

Helix Pharmacogenomics (PGx) Level A Panel

Patient Name: Jane Doe
Date of Birth: 1990-01-01

Patient ID: XXXXXX
Helix ID: XXXXXX

Provider Name: Client Client
Collection Date: 2026-01-31

Order Date: 2026-02-02
Report Date: 2026-02-03

Note: This report is intended for use by a medical professional. Please discuss any adjustments to your medication with your treating provider.

Drug Summary

Aminoglycoside antibacterials

	Normal Interaction	Use with Caution	Consider Alternatives	Impact Unknown
Amikacin (Arikayce®)	✓			
Dibekacin (Panimycin®, Dibekacin Meiji®)	✓			
Gentamicin (Garamycin®)	✓			
Kanamycin (Kantrex®)	✓			
Neomycin (Mycifradin®, Neo-Fradin®)	✓			
Netilmicin (Netromycin®)	✓			
Paromomycin (Humatin®)	✓			
Plazomicin (Zemdri®)	✓			
Ribostamycin (Vistamycin®)	✓			
Streptomycin	✓			
Tobramycin (Tobrex®)	✓			

Anticoagulants

	Normal Interaction	Use with Caution	Consider Alternatives	Impact Unknown
Warfarin (Coumadin®, Jantoven®)				?

Anticonvulsants

	Normal Interaction	Use with Caution	Consider Alternatives	Impact Unknown
Carbamazepine (Tegretol®)	✓			
Fosphenytoin (Cerebyx®)	✓			
Oxcarbazepine (Trileptal®)	✓			
Phenytoin (Dilantin®, Phenytek®)	✓			

Antidepressants

	Normal Interaction	Use with Caution	Consider Alternatives	Impact Unknown
Amitriptyline (Elavil®)	✓			
Citalopram (Celexa®)		⚠		
Escitalopram (Lexapro®)		⚠		
Nortriptyline (Pamelor®)	✓			
Paroxetine (Paxil®)	✓			
Sertraline (Zoloft®)		⚠		
Vortioxetine (Trintellix®)	✓			

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Antiemetics

	Normal Interaction	Use with Caution	Consider Alternatives	Impact Unknown
Ondansetron (Zofran®)	✓			
Tropisetron (Novaban®)	✓			

Antifungals

	Normal Interaction	Use with Caution	Consider Alternatives	Impact Unknown
Voriconazole (Vfend®)	✓			

Antineoplastics

	Normal Interaction	Use with Caution	Consider Alternatives	Impact Unknown
Mercaptopurine (Purixan®)	✓			
Tamoxifen (Soltamox®)	✓			
Thioguanine (Tabloid®)	✓			

Antiplatelets

	Normal Interaction	Use with Caution	Consider Alternatives	Impact Unknown
Clopidogrel (Plavix®)			⚠	

Antivirals

	Normal Interaction	Use with Caution	Consider Alternatives	Impact Unknown
Abacavir (Ziagen®)	✓			
Atazanavir (Reyataz®)	✓			

Fluoropyrimidines

	Normal Interaction	Use with Caution	Consider Alternatives	Impact Unknown
Capecitabine (Xeloda®)	✓			
Fluorouracil (Efudex®, Adrucil®)	✓			

Immunosuppressants

	Normal Interaction	Use with Caution	Consider Alternatives	Impact Unknown
Azathioprine (Imuran®, Azasan®)	✓			
Tacrolimus (Prograf®)	✓			

Interferons

	Normal Interaction	Use with Caution	Consider Alternatives	Impact Unknown
Peginterferon alfa-2a (Pegasys®)		⚠		
Peginterferon alfa-2b (PegIntron®)		⚠		

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NSAIDs

	Normal Interaction	Use with Caution	Consider Alternatives	Impact Unknown
Celecoxib (CeleBREX®, Elyxyb®)	✓			
Flurbiprofen (Ansaid®)	✓			
Ibuprofen (Advil®, Motrin®)	✓			
Lornoxicam (Xefo®)	✓			
Meloxicam (Mobic®, Vivlodex®)	✓			
Piroxicam (Feldene®)	✓			
Tenoxicam (Mobiflex®)	✓			

Non-stimulants

	Normal Interaction	Use with Caution	Consider Alternatives	Impact Unknown
Atomoxetine (Strattera®)		⚠		

