD1	rs11746641	TT
DRD1	rs11749035	CC	DRD1	rs2168631	GG
DRD1	rs265976	GG	DRD1	rs4532	CT
DRD1	rs5326	CC	DRD2	rs6277	AA
DRD2	rs2514218	CC	DRD2	rs4436578	TT
DRD2	rs1799978	TT	DRD2	rs6275	GG
DRD2	rs2283265	CC	DRD2	rs1076560	CC
DRD2	rs1124493	GG	DRD2	rs6279	CC
DRD2	rs2440390	CC	DRD2	rs2734841	CC
DRD2	rs2734842	CC	DRD3	rs6280	TT
DRD3	rs167770	AA	DRD3	rs324023	CC
DRD3	rs324026	TT	DRD3	rs963468	GG
DRD3	rs167771	AA	DROSHA	rs639174	CT
DUSP1	rs881152	GA	EDN1	rs5370	GG
EGFR	rs2293347	CC	EGFR	rs10258429	CC
ENOSF1	rs11280056	II	EPB41	rs6702335	AG
EPHX1	rs2234922	AG	EPHX1	rs1051740	TT
EPHX1	rs1877724	CC	EPM2A	rs1415744	CC
ERCC1	rs11615	AG	ERCC1	rs3212986	CA
ERCC2	rs13181	TG	ERCC2	rs1799793	CT
ERCC2	rs238406	TG	ERICH3	rs11580409	AC
ESR1	rs2207396	GA	F13A1	rs5985	CA
F3	rs3917643	TT	FAAH	rs324420	CA
FAAH	rs2295632	TT	FAAH	rs3766246	AA
FAAH	rs4141964	TT	FASTKD3	rs1801394	GG
FCER1G	rs11587213	AG	FDPS	rs11264359	AA
FDPS	rs2297480	TT	FGF2	rs1449683	CT

Gene	Marker	Genotype	Gene	Marker	Genotype
FKBP5	rs1360780	TC	FKBP5	rs4713916	AG
FMO1	rs12720462	CC	FMO1	rs7877	CC
FMO3	rs2266780	GG	FMO3	rs1736557	GG
FMO5	rs7541245	CA	FOXP3	rs3761548	GG
FPGS	rs1544105	CT	FSIP1	rs7179742	AA
FTO	rs12595985	CC	FTO	rs9940629	AG
FTO	rs16952570	TT	FTO	rs79206939	GG
GABRA1	rs2279020	GA	GABRA1	rs2290732	AG
GABRA2	rs279858	TC	GABRQ	rs3810651	AA
GAD1	rs3749034	GG	GAL	rs948854	TT
GALNT14	rs9679162	GT	GALNT14	rs12613732	TT
GALNT18	rs7937567	GG	GALNT2	rs2144300	CT
GALNT2	rs2144297	TT	GALR1	rs2717162	TT
GARS1-DT	rs1074373	CC	GATA3	rs3824662	CC
GCG	rs13429709	TC	GDNF	rs2216711	AA
GDNF	rs2973049	CC	GGCX	rs11676382	CC
GGCX	rs2592551	GG	GGH	rs11545077	CT
GGH	rs3758149	GA	GGH	rs11545078	GG
GGH	rs719235	CC	GIPR	rs10423928	TA
GLDC	rs10975641	CG	GLP1R	rs6923761	GG
GNB3	rs2301339	GA	GNB3	rs5443	CT
GNMT	rs10948059	TT	GP1BA	rs6065	CC
GPX5	rs451774	GG	GRIA3	rs4825476	GA
GRIA3	rs3761554	TT	GRIA3	rs3761555	TC
GRIA3	rs502434	TC	GRIK1	rs2832407	CC
GRIN2B	rs1806201	GG	GRIN2B	rs1019385	CA
GRM3	rs724226	AG	GRM7	rs2069062	GG
GSK3B	rs334558	AA	GSTM3	rs36120609	II
GSTP1	rs1138272	CC	GSTP1	rs1695	AA
HCG22	rs2523864	CT	HCG22	rs3873352	CG
HLA-C	rs9461684	CC	HLA-DPB1	rs1042136	AA
HLA-G	rs9380142	AG	HLA-G	rs17179108	CC
HMGCR	rs17238540	TT	HMGCR	rs17671591	CT
HMGCR	rs17244841	AA	HMGCS2	rs9943291	TT
HNF4A	rs1884613	CC	HNMT	rs1050891	AA

