Medications and Breast-Feeding: A Guide for Pharmacists, Pharmacy Technicians, and Other Healthcare Professionals Part II

FRANK J NICE, DEBORAH DEEUGENIO, TRACI A DIMINO, INGRID C FREENY, MARISSA B ROVNACK, AND JOSEPH S GROMELSKI

Objective: To provide a guide for practicing pharmacists, pharmacy technicians, and other healthcare professionals so that they are able to counsel and advise breast-feeding mothers and fellow healthcare professionals on the safety and use of common cardiology and general medications during breast-feeding.

Data Sources: Primary texts used by the breast-feeding community (*Medications and Mothers' Milk*, *Drugs in Pregnancy and Lactation*, *Drugs and Human Lactation*) were searched, as well as Micromedex, MEDLINE, PubMed, EMBASE, and EMBASE2 (1984–February 2004).

Study Selection/Data Extraction: Multiple sources were used wherever available to validate the data, and primary articles were used to verify all tertiary source information. Search terms included breast-feeding, lactation, nursing, and medications, as well as specific drug names.

Data Synthesis: Concerns regarding medication use during breast-feeding have caused mothers to either discontinue nursing or not take necessary medications. Complete avoidance of medications or cessation of breast-feeding is often unnecessary. Although there are drugs that can be harmful to nursing infants, breast milk concentrations of most drugs are insufficient to cause any harm.

Conclusions: Having objective and reliable information on medications enables pharmacists, pharmacy technicians, healthcare providers, and mothers to make educated decisions regarding drug therapy and breast-feeding.

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The following discussion of medication categories, which includes drugs used in cardiology and general practice, will help pharmacists and other healthcare professionals understand which drugs are the optimal choices within specific categories for breast-feeding mothers to take while minimizing the impact on infants. Ambulatory care medications and analgesics and anesthetics were discussed in Part I of this 3-part series.[1] Data and references supporting each drug are detailed in tables, where applicable. American Academy of Pediatrics (AAP) recommendations are also listed, if available.[2]

FRANK J NICE MS MPA DPA CPHP, Assistant Director, Clinical Neurosciences Program (CNP), National Institutes of Health (NIH), Bethesda, MD; **DEBORAH DEEUGENIO PharmD,** at time of writing, Pharmacy Student (USP), CNP, NIH; now, Assistant Professor, School of Pharmacy, Temple University, Philadelphia, PA; Clinical Pharmacist, Jefferson Antithrombotics Therapy Service, Jefferson Heart Institute, Philadelphia; **TRACI A DIMINO PharmD,** at time of writing, Pharmacy Student (USP), CNP, NIH; now, Adverse Event Specialist, Global Safety Surveillance & Epidemiology, Wyeth, Collegeville, PA; **INGRID C FREENY PharmD,** at time of writing, Pharmacy Student (USP), CNP, NIH; now, Medical Student, Drexel University College of Medicine, Philadelphia; **MARISSA B ROVNACK PharmD,** at time of writing, Pharmacy Student (Wilkes University), CNP, NIH; now, Clinical Staff Pharmacist, Lehigh Valley Hospital and Health Network, Allentown, PA; and **JOSEPH S GROMELSKI PharmD,** at time of writing, Pharmacy Student (Wilkes University), CNP, NIH; now, Pharmacist, Walmart, Baltimore, MD; Law Student, University of Maryland, Baltimore. *Reprints:* Frank J Nice MS MPA DPA CPHP, National Institutes of Health, 10 Center Dr. MSC 1430, Bethesda, MD 20892-1430, fax 301/402-1007, fjncat@hotmail.com.

Cardiology Medications

ANGIOTENSIN-CONVERTING ENZYME INHIBITORS AND ANGIOTENSIN II RECEPTOR BLOCKERS

Neonates are exceptionally sensitive to the hypotensive effects of angiotensin-converting enzyme inhibitors; however, these drugs have been used in infants and children. Enalapril and captopril are considered the drugs of choice for lactating hypertensive women[3] (Table 1[3-6]).