Opioids & related medications

	Normal Interaction	Use with Caution	Consider Alternatives	Impact Unknown
Codeine	✓			
Tramadol (Ultram®, Conzip®)	✓			

Proton Pump Inhibitors

	Normal Interaction	Use with Caution	Consider Alternatives	Impact Unknown
Lansoprazole (Prevacid®)	✓			
Omeprazole (Prilosec®)	✓			
Pantoprazole (Protonix®)	✓			

Statins

	Normal Interaction	Use with Caution	Consider Alternatives	Impact Unknown
Atorvastatin (Lipitor®, Atorvaliq)		⚠		
Fluvastatin (LescolXL®)			⚠	
Lovastatin (Mevacor®, Altoprev®)			⚠	
Pitavastatin (Livalo®, Zypitamag®)		⚠		
Pravastatin (Pravachol®)		⚠		
Rosuvastatin (Crestor®, Ezallor Sprinkle®)		⚠		
Simvastatin (Zocor®, FloLipid®)			⚠	

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Legend

SYMBOL	IMPLICATION
	Major gene-drug interaction, consider different drug
	Major gene-drug interaction, consider reduced or increased dose
	No recommended action
	Impact not determined, consider standard dose and alter as needed

Gene Summary

GENE	RESULT	STATUS
ABCG2, rs2231142	C/A	Decreased function
CYP2C19	*1/*2	Intermediate Metabolizer
CYP2C9	*1/*2	Intermediate Metabolizer
CYP2D6	*2/*35	Normal Metabolizer
CYP3A5	*3/*3	Poor Metabolizer
CYP4F2	*3/*3	Deficient
DPYD	Reference/Reference	Normal Metabolizer
HLA-B*15:02	ABSENT	HLA-B: *15:02 negative
HLA-B*57:01	ABSENT	HLA-B: *57:01 negative
IFNL3/IFNL4, rs12979860	C/T	rs12979860 T carrier
MT-RNR1, rs267606617	A	Variant absent
MT-RNR1, rs267606618	T	Variant absent
MT-RNR1, rs267606619	C	Variant absent
NUDT15	*1/*1	Normal Metabolizer
SLCO1B1	*15/*15	Poor Function
TPMT	*1/*1	Normal Metabolizer
UGT1A1	*1/*80	Intermediate Metabolizer
VKORC1, rs9923231	C/T (G/A)	rs9923231 T carrier

Drug Details

Aminoglycoside antibacterials

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Amikacin (Arikayce®)

Normal response expected

Gene	Result	Status
MT-RNR1, rs267606617	A	Variant absent
MT-RNR1, rs267606618	T	Variant absent
MT-RNR1, rs267606619	C	Variant absent

Dibekacin (Panimycin®, Dibekacin Meiji®)

Normal response expected

Gene	Result	Status
MT-RNR1, rs267606617	A	Variant absent
MT-RNR1, rs267606618	T	Variant absent
MT-RNR1, rs267606619	C	Variant absent

Gentamicin (Garamycin®)

Normal response expected

Gene	Result	Status
MT-RNR1, rs267606617	A	Variant absent
MT-RNR1, rs267606618	T	Variant absent
MT-RNR1, rs267606619	C	Variant absent

Kanamycin (Kantrex®)

Normal response expected

Gene	Result	Status
MT-RNR1, rs267606617	A	Variant absent
MT-RNR1, rs267606618	T	Variant absent
MT-RNR1, rs267606619	C	Variant absent

Neomycin (Mycifradin®, Neo-Fradin®)

Normal response expected

Gene	Result	Status
MT-RNR1, rs267606617	A	Variant absent
MT-RNR1, rs267606618	T	Variant absent
MT-RNR1, rs267606619	C	Variant absent

Netilmicin (Netromycin®)

Normal response expected

Gene	Result	Status
MT-RNR1, rs267606617	A	Variant absent
MT-RNR1, rs267606618	T	Variant absent
MT-RNR1, rs267606619	C	Variant absent

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Paromomycin (Humatin®)

Normal response expected

Gene	Result	Status
MT-RNR1, rs267606617	A	Variant absent
MT-RNR1, rs267606618	T	Variant absent
MT-RNR1, rs267606619	C	Variant absent

Plazomicin (Zemdri®)

