MORPHEUS
— PRECISION HEALTH —
LONGEVITY AND WELLNESS

PHARMACOGENOMICS REPORT

Patient	De-identified patient	**DOB / Sex**	Not provided / Not provided
Test	Not provided	**Specimen**	Not provided
Collected	Not provided	**Reported**	Not provided

Normal: standard dosing	Intermediate: adjust or monitor	Rapid or poor: avoid or change

Gene Results

Gene	Genotype	Phenotype	Key drugs affected
CYP2B6	*1/*7	**Intermediate Metabolizer**	Efavirenz, sertraline, methadone
CYP2C19	*17/*17	**Ultra-Rapid Metabolizer**	PPIs, citalopram/escitalopram, sertraline, tertiary TCAs, voriconazole, clopidogrel
CYP2D6	*1/*5	**Intermediate Metabolizer**	Codeine, tramadol, hydrocodone, TCAs, SSRIs, atomoxetine, tamoxifen, ondansetron, metoprolol
CYP3A4	*1/*22	**Intermediate Metabolizer**	Tacrolimus
CYP3A5	*3/*3	**Poor Metabolizer***	Tacrolimus
NAT2	*5/*6	**Poor Metabolizer**	Hydralazine, isoniazid, procainamide, sulfasalazine, dapsone
SLCO1B1	*1/*15	**Decreased Function**	Statins
ABCG2	c.421 C/C	**Normal Function**	Rosuvastatin
CYP2C9	*1/*1	**Normal Metabolizer**	NSAIDs, phenytoin, warfarin, fluvastatin
CYP4F2	*1/*1	**Normal Metabolizer**	Warfarin
DPYD	No Variants Detected	**Normal Metabolizer (Activity Score; 2.0)**	Fluorouracil, capecitabine
F5	G/G	**Normal Thrombosis Risk**	Estrogen-containing therapy
HLA-A*31:01	Neg/Neg	**Negative**	Carbamazepine
HLA-B*15:02	Neg/Neg	**Negative**	Carbamazepine, oxcarbazepine, phenytoin
HLA-B*57:01	Neg/Neg	**Negative**	Abacavir
HLA-B*58:01	Neg/Neg	**Negative**	Allopurinol
IFNL3	C/C	**Favorable Response Genotype**	Peginterferon alfa + ribavirin
NUDT15	*1/*1	**Normal Metabolizer**	Thiopurines
TPMT	*1/*1	**Normal Metabolizer**	Thiopurines
UGT1A1	*1/*1	**Normal Metabolizer**	Atazanavir, irinotecan
VKORC1	No Variants Detected	**Low Sensitivity to Warfarin**	Warfarin

**CYP3A5 *3/*3 is the most common genotype in people of European ancestry and means standard tacrolimus dosing.*

Medication Quick Reference

AVOID OR CHANGE	ADJUST OR MONITOR	STANDARD DOSING
Cardiology & Lipids Simvastatin, Lovastatin, Procainamide **Gastrointestinal** Omeprazole, Lansoprazole, Pantoprazole, Dexlansoprazole **Psychiatry** Citalopram, Escitalopram, Amitriptyline, Clomipramine, Doxepin, Imipramine, Trimipramine **Infectious Disease** Voriconazole, Isoniazid	**Cardiology & Lipids** Atorvastatin, Rosuvastatin, Pitavastatin, Warfarin, Hydralazine **Pain & Anesthesia** Codeine, Tramadol, Hydrocodone, Methadone **Gastrointestinal** Sulfasalazine **Psychiatry** Sertraline, Nortriptyline, Desipramine, Atomoxetine **Neurology** Amifampridine **Infectious Disease** Efavirenz, Dapsone **Oncology, Immunology & Transplant** Tamoxifen, Tacrolimus	**Cardiology & Lipids** Clopidogrel, Metoprolol, Pravastatin, Fluvastatin **Pain & Anesthesia** Oxycodone, Morphine, Hydromorphone, Fentanyl, Ondansetron, Tropisetron, Celecoxib, Flurbiprofen, Ibuprofen, Lornoxicam, Meloxicam, Piroxicam, Tenoxicam **Gastrointestinal** Esomeprazole, Rabeprazole **Psychiatry** Paroxetine, Fluvoxamine, Vortioxetine, Venlafaxine **Neurology** Phenytoin, Fosphenytoin, Carbamazepine, Oxcarbazepine **Infectious Disease** Atazanavir, Abacavir, Peginterferon alfa, Ribavirin **Oncology, Immunology & Transplant** Fluorouracil, Capecitabine, Tegafur, Azathioprine, Mercaptopurine, Thioguanine, Irinotecan **Other** Allopurinol, Estrogen-containing therapy

See detailed recommendations on the following pages. Drugs marked Literature or FDA label are not CPIC guidelines.