Gene	Marker	Genotype	Gene	Marker	Genotype
HRH3	rs3787430	CC	HRH4	rs4483927	TT
HSD11B1	rs846908	GG	HSD11B1	rs4844880	TT
HSD11B1	rs846910	GG	HSPA1A	rs1043620	CC
HSPA1L	rs2227956	AA	HTR1A	rs6295	GG
HTR1A	rs10042486	TT	HTR1A	rs1364043	TG
HTR1B	rs6296	CC	HTR1B	rs130058	AA
HTR1B	rs11568817	CC	HTR1B	rs9361233	CC
HTR2A	rs2770296	CT	HTR2A	rs7997012	AG
HTR2A	rs6311	CC	HTR2A	rs6313	GG
HTR2A	rs9316233	CC	HTR2A	rs6314	GG
HTR2A	rs6305	GG	HTR2C	rs1414334	GG
HTR2C	rs3813929	CC	HTR2C	rs6318	GC
HTR2C	rs2497538	CA	HTR2C	rs518147	GC
HTR2C	rs3813928	GG	HTR3A	rs1062613	CC
HTR3A	rs2276302	AA	HTR3B	rs2276307	AA
HTR7	rs1935349	CC	IL10	rs1800872	TG
IL10	rs1800896	TT	IL10	rs1800871	AG
IL11	rs1126757	CC	IL18	rs5744247	GG
IL18	rs1946518	GG	IL1B	rs1143627	AA
IL1B	rs16944	GG	IL23R	rs7518660	GG
IL3	rs181781	GA	IL4	rs2243250	CT
IRS1	rs13431554	AA	ITGA2	rs1062535	GA
ITGA2	rs1126643	CT	ITGB3	rs5918	TT
ITIH3	rs2535629	GA	ITPA	rs1127354	CC
ITPA	rs7270101	AA	KCNJ1	rs11600347	CC
KCNJ1	rs12795437	GG	KCNJ11	rs5219	CC
KCNJ6	rs2835859	TT	KCNJ6	rs2070995	CC
KCNK3	rs1275988	TT	KCNQ1	rs2237895	AA
KLRC1	rs7301582	CC	KLRD1	rs2302489	AT
KMT2E	rs117986340	GG	LDLR	rs688	CT
LDLR	rs5925	TC	LEP	rs4731426	GC
LEP	rs7799039	GA	LEPR	rs1805094	GG
LEPR	rs1137101	AA	LGR5	rs17109924	TC
LIG3	rs1052536	CC	LIPC	rs1800588	CC
LPL	rs328	CG	LTA4H	rs2660845	AA