Normal response expected

Gene	Result	Status
MT-RNR1, rs267606617	A	Variant absent
MT-RNR1, rs267606618	T	Variant absent
MT-RNR1, rs267606619	C	Variant absent

Ribostamycin (Vistamycin®)

Normal response expected

Gene	Result	Status
MT-RNR1, rs267606617	A	Variant absent
MT-RNR1, rs267606618	T	Variant absent
MT-RNR1, rs267606619	C	Variant absent

Streptomycin

Normal response expected

Gene	Result	Status
MT-RNR1, rs267606617	A	Variant absent
MT-RNR1, rs267606618	T	Variant absent
MT-RNR1, rs267606619	C	Variant absent

Tobramycin (Tobrex®)

Normal response expected

Gene	Result	Status
MT-RNR1, rs267606617	A	Variant absent
MT-RNR1, rs267606618	T	Variant absent
MT-RNR1, rs267606619	C	Variant absent

Anticoagulants

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Warfarin (Coumadin®, Jantoven®)

Metabolizer Impact Unknown

Gene	Result	Status
CYP2C9	*1/*2	Intermediate Metabolizer
CYP4F2	*3/*3	Deficient
VKORC1,rs9923231	C/T(G/A)	rs9923231 T carrier

Anticonvulsants

Carbamazepine (Tegretol®)

Normal response expected

Gene	Result	Status
HLA-B*15:02	ABSENT	HLA-B: *15:02 negative

Fosphenytoin (Cerebyx®)

Normal response expected

Gene	Result	Status
CYP2C9	*1/*2	Intermediate Metabolizer
HLA-B*15:02	ABSENT	HLA-B: *15:02 negative

Oxcarbazepine (Trileptal®)

Normal response expected

Gene	Result	Status
HLA-B*15:02	ABSENT	HLA-B: *15:02 negative

Phenytoin (Dilantin®, Phenytek®)

Normal response expected

Gene	Result	Status
CYP2C9	*1/*2	Intermediate Metabolizer
HLA-B*15:02	ABSENT	HLA-B: *15:02 negative

Antidepressants

Amitriptyline (Elavil®)

Normal response expected

Gene	Result	Status
CYP2C19	*1/*2	Intermediate Metabolizer
CYP2D6	*2/*35	Normal Metabolizer

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Citalopram (Celexa®)

Use caution

Gene	Result	Status
CYP2C19	*1/*2	Intermediate Metabolizer

Escitalopram (Lexapro®)

Use caution

Gene	Result	Status
CYP2C19	*1/*2	Intermediate Metabolizer

Nortriptyline (Pamelor®)

Normal response expected

Gene	Result	Status
CYP2D6	*2/*35	Normal Metabolizer

Paroxetine (Paxil®)

Normal response expected

Gene	Result	Status
CYP2D6	*2/*35	Normal Metabolizer

Sertraline (Zoloft®)

Use caution

Gene	Result	Status
CYP2C19	*1/*2	Intermediate Metabolizer

Vortioxetine (Trintellix®)

Normal response expected

Gene	Result	Status
CYP2D6	*2/*35	Normal Metabolizer

Antiemetics

Ondansetron (Zofran®)

Normal response expected

Gene	Result	Status
CYP2D6	*2/*35	Normal Metabolizer

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Order Date: 2026-02-02
Report Date: 2026-02-03

Tropisetron (Novaban®)

Normal response expected

Gene	Result	Status
CYP2D6	*2/*35	Normal Metabolizer

Antifungals

Voriconazole (Vfend®)

Normal response expected

Gene	Result	Status
CYP2C19	*1/*2	Intermediate Metabolizer

Antineoplastics

Mercaptopurine (Purixan®)

Normal response expected

Gene	Result	Status
NUDT15	*1/*1	Normal Metabolizer
TPMT	*1/*1	Normal Metabolizer

Tamoxifen (Soltamox®)

Normal response expected

Gene	Result	Status
CYP2D6	*2/*35	Normal Metabolizer

Thioguanine (Tabloid®)

Normal response expected

Gene	Result	Status
NUDT15	*1/*1	Normal Metabolizer
TPMT	*1/*1	Normal Metabolizer

Antiplatelets

Clopidogrel (Plavix®)

