



TEXAS TECH UNIVERSITY HEALTH SCIENCES CENTER EL PASO

Operating Policy and Procedure

HSCEP OP: 75.17, Disposals of Medications

PURPOSE: It is the policy of Texas Tech University Health Sciences Center El Paso (TTUHSC El Paso) to dispose of all expired, unwanted prescription-drug medications in a safe manner for the environment and protection of any person who might potentially come into contact with disposed medications.

REVIEW: This Operating Policy and Procedure (HSCEP OP) pertains to all staff employed by TTUHSC El Paso and all outlying clinics.

This HSCEP OP will be reviewed in March of every even numbered year by the senior director of safety services, with recommendations and revisions forwarded through the managing director of physical plant and support services to the chief operating officer vice president for operations.

PROCEDURE:

- I. Any unwanted, expired medications of any type will need to be set aside and characterized into the following groups. Liquids and solids will be disposed of through an approved waste hauler. Medication classified as hazardous will need to be disposed of through a hazardous chemical disposal hauler and controlled substance medication will be disposed of through an authorized controlled substance hauler. (See attached drug disposal poster for examples)
 - A. **Liquids-** includes, but not limited to, cough syrup, ointments, partial vials, vaccines, etc.
 - B. **Solids-** includes, but not limited to, pills, capsules without liquid contents, powders, etc.
 - C. **Hazardous-** includes, but not limited to, inhalants, aerosol cans, chemotherapy drugs, nitroglycerin products, epinephrine, warfarin, etc. This type of medication is processed by a chemical transfer disposal form, and will be treated as hazardous waste.
 - D. **Controlled Substance Medications-** includes, but not limited to, morphine, codeine, muscle relaxants, sedatives, etc.
- II. Medication that is ready to be disposed of needs to remain in the department. The department needs to complete a prescription medication disposal form, available on the Safety Services webpage. The form can be found at <http://www.ttuhscc.edu/admin/safety/forms/drugs.aspx>. The Department of Safety Services will be prompted once the request form is submitted and will pick up the waste from the department. (See attached sample copy)
- III. Off-site clinics must dispose using authorized waste hauler disposal boxes. Off-site clinics must arrange with Safety Services for pickups, and they need to complete the hazardous chemical transfer form for those products identified as chemicals and the controlled substance medication form for this type of waste. The forms can be located at this website: <http://www.ttuhscc.edu/admin/safety/>. Off-site clinics do not need to complete the prescription drugs/medication disposal form.
- IV. The medications will be disposed of appropriately and the department will be charged their

portion of the disposal fee.

- V. Departments are to conduct a medication assessment to identify those medications that are classified as hazardous drugs and maintain an inventory list of these medications. (Attachment A). These typically include: cancer chemotherapy, antiviral drugs, hormones, some bioengineered drugs, and other miscellaneous drugs. The National Institute for Occupational Safety and Health (NIOSH) definition of drugs considered hazardous includes those that exhibit one or more characteristics in humans or animals:
- Carcinogenicity
 - Teratogenicity or other developmental toxicity
 - Reproductive toxicity
 - Organ toxicity at low doses
 - Genotoxicity
 - Structure and/or toxicity profiles of new drugs that mimic existing drugs determined hazardous by the above criteria.
- VI. **Attachment B**: is a listing of major hazardous drugs generated by the American Society of Health Pharmacists (ASHP) and the American Hospital Formulary Service (AHFS) Drug Information. Since the list is not all inclusive, departments should check the Safety Data Sheets (SDS) of each medication to evaluate the potential hazard of the drug and determine if it is hazardous or not.
- VII. Contact the Department of Safety Services if you have any questions or concerns.



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Medication Inventory (Attachment A)

Identify if waste is hazardous?

| Item # | Product Name | Substance Name | Concentration | CAS # | Quantity | Unit | Hazard Class | Location | Date Received | Date Expired | Supplier | Yes | No |
|--------|--------------|----------------|---------------|-------|----------|------|--------------|----------|---------------|--------------|----------|-----|----|
| 1 | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | |
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| 13 | | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | |
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| 16 | | | | | | | | | | | | | |
| 17 | | | | | | | | | | | | | |
| 18 | | | | | | | | | | | | | |
| 19 | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | |



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Table 1. Antineoplastic drugs including those with manufacturers' safe handling guidance (MSHG)