Gene	Marker	Genotype	Gene	Marker	Genotype
LTC4S	rs730012	AC	MAFK	rs4720833	AA
MAP3K1	rs726501	GA	MAP3K1	rs16886403	TC
MC1R	rs2228478	AA	MC1R	rs2228479	GG
MC4R	rs489693	CC	MC4R	rs17782313	TT
MIR27A	rs895819	TC	MLLT3	rs10964552	CC
MMP3	rs35068180	DD	MTHFR	rs1801131	TG
MTHFR	rs1801133	GG	MTHFR	rs4846051	AA
MTR	rs1805087	AG	MTR	rs3768142	TT
MTRR	rs1801394	GG	MUTYH	rs3219484	CC
MYD88	rs6853	AA	MYLIP	rs9370867	AG
NAT2	rs4271002	GG	NAT2	rs1041983	TT
NAT2	rs1208	AA	NAT2	rs1799929	CC
NAT2	rs1799930	AA	NAT2	rs1799931	GG
NAT2	rs1801280	TT	NAT2	rs4646244	AA
NCF4	rs1883112	GA	NEDD4L	rs520210	GA
NEDD4L	rs4149601	GG	NEDD4L	rs292449	GC
NGF	rs2239622	GG	NOD2	rs2066844	CC
NOS1AP	rs10494366	GT	NOS2	rs11080344	TC
NOS3	rs1799983	TG	NOS3	rs2070744	CC
NPC1L1	rs17655652	TC	NPPA-AS1	rs5063	CC
NQO1	rs1800566	GG	NQO1	rs10517	GG
NQO2	rs1143684	CT	NR1H3	rs11039149	AA
NR1I2	rs2461817	AC	NR1I2	rs3814055	CC
NR1I2	rs4688040	GT	NR1I2	rs7643645	AG
NR1I2	rs1523130	CC	NR1I2	rs2276707	CC
NR1I2	rs6785049	AA	NR1I3	rs2307424	AA
NR1I3	rs3003596	AA	NR3C2	rs5522	TT
NRAS	rs1065634	TT	NTRK2	rs10465180	CT
NUDT15	rs116855232	CC	OPRD1	rs529520	AC
OPRD1	rs678849	TT	OPRD1	rs2234918	CC
OPRD1	rs797397	GA	OPRD1	rs581111	GG
OPRK1	rs3802281	TT	OPRK1	rs1051660	CC
OPRL1	rs2229205	CC	OPRM1	rs1799971	AA
OPRM1	rs79910351	CC	OPRM1	rs540825	AT
OPRM1	rs9397685	AA	OPRM1	rs10485058	AA

Gene	Marker	Genotype	Gene	Marker	Genotype
OSGEP	rs1760944	TG	P2RY1	rs1065776	CC
P2RY12	rs6809699	AC	P2RY12	rs6787801	AG
P2RY12	rs2046934	GA	P2RY12	rs3732759	AA
PACSIN2	rs2413739	CC	PEAR1	rs12041331	GG
PEAR1	rs57731889	CC	PEAR1	rs41273215	CC
PIK3CA	rs2699887	CT	PLA2G4A	rs12746200	AA
PLA2G4A	rs10157410	GG	PLCE1	rs932764	AG
PLCG1	rs2228246	AA	PMCH	rs7973796	GA
PNPLA3	rs738409	CC	POLG	rs3087374	CC
POLR3G	rs2562519	TT	PON1	rs662	TT
POR	rs1057868	CT	POR	rs41301394	CT
PPARA	rs4253728	GA	PPARA	rs4823613	AG
PPARG	rs3856806	CC	PPARG	rs1801282	CC
PRKAG2	rs10224002	GG	PRKCB	rs11649514	GG
PROC	rs1799808	CC	PROX1	rs340874	TC
PSORS1C1	rs3131003	GA	PSORS1C1	rs9263726	GA
PTEN	rs2299939	CC	PTGER2	rs2075797	CC
PTGER3	rs7551789	AA	PTGER4	rs4133101	TC
PTGES	rs2302821	AA	PTGFR	rs3766355	CA
PTGFR	rs3753380	TC	PTGIR	rs1126510	AG
PTGS1	rs10306114	AA	PTGS1	rs1330344	CC
PTGS2	rs20417	CG	PTGS2	rs4648287	AA
RABEP1	rs1000940	GG	RAC2	rs13058338	TA
RAF1	rs11710163	AA	RARS	rs244898	CC
REEP5	rs153549	GG	REEP5	rs153560	AA
REV1	rs3087403	CC	REV3L	rs462779	AA
RGS4	rs2842030	GG	RGS4	rs951439	TT
RGS4	rs2661319	TT	RGS5	rs1056515	GT
RHOA	rs11716445	GG	RRM1	rs232043	AA
RRM1	rs720106	TT	RRM1	rs2284449	TT
RYR1	rs112563513	GG	RYR1	rs118192116	CC
RYR1	rs118192122	GG	RYR1	rs118192124	CC
RYR1	rs118192161	CC	RYR1	rs118192162	AA
RYR1	rs118192163	GG	RYR1	rs118192167	AA
RYR1	rs118192168	GG	RYR1	rs118192170	TT