ANTICOAGULANTS

Heparin and warfarin are considered drugs of choice for anticoagulation in lactating women.[7] Due to the large molecular mass of heparin products and their susceptibility to destruction in the gastrointestinal tract of breast-feeding infants, the clinical consequences of maternal doses should be negligible. Warfarin is highly protein bound, and, as of this writing, no adverse effects in breast-fed infants have been reported with this anticoagulant (Table 2).[7-12]

ANTIARRHYTHMICS

Many antiarrhythmic agents, representing most classes and categories, are considered to be compatible with breast-feeding by the AAP: digoxin, lidocaine, quinidine, mexiletine, verapamil, sotalol, flucainamide, and procainamide.[2] Digoxin used by breast-feeding mothers results in undetectable infant serum concentrations (Table 3).[13-26]

ANTIHYPERTENSIVE AGENTS (MISCELLANEOUS)

Hydralazine, methyldopa, and minoxidil are usually considered compatible with breast-feeding.[27] Even though high concentrations of clonidine appear in breast milk, no adverse effects have been reported. Reserpine may cause some adverse effects in infants (Table 4).[28-34]

β-BLOCKERS

β-Blockers are weak bases and tend to ionize when in breast milk, which is more acidic than plasma. This ionization allows for β-blockers to accumulate in milk. High

Table 1. ACE Inhibitors and Angiotensin II Receptor Blockers

DRUG	DATA	AAP 2001 RECOMMENDATIONS	REFERENCE
ACE inhibitors			
benazepril (Lotensin)	both benazepril and benazeprilat found in milk estimated infant dose is 0.1% of maternal dose; oral absorption is poor (37%)	not addressed	3, 6
captopril (Capoten)	in study of lactating women who received 300 mg/day, infant concentrations were ~1% ~0.002% of the maternal daily dose is excreted into milk over 24 h; 5-kg infant would consume a maximum of 9 µg/kg of unbound captopril	usually compatible; no adverse effects reported	3, 4
enalapril (Vasotec)	in study of lactating women receiving one 20-mg dose, enalapril and enalaprilat were excreted into milk; mean maximum milk concentrations were 1.74 and 1.72 ng/mL, respectively; estimated that infant would receive a total daily dose of 2 µg; another study found undetectable concentrations	usually compatible	3, 5
fosinopril (Monopril)	barely detectable concentrations found in milk after 20-mg dose no other data available; use alternative if possible	not addressed	3, 6
lisinopril (Prinivil, Zestril)	excretion into milk unknown no data available; observe for hypotension and weakness	not addressed	3, 6
moexipril (Univasc)	excretion into milk unknown no data available; observe for hypotension and weakness	not addressed	3, 6
perindopril (Aceon)	animal data suggest passage into milk	not addressed	3
quinapril (Accupril)	excreted into human milk animal data suggest excretion is <5%; use with caution	not addressed	3, 6
ramipril (Altace)	undetectable concentrations of drug or metabolite in milk after a 10-mg dose; ~0.25% excreted into milk effects of multiple dosing unknown; avoid use during first 2 wk	not addressed	3, 6
trandolapril (Mavik)	animal data suggest passage into milk	not addressed	3
Angiotensin II receptor blockers candesartan (Atacand) eprosartan (Teveten) irbesartan (Avapro) losartan (Cozaar) telmisartan (Micardis) valsartan (Diovan)	no human data available some animal studies show variable excretion into milk; no known pediatric concerns, but use caution	not addressed	3, 6

AAP = American Academy of Pediatrics; ACE = angiotensin-converting enzyme.

protein binding may help counteract this effect. Some agents, such as metoprolol, atenolol, and nadolol, may have a milk:plasma ratio of 3:1. However, as of this writing, no adverse effects have been reported. β-Blockers are generally regarded as safe; however, infants should be monitored for signs of β-blockade (hypotension, bradycardia, cyanosis, transient tachypnea). Some healthcare professionals argue that water-soluble agents with low protein binding (eg, atenolol, acebutolol, sotalol) should be substituted with safer agents such as propranolol or metoprolol. Propranolol is considered the drug of choice for lactating hypertensive patients[35] (Table 5[6,35-49]).