| Drug | AHFS classification | MSHG | Reason for listing | Links |
|-----------------------------------|-----------------------------|------|---|--------------------|
| abiraterone* | 10:00 antineoplastic agents | | Women who are pregnant or women who may be pregnant should not handle without protection (e.g., gloves); FDA Pregnancy Category X | DailyMed; DrugBank |
| ado-trastuzumab emtansine | 10:00 antineoplastic agents | yes | Conjugated monoclonal antibody; FDA Pregnancy Category D | DailyMed; DrugBank |
| altretamine | 10:00 antineoplastic agents | yes | FDA Pregnancy category D | DailyMed; DrugBank |
| amsacrine | NA antineoplastic agents | yes | IARC Group 2B | DrugBank |
| anastrozole | 10:00 antineoplastic agents | | FDA Pregnancy category X | DailyMed; DrugBank |
| arsenic trioxide | 10:00 antineoplastic agents | yes | IARC Group 1 carcinogen**; FDA Pregnancy Category D | DailyMed; DrugBank |
| azacitidine | 10:00 antineoplastic agents | yes | IARC Group 2A carcinogen; FDA Pregnancy Category D | DailyMed; DrugBank |
| bacillus calmette Guerin (BCG)*** | 80:12 vaccines | yes | See special handling requirements**; FDA Pregnancy Category C | DailyMed |
| bendamustine | 10:00 antineoplastic agents | yes | FDA Pregnancy Category D | DailyMed; |
| bexarotene | 10:00 antineoplastic agents | | FDA Pregnancy Category X | DailyMed; DrugBank |
| bicalutimide | 10:00 antineoplastic agents | | FDA Pregnancy Category X | DailyMed; DrugBank |
| bleomycin | 10:00 antineoplastic agents | yes | IARC Group 2B; FDA Pregnancy Category D | DailyMed; DrugBank |
| bortezomib | 10:00 antineoplastic agents | yes | FDA Pregnancy Category D | DailyMed; DrugBank |
| brentuximab vedotin | 10:00 antineoplastic agents | yes | Conjugated monoclonal antibody; FDA Pregnancy Category D | DailyMed; DrugBank |
| busulfan | 10:00 antineoplastic agents | yes | IARC Group 1 carcinogen; FDA Pregnancy Category D | DailyMed; DrugBank |
| cabazitaxel | 10:00 antineoplastic agents | yes | FDA Pregnancy Category D | DailyMed; DrugBank |
| capecitabine | 10:00 antineoplastic agents | yes | Metabolized to 5-fluorouracil; FDA Pregnancy Category D | DailyMed; DrugBank |
| carboplatin | 10:00 antineoplastic agents | yes | FDA Pregnancy Category D | DailyMed; DrugBank |
| carmustine | 10:00 antineoplastic agents | yes | IARC Group 2A carcinogen; FDA Pregnancy Category D | DailyMed; DrugBank |
| chlorambucil | 10:00 antineoplastic agents | yes | IARC Group 1 carcinogen; FDA Pregnancy Category D | DailyMed; DrugBank |
| cisplatin | 10:00 antineoplastic agents | yes | IARC Group 2A carcinogen; FDA Pregnancy Category D | DailyMed; DrugBank |
| cladribine | 10:00 antineoplastic agents | yes | FDA Pregnancy Category D | DailyMed; DrugBank |
| clofarabine | 10:00 antineoplastic agents | yes | FDA Pregnancy Category D | DailyMed; DrugBank |
| crizotinib | 10:00 antineoplastic agents | | FDA Pregnancy Category D | DailyMed |
| cyclophosphamide | 10:00 antineoplastic agents | yes | IARC Group 1 carcinogen; FDA Pregnancy Category D | DailyMed; Drugbank |
| cytarabine | 10:00 antineoplastic agents | yes | FDA Pregnancy Category D | DailyMed; DrugBank |



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Table 1 (Continued). Antineoplastic drugs including those with manufacturers' safe handling guidance (MSHG)

| Drug | AHFS classification | MSHG | Reason for listing | Links |
|--------------------------|-----------------------------|------|---|--------------------|
| dacarbazine | 10:00 antineoplastic agents | yes | FDA Pregnancy Category C | DailyMed; Drugbank |
| dactinomycin | 10:00 antineoplastic agents | yes | FDA Pregnancy Category D | DailyMed; DrugBank |
| dasatinib | 10:00 antineoplastic agents | yes | FDA Pregnancy Category D | DailyMed; Drugbank |
| daunorubicin | 10:00 antineoplastic agents | yes | IARC Group 2B, AKA daunomycin; FDA Pregnancy Category D | DailyMed; Drugbank |
| decitabine | 10:00 antineoplastic agents | yes | FDA Pregnancy Category D | DailyMed; Drugbank |
| degarelix | 10:00 antineoplastic agents | yes | FDA Pregnancy Category X | DailyMed; Drugbank |
| docetaxel | 10:00 antineoplastic agents | yes | FDA Pregnancy Category D | DailyMed; DrugBank |
| doxorubicin | 10:00 antineoplastic agents | yes | IARC Group 2A carcinogen; FDA Pregnancy Category D | DailyMed; DrugBank |
| epirubicin | 10:00 antineoplastic agents | yes | FDA Pregnancy Category D | DailyMed; Drugbank |
| eribulin | 10:00 antineoplastic agents | | FDA Pregnancy Category D | DailyMed; DrugBank |
| erlotinib | 10:00 antineoplastic agents | | FDA Pregnancy Category D | DailyMed; DrugBank |
| estramustine | 10:00 antineoplastic agents | yes | FDA Pregnancy Category X | DailyMed; Drugbank |
| etoposide | 10:00 antineoplastic agents | yes | IARC Group 1 carcinogen; FDA Pregnancy Category D | DailyMed; DrugBank |
| everolimus | 10:00 antineoplastic agents | yes | FDA Pregnancy Category D | DailyMed; Drugbank |
| exemestane | 10:00 antineoplastic agents | | FDA Pregnancy Category X | DailyMed; DrugBank |
| floxuridine | 10:00 antineoplastic agents | yes | FDA Pregnancy Category D | DailyMed; DrugBank |
| fludarabine | 10:00 antineoplastic agents | yes | FDA Pregnancy Category D | DailyMed; DrugBank |
| fluorouracil | 10:00 antineoplastic agents | yes | FDA Pregnancy Category D | DailyMed; DrugBank |
| flutamide | 10:00 antineoplastic agents | | Indicated only for men; FDA Pregnancy Category D | DailyMed; DrugBank |
| fulvestrant | 10:00 antineoplastic agents | | FDA Pregnancy Category D | DailyMed; DrugBank |
| gemcitabine | 10:00 antineoplastic agents | yes | FDA Pregnancy Category D | DailyMed; DrugBank |
| gemtuzumab ozogamicin | 10:00 antineoplastic agents | yes | FDA Pregnancy Category D | DailyMed; DrugBank |