Gene	Marker	Genotype	Gene	Marker	Genotype
RYR1	rs118192175	CC	RYR1	rs118192177	CC
RYR1	rs118192178	CC	RYR1	rs121918592	GG
RYR1	rs121918594	GG	RYR1	rs121918595	CC
RYR1	rs1801086	GG	RYR1	rs193922747	TT
RYR1	rs193922753	GG	RYR1	rs193922768	CC
RYR1	rs193922770	CC	RYR1	rs193922772	GG
RYR1	rs193922802	GG	RYR1	rs193922803	CC
RYR1	rs193922807	GG	RYR1	rs193922809	GG
RYR1	rs193922816	CC	RYR1	rs193922818	GG
RYR1	rs193922832	GG	RYR1	rs193922843	GG
RYR1	rs193922876	CC	RYR1	rs193922878	CC
RYR1	rs28933396	GG	RYR1	rs28933397	CC
RYR1	rs63749869	GG	RYR2	rs2819742	AG
SCAP	rs12487736	TT	SCARB1	rs5888	AG
SCN1A	rs3812718	CT	SCN2A	rs2304016	AA
SELE	rs3917412	CC	SERPINE1	rs6092	GG
SERPINE1	rs1799889	AG	SERPINE1	rs2227631	AG
SH2B1	rs3888190	CC	SLC12A3	rs1529927	GG
SLC16A5	rs4788863	TC	SLC16A7	rs3763980	AT
SLC19A1	rs12659	GG	SLC19A1	rs1051266	CC
SLC19A1	rs1051296	AA	SLC22A1	rs628031	AG
SLC22A1	rs683369	CC	SLC22A1	rs622342	AA
SLC22A1	rs594709	GA	SLC22A1	rs202220802	II
SLC22A1	rs2282143	CT	SLC22A1	rs34130495	GG
SLC22A1	rs35167514	II	SLC22A1	rs12208357	CC
SLC22A16	rs723685	AA	SLC22A16	rs6907567	AG
SLC22A16	rs714368	TC	SLC22A16	rs12210538	AA
SLC22A2	rs316019	CC	SLC22A3	rs2076828	CC
SLC22A3	rs8187725	CC	SLC22A4	rs1050152	TT
SLC22A5	rs2631372	GG	SLC30A9	rs1047626	AG
SLC31A1	rs7851395	GG	SLC31A1	rs10981694	TT
SLC39A14	rs17060812	CC	SLC47A1	rs2289669	AA
SLC47A2	rs12943590	GG	SLC47A2	rs34834489	GA
SLC6A12	rs557881	GG	SLC6A2	rs2242446	TT
SLC6A4	rs1042173	AA	SLC7A5	rs4240803	GG