CALCIUM-CHANNEL BLOCKERS

There are few data available concerning calcium-channel blockers and lactation. Nursing infants should be monitored for lethargy, hypotension, and headache (if possible). Diltiazem is considered usually compatible with breast-feeding. Verapamil and nifedipine are considered the drugs of choice for lactating hypertensive patients[50] (Table 6[6,20,21,36,50-56]).

DIURETICS

Low-dose, short-acting thiazides (hydrochlorothiazide, chlorothiazide) are considered to be compatible with breast-feeding, as is spironolactone. Long-acting agents may accumulate in infants' plasma[57] (Table 7[30,58]).

LIPID-LOWERING AGENTS

Atherosclerosis that results from hyperlipidemia is a chronic condition. It is unlikely that discontinuation of therapy during pregnancy or lactation will affect the long-term outcome of therapy. It is possible that the use of antilipemic agents may decrease the amount of available cholesterol and cholesterol byproducts that are essential to the developing infant. American Heart Association (AHA) guidelines recommend that pregnant or lactating women with hyperlipoprotenemia follow Phase I and II AHA diets (with the exception that 2% skim milk be increased to 4 cups per day)[59] (Table 8[6,36,60]).

General Medicines

CORTICOSTEROIDS

When used on a short-term basis, topically (except around or on the nipple), or by inhalation, fairly low concentrations of corticosteroids are found in human milk. This is especially true for doses of prednisone <30 mg/day, prednisolone <20–80 mg/day, and methylprednisolone <8 mg/day (Table 9).[61-66]

CYTOTOXIC AGENTS

Cytotoxic agents are usually very toxic and may cause bone marrow suppression and damage to epithelial cells

Table 2. Anticoagulants

DRUG	DATA	AAP 2001 RECOMMENDATIONS	REFERENCE
Bishydroxycoumarin (Dicumarol)	>1,500 pts. treated without PT monitoring no hemorrhagic complications seen in nursing infants	usually compatible; no adverse effects reported	7
Direct thrombin inhibitors hirudin	lactating woman given 50 mg of lepirudin bid; no hirudin detectable in milk, although maternal serum concentrations were within therapeutic range; no adverse effects seen in the infant during 3-mo treatment period	not addressed	11
lepirudin (Refludan)	molecule is large (6,980 Daltons) and not expected to cross into milk no data available; drug should not be used unless potential benefits outweigh risks	not addressed	7
Heparin	can be associated with osteoporosis, allergy, and thrombocytopenia in mother and child; however, molecule is too large to be secreted into breast milk and is unlikely to pass into milk	not addressed	7, 12
Low-molecular-weight heparins	data lacking; however, molecular weight is 4,200–6,000 Daltons; not expected to pass into milk destroyed in GI tract, minimizing infant's absorption	not addressed	7
Platelet inhibitors clopidogrel (Plavix) ticlopidine (Ticlid)	no data available; avoid use unless potential benefits outweigh risks	not addressed	7
Warfarin (Coumadin)	study of 13 lactating women found no detectable concentrations in milk or infant serum; another study found no change in PTT of infant 99% protein bound, ionic, and non-lipophilic; therefore, crossing into milk is minimal	usually compatible; no adverse effects reported	8–10

AAP = American Academy of Pediatrics; GI = gastrointestinal; PT = prothrombin time; PTT = partial thromboplastin time.

in infants.[6] Breast-feeding is generally considered contraindicated when cytotoxic agents are used due to potential adverse effects.[57,67] Cyclosporine, though, has been used in 8 breast-feeding women without toxic effects in their infants.[68-70] Data on cytotoxic agent secretion into breast milk are sparse.[67]

The AAP considers the following agents to have the potential to interfere with cellular metabolism of the nursing infant:[2] cyclophosphamide (possible immune suppression, unknown effect on growth or association with carcinogenesis, neutropenia), cyclosporine (possible immune suppression, unknown effect on growth or association with carcinogenesis), doxorubicin (possible immune suppression, unknown effect on growth or association with carcinogenesis, concentrated in human milk), and methotrexate (possible immune suppression, unknown effect on growth or association with carcinogenesis, neutropenia).

