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Breast Cancer Drugs and Their Interactions

Drug Name	Class	Lab Effects/Interference	Drug Interactions
Anastrozole (Arimidex)	Nonsteroidal aromotase inhibitor	Elevated GGT	Currently unknown
Capecitabine (Xeloda)	Fluropyrimidine carbamate	Increased bilirubin and alkaline phosphate	Warfarin: increased INR, monitor and adjust dose prn Phenytoin: monitor phenytoin serum level closely and adjust prn Leucovorin: synergy and increased toxicity; monitor closely
Carboplatin (Paraplatin)	Alkylating agent	Increased LFT and RFT Monitor urine creatinine clearance	Cisplatin: combination may cause increased renal toxicty Myelosuppresive drugs: combination may cause increased bone marrow depression Taxol: carboplatin administered following taxol maximizes efficacy Avoid aluminum needles in drug handling
Cyclophosphamide (Cytoxan)	Alkylating agent	Increased postassium, uric acid secondary to tumor lysis Monitor electrolytes for symptoms of SIADH Decreased CBC and platelets	Anticoagulants: effects may be increased Digoxin; serum concentration may be decreased and dose adjustments may be required Doxorubicin: cardiomyopathy may be potentiated Succinylcholine: may prolong neuromuscular blockage Barbiturates and other CYP450 inducers: increase cyclophosphamide activation and toxicity
Docetaxel (Taxotere)	Taxoid, mitotic spindle position	Decreased CBC	Potential radiosensitization Inhibitors of CYP3A4: can decrease drug elimination and increasetoxicity; caution should be observed
Doxorubicin hydrochloride (Adriamycin)	Anthracycline	Decreased CBC Increased LFT Increased uric acid secondary to tumor lysis	Barbiturates and other CYP450 inducers: may increase drug clearance Cyclophosphamide: combination may increase risk of hemorrhage and cardiotoxicity Mitomycin: combination may increase risk of cardiotoxicity Digoxin: combination decreases digoxin serum concentrations Mercaptopurine: combination may increase risk of hepatotoxcity
Doxorubicin hydrochloride lyposomal (Doxil)	Anthracycline	Decreased CBC	No formal drug interactions reported; however, recommed same cautions as those for Adriamycin

Epirubicin (Ellence, Farmorubicine. Farmorubicina, Pharmorubicin)	Anthracycline	Decreased WBC counts and neutrophil counts	Cytotoxic drugs: additive toxicity (hematologic and gastrointestinal) Cardioactive drugs: combination with calcium-channel blockers may increase risk of CHF; close cardiac function monitoring required Potential radiosensitization: given after radiation therapy; radiation recall inflammatory reaction may occur at site of prior radiation Crimetidine: combination increases drug AUC by 50%. *Do not* use concurrently; hold cimetidine during treatment.
Exemestane (Aromasin)	Steroidal aromatase inhibitor	Lymphopenia (20% incidence) Elevated LFT (AST, ALT, alkaline phosphatase, GGT) rarely	CYP450 inducers: may increase drug clearance
5-Fluorouracil (flurouracil, Adrucil, 5-FU, Efudex)	Pyrimidine antimetabolite	Decreased CBC	Cimetidine: may increase pharmacologic effects of fluorouracil
Fulvestrant (Faslodex)	Estrogen-receptor downregulator	None	Currently unknown
Gemcitabine (Gemzar, difluorodeoxy-citidine)	Antimetabolite	Decreased CBC Increased LFT and RFT	Potential radiosensitization
Goserelin acetate (Zoladex)	Synthetic analog of of luteinizing hormone-releasing hormone	Hypercalcemia in patients with bone metastasis	Currently unknown
Lapatinib (Tykerb)	Tyrosine kinase inhibitor	Monitor left ventricular function	CYP450 inhibitors and inducers: may alter metabolism
Letrozole (Femara)	Nonsteroidal aromotase inhibitor	Liver transaminases may be transiently elevated	Currently unknown
Leucovorin calcium (folinic acid, citrovorum factor)	Derivative of folic acid	None	5-Flurouracil: potentiation Folic acid: can antagonize drug effect; high doses may decrease effects of phenobarbital, phenytoin, and primidone