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Table 1 (Continued). Antineoplastic drugs including those with manufacturers' safe handling guidance (MSHG)

| Drug | AHFS classification | MSHG | Reason for listing | Links |
|-----------------|-----------------------------|------|---|--------------------|
| goserelin | 10:00 antineoplastic agents | | FDA Pregnancy Category X | DailyMed; DrugBank |
| hydroxyurea | 10:00 antineoplastic agents | yes | Special warning on handling bottles and capsules FDA Pregnancy Category D | DailyMed; DrugBank |
| idarubicin | 10:00 antineoplastic agents | yes | FDA Pregnancy Category D | DailyMed; DrugBank |
| ifosfamide | 10:00 antineoplastic agents | yes | FDA Pregnancy Category D | DailyMed; DrugBank |
| imatinib | 10:00 antineoplastic agents | yes | FDA Pregnancy Category D | DailyMed; DrugBank |
| irinotecan | 10:00 antineoplastic agents | yes | FDA Pregnancy Category D | DailyMed; DrugBank |
| ixabepilone | 10:00 antineoplastic agents | yes | FDA Pregnancy Category D | DailyMed; DrugBank |
| letrozole | 10:00 antineoplastic agents | | FDA pregnancy Category X | DailyMed; DrugBank |
| leuprolide | 10:00 antineoplastic agents | yes | FDA Pregnancy Category X | DailyMed; DrugBank |
| lomustine | 10:00 antineoplastic agents | yes | IARC Group 2A carcinogen; FDA Pregnancy Category D | DailyMed; DrugBank |
| mechlorethamine | 10:00 antineoplastic agents | yes | FDA Pregnancy Category D | DailyMed; DrugBank |
| megestrol | 10:00 antineoplastic agents | | Nursing should be discontinued if megestrol is required. Women at risk of pregnancy should avoid exposure; FDA Pregnancy Category X | DailyMed; DrugBank |
| melphalan | 10:00 antineoplastic agents | yes | IARC Group 1 carcinogen; FDA Pregnancy Category D | DailyMed; DrugBank |
| mercaptopurine | 10:00 antineoplastic agents | yes | FDA Pregnancy Category D | DailyMed; DrugBank |
| methotrexate | 10:00 antineoplastic agents | yes | FDA Pregnancy Category X | DailyMed; DrugBank |
| mitomycin | 10:00 antineoplastic agents | yes | IARC Group 2B; FDA Pregnancy Category D | DailyMed; DrugBank |
| mitotane | 10:00 antineoplastic agents | yes | FDA Pregnancy Category D | DailyMed; DrugBank |
| mitoxantrone | 10:00 antineoplastic agents | yes | IARC Group 2B; FDA Pregnancy Category D | DailyMed; DrugBank |
| nelarabine | 10:00 antineoplastic agents | yes | FDA Pregnancy Category D | DailyMed; DrugBank |



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Table 1 (Continued). Antineoplastic drugs including those with manufacturers' safe handling guidance (MSHG)