GASTROINTESTINAL DRUGS

Gastrointestinal drugs include laxatives, antidiarrheals, antacids, histamine$_2$ (H_2)-antagonists, proton- pump inhibitors, and promotility agents. Bulk-forming laxatives are agents of choice for constipation. Loperamide and absorbents provide the best treatment of diarrhea for breast-feeding mothers. Nonsystemic antacids are considered safe as infants are exposed to only small amounts of the salts. Antiflatulants, likewise, are considered safe. H_2-antagonists have good breast-feeding profiles; famotidine

Table 3. Antiarrhythmics

DRUG	DATA	AAP 2001 RECOMMENDATIONS	REFERENCE
Adenosine (Adenocard, Adenoscan)	no data available; has short half-life and has been shown safe for use in infants and children; probably safe for breast-feeding	not addressed	13
Amiodarone (Cordarone) class III	considerable amounts of drug and metabolite (desethylamiodarone) are present in milk concentrations in milk are greater than in maternal serum; infant may be exposed to the equivalent of an adult low maintenance dose; breast-feeding not recommended	usually compatible; no adverse effects reported	13, 14, 19
Digoxin (Lanoxin)	concentrations in milk and plasma similar; daily amount ingested by infant is <2 µg; undetectable in serum of breast-fed infants	usually compatible; no adverse effects reported	13, 14
Disopyramide (Norpace) class IA	case of woman taking 100 mg 5 times/day with milk:plasma ratio of 0.4; other reports of milk:plasma ratio of 0.9; even with higher ratio, maximum an infant would ingest is 3 mg/day one case of infant who had detectable serum concentrations monitor for anticholinergic effects	usually compatible; no adverse effects reported	15, 16
Flecainide (Tambocor) class IC	study found 100 mg twice a day produced milk concentrations 270–1,521 ng/mL; milk:plasma ratios ranged from 2.1 to 3.7; risk of infant ingesting toxic amounts is low	usually compatible	23, 24
Lidocaine (Xylocaine) class IB	excreted in milk in small amounts; should not harm infant; considered safe, but monitor for toxicity	usually compatible; no adverse effects reported	13, 14
Mexiletine (Mexitil)	case of a woman on 200 mg 3 times a day with mean milk:plasma ratio of 1.45 concentrations higher in milk than in maternal serum; use with caution	usually compatible; no adverse effects reported	17, 18
Nimodipine (Nimotop)	after a 45-mg iv dose over 24 h, milk:plasma ratio was 0.06–0.15; infant would receive ~0.008–0.092% of maternal dose; milk concentration is about 1/3 of that in plasma may need to withhold breast-feeding for 45 h after last dose	not addressed	20, 21
Procainamide (Pronestyl, Procanbid) class IA	mean milk:plasma ratios for procainamide and *N*-acetylprocainamide were 4.3 and 3.8, respectively	usually compatible; no adverse effects reported	26
Propafenone (Rythmol) class IC	excreted in breast milk safety for nursing infant unknown	not addressed	13
Quinidine class IA	concentrations in breast milk are low (~70% of serum); considered safe	usually compatible; no adverse effects reported	13
Sotalol (Betapace) class III	study showed milk:plasma ratio 2.43–5.64; infant would ingest 20–23% of maternal dose no adverse effects reported in infants; however, monitor for bradycardia, hypotension, and respiratory distress	usually compatible	13, 14, 22
Tocainide (Tonocard)	appears to be concentrated in human milk with concentrations almost twice that of serum; should be used with caution	not addressed	25
Verapamil (Calan, Covera, Isoptin, Verelan) class IV	concentrations in breast milk 23–94% of maternal serum concentrations (see Table 6)	usually compatible; no adverse effects reported	13

AAP = American Academy of Pediatrics.

and nizatidine produce lower concentrations in breast milk than cimetidine and ranitidine. Few data are available on proton-pump inhibitors and promotility agents (Table 10).[71-74]

MISCELLANEOUS MEDICATIONS

Information is presented on acetazolamide, carisoprodol, colchicine, cyclosporine, gadopentate (magnetic resonance imaging contrast medium), and pyridostigmine, as questions are raised regarding the use of these agents during breast-feeding. In addition, data exist to assist in making informed decisions on the use of these drugs in lactating women (Table 11).[68-70,75-83]