ACTION REQUIRED: MEDICATIONS NEEDING ADJUSTMENT

Red and yellow medications only, grouped by system. Full list of all medications follows.

Cardiology & Lipids

Drug	Gene(s)	Recommendation	Source
Simvastatin	SLCO1B1	Use an alternative statin; if necessary, keep dose <20 mg/day.	CPIC
Lovastatin	SLCO1B1	Use an alternative statin.	CPIC
Atorvastatin	SLCO1B1	Start ≤40 mg/day; if more intensity is needed, use rosuvastatin or combination therapy.	CPIC
Rosuvastatin	SLCO1B1, ABCG2	Start ≤20 mg/day; if more is needed, use an alternative or combination therapy.	CPIC
Pitavastatin	SLCO1B1	Start ≤2 mg/day; if more is needed, use an alternative.	CPIC
Warfarin	CYP2C9, VKORC1, CYP4F2	Use a validated pharmacogenetic dosing algorithm; VKORC1 result predicts a higher-than-average dose requirement.	CPIC
Hydralazine	NAT2	Start 40–75 mg/day total; titrate carefully to effect; use caution at ≥200 mg/day (drug-induced lupus risk).	CPIC
Procainamide	NAT2	Higher exposure and drug-induced lupus risk in slow acetylators.	Literature

Pain & Anesthesia

Drug	Gene(s)	Recommendation	Source
Codeine	CYP2D6	Label dosing; if no response, use a non-codeine, non-tramadol opioid.	CPIC
Tramadol	CYP2D6	Label dosing; if no response, use a non-codeine, non-tramadol opioid.	CPIC
Hydrocodone	CYP2D6	Label dosing; if no response, consider a non-tramadol/codeine alternative.	CPIC
Methadone	CYP2B6	No guideline; reduced CYP2B6 function may raise exposure and QT risk.	Literature

Gastrointestinal

Drug	Gene(s)	Recommendation	Source
Omeprazole	CYP2C19	Increase starting daily dose by 100%, in divided doses; monitor efficacy.	CPIC
Lansoprazole	CYP2C19	Increase starting daily dose by 100%, in divided doses; monitor efficacy.	CPIC
Pantoprazole	CYP2C19	Increase starting daily dose by 100%, in divided doses; monitor efficacy.	CPIC
Dexlansoprazole	CYP2C19	Increase starting daily dose by 100%, in divided doses; monitor efficacy.	CPIC
Sulfasalazine	NAT2	Higher adverse-effect risk in slow acetylators.	Literature

Psychiatry

Drug	Gene(s)	Recommendation	Source
Citalopram	CYP2C19	Consider an alternative not predominantly metabolized by CYP2C19; if used, may need higher maintenance dose.	CPIC
Escitalopram	CYP2C19	Consider an alternative not predominantly metabolized by CYP2C19; if used, may need higher maintenance dose.	CPIC
Sertraline	CYP2C19, CYP2B6	Standard starting dose; if response is inadequate, titrate higher or switch.	CPIC
Amitriptyline	CYP2C19, CYP2D6	Avoid; if a TCA is needed, use nortriptyline or desipramine.	CPIC
Clomipramine	CYP2C19, CYP2D6	Avoid; if a TCA is needed, use nortriptyline or desipramine.	CPIC
Doxepin	CYP2C19, CYP2D6	Avoid; if a TCA is needed, use nortriptyline or desipramine.	CPIC
Imipramine	CYP2C19, CYP2D6	Avoid; if a TCA is needed, use nortriptyline or desipramine.	CPIC
Trimipramine	CYP2C19, CYP2D6	Avoid; if a TCA is needed, use nortriptyline or desipramine.	CPIC
Nortriptyline	CYP2D6	Consider 25% dose reduction; use therapeutic drug monitoring.	CPIC
Desipramine	CYP2D6	Consider 25% dose reduction; use therapeutic drug monitoring.	CPIC
Atomoxetine	CYP2D6	Start 40 mg/day, increase to 80 mg/day after 3 days; consider 100 mg/day at 2 weeks if needed and tolerated.	CPIC

Neurology

Drug	Gene(s)	Recommendation	Source
Amifampridine	NAT2	Start 15 mg/day in poor metabolizers.	FDA label

Infectious Disease

Drug	Gene(s)	Recommendation	Source
Voriconazole	CYP2C19	Use an alternative: isavuconazole, posaconazole or liposomal amphotericin B.	CPIC
Efavirenz	CYP2B6	Consider starting at 400 mg/day instead of 600 mg.	CPIC
Isoniazid	NAT2	Higher hepatotoxicity risk in slow acetylators; consider dose reduction.	Literature
Dapsone	NAT2	Higher adverse-effect risk in slow acetylators.	Literature