| Drug | AHFS classification | MSHG | Reason for listing | Links |
|--------------|-----------------------------|------|--|--------------------|
| nilotinib | 10:00 antineoplastic agents | | FDA Pregnancy Category D | DailyMed; DrugBank |
| omacetaxin | 10:00 antineoplastic agents | yes | FDA Pregnancy Category D | DailyMed; DrugBank |
| oxaliplatin | 10:00 antineoplastic agents | yes | FDA Pregnancy Category D | DailyMed; DrugBank |
| paclitaxel | 10:00 antineoplastic agents | yes | FDA Pregnancy Category D | DailyMed; DrugBank |
| pazopanib | 10:00 antineoplastic agents | | FDA Pregnancy Category D | DailyMed; DrugBank |
| pemetrexed | 10:00 antineoplastic agents | yes | FDA Pregnancy Category D | DailyMed; DrugBank |
| pentostatin | 10:00 antineoplastic agents | yes | FDA Pregnancy Category D | DailyMed; DrugBank |
| pralatrexate | 10:00 antineoplastic agents | yes | FDA Pregnancy Category D | DailyMed; DrugBank |
| procarbazine | 10:00 antineoplastic agents | yes | IARC Group 2A carcinogen; FDA Pregnancy Category D | DailyMed; DrugBank |
| romidepsin | 10:00 antineoplastic agents | yes | FDA Pregnancy Category D | DailyMed |
| sorafenib | 10:00 antineoplastic agents | | FDA Pregnancy Category D | DailyMed; DrugBank |
| streptozocin | 10:00 antineoplastic agents | yes | IARC Group 2B; FDA Pregnancy Category D | DailyMed; DrugBank |
| sunitinib | 10:00 antineoplastic agents | | FDA Pregnancy Category D | DailyMed; DrugBank |
| tamoxifen | 10:00 antineoplastic agents | | IARC Group 1 carcinogen; FDA Pregnancy Category D | DailyMed; DrugBank |
| temozolomide | 10:00 antineoplastic agents | yes | FDA Pregnancy Category D | DailyMed; DrugBank |
| temsirolimus | 10:00 antineoplastic agents | yes | FDA Pregnancy Category D | DailyMed; DrugBank |
| teniposide | 10:00 antineoplastic agents | yes | IARC Group 2A carcinogen; FDA Pregnancy Category D | DailyMed; DrugBank |
| thioguanine | 10:00 antineoplastic agents | yes | FDA Pregnancy Category D | DailyMed; DrugBank |
| thiotepa | 10:00 antineoplastic agents | yes | IARC Group 1 carcinogen; FDA Pregnancy Category D | DailyMed; DrugBank |
| topotecan | 10:00 antineoplastic agents | yes | FDA Pregnancy Category D | DailyMed; DrugBank |
| toremifene | 10:00 antineoplastic agents | | FDA Pregnancy Category D | DailyMed; DrugBank |
| trimetrexate | 10:00 antineoplastic agents | yes | FDA Pregnancy Category D | DailyMed; DrugBank |
| triptorelin | 10:00 antineoplastic agents | | FDA Pregnancy Category X | DailyMed |



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Table 1 (Continued). Antineoplastic drugs including those with manufacturers' safe handling guidance (MSHG)

| Drug | AHFS classification | MSHG | Reason for listing | Links |
|-------------|-----------------------------|------|--------------------------|--------------------|
| valrubicin | 10:00 antineoplastic agents | yes | FDA Pregnancy Category C | DailyMed; DrugBank |
| vandetanib | 10:00 antineoplastic agents | yes | FDA Pregnancy Category D | DailyMed; DrugBank |
| vemurafenib | 10:00 antineoplastic agents | | FDA Pregnancy Category D | DailyMed; DrugBank |
| vinblastine | 10:00 antineoplastic agents | yes | FDA Pregnancy Category D | DailyMed; DrugBank |
| vincristine | 10:00 antineoplastic agents | yes | FDA Pregnancy Category D | DailyMed; Drugbank |
| vinorelbine | 10:00 antineoplastic agents | yes | FDA Pregnancy Category D | DailyMed; DrugBank |
| vorinostat | 10:00 antineoplastic agents | yes | FDA Pregnancy Category D | DailyMed; Drugbank |



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The drugs in Table 2 meet one or more of the NIOSH criteria for a hazardous drug. Unopened, intact tablets and capsules may not pose the same degree of occupational exposure risk as injectable drugs, which usually require extensive preparation. Cutting, crushing, or otherwise manipulating tablets and capsules will increase the risk of exposure to workers. Some of these drugs may represent an occupational hazard to males or females who are actively trying to conceive, women who are pregnant or may become pregnant, or women who are breast feeding, because they may be present in breast milk. Manufacturers' safe-handling guidance (MSHG) is typically in Section 16 of the drug package insert. See Table 5 for safe-handling recommendations. AHFS = American Hospital Formulary Service; MHRD = maximum recommended human dose.

*Drugs in red font were added in 2014.

**International Agency for Research on Cancer, www.iarc.fr

***Drugs in blue font meet one or more additional criteria for a hazardous drug and also pose a potential reproductive hazard.

Table 2. Non-antineoplastic drugs that meet one or more of the NIOSH criteria for a hazardous drug including those with manufacturers' safe handling guidance (MSHG)

| Drug | AHFS classification | MSHG | Reason for listing | Links |
|---------------|--|------|---|--------------------|
| abacavir* | 8:18.08.20 nucleoside and reverse transcriptase inhibitors | | FDA Pregnancy Category C; malignant tumors observed in male and female mice and rats; genotoxic in <i>in vivo</i> micronucleus test. | DailyMed; DrugBank |
| alefacept | 84:92 skin and mucous membrane agents, miscellaneous | | Increased frequency of malignancies observed in treated patients; FDA Pregnancy Category B | DailyMed; DrugBank |
| apomorphine | 28:36.20.08 Nonergot-derivative dopamine receptor agonists | | FDA Pregnancy Category C; genotoxic in several <i>in vitro</i> assays. | DailyMed; DrugBank |
| azathioprine | 92:44 immunosuppressant agents | yes | IARC Group 1 carcinogen**; FDA Pregnancy Category D*** | DailyMed; DrugBank |
| carbamazepine | 28:12:92 anticonvulsants, miscellaneous | | Black Box warning for aplastic anemia; congenital malformations in offspring of mothers who took drug; rapid transplacental passage; FDA Pregnancy Category D | DailyMed; Drugbank |