Consider alternative medication

Gene	Result	Status
CYP2C19	*1/*2	Intermediate Metabolizer

Antivirals

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Abacavir (Ziagen®)

Normal response expected

Gene	Result	Status
HLA-B*57:01	ABSENT	HLA-B: *57:01 negative

Atazanavir (Reyataz®)

Normal response expected

Gene	Result	Status
UGT1A1	*1/*80	Intermediate Metabolizer

Fluoropyrimidines

Capecitabine (Xeloda®)

Normal response expected

Gene	Result	Status
DPYD	Reference/Reference	Normal Metabolizer

Fluorouracil (Efudex®, Adrucil®)

Normal response expected

Gene	Result	Status
DPYD	Reference/Reference	Normal Metabolizer

Immunosuppressants

Azathioprine (Imuran®, Azasan®)

Normal response expected

Gene	Result	Status
NUDT15	*1/*1	Normal Metabolizer
TPMT	*1/*1	Normal Metabolizer

Tacrolimus (Prograf®)

Normal response expected

Gene	Result	Status
CYP3A5	*3/*3	Poor Metabolizer

Interferons

Peginterferon alfa-2a (Pegasys®)

Use caution

Gene	Result	Status
IFNL3/IFNL4, rs12979860	C/T	rs12979860 T carrier

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Helix ID: XXXXXX

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Peginterferon alfa-2b (PegIntron®)

Use caution

Gene	Result	Status
IFNL3/IFNL4, rs12979860	C/T	rs12979860 T carrier

NSAIDs

Celecoxib (CeleBREX®, Elyxyb®)

Normal response expected

Gene	Result	Status
CYP2C9	*1/*2	Intermediate Metabolizer

Flurbiprofen (Ansaid®)

Normal response expected

Gene	Result	Status
CYP2C9	*1/*2	Intermediate Metabolizer

Ibuprofen (Advil®, Motrin®)

Normal response expected

Gene	Result	Status
CYP2C9	*1/*2	Intermediate Metabolizer

Lornoxicam (Xefo®)

Normal response expected

Gene	Result	Status
CYP2C9	*1/*2	Intermediate Metabolizer

Meloxicam (Mobic®, Vivlodex®)

Normal response expected

Gene	Result	Status
CYP2C9	*1/*2	Intermediate Metabolizer

Piroxicam (Feldene®)

Normal response expected

Gene	Result	Status
CYP2C9	*1/*2	Intermediate Metabolizer

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Order Date: 2026-02-02
Report Date: 2026-02-03

Tenoxicam (Mobiflex®)

Normal response expected

Gene	Result	Status
CYP2C9	*1/*2	Intermediate Metabolizer

Non-stimulants

Atomoxetine (Strattera®)

Use caution

Gene	Result	Status
CYP2D6	*2/*35	Normal Metabolizer

Opioids & related medications

Codeine

Normal response expected

Gene	Result	Status
CYP2D6	*2/*35	Normal Metabolizer

Tramadol (Ultram®, Conzip®)

Normal response expected

Gene	Result	Status
CYP2D6	*2/*35	Normal Metabolizer

Proton Pump Inhibitors

Lansoprazole (Prevacid®)

Normal response expected

Gene	Result	Status
CYP2C19	*1/*2	Intermediate Metabolizer

Omeprazole (Prilosec®)

Normal response expected

Gene	Result	Status
CYP2C19	*1/*2	Intermediate Metabolizer

Pantoprazole (Protonix®)

Normal response expected

Gene	Result	Status
CYP2C19	*1/*2	Intermediate Metabolizer

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Patient ID: XXXXXX
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Collection Date: 2026-01-31

Order Date: 2026-02-02
Report Date: 2026-02-03

Statins

Atorvastatin (Lipitor®, Atorvaliq) Use caution

Gene	Result	Status
SLCO1B1	*15/*15	Poor Function

Fluvastatin (LescolXL®) Consider alternative medication

Gene	Result	Status
CYP2C9	*1/*2	Intermediate Metabolizer
SLCO1B1	*15/*15	Poor Function