Gene	Marker	Genotype	Gene	Marker	Genotype
SLCO1A2	rs3764043	CC	SLCO1A2	rs4149009	CT
SLCO1B1	rs4149056	TC	SLCO1B1	rs4149036	AA
SLCO1B1	rs2306283	GG	SLCO1B1	rs11045819	CC
SLCO1B1	rs2291073	TG	SLCO1B1	rs11045879	TC
SLCO1B1	rs11045821	GG	SLCO1B1	rs4149081	GA
SLCO1B3	rs4149117	TG	SLCO1B3	rs7311358	GA
SLCO2B1	rs12422149	GG	SLCO2B1	rs3781727	TT
SOD2	rs4880	AG	SP1	rs784888	GG
SRP19	rs495794	AG	STAT6	rs1059513	TT
STK39	rs6749447	TG	STN1	rs4387287	CC
STX1B	rs72800847	GG	STX1B	rs4889606	AA
STX4	rs10871454	CC	SV2C	rs11960832	CC
TAAR6	rs4305746	GA	TAPBP	rs1059288	AA
TAPBP	rs2071888	GG	TBC1D1	rs9852	CC
TBX2	rs8068318	CT	TBXA2R	rs4523	AG
TBXA2R	rs1131882	GA	TBXAS1	rs6962291	TT
TCF19	rs2073724	CC	TCF7L2	rs4132670	GA
TCF7L2	rs4506565	AT	TCF7L2	rs7917983	TT
TCF7L2	rs290487	CC	TGFB1	rs1800469	AG
TH	rs2070762	AG	THBD	rs1042580	TC
THRA	rs11819745	GG	TLR3	rs3775291	TT
TLR4	rs4986790	AA	TLR4	rs1927907	CC
TNF	rs1800629	GG	TNFAIP3	rs6920220	GG
TNFRSF11A	rs1805034	TT	TPH2	rs10879346	CT
TPH2	rs1487278	TT	TPMT	rs1142345	TT
TPMT	rs12201199	AA	TPMT	rs1800460	CC
TRAF3IP2	rs76228616	GG	TSC1	rs7862221	TT
TYMP	rs11479	GG	TYMS	rs2847153	GG
TYMS	rs11280056	II	TYMS	rs183205964	GG
UBE2I	rs9597	CC	UGT1A	rs34650714	CC
UGT1A	rs2741049	CC	UGT1A	rs2070959	GG
UGT1A	rs6759892	GG	UGT1A	rs28898617	AA
UGT1A1	rs887829	TT	UGT1A1	rs1042640	CC
UGT1A1	rs8330	CC	UGT1A1	rs10929303	CC
UGT1A1	rs10929302	AA	UGT1A3	rs7604115	TT

Gene	Marker	Genotype	Gene	Marker	Genotype
UGT1A6	rs1105879	CC	UGT1A7	rs7586110	GG
UGT1A9	rs2003569	GG	UGT2B15	rs1902023	AC
UGT2B7	rs7662029	GG	UGT2B7	rs28365063	AG
UGT2B7	rs7439366	CC	UGT2B7	rs10028494	AA
UGT2B7	rs7668258	CC	UGT2B7	rs4554144	TT
UGT2B7	rs6600879	GG	UGT2B7	rs6600880	AA
UGT2B7	rs6600893	CC	UGT2B7	rs7438135	AA
UGT2B7	rs11940316	CC	UGT2B7	rs7668282	TT
UGT2B7	rs12233719	GG	VDR	rs11168293	GG
VEGFA	rs25648	CC	VEGFA	rs2010963	GG
VEGFA	rs699947	AC	VKORC1	rs9923231	CC
VKORC1	rs9934438	GG	VKORC1	rs61742245	CC
VKORC1	rs55894764	CC	VKORC1	rs17878544	TT
VKORC1	rs8050894	CC	VKORC1	rs2359612	GG
VKORC1	rs2884737	AA	VKORC1	rs72547529	CC
VKORC1	rs104894542	AA	VKORC1	rs17886199	AA
VKORC1	rs104894539	CC	VKORC1	rs104894541	TT
VKORC1	rs11150606	TT	VKORC1	rs104894540	AA
VKORC1L1	rs4072879	AA	WNK1	rs880054	TT
WNT5B	rs2010851	CC	XPC	rs2228001	GT
XPO1	rs11125883	AC	XRCC1	rs1799782	GG
XRCC1	rs25487	TC	XRCC3	rs861539	AA
XRCC4	rs2075685	TT	YEATS4	rs7297610	CT
ZBTB22	rs3130100	TT			

ANNEX: DETAILED INFORMATION ON WARFARIN

This annex details more precisely the needs related to the recommendations for warfarin, prescribed for people with cardiovascular problems. For the correct calculation of the recommended dose, the algorithm proposed by IWPC has been used (***I**nternational **W**arfarin **P**harmacogenetics **C**onsortium*), which takes into account anthropometric factors such as age, weight, height or ancestry, and genetic information from impact variants in the VKORC1 and CYP2C9 genes.