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Table 2 (Continued). Non-antineoplastic drugs that meet one or more of the NIOSH criteria for a hazardous drug including those with manufacturers' safe handling guidance (MSHG)

| Drug | AHFS classification | MSHG | Reason for listing | Links |
|--------------------|---|------|--|--------------------|
| chloramphenicol | 8:12:08 chloramphenicols | | IARC Group 2A carcinogen; FDA Pregnancy Category C | DailyMed; DrugBank |
| cidofovir | 8:18:32 nucleoside and nucleotides | yes | FDA Pregnancy Category C | DailyMed; Drugbank |
| cyclosporine | 92:44 immunosuppressive agents | | IARC Group 1 carcinogen; FDA pregnancy Category C | DailyMed; Drugbank |
| deferiprone | 64:00 Heavy metal antagonists | | Genotoxic <i>in vitro</i> and <i>in vivo</i> ; FDA Pregnancy Category D | DailyMed; DrugBank |
| dexrazoxane | 92:56 protective agents | yes | FDA Pregnancy Category C; secondary malignancies observed in patients treated long term with Razoxane (a racemic mixture containing dexrazane); genotoxic <i>in vitro</i> and <i>in vivo</i> ; in laboratory studies, testicular atrophy observed at or below the human dose | DailyMed; DrugBank |
| diethylstilbestrol | NA | | IARC Group 1 carcinogen; FDA Pregnancy Category X | DrugBank |
| divalproex | 28:12:92 anticonvulsants, miscellaneous | | Black Box warning for teratogenicity; FDA Pregnancy Category D; tumors seen in laboratory studies at doses below MRHD | DailyMed |
| entecavir | 8:18:32 nucleosides and nucleotides | yes | FDA Pregnancy Category C | DailyMed; DrugBank |



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Table 2 (Continued). Non-antineoplastic drugs that meet one or more of the NIOSH criteria for a hazardous drug including those with manufacturers' safe handling guidance (MSHG)

| Drug | AHFS classification | MSHG | Reason for listing | Links |
|---|-----------------------------------|------|---|--------------------|
| estradiol | 68:16:04 estrogens | | Black Box warning for malignant neoplasms; increased risk of endometrial cancer, breast cancer, and ovarian cancer; in laboratory studies, increased frequency of carcinomas of the breast, uterus, cervix, vagina, testis, and liver; present in breast milk; FDA Pregnancy Category X | DailyMed; DrugBank |
| estrogen/ progesterone combinations | 68:12 contraceptives | | IARC Group 1 carcinogen; FDA Pregnancy Category X | DailyMed |
| estrogens, conjugated | 68:16:04 estrogens | | Black Box warning for endometrial cancer and cardiovascular risks; long-term use in women and laboratory studies increases frequency of several cancers; FDA Pregnancy Category X | DailyMed |
| estrogens, esterified | 68:16:04 estrogens | | Black Box warning for endometrial cancer and cardiovascular risks: FDA Pregnancy Category X | DailyMed |
| estropipate | 68:16:04 estrogens | | Black Box warning for endometrial carcinoma in postmenopausal women and use during pregnancy; FDA Pregnancy Category X | DailyMed; DrugBank |
| fingolimod | 92:20 biologic response modifiers | | FDA Pregnancy Category C; in laboratory studies, increased malformations and embryo-fetal deaths at less than the RHD; malignant lymphomas observed in male and female mice. | DailyMed; DrugBank |



Table 2 (Continued). Non-antineoplastic drugs that meet one or more of the NIOSH criteria for a hazardous drug including those with manufacturers' safe handling guidance (MSHG)

| Drug | AHFS classification | MSHG | Reason for listing | Links |
|-----------------------------|--|------|---|--------------------|
| flouxymesterone | 68:08 androgens | | Tumors in mice and rats and possibly humans; FDA Pregnancy Category X | DailyMed; DrugBank |
| fosphenytoin | 28:12.12 hydantoins | | Metabolized to phenytoin; FDA Pregnancy Category D | DailyMed; DrugBank |
| ganciclovir | 8:18:32 nucleosides and nucleotides | yes | FDA Pregnancy Category C | DailyMed; DrugBank |
| leflunomide | 92:36 disease-modifying antirheumatic agents | | Teratogenic in laboratory studies at 1/10 HD; marked postnatal survival at 1/100 HD; FDA Pregnancy Category X; severe liver injury reported in patients; carcinogenicity observed at doses below HD | DailyMed; DrugBank |
| lenalidomide | 92:20 biologic response modulators | yes | Analog of thalidomide; FDA Black box warnings for limb abnormalities; pregnancy Category X; in laboratory studies, caused thalidomide-type limb defects in monkey offspring | DailyMed; DrugBank |
| liraglutide recombinant | 68:20.06 incretin mimetics | | FDA Pregnancy Category C; Black Box warning for thyroid C-cell tumors, with supporting evidence in laboratory studies; also in laboratory studies, teratogenic at or below the MRHD. | DailyMed; DrugBank |
| medroxyprogesterone acetate | 68:32 progestins | yes | IARC Group 2B; FDA Pregnancy Category X | DailyMed; DrugBank |