OPHTHALMICS

Ophthalmic ingredients may pass into breast milk as systemically absorbed medications do. As an example, ophthalmic timolol is absorbed systemically and passes into human milk. Pilocarpine also appears to do so. As of this writing, similar documented data do not exist for other ophthalmic preparations.[76] Breast-feeding women should use the lowest effective doses of ophthalmics that produce the lowest systemic concentrations (Table 12).[6,76,84,85]

Topical Preparations

Most topical drugs can be used safely while a mother is breast-feeding as only small amounts eventually are passed into the milk. The mechanisms for passage into milk are similar to those of nontopical drugs.[86] Few data are available regarding the use of drugs applied directly to the breast area.[87] The breast-feeding infant may ingest drugs applied directly to the nipple area. An example exists where cocaine was applied directly to the breast for pain control and the nursing infant experienced apnea and seizures.[88] The area should be cleansed thoroughly before the infant feeds, and the safety of each agent should be assessed before application.

Dermatologic categories of drugs usually not contraindicated for use during breast-feeding include analgesic, anesthetic, antibiotic, antiviral, antiacne, antifungal, antiparasitic, antiprotozoal, and bleaching agents.[89] Minimal amounts of tretinoin are thought not to be harmful to infants, and, as of this writing, no adverse effects have been reported.[6,90] The use of tretinoin does not appear to represent a significant risk to nursing infants.[91] ⏧

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Table 4. Antihypertensive Agents (Miscellaneous)

DRUG	DATA	AAP 2001 RECOMMENDATIONS	REFERENCE
Clonidine (Catapres)	mother receiving 37.5 µg twice a day resulted in 0.60 ng/mL in milk undetectable in the infant serum; infant estimated to receive 6.8% of maternal dose study of 10 lactating women found milk concentrations to be twice that of serum; no adverse effects reported in infants	not addressed	28, 29
Hydralazine (Apresoline)	infant may receive 0.013 mg/feeding when maternal dose is 50 mg 3 times a day no clinically relevant concentrations have been found in infants	usually compatible; no adverse effects reported	30, 31
Methyldopa (Aldomet)	case of lactating woman receiving 250 mg bid for 10 days: infant serum concentrations were undetectable, but urine concentration was 3,800 ng/mL; during 3-mo follow-up, no adverse effects reported	usually compatible; no adverse effects reported	32, 33
Minoxidil (Loniten, Rogaine)	concentrations measured after 7.5-mg single dose: drug excreted in milk at concentrations similar to those in plasma	usually compatible; no adverse effects reported	34
Reserpine (Serpasil)	excreted in breast milk may cause nasal congestion and increased respiratory secretions in infants	not addressed	30

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Table 5. β-Blockers

DRUG	DATA	AAP 2001 RECOMMENDATIONS	REFERENCE
Acebutolol (Sectral)	drug and metabolite found in milk and absorbed by infant; infants receive 10% of mothers' dose in study, symptoms of β-blockade observed in 1 of 7 infants	use with caution because of significant adverse effects in nursing infants: hypotension, bradycardia, tachypnea	6, 36–39
Atenolol (Tenormin)	concentration in milk greater than in mother's serum case report of infant experiencing cyanosis, hypothermia, hypotension, and bradycardia; safer alternatives should be used	use with caution because of significant adverse effects in nursing infants: hypotension, bradycardia, tachypnea	6, 35, 36, 38–41
Betaxolol (Betoptic, Kerlone)	1 study showed accumulation in milk, with milk:plasma ratio 2.0–11.6 recommend monitoring infant for β–blockade	not addressed	35
Bisoprolol (Zebeta)	<2% secreted in animal milk; no published data on human milk	not addressed	6, 36
Carteolol (Cartrol)	<2% secreted in animal milk; no published data on human milk	not addressed	6, 36
Carvedilol (Coreg)	animal studies show excretion into milk; no published data on human milk drug very lipophilic	not addressed	6, 35, 42
Dilevalol	after a 400-mg dose, only 27 μg, or 0.007% of the dose, was excreted into breast milk over a 48-h period	not addressed	43
Esmolol (Brevibloc)	no published data on human milk; however, drug administered iv has very short half-life (9 min) and low-lipid solubility	not addressed	6
Labetalol (Normodyne, Trandate)	only 0.004–0.07% of maternal dose excreted in milk study of 24 infants found no adverse effects; peak concentrations 2–3 h after dose	usually compatible; no adverse effects reported	6, 36, 44
Metoprolol (Lopressor)	milk concentrations higher than in mother's serum; no adverse effects reported recommended to wait at least 3–4 h after dose to breastfeed	usually compatible; no adverse effects reported drug is concentrated in milk	6, 35, 36, 41, 42
Nadolol (Corgard)	infants receive 2–7% of maternal dose due to drug's long half-life and high milk:plasma ratio, not agent of choice monitor for β-blockade	usually compatible; no adverse effects reported drug is concentrated in milk	6, 35, 36, 46
Pindolol (Visken)	drug excreted in breast milk observe for bradycardia and β-blockade	not addressed	36
Propranolol (Inderal)	infant receives between 0.2% and 0.9% of maternal dose several studies demonstrate no adverse effects	usually compatible; no adverse effects reported	6, 35, 36, 47, 48
Sotalol (Betapace)	drug concentrates in milk (3–5 times mother's plasma); however, no adverse effects reported infants receive 20–30% of maternal dose	usually compatible	5, 35, 36, 49