Oncology, Immunology & Transplant

Drug	Gene(s)	Recommendation	Source
Tamoxifen	CYP2D6	Consider 40 mg/day, or an alternative where one exists. Avoid CYP2D6 inhibitors.	CPIC
Tacrolimus	CYP3A5, CYP3A4	Standard starting dose (CYP3A5 non-expresser); CYP3A4*22 may lower requirement, so monitor troughs closely.	CPIC

ALL MEDICATIONS: DETAILED RECOMMENDATIONS

Cardiology & Lipids

Drug	Gene(s)	Recommendation	Source
Clopidogrel	CYP2C19	Standard dosing. Rapid/ultrarapid status does not reduce efficacy.	CPIC
Metoprolol	CYP2D6	Standard dosing.	CPIC
Simvastatin	SLCO1B1	Use an alternative statin; if necessary, keep dose <20 mg/day.	CPIC
Lovastatin	SLCO1B1	Use an alternative statin.	CPIC
Atorvastatin	SLCO1B1	Start ≤40 mg/day; if more intensity is needed, use rosuvastatin or combination therapy.	CPIC
Rosuvastatin	SLCO1B1, ABCG2	Start ≤20 mg/day; if more is needed, use an alternative or combination therapy.	CPIC
Pitavastatin	SLCO1B1	Start ≤2 mg/day; if more is needed, use an alternative.	CPIC
Pravastatin	SLCO1B1	Desired starting dose; adjust per disease-specific guidelines.	CPIC
Fluvastatin	SLCO1B1, CYP2C9	Desired starting dose; adjust per disease-specific guidelines.	CPIC
Warfarin	CYP2C9, VKORC1, CYP4F2	Use a validated pharmacogenetic dosing algorithm; VKORC1 result predicts a higher-than-average dose requirement.	CPIC
Hydralazine	NAT2	Start 40–75 mg/day total; titrate carefully to effect; use caution at ≥200 mg/day (drug-induced lupus risk).	CPIC
Procainamide	NAT2	Higher exposure and drug-induced lupus risk in slow acetylators.	Literature

Pain & Anesthesia

Drug	Gene(s)	Recommendation	Source
Codeine	CYP2D6	Label dosing; if no response, use a non-codeine, non-tramadol opioid.	CPIC
Tramadol	CYP2D6	Label dosing; if no response, use a non-codeine, non-tramadol opioid.	CPIC
Hydrocodone	CYP2D6	Label dosing; if no response, consider a non-tramadol/codeine alternative.	CPIC
Oxycodone	CYP2D6	No CYP2D6-based change.	CPIC
Morphine	CYP2D6	No CYP2D6-based change.	CPIC
Hydromorphone	CYP2D6	No CYP2D6-based change.	CPIC
Fentanyl	CYP2D6	No CYP2D6-based change.	CPIC
Ondansetron	CYP2D6	Standard dosing.	CPIC
Tropisetron	CYP2D6	Standard dosing.	CPIC
Celecoxib	CYP2C9	Standard dosing.	CPIC
Flurbiprofen	CYP2C9	Standard dosing.	CPIC
Ibuprofen	CYP2C9	Standard dosing.	CPIC
Lornoxicam	CYP2C9	Standard dosing.	CPIC
Meloxicam	CYP2C9	Standard dosing.	CPIC
Piroxicam	CYP2C9	Standard dosing.	CPIC
Tenoxicam	CYP2C9	Standard dosing.	CPIC
Methadone	CYP2B6	No guideline; reduced CYP2B6 function may raise exposure and QT risk.	Literature

Gastrointestinal

Drug	Gene(s)	Recommendation	Source
Omeprazole	CYP2C19	Increase starting daily dose by 100%, in divided doses; monitor efficacy.	CPIC
Lansoprazole	CYP2C19	Increase starting daily dose by 100%, in divided doses; monitor efficacy.	CPIC
Pantoprazole	CYP2C19	Increase starting daily dose by 100%, in divided doses; monitor efficacy.	CPIC
Dexlansoprazole	CYP2C19	Increase starting daily dose by 100%, in divided doses; monitor efficacy.	CPIC
Esomeprazole	CYP2C19	No CPIC recommendation; less CYP2C19-dependent PPI.	CPIC (no rec)
Rabeprazole	CYP2C19	No CPIC recommendation; less CYP2C19-dependent PPI.	CPIC (no rec)