Therefore, based on ancestry, genetics and anthropometric characteristics, the warfarin dose recommendation for the patient is as follows:

RECOMMENDED DAILY DOSE: 6.26 mg

Additionally, CPIC recommends a dose adjustment considering additional genetic information, such as the CYP4F2 gene, among others. Based on this information, it is recommended to modify the dose as follows:

MANTAIN DOSE

CALCULATION LIMITS

This dose is indicative, as for greater precision it should be taken into account if the patient is taking enzyme inducers (carbamazepine, rifampicin, phenytoin...), in which case the dose should be increased, or enzyme inhibitors (amioradone, statins, antifungals...), in which case the dose should be reduced. It is therefore recommended to follow the patient's clinical history in order to adjust the dose with a higher level of precision.

These calculations are made on the basis of demonstrated and published scientific evidence. For dose calculation, the IWPC algorithm takes into account the following haplotype combinations for CYP2C9: *1/*1, *1/*2, *2/*2, *2/*3, *1/*3 and *3/*3, together with the rs9923231 variant of VKORC1. This algorithm also leads to a dose reduction in African, African-American or Asian ancestry.

For the calculation of the modification, the following CYP2C9 haplotypes are taken into account: *5, *6 and *11. In addition, the CPIC adjustment takes into account other genetic information such as the CYP4F2 gene and the rs12777823 marker. An association between rs12777823 and warfarin dose has been found only in people of African-American ancestry, so although the variant is listed as a risk, it is not taken into account in the dose calculation. Conversely, if the patient has an ancestry other than African-American, the haplotype present in the CYP4F2 gene is studied, where the haplotype combinations are taken into account: *1/*1, *1/*3 and *3/*3. If the patient presents other alleles or combinations that imply reduced or slow metabolism, it is recommended to see a medical professional for a more precise assessment.

BIBLIOGRAPHY

Johnson, J. A., Caudle, K. E., Gong, L., Whirl-Carrillo, M., Stein, C. M., Scott, S. A., Lee, M. T., Gage, B. F., Kimmel, S. E., Perera, M. A., Anderson, J. L., Pirmohamed, M., Klein, T. E., Limdi, N. A., Cavallari, L. H., & Wadelius, M. (2017). Clinical Pharmacogenetics Implementation Consortium (CPIC) Guideline for Pharmacogenetics-Guided Warfarin Dosing: 2017 Update. *Clinical pharmacology and therapeutics*, 102(3), 397–404. https://doi.org/10.1002/cpt.668

International Warfarin Pharmacogenetics Consortium, Klein, T. E., Altman, R. B., Eriksson, N., Gage, B. F., Kimmel, S. E., Lee, M. T., Limdi, N. A., Page, D., Roden, D. M., Wagner, M. J., Caldwell, M. D., Johnson, J. A. (2009). Estimation of the warfarin dose with clinical and pharmacogenetic data. *The New England journal of medicine*, 360(8), 753–764. https://doi.org/10.1056/NEJMoa0809329

CONSIDERATIONS

Pharmacogenetics studies the influence of human genetics on the activity of a drug, its transport and metabolism. This knowledge allows specific drugs to be targeted to different groups of people classified according to their genetics, known as **Personalised Medicine**.

MyPharma Basic is a pharmacogenetic test which evaluates the pharmacological compatibility of 113 drugs with the genotype of each person. The genetic variants included in this study are single nucleotide polymorphisms (SNPs) and complete haplotypes of a gene. The main objective is to provide a tool with high clinical value and interpretability for healthcare specialists. To this end, the design of variants and drugs included in this test has been based on their usefulness and clinical validity. Therefore, the test includes those variants with the highest level of scientific evidence available to date for each of the target genes.