AAP = American Academy of Pediatrics.

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Table 6. Calcium-Channel Blockers

DRUG	DATA	AAP 2001 RECOMMENDATIONS	REFERENCE
Amlodipine (Norvasc)	no data available; most calcium-channel blockers transfer to breast milk	not addressed	6, 36, 50
Bepridil (Vascor)	milk concentration 1/3 that of mother's serum drug has long half-life and potency that could pose problems no published data	not addressed	6, 36, 50
Diltiazem (Cardizem, Dilacor-XR)	enters milk freely; concentration equals that of mother's serum; peak concentrations occur 8 h after dose avoid extended-release preparations case reports cite no adverse effects	usually compatible; no adverse effects reported	6, 36, 50, 51
Felodipine (Plendil)	no data on human lactation available; however, expected to be excreted in milk due to low molecular weight	not addressed	6, 36,50
Isradipine (DynaCirc)	no data on human lactation available; however, expected to be excreted in milk due to low molecular weight	not addressed	6, 36, 50
Nicardipine (Cardene)	no data on human lactation available; drug found in animal milk	not addressed	36, 50
Nifedipine (Adalat, Procardia)	probably safe; 90% protein bound; therefore, concentrations are expected to be low 3 studies evaluating maternal doses of 10–20 mg/day found no adverse effects; little risk to infant peak milk concentration occurred 1 h after dose may be useful for nipple spasm	usually compatible	6, 36, 50, 52–54
Nimodipine (Nimotop)	concentration less in milk than in maternal serum infants receive 0.008–0.092% of mother's dose; exposure poses little risk	not addressed	6, 20, 21, 50
Nisoldipine (Sular)	no data on human lactation available; poor bioavailability and high protein binding make absorption unlikely	not addressed	6, 50
Verapamil (Calan, Covera)	milk concentration only 23% of mother's serum; infants ingest 0.01% of mother's dose a case report found significantly higher infant serum concentrations	usually compatible; no adverse effects reported	6, 36, 50, 55, 56

AAP = American Academy of Pediatrics.

Table 7. Diuretics

DRUG	DATA	AAP 2001 RECOMMENDATIONS	REFERENCE
Furosemide (Lasix)	excretion into breast milk is unknown has been reported to decrease milk production	not addressed	30
Spironolactone (Aldactone)	canrenone, a weak active metabolite, is minimally excreted into milk	considered usually compatible; no adverse effects reported	30
Thiazides hydrochlorothiazide (Hydrodiuril) chlorothiazide (Diuril)	estimated dose of chlorothiazide to infant is 1 mg/day drug considered safe for use in infants with heart disease at doses of 20 mg/kg/day both excreted in minimal amounts in milk; neither detected in nursing infant's serum	both considered usually compatible	30, 58

AAP = American Academy of Pediatrics.