Lovastatin (Mevacor®, Altoprev®) Consider alternative medication

Gene	Result	Status
SLCO1B1	*15/*15	Poor Function

Pitavastatin (Livalo®, Zypitamag®) Use caution

Gene	Result	Status
SLCO1B1	*15/*15	Poor Function

Pravastatin (Pravachol®) Use caution

Gene	Result	Status
SLCO1B1	*15/*15	Poor Function

Rosuvastatin (Crestor®, Ezallor Sprinkle®) Use caution

Gene	Result	Status
ABCG2, rs2231142	C/A	Decreased function
SLCO1B1	*15/*15	Poor Function

Simvastatin (Zocor®, FloLipid®) Consider alternative medication

Gene	Result	Status
SLCO1B1	*15/*15	Poor Function

Methods and Limitations



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Data were generated from extracted DNA using the validated Helix Exome+ assay by the Helix clinical laboratory. The Exome+ assay is based on target enrichment followed by next generation sequencing using paired end reads on an Illumina DNA sequencing system. Star alleles were determined using a proprietary algorithm which performs variant calling and then determines star allele solutions based on a combination of defining SNPs and exon-level copy number.

Metabolizer status was determined based on star allele solutions according to CPIC guidelines, with the following exceptions: (1) metabolizer status was set as Indeterminate if a novel nonsense or truncating novel mutation was observed within the gene, (2) metabolizer status was set as Indeterminate if the combination of defining SNPs and copy number suggested a novel star allele solution, and (3) if more than two copies of a gene were detected then metabolizer status was set as Indeterminate. Drug/gene considerations were limited to guidelines published by CPIC.

Phasing could not be performed for genotypes, and therefore in some cases the star allele solution could not be disambiguated between two or more equally likely possibilities. In these cases, if the metabolizer status was the same regardless of possible star allele solutions, the more common star allele solution was provided along with the metabolizer status. If the metabolizer status was different for the equally-likely star allele solutions, the star alleles were reported as Unknown and the metabolizer status was considered Indeterminate.

All samples were sequenced and interpreted in Helix's CLIA-certified (#05D2117342) and CAP-accredited (#9382893) laboratory in San Diego, California. These tests have not been cleared or approved by the U.S. Food and Drug Administration.

The reportable range includes the following results:

ABCG2: rs2231142; CYP2C9: *1-*61; CYP2C19: *1-*19, *22-*26, *28-*39; CYP2D6: *1-*15, *4N, *17-*65, *68-*75, *81, *83-*114; CYP3A5: *1, *3, *6-*9; CYP4F2: *1, *3; DPYD: *1, *2A, *3, *4, *6-*8, *9B, *10-*13, HapB3, rs150036960, rs72549310, rs80081766, rs150385342, rs141462178, rs200562975, rs2297595, rs139834141, rs6670886, rs115232898, rs72549308, rs72549307, rs45589337, rs146356975, rs150437414, rs145112791, rs201018345, rs183385770, rs143154602, rs72549305, rs75017182, rs140602333, rs143815742, rs61622928, rs200064537, rs764666241, rs142512579, rs186169810, rs72975710, rs144395748, rs57918000, rs199549923, rs72549304, rs111858276, rs138391898, rs148994843, rs190951787, rs142619737, rs201615754, rs59086055, rs138616379, rs145773863, rs147601618, rs17376848, rs3918289, rs55971861, rs138545885, rs137999090, rs145548112, rs146529561, rs60511679, rs112766203, rs56005131, rs199634007, rs200687447, rs60139309, rs201035051, rs55674432, rs147545709, rs67376798, rs141044036, rs145529148, rs72547602, rs72547601, rs202144771, rs139459586, rs140114515, rs148799944, rs114096998; HLA-B*15:02, *57:01; IFNL3 / IFNL4: rs12979860; MT-RNR1: rs267606617, rs267606618, rs267606619; NUDT15: *1-*20; SLCO1B1: *1-*16, *19, *20, *23-*34, *36-*44, *47-*49; TPMT: *1, *2, *3A, *3B, *3C, *4-*44; UGT1A1: *1, *6, *27, *80; VKORC1: rs9923231. Sensitivity may be reduced for the CYP2D6*13 allele. UGT1A1*80 is used as a proxy for UGT1A1*28 and therefore treated as decreased function.