Table 2 (Continued). Non-antineoplastic drugs that meet one or more of the NIOSH criteria for a hazardous drug including those with manufacturers' safe handling guidance (MSHG)

| Drug | AHFS classification | MSHG | Reason for listing | Links |
|-----------------------|---|------|--|--------------------|
| mycophenolate mofetil | 92:44 immunosuppressive agents | | Black Box warning for embryo fetal toxicity, malignancies and serious infections; Increased risk of first-trimester pregnancy loss and increased risk of congenital malformations; FDA Pregnancy Category D; Special warning: tablets should not be crushed and capsules should not be opened or crushed. Avoid inhalation or direct contact with skin or mucous membranes of the powder contained in capsules and oral suspension (before or after constitution). If such contact occurs, wash thoroughly with soap and water; rinse eyes with plain water. | DailyMed; DrugBank |
| mycophenolic acid | 92:44 immunosuppressive agents | | Black Box warning for first trimester pregnancy loss and an increased risk of congenital malformations; FDA Pregnancy Category D; Black Box warning for lymphomas and other malignancies; genotoxic <i>in vitro</i> and <i>in vivo</i> | DailyMed; DrugBank |
| nevirapine | 8:18.08.16 nonnucleoside reverse transcriptase inhibitors | | FDA Pregnancy Category B; in laboratory studies, hepatocellular adenomas and carcinomas at doses lower than human dose. | DailyMed; DrugBank |
| oxcarbazepine | 28:12:92 anticonvulsants, miscellaneous | | Tumors observed in laboratory studies at 1/10 MRHD; FDA Pregnancy Category C | DailyMed; Drugbank |



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Table 2 (Continued). Non-antineoplastic drugs that meet one or more of the NIOSH criteria for a hazardous drug including those with manufacturers' safe handling guidance (MSHG)

| Drug | AHFS classification | MSHG | Reason for listing | Links |
|------------------|---|------|---|--------------------|
| palifermin | 84:16 cell stimulants and proliferants | | FDA Pregnancy Category C; potential for stimulation of tumor growth | DailyMed; Drugbank |
| phenoxybenzamine | 12:16:04:04 non-selective alpha-andrenergic blocking agents | | IARC Group 2B; FDA Pregnancy Category C | DailyMed; DrugBank |
| phenytoin | 28:12.12 hydantoins | | IARC 2B; FDA Pregnancy Category D | DailyMed; DrugBank |
| pipobroman | NA | | FDA Pregnancy Category D | Drugbank |
| progesterone | 68:32 progestins | | IARC Group 2B | DailyMed; Drugbank |
| progestins | 68:12 contraceptives | | FDA Pregnancy Category X | |
| propylthiouracil | 68:36.08 antithyroid agents | | IARC 2B; FDA Pregnancy Category D | DailyMed; DrugBank |
| raloxifene | 68:16:12 estrogen agonists-antagonists | | Abortion and developmental abnormalities seen at low doses in laboratory studies; evidence of tumors at low doses in laboratory studies; FDA Pregnancy Category X | DailyMed; Drugbank |
| rasagiline | 28:36 antiparkinsonian agents | | FDA Pregnancy Category C | DailyMed; Drugbank |
| risperidone | 28:16:08:04 atypical antipsychotics | | Evidence of tumors at low doses in laboratory studies; may be prolactin-mediated; FDA Pregnancy Category C | DailyMed; DrugBank |
| sirolimus | 92:44 immunosuppressive agents | | AKA rapamycin; increased risk of lymphomas and other malignancies; embryotoxic and fetotoxic at 0.2 HD; FDA Pregnancy Category C | DailyMed; DrugBank |



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Table 2 (Continued). Non-antineoplastic drugs that meet one or more of the NIOSH criteria for a hazardous drug including those with manufacturers' safe handling guidance (MSHG)

| Drug | AHFS classification | MSHG | Reason for listing | Links |
|----------------|---|------|---|--------------------|
| spironolactone | 24:32.20 mineralocorticoid receptor antagonists | | FDA Pregnancy Category C; black box warning for tumorigenicity in laboratory studies. | DailyMed; DrugBank |
| tacrolimus | 92:44 immunosuppressive agents | | Increased risk of lymphomas and other malignancies; reproductive effects seen in laboratory studies below the MRHD; excreted in breast milk; FDA Pregnancy Category C | DailyMed; DrugBank |
| thalidomide | 92:20 biologic response modulators | yes | FDA Pregnancy Category X | DailyMed; DrugBank |
| uracil mustard | NA | yes | FDA Pregnancy Category D | DrugBank |
| valganciclovir | 8:18:32 nucleosides and nucleotides | yes | FDA Pregnancy Category C | DailyMed; DrugBank |
| zidovudine | 8:18:08 antiretroviral agents | | IARC Group 2B; FDA Pregnancy Category C | DailyMed; DrugBank |



The drugs in Table 3 primarily meet the NIOSH criteria for reproductive hazards. They represent a potential occupational hazard to males or females who are actively trying to conceive, women who are pregnant or may become pregnant, or breast feeding as they may be present in breast milk. Unopened, intact tablets and capsules may not pose the same degree of occupational risk as injectable drugs that usually require extensive preparation. Cutting, crushing or otherwise manipulating tablets and capsules will increase the risk of exposure to workers. Manufacturers' safe handling guidance (MSHG) is typically in Section 16 of the drug package insert. See Table 5 for safe handling recommendations.