Pharmacogenomics Knowledge Database (PharmGKB) is the largest public database, formed by a consortium of pharmacogenomics and pharmacogenetics experts responsible of the collection, selection, incorporation and dissemination of all knowledge related to the impact of human genetic variation on drug response. PharmGKB is funded by the National Institute of Health (NIH) and the National Institute of General Medical Sciences (NIGMS) in the United States, and is a member of the NIH Pharmacogenomics Research Partnership (PGRN). PharmGKB was founded by Stanford University in year 2000.

The results of the MyPharma Basic test should serve as a tool to be taken into consideration when making personalised therapeutic decisions. The response to drugs is also affected by other factors such as concomitant treatments with other drugs, diseases, toxic habits, age, gender, etc. The final decision on treatment for each patient should always be made by the medical specialist or prescriber based on a thorough assessment of the patient.

TECHNOLOGY

DNA Microarray technology consists of a solid surface with microscopic reactions (microreactions) or DNA chip, on which molecular probes are attached to detect the presence of target DNA molecules. Probe-target hybridization is usually detected and quantified by measuring the intensity of a given fluorescence provided by the molecular probe in samples. This type of technology allows the detection of thousands of specific DNA fragments present in a DNA sample. On the other hand, the specificity in terms of DNA sequence recognition is very high since single nucleotide exchange (single-base resolution) can be detected using short oligonucleotide probes (20-25 nucleotides). As a result, DNA Microarray technology has also evolved to be applied as a DNA sequencing technique to genotype several hundred thousand single nucleotide variants (SNVs) in target genes located throughout the genome (Whole Genome DNA Microarray).

Bead Chip Infinium Global Screening Array Orion (GSA Orion) is a line of DNA chips developed by Illumina for its DNA Microarray iScan platform, widely used in population genetic studies and precision medicine, providing optimized content with 100% reliable and reproducible high-quality genotyping results. The construction of the GSA Chip was carried out in collaboration with a consortium of experts, and for the selection of SNVs, information from prestigious scientific databases such as gnomAD, NHGRI-EBI-GWAS Catalog, ClinVAr, MHC-HLA-KIR and PharmGKB has been used. The GSA allows the analysis of approximately 700,000 SNVs that cover variants of interest (hot spots) throughout the entire genome, impacting a wide range of genetic traits with physiological and pathophysiological implications. In addition, it allows the customization by users to incorporate Ad Hoc 50,000-100,000 variants of interest.

QUALITY

Laboratory has standard and effective procedures to protect against technical and operational problems. However, results can be altered due to problems with sample collection (contamination) and labelling (identification), delay in receiving the sample in the laboratory (integrity), among other problems. This could lead to invalidation of the test results. In such cases, you would be asked to repeat the entire testing process.

As with all genetic tests, there is a small chance that laboratory may report inaccurate information. If there is a suspicion of an error in the detected genotype, a verification test may be requested.

RISKS AND LIMITATIONS

The results presented in this report are limited to the scientific knowledge existing at the date of test processing.

This test only detects the specified genetic variants, it does not detect other minority variants, even if they are related to other pathologies. The metaboliser types provided refer to general phenotypes. Enzyme activity may be substrate dependent. The recommendations described throughout this report of results are indicative, OVERGENES is not responsible for any possible misinterpretation of the results provided. MyPharma Basic is not a medical report.

These results should **NOT** be interpreted as a diagnostic tool, it only informs about the genetic predisposition of each individual to respond to possible treatment with any of these drugs.

Genetics for people

Contact:

Scientific Park
Valencia University

St, Agustín Escardino Benlloch, 9
Paterna, Valencia

(+34)96 321 77 58
info@overgenes.com

www.overgenes.com