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Table 8. Lipid-Lowering Agents

DRUG	DATA	AAP 2001 RECOMMENDATIONS	REFERENCE
Atorvastatin (Lipitor)	present in animal milk; no human studies available due to poor bioavailability and high protein binding, high milk concentrations unlikely	not addressed	6
Cholestyramine resin (Questran)	not systemically absorbed; theoretically should not be present in milk no published data on lactation prolonged use could result in deficiency of fat-soluble vitamins (A, D, K) in mother and infant	not addressed	6, 36
Clofibrate (Atromid-S)	excreted in animal milk; no human lactation data available	not addressed	36
Colestipol (Colestid)	not systemically absorbed; theoretically should not be present in milk no published data on lactation prolonged use could result in deficiency of fat-soluble vitamins (A, D, K) in mother and infant	not addressed	36
Dextrothyroxine (Choloxin)	no data available	not addressed	36
Fluvastatin (Lescol)	present in milk with milk:plasma ratio 2 not recommended for use during lactation		36
Gemfibrozil (Lopid)	no data available	not addressed	36
Lovastatin (Mevacor)	excreted in animal milk; no human lactation data available not recommended for use during lactation	not addressed	36
Niacin (Niaspan)	recommended that women not exceed niacin RDA of 18–20 mg/day	not addressed	36
Pravastatin (Pravachol)	excreted in milk in small amounts; infants receive 0.4% of mothers' dose	not addressed	36, 60
Simvastatin (Zocor)	no data available; not recommended for use during lactation	not addressed	36

AAP = American Academy of Pediatrics; RDA = recommended daily allowance.

Table 9. Corticosteroids

DRUG	DATA	AAP 2001 RECOMMENDATIONS	REFERENCE
Corticosteroids (inhaled)	probably safe due to very limited systemic absorption; however, no documentation exists	not addressed	66
Methylprednisolone (Solu-Medrol)	appear to be low concentrations in milk; safest dose <8 mg/day long-term use questionable	not addressed	63
Prednisolone (Key-Pred, Predcor)	fairly low concentrations in milk safest at doses <20 mg/day, although at 80 mg/day, infant would be exposed only to 0.1% of maternal dose probably safe in lactation	usually compatible; no adverse effects reported	63–65
Prednisone (Orasone, Deltasone)	concentrations in milk extremely low; no adverse effects noted in infants at doses <30 mg/day long-term use questionable	usually compatible; no adverse effects reported	61–63

AAP = American Academy of Pediatrics.

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Table 10. Gastrointestinal Drugs

DRUG	DATA	AAP 2001 RECOMMENDATIONS	REFERENCE
Antacids	nonsystemic antacids probably safe because not readily absorbed avoid systemic antacids	magnesium sulfate considered usually compatible; no adverse effects reported	71
Anticholinergics/ antispasmodics	anticholinergic adverse effects and decreased milk volume possible	not addressed	72
Antidiarrheals	kaolin/pectin, psyllium, and other bulk-forming agents not readily absorbed no adverse effects noted in infants, so probably safe avoid diphenoxylate/atropine due to possible decreased milk production due to atropine avoid paregoric due to possible infant sedation avoid bismuth salicylate due to possible salicylate absorption	loperamide (Imodium) considered usually compatible atropine considered usually compatible; no adverse effects reported	71, 72
H_2-receptor antagonists			
cimetidine (Tagamet)	infant receives 6.7% of maternal dose, which appears to be less than average infant dose	usually compatible; concentrated in human milk; no adverse effects reported	71, 73
famotidine (Pepcid)	appears to effect lower concentrations in breast milk than ranitidine or cimetidine	not addressed	71
nizatidine (Axid)	0.1% of 150-mg dose found in breast milk; probably safe avoid nursing 1–2 h after dose due to peak milk concentrations	not addressed	71
ranitidine (Zantac)	breast milk concentrations similar to those of cimetidine	not addressed	71
Laxatives	bulk-forming preferred over stimulant laxatives monitor for laxative effects in infant senna undetectable in breast milk; diarrhea in 2 of 75 infants whose mothers received senna magnesium levels almost completely unchanged in breast milk with maternal laxative use	usually compatible; concentrated in human milk; no adverse effects reported	71, 72
Promotility drugs	metoclopramide may increase milk production due to increased prolactin levels; monitor for extrapyramidal effects and depression in mother after 3 wk no adverse effects noted in 7 exposed infants	metoclopramide's effects unknown, but may be of concern	71, 72
Proton-pump inhibitors	omeprazole (Prilosec) concentration in milk <7% of maternal serum concentration no infant adverse effects reported all proton-pump inhibitors have half-life of 10 min <pH 4; thus, small amount in milk would not be bioavailable to the infant	not addressed	74
Simethicone (Mylicon)	not systemically absorbed by mother used in infants with colic	not addressed	71
Sucralfate (Carafate)	no reports of use in lactation; however, almost no systemic absorption probably safe to use in lactation	not addressed	71, 72