*Drugs in red font were added in 2014.

Table 3. Non-antineoplastic drugs that primarily have adverse reproductive effects

| Drug | AHFS classification | Reason for listing | Links |
|--------------------|---|---|--------------------|
| acitretin | 88:04 vitamin A | Black Box warning on adverse reproductive effects; FDA Pregnancy Category X | DailyMed; DrugBank |
| alitretinoin | 84:92 skin and mucous membrane agents, miscellaneous | FDA Pregnancy Category D | DailyMed; DrugBank |
| ambrisentan | 24:12:92 vasodilating agents, miscellaneous | Black Box warning on adverse reproductive effects; reduced sperm counts in patients; FDA Pregnancy Category X | DailyMed; |
| bosentan | 24:12:92 vasodilating agents, miscellaneous | Black Box warning on adverse reproductive effects; FDA Pregnancy Category X | DailyMed; DrugBank |
| cabergoline | 28:36:20:04 ergot-derivative dopamine receptor agonists | Inhibition of conception and embryo fetal effects at doses below recommended human dose; FDA Pregnancy Category B | DailyMed; DrugBank |
| cetorelix | 92:40 gonadotropin-releasing hormone antagonists | FDA Pregnancy Category X | DailyMed; DrugBank |
| choriogonadotropin | 68:18 gonadotropins | FDA pregnancy Category X; may cause fetal harm when administered to a pregnant woman. | DailyMed; DrugBank |



Table 3 (Continued). Non-antineoplastic drugs that primarily have adverse reproductive effects

| Drug | AHFS classification | Reason for listing | Links |
|-----------------------------|------------------------------------|--|------------------------------|
| clonazepam | 28:12:08 benzodiazepines | Increased risk of congenital abnormalities when taken in first trimester; FDA Pregnancy Category D | DailyMed; DrugBank |
| colchicine | 92:16 antigout agents | FDA Pregnancy Category C; published animal reproduction and development studies indicate it causes embryofetal toxicity, teratogenicity, and altered postnatal development at exposures within or above the clinical therapeutic range | DailyMed; DrugBank |
| dinoprostone | 76:00 oxytocics | Hazardous only for women in late pregnancy; FDA Pregnancy Category C | DailyMed; DrugBank |
| dronedarone | 24:04:04 antiarrhythmics | Teratogenic in laboratory studies at ½ MRHD; FDA Pregnancy Category X | DailyMed; DrugBank |
| dutasteride | 92:08 5-alpha reductase inhibitors | Women warned not to handle; FDA Pregnancy Category X | DailyMed; DrugBank |
| ergonovine/methylergonovine | 76:00 oxytocics | Use is contraindicated during pregnancy because of its uterotonic effects; FDA Pregnancy Category C | DailyMed; DrugBank; DrugBank |
| finasteride | 92:08 5-alpha reductase inhibitors | Women should not handle crushed or broken finasteride tablets when they are pregnant or may potentially be pregnant due to potential risk to a male fetus; FDA Pregnancy Category X | DailyMed; Drugbank |



Table 3 (Continued). Non-antineoplastic drugs that primarily have adverse reproductive effects

| Drug | AHFS classification | Reason for listing | Links |
|-------------------------|--|---|---------------------|
| fluconazole | 8:18.08 azoles | FDA Pregnancy Category C; case reports describe congenital anomalies in infants exposed in utero to maternal fluconazole (400–800 mg/day) during most or all of the first trimester, similar to those seen in animal studies | DailyMed; DrugBank |
| ganirelix | 92:40 gonadotropin-releasing hormone antagonists | FDA Pregnancy Category X | DailyMed |
| gonadotropin, chorionic | 68:18 gonadotropins | Defects of forelimbs and central nervous system and alterations in sex ratio have been reported in laboratory studies; FDA pregnancy Category C | DailyMed; DrugBank7 |
| icatibant | 92:32 complement inhibitors | FDA Pregnancy Category C; in laboratory studies, premature birth and abortion rates increased at a dose that was less than 1/40th the MRHD and delayed parturition and fetal death occurred at 0.5 and 2-fold, respectively, the MRHD | DailyMed; DrugBank |
| mentropins | 68:18 gonadotropins | FDA Pregnancy Category X | Drugbank |
| methyltestosterone | 68:08 androgens | FDA Pregnancy Category X | DailyMed; DrugBank |
| mifepristone | 76:00 oxytocics | When given to pregnant women results in termination of pregnancy; FDA Pregnancy Category X | DailyMed; DrugBank |
| misoprostol | 56:28.28 prostaglandins | FDA Pregnancy Category X | DailyMed; DrugBank |