Sulfasalazine	NAT2	Higher adverse-effect risk in slow acetylators.	Literature

Psychiatry

Drug	Gene(s)	Recommendation	Source
Citalopram	CYP2C19	Consider an alternative not predominantly metabolized by CYP2C19; if used, may need higher maintenance dose.	CPIC
Escitalopram	CYP2C19	Consider an alternative not predominantly metabolized by CYP2C19; if used, may need higher maintenance dose.	CPIC
Sertraline	CYP2C19, CYP2B6	Standard starting dose; if response is inadequate, titrate higher or switch.	CPIC
Amitriptyline	CYP2C19, CYP2D6	Avoid; if a TCA is needed, use nortriptyline or desipramine.	CPIC
Clomipramine	CYP2C19, CYP2D6	Avoid; if a TCA is needed, use nortriptyline or desipramine.	CPIC
Doxepin	CYP2C19, CYP2D6	Avoid; if a TCA is needed, use nortriptyline or desipramine.	CPIC
Imipramine	CYP2C19, CYP2D6	Avoid; if a TCA is needed, use nortriptyline or desipramine.	CPIC
Trimipramine	CYP2C19, CYP2D6	Avoid; if a TCA is needed, use nortriptyline or desipramine.	CPIC
Nortriptyline	CYP2D6	Consider 25% dose reduction; use therapeutic drug monitoring.	CPIC
Desipramine	CYP2D6	Consider 25% dose reduction; use therapeutic drug monitoring.	CPIC
Paroxetine	CYP2D6	Standard dosing.	CPIC
Fluvoxamine	CYP2D6	Standard dosing.	CPIC
Vortioxetine	CYP2D6	Standard dosing.	CPIC
Venlafaxine	CYP2D6	Standard dosing.	CPIC
Atomoxetine	CYP2D6	Start 40 mg/day, increase to 80 mg/day after 3 days; consider 100 mg/day at 2 weeks if needed and tolerated.	CPIC

Neurology

Drug	Gene(s)	Recommendation	Source
Phenytoin	CYP2C9, HLA-B*15:02	Standard dosing.	CPIC
Fosphenytoin	CYP2C9, HLA-B*15:02	Standard dosing.	CPIC
Carbamazepine	HLA-B*15:02, HLA-A*31:01	Standard dosing.	CPIC
Oxcarbazepine	HLA-B*15:02	Standard dosing.	CPIC
Amifampridine	NAT2	Start 15 mg/day in poor metabolizers.	FDA label

Infectious Disease

Drug	Gene(s)	Recommendation	Source
Voriconazole	CYP2C19	Use an alternative: isavuconazole, posaconazole or liposomal amphotericin B.	CPIC
Efavirenz	CYP2B6	Consider starting at 400 mg/day instead of 600 mg.	CPIC
Isoniazid	NAT2	Higher hepatotoxicity risk in slow acetylators; consider dose reduction.	Literature
Dapsone	NAT2	Higher adverse-effect risk in slow acetylators.	Literature
Atazanavir	UGT1A1	No genetic reason to avoid.	CPIC
Abacavir	HLA-B*57:01	May be used.	CPIC
Peginterferon alfa	IFNL3	Favorable response genotype.	CPIC
Ribavirin	IFNL3	Favorable response genotype.	CPIC

Oncology, Immunology & Transplant

Drug	Gene(s)	Recommendation	Source
Tamoxifen	CYP2D6	Consider 40 mg/day, or an alternative where one exists. Avoid CYP2D6 inhibitors.	CPIC

Tacrolimus	CYP3A5, CYP3A4	Standard starting dose (CYP3A5 non-expresser); CYP3A4*22 may lower requirement, so monitor troughs closely.	CPIC
Fluorouracil	DPYD	Full standard dose.	CPIC
Capecitabine	DPYD	Full standard dose.	CPIC
Tegafur	DPYD	Full standard dose.	CPIC
Azathioprine	TPMT, NUDT15	Normal starting dose.	CPIC
Mercaptopurine	TPMT, NUDT15	Normal starting dose.	CPIC
Thioguanine	TPMT, NUDT15	Normal starting dose.	CPIC
Irinotecan	UGT1A1	Standard dosing.	FDA/DPWG

Other

Drug	Gene(s)	Recommendation	Source
Allopurinol	HLA-B*58:01	Use per standard practice.	CPIC
Estrogen-containing therapy	F5	No added Factor V Leiden risk.	Literature

Limitations & Interpretation Notes

Interpretation notes

- Strong CYP2D6 inhibitors (bupropion, fluoxetine, paroxetine) can convert a CYP2D6 normal or intermediate metabolizer to a functional poor metabolizer.
- Phenotypes are as reported by the laboratory. CYP2D6 phenotype follows activity-score classification (2020 consensus).
- Several CYP2C9 recommendations depend on activity score (1.0 vs 1.5), which may not appear on the lab report.
- Only the alleles tested by the laboratory were assessed; untested variants default to normal (*1).
- Recommendations are from the Morpheus PGx rules table v1.0, reviewed against CPIC on 2026-09-26. Confirm current guidance before prescribing decisions.
- Source: Not provided, specimen Not provided.