PGx Report - Pain Management

Type: Anti-inflammatory Agent, Analgesic, Antipyretic

Drug Class	Generic	Primary Mechanism Involved	Other Mechanisms Involved	Used As Directed	May Have Decreased Efficacy	May Have Increased Toxicity
The Nonsteroidal Antiinflammatory Drugs (NSAIDs)						
Acetic acid derivatives	Nabumetone	CYP1A2	CYP2C19, CYP3A4	✓		
	Indomethacin	CYP2C9	CYP2C19	✓		
Enolic acid (Oxicam) derivatives	Meloxicam	CYP2C9	CYP1A2, CYP3A4, CYP3A5	✓		
	Piroxicam	CYP2C9	CYP3A4, CYP3A5	✓		
	Tenoxicam	CYP2C9		✓		
	Lornoxicam	CYP2C9		✓		
Selective COX-2 inhibitors (Coxibs)	Etoricoxib	CYP3A4	CYP3A5, CYP2C9, CYP2D6, CYP1A2	✓		
	Parecoxib	CYP2C9	CYP3A4, CYP3A5	✓		
	Celecoxib	CYP2C9	CYP2C19	✓		
Propionic acid derivatives	Ibuprofen	CYP2C9	CYP2C19	✓		
	Flurbiprofen	CYP2C9		✓		
	Ketoprofen	CYP3A4	CYP2C9, CYP3A5	✓		
	Fenoprofen	CYP2C9	UGT2B7	✓		
	Vicoprofen	CYP2D6	CYP3A4	✓		
	Naproxen	CYP2C9	CYP1A2	✓		
Anthranilic acid derivatives (Fenamates)	Mefenamic acid	CYP2C9		✓		

PGx Report - Pain Management

Type: Opioid

Drug Class	Generic	Primary Mechanism Involved	Other Mechanisms Involved	Used As Directed	May Have Decreased Efficacy	May Have Increased Toxicity
Opioid Analgesics						
Opium alkaloids	Codeine	CYP2D6	CYP3A4, CYP3A5, OPRM1	✓		
Ethers of morphine	Dihydrocodeine	CYP3A4	CYP2D6, CYP3A5	✓		
	Ethylmorphine	CYP2D6	CYP3A4, CYP3A5	✓		
Semi-synthetic alkaloid derivatives	Hydrocodone	CYP2D6	CYP3A4, CYP3A5, OPRM1	✓		
	Oxycodone	CYP3A4	CYP3A5, CYP2D6, ABCB1, COMT	✓		
Synthetic opioids						
Anilidopiperidine derivatives	Alfentanyl	CYP3A4	CYP3A5, ABCB1, OPRM1	✓		
	Fentanyl	CYP3A4	CYP3A5, ABCB1, OPRM1	✓		
	Sufentanil	CYP3A4	CYP3A5, OPRM1	✓		
Phenylpiperidine derivatives	Meperidine	CYP2B6	CYP3A4, CYP2C19, CYP3A5	✓		
	Ketobemidone	CYP2C9	CYP3A4, CYP3A5	✓		
Diphenylpropylamine derivatives	Dextropropoxyphene	CYP3A4	CYP3A5, Renal Excretion	✓		
	Levacetylmethadol	CYP3A4	CYP3A5	✓		
	Loperamide	CYP3A4	CYP3A5	✓		
	Methadone	CYP3A4	CYP2B6, CYP2D6, CYP3A5, ABCB1, COMT	✓		
Oripavine derivatives	Buprenorphine	CYP3A4	CYP3A5	✓		
Morphinan derivatives	Dextromethorphan	CYP2D6	CYP3A4, CYP3A5	✓		
Others	Tramadol	CYP2D6	CYP3A4, CYP2B6, CYP3A5, OPRM1, SLC22A1, COMT	✓		
	Tapentadol	CYP2C9	CYP2C19, CYP2D6	✓		
	Tilidine	CYP3A4	CYP2C19, CYP3A5	✓		
Anti-opioid	Methylnaltrexone	CYP2D6	CYP3A4, CYP3A5	✓		

PGx Report - Pain Management

Type: Drugs Prescribed for the Treatment of Gout, Antirheumatic

Drug Class	Generic	Primary Mechanism Involved	Other Mechanisms Involved	Used As Directed	May Have Decreased Efficacy	May Have Increased Toxicity
Drugs Prescribed for Gout						
Uricosurics	Sulfinpyrazone	CYP2C9	CYP3A4, CYP3A5	✓		
Mitotic inhibitors	Colchicine	CYP3A4	CYP3A5	✓		
Xanthine oxidase inhibitors	Febuxostat	CYP1A2	CYP2C9	✓		
	Allopurinol	AOX1	Renal Excretion, HLA-B*5801	✓		
	Oxypurinol	Renal Excretion		✓		
Recombinant urate oxidase	Rasburicase		G6PD, CYB5R1, CYB5R2, CYB5R3, CYB5R4	✓		
DMARDs	Leflunomide	CYP1A2		✓		
Anti-inflammatory	Tofacitinib	CYP3A4	CYP2C19, CYP3A5	✓		
Abbreviations: DMARDs, Disease-modifying antirheumatic drugs; RE, renal excretion (unchanged drug).						

Additional SNPs of Importance for Pain Management

Gene	Marker	Genotype	Drug	Level of Evidence	Results
OPRM1	rs1799971	A/A	Naloxone	2B	Patients may have lower cortisol response
OPRM1	rs1799971	A/A	Morphine	2B	Pain patients may experience increased efficacy of opioids and may be less susceptible to opioid addiction, and may require a decreased dose of opioids
OPRM1	rs1799971	A/A	Alfentanil	2B	Pain patients may experience increased efficacy of opioids and may be less susceptible to opioid addiction, and may require a decreased dose of opioids
OPRM1	rs1799971	A/A	Fentanyl	2B	Pain patients may experience increased efficacy of opioids and may be less susceptible to opioid addiction, and may require a decreased dose of opioids
OPRM1	rs1799971	A/A	Tramadol	2B	Pain patients may experience increased efficacy of opioids and may be less susceptible to opioid addiction, and may require a decreased dose of opioids
OPRM1	rs1799971	A/A	Hydrocodone	3	Patients may have a decreased risk for experiencing side effects, including constipation, dry mouth or respiratory depression
COMT	rs4680	A/A	Paroxetine	3	Patients may require a lower dose