AAP = American Academy of Pediatrics.

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Table 11. Miscellaneous Medications

DRUG	DATA	AAP 2001 RECOMMENDATIONS	REFERENCE
Acetazolamide (Diamox)	drug is weak acid milk concentrations 1.3–2.1 µg/mL infant ingests about 0.6 mg (0.06%) of maternal dose; drug detected in small amounts in infant serum; breast milk concentrations are 1/3 those of serum concentrations	usually compatible; no adverse effects reported	75, 76
Carisoprodol (Rela, Soma)	average milk concentrations from drug and active metabolite (meprobamate) were 0.9 and 11.6 µg/mL; infant estimated to receive 4.1% of maternal dose; no adverse effects reported	not addressed	77
Colchicine (Acetycol, Colsalide)	drug is lipophilic and 50% protein bound rapidly and heavily excreted into milk at concentrations of 30 ng/mL; infant would ingest ~10% of maternal dose because infants have decreased renal and hepatic function, drug may accumulate no adverse effects reported; hematologic and digestive toxicity should be monitored	usually compatible	78, 79
Cyclosporine (Neoral, Sandimune, SangCya)	milk:plasma ratio 84%; no detectable drug in infant infant development normal for 10.5 mo milk concentrations of 7 lactating women 87–440 ng/mL; no detectable concentrations in infants, and no adverse effects seen	may interfere with cellular metabolism of nursing infant possible immune suppression and unknown effect on growth or association with carcinogenesis	68–70, 80
Gadopentetate dimeglumine (contrast media) (Magnevist)	injected into 20 lactating women; cumulative excretion into milk over 24 h 0.57 µmol <0.04% of dose excreted into breast milk	usually compatible; no adverse effects reported	81, 82
Pyridostigmine (Mestinon, Regonol)	milk concentrations ~40% of maternal serum concentrations; no detectable concentrations in infants infants may ingest ~0.1% of maternal dose eliminated renally; therefore, may have decreased elimination in infants	usually compatible; no adverse effects reported	83

AAP = American Academy of Pediatrics.

Table 12. Ophthalmics

DRUG	DATA	AAP 2001 RECOMMENDATIONS	REFERENCE
Antibiotics	probably do not cause clinically relevant milk concentrations	not addressed	6
Atropine	use with caution	usually compatible; no adverse effects reported	6
Betaxolol (Betoptic)	β-blockade adverse effects reported in 1 case	not addressed	6
Corticosteroids	probably do not cause clinically relevant milk concentrations	not addressed	6
Dipivefrin (AKPro, Propine)	no adverse effects reported	not addressed	6
Epinephrine	no adverse effects reported, but observe for brief stimulation unlikely to be absorbed by full-term infant	not addressed	6
Fluorescein (AK-Fluor, Fluor-I-Strip)	no adverse effects reported, but avoid phototherapy if used absorbed systemically low potential for toxicity	usually compatible	6, 84
Pilocarpine (Isopto Carpine, Pilocar, Akarpine, Ocusert Pilo)	no adverse effects reported, but observe for vomiting, GI distress, diarrhea	not addressed	6
Scopolamine	no adverse effects reported, but observe for drowsiness	not addressed	6
Timolol (Blocadren, Timoptic)	absorbed systemically after 0.5% dose; concentrations in milk higher than in plasma observe for hypotension, weakness, hypoglycemia, sedation, depression use with caution	usually compatible; no adverse effects reported	6, 76, 85

AAP = American Academy of Pediatrics; GI = gastrointestinal.

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