Leuprolide acetate (Lupron, Viadur)	Antihormone	Decreased PSA, testosterone, WBC, and total serum protein; increased calcium Injection: increased bun and creatinine Depot injection: increased LDH, alkaline phosphatase, AST, uric acid, cholesterol, LDL, triglycerides, glucose, WBC count, phosphate; decreased potassium and platelets	
Megestrol acetate (Megace)	Synthetic progestin	Rarely, may increase glucose, LDH level	Currently unknown
Methotrexate (Amethopterin, Mexate, Folex, Trexall)	Antimetabolite, folic acid antagonist	Decreased CBC Increased LFT and RFT	Protein-bound drugs (aspirin, sulfonamides, sulfonylureas, phenytoin, tetracycline, chloramphenicol) may increase toxicity NSAIDs (including indomethacin and ketoprofen): may increase methotrexate serum concentration. *Do not* administer concurrently with high doses of methotrexate; caution should be observed at moderate or low doses Cotrimoxazole and pyrimethamine: increase methotrexate serum levels; do not use concurrently
Mitoxantrone (Novantrone)	DNA intercalator	Decreased CBC Decreased electrolytes Increased LFT and uric acid	Myelosuppressive agents: combination can cause increased hematologic toxicity
Paclitaxel (Taxol)	Taxoid, mitotic inhibitor	Decreased CBC Increased LFT	Cisplatin: taxol should be given prior to cisplatin to avoid decreased clearance and increased myelosuppression Ketoconazole and CYP3A4 inhibitors: may inhibit paclitaxel clearance; use together with caution Carboplatin: may increase cytotoxicity when administered after doxorubicin and liposomal formation: may increase incidence of neutropenia and stomatitis when adminstered after paclitaxel; combination may increase cardiotoxicity Beta blockers, calcium-channel blockers, and digoxin: additive bradycardia may occur; assess/monitor patient closely
Pamidronate disodium (Aredia)	Bisphosphonate	Decreased calcium, potassium, magnesium, and phosphorus levels	Caution indicated with nephrotoxins

Tamoxifen citrate (Nolvadex, Soltamox)	Antiestrogen	Decreased CBC Increased LFT and calcium levels Interference in lab tests as TFT and hyperlipidemia	Anticoagulants: increase PT; monitor PT closely and reduce anticoagulant close CYP450 inhibitors and inducers: alter tamoxifen metabolism Thisazide diruetics: combination may increase risk of hypercalcemia Anticoagulants: increased PT; monitor PT closely and reduce anticoagulant dose
Toremifene citrate (Fareston)	Synthetic tamoxifen analog	Decreased WBC and platelets	Testosterone and cyclosporine: may inhibit metabolism CYP450 inhibitors and inducers alter tamoxifen metabolism Thiazide fiuretics: combination may increase risk of hypercalcemia Anticoagulants: increased PT; monitor PT closely and reduce anticoagulant dose
Trastuzumub (Herpceptin)	HER2/neu antibody	Monitor left ventricular function	Paclitaxel: may inhibit elimination
Vinorelbine tartrate (Navelbine)	Semisynthetic vinca alkaloid	Decreased CBC (especially WBC count) Increased LFT	Ciplatin: combination may increase granulocytopenia Mitomycin: combination may increase acute pulmonary reactions CYP450 inhibitors: may alter metabolism; caution recommended when given concurrently
Zoledronic acid (Zometa)	Bisphosphonate	Hypocalcemia, hypophosphatemia, and hypomagnesemia Increased BUN and serum creatine	Aminoglycoside antibiotics and loop diuretics: may potentiate hypocalcemia; caution recommended

ALT: alanine aminotransferase; AST: aspartate aminotransferase; AUC: area under the curve; BUN blood urea nitrogen; CBC: complete blood count; CHF: congestive heart failure; DNA: deoxyribonucleic acid; GGT: gamma glutamyl transferase; INR: International Normalized Ratio; LDH: lactic dehydrogenase hormone; LDL: low-density lipoprotein; LFT: liver function tests; NSAIDs: nonsteroidal anti-inflammatory drugs; prn: pro re nata ("as needed"); PSA: prostate specific antigen; PT: prothrombin time; RFT: respiratory function tests; SIADH: syndrome of inappropriate antidiuretic hormone; TFT: thyroid function tests; WBC: white blood cell

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