Results are based on CPIC Level A guidelines for:

Abacavir, HLA-B*57:01; Amikacin, MT-RNR1; Amitriptyline, CYP2C19, CYP2D6; Atazanavir, UGT1A1 (CPIC A); Atomoxetine, CYP2D6; Atorvastatin, SLCO1B1; Azathioprine, NUDT15, TPMT; Capecitabine, DPYD; Carbamazepine, HLA-B*15:02; Celecoxib, CYP2C9; Citalopram, CYP2C19; Clopidogrel, CYP2C19; Codeine, CYP2D6; Dibekacin, MT-RNR1, (CPIC A); Escitalopram, CYP2C19; Fluorouracil, DPYD; Flurbiprofen, CYP2C9; Fluvastatin, CYP2C9, SLCO1B1; Fosphenytoin, CYP2C9, HLA-B*15:02 (FDA Section 1, CPIC A); Gentamicin, MT-RNR1; Ibuprofen, CYP2C9; Kanamycin, MT-RNR1; Lansoprazole, CYP2C19; Lornoxicam, CYP2C9; Lovastatin, SLCO1B1; Meloxicam, CYP2C9; Mercaptopurine, NUDT15, TPMT; Neomycin, MT-RNR1, (CPIC A); Netilmicin, MT-RNR1, (CPIC A); Nortriptyline, CYP2D6; Omeprazole, CYP2C19; Ondansetron, CYP2D6; Oxcarbazepine, HLA-B*15:02; Pantoprazole, CYP2C19; Paromomycin, MT-RNR1, (CPIC A); Paroxetine, CYP2D6; Peginterferon alfa-2a, IFNL3 / IFNL4; Peginterferon alfa-2b, IFNL3 / IFNL4; Phenytoin, CYP2C9, HLA-B*15:02 (FDA Section 1, CPIC A); Piroxicam, CYP2C9; Pitavastatin, SLCO1B1; Plazomicin, MT-RNR1; Pravastatin, SLCO1B1; Ribostamycin, MT-RNR1, (CPIC A); Rosuvastatin, ABCG2, SLCO1B1; Sertraline, CYP2C19; Simvastatin, SLCO1B1; Streptomycin, MT-RNR1; Tacrolimus, CYP3A5; Tamoxifen, CYP2D6; Tenoxicam, CYP2C9; Thioguanine, NUDT15, TPMT; Tobramycin, MT-RNR1; Tramadol, CYP2D6; Tropicisetron, CYP2D6; Voriconazole, CYP2C19; Vortioxetine, CYP2D6; Warfarin, CYP2C9, CYP4F2, VKORC1.

Disclaimer

The interpretations and drug considerations provided by Helix are intended solely for use by a medical professional and do not constitute medical advice by Helix. All treatment decisions and diagnoses remain the full responsibility of the treating provider. Results included in this report are based on the guidelines published by the FDA and CPIC, and do not account for other factors that may impact drug response, such as environment, medical conditions, drug-drug interactions, or additional genetic variants. Helix is not responsible or liable for any errors, omissions, or ambiguities in the interpretation or use of the results of this report. Administration of any medication listed in this report requires careful therapeutic monitoring regardless of the drug considerations outlined in this report. All dates and times displayed are Pacific Time and may vary from the dates and times for Collection, Order and Report for the providers/patients.

Result Notations

<https://www.fda.gov/medical-devices/precision-medicine/table-pharmacogenetic-associations>

<https://cpicpgx.org/guidelines>

<https://www.pharmgkb.org/guidelineAnnotations>



Helix Pharmacogenomics (PGx) Level A Panel

Patient Name: Jane Doe
Date of Birth: 1990-01-01

Patient ID: XXXXXX
Helix ID: XXXXXX

Provider Name: Client Client
Collection Date: 2026-01-31

Order Date: 2026-02-02
Report Date: 2026-02-03

Report Signed By

Kenneth David Becker, PhD, HCLD, CQ, CGMBS

Helix's Sequence Once, Query Often® Model

When your provider orders a genetic test through Helix, we use our proprietary Sequence Once, Query Often® model to perform whole exome sequencing and analyze the specific genes related to the test. Helix securely stores your whole exome for future clinical use. With your permission, this allows your health care providers to order future medically necessary genetic tests from Helix without needing another sample. Instead, these tests are conducted through digital analysis of your stored genetic information.

To learn more about how Helix protects the privacy and security of your genetic information and learn more about your rights, please visit <https://www.helix.com/privacy-and-policy-highlights>.

SAMPLE