Table 3 (Continued). Non-antineoplastic drugs that primarily have adverse reproductive effects

| Drug | AHFS classification | Reason for listing | Links |
|-----------------------------|---|---|--------------------|
| nafarelin | 68:18 gonadotropins | Note: Given only as nasal spray; no potential for occupational exposure; FDA Pregnancy Category X | DailyMed; DrugBank |
| oxytocin | 76:00 oxytocics | Hazardous only for women in 3rd trimester; FDA Pregnancy Category C | DailyMed; DrugBank |
| paroxetine | 28:16:04:20 selective serotonin uptake inhibitors | Increased risk of congenital abnormalities when taken in first trimester; complications in pregnancy when taken in third trimester; FDA Pregnancy Category D | DailyMed; Drugbank |
| pentetate calcium trisodium | NA | Severe teratogenic effects in laboratory studies in dogs: supplied in ampule which can lead to occupational exposure; FDA Pregnancy Category C | DailyMed |
| plerixafor | 20:16 hematopoietic agents | Teratogenic in laboratory studies; FDA Pregnancy Category D | DailyMed; DrugBank |
| ribavirin | 8:18:32 nucleosides and nucleotides | Teratogenic and embryotoxic effects in several laboratory studies; contraindicated in women who are pregnant and in the male partners of women who are pregnant; FDA Pregnancy Category X | DailyMed; DrugBank |
| telavancin | 8:12:28 glycopeptides | Black Box warning for potential risk to fetus and adverse reproductive outcomes; reduced fetal weights and increased rates of digit and limb malformations in three species at clinical doses; FDA Pregnancy Category C | DailyMed; Drugbank |



Table 3 (Continued). Non-antineoplastic drugs that primarily have adverse reproductive effects*

| Drug | AHFS classification | Reason for listing | Links |
|-------------------------|---|--|------------------------------|
| testosterone | 68:08 androgens | Children should avoid contact with unwashed or unclothed application sites on skin; FDA Pregnancy Category X | DailyMed; DrugBank |
| topiramate | 28:12.92 anticonvulsants, miscellaneous | FDA Pregnancy Category D | DailyMed; DrugBank |
| tretinoin | 84:16 cell stimulants and proliferants | Black Box warning for severe birth defects; Special FDA distribution system; FDA Pregnancy Category X | DailyMed; DrugBank |
| ulipristal | 68:12 contraceptives | FDA Pregnancy Category X | DailyMed |
| valproate/valproic acid | 28:12:92 anticonvulsants, miscellaneous | Black Box warning for teratogenicity; congenital malformations including neural tube defects and others; teratogenic in multiple species; FDA Pregnancy Category D | DailyMed; DailyMed; DrugBank |
| vigabatrin | 28:12:92 anticonvulsants, miscellaneous | Malformations seen in laboratory studies below the MRHD; FDA Pregnancy Category C | DailyMed; Drugbank |
| voriconazole | 8:14.08 azoles | FDA Pregnancy Category D | DailyMed; DrugBank |
| warfarin | 20:12.04.08 coumarin derivatives | FDA Pregnancy Category D | DailyMed; DrugBank |
| ziprasidone | 28:16:08:04 atypical antipsychotics | Developmental toxicity, including possible teratogenic effects at doses similar to human therapeutic doses; an increase in the number of pups born dead and a decrease in postnatal survival at less than MRHD; FDA Pregnancy Category C | DailyMed; Drugbank |



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Table 3 (Continued). Non-antineoplastic drugs that primarily have adverse reproductive effects*

| Drug | AHFS classification | Reason for listing | Links |
|-----------------|---|---|--------------------|
| zoledronic acid | 92:24 bone resorption inhibitors | Number of stillbirths increased and survival of neonates decreased in laboratory studies at low doses; FDA Pregnancy Category D | DailyMed; DrugBank |
| zonisamide | 28:12:92 anticonvulsants, miscellaneous | Teratogenic in multiple animal species; FDA Pregnancy Category C | DailyMed; DrugBank |



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Table 4 lists drugs that were deleted from the 2004 and 2012 NIOSH hazardous drug lists. The 2004 list was a composite of five separate lists. When the drugs on that list were reviewed against the NIOSH criteria for hazardous drugs, these 11 drugs did not meet the criteria. Tetracycline was removed from the 2012 list on the basis of feedback from stakeholders.

*AHFS = American Hospital Formulary Service.

Table 4a. Drugs deleted from the 2004 hazardous drug list for not meeting the NIOSH criteria for hazardous drugs

| Drug | AHFS Classification* |
|-----------------------------|---|
| aldesleukin | 10:00 antineoplastic agents |
| asparaginase | 10:00 antineoplastic agents |
| denileukin | 10:00 antineoplastic agents |
| estrone | 68:16.04 estrogens |
| nilutamide | 10:00 antineoplastic agents |
| pegaspargase | 10:00 antineoplastic agents |
| pentamidine isethionate | 8:40 miscellaneous anti-infectives |
| podofilox/podophyllum resin | 84:36 miscellaneous skin and mucous membrane agents (mitotic inhibitor) |
| testolactone | 10:00 antineoplastic agents |
| trifluridine | 52:04.06 antivirals |
| vidarabine | 52:04.06 antivirals |

Table 4b. Drugs deleted from the 2012 list on the basis of stakeholder comments

| Drug | AHFS Classification* |
|--------------|-----------------------|
| Tetracycline | 8:12.24 tetracyclines |