THOMSON REUTERS™

IODINE

MICROMEDEX® DRUGDEX® EVALUATION

DRUGDEX Drug Evaluations provide information on: dosage, pharmacokinetics, cautions, interactions, clinical applications, adverse effects, comparative efficacy, and drug of choice information.

For more information about Thomson Reuters Micromedex, visit www.micromedex.com.

Information valid as of March 17, 2011.

THOMSON REUTERS™

INSOLUBLE PRUSSIAN BLUE

MICROMEDEX® POISINDEX® MANAGEMENT

The POISINDEX Managements provide information on the evaluation, clinical effects, range of toxicity, and treatment protocols for exposures to drugs, chemicals and physical/environmental agents.

For more information about Thomson Reuters Micromedex, visit www.micromedex.com.

Information valid as of March 17, 2011.

THOMSON REUTERS™

IODIDES

MICROMEDEX® POISINDEX® MANAGEMENT

POISINDEX Managements provide information on the evaluation, clinical effects, range of toxicity, and treatment protocols for exposures to drugs, chemicals and physical/environmental agents.

For more information about Thomson Reuters Micromedex, visit www.micromedex.com.

Information valid as of March 17, 2011.

THOMSON REUTERS™

NONIONIZING RADIATION

MICROMEDEX® POISINDEX® MANAGEMENT

POISINDEX Managements provide information on the evaluation, clinical effects, range of toxicity, and treatment protocols for exposures to drugs, chemicals and physical/environmental agents.

For more information about Thomson Reuters Micromedex, visit www.micromedex.com.

Information valid as of March 17, 2011.

THOMSON REUTERS™

PENTETATE CALCIUM TRISODIUM

MICROMEDEX® POISINDEX® MANAGEMENT

POISINDEX Managements provide information on the evaluation, clinical effects, range of toxicity, and treatment protocols for exposures to drugs, chemicals and physical/environmental agents.

For more information about Thomson Reuters Micromedex, visit www.micromedex.com.

Information valid as of March 17, 2011.

THOMSON REUTERS™

PENTETATE ZINC TRISODIUM

MICROMEDEX® POISINDEX® MANAGEMENT

POISINDEX Managements provide information on the evaluation, clinical effects, range of toxicity, and treatment protocols for exposures to drugs, chemicals and physical/environmental agents.

For more information about Thomson Reuters Micromedex, visit www.micromedex.com.

Information valid as of March 17, 2011.

THOMSON REUTERS™

RADIATION

MICROMEDEX® POISINDEX® MANAGEMENT

POISINDEX Managements provide information on the evaluation, clinical effects, range of toxicity, and treatment protocols for exposures to drugs, chemicals and physical/environmental agents.

For more information about Thomson Reuters Micromedex, visit www.micromedex.com.

Information valid as of March 17, 2011.

THOMSON REUTERS™

RADIATION

MICROMEDEX® REPROTEXT®

REPROTEXT documents help to evaluate human reproductive risks from exposures to drugs, chemical, and physical/environmental agents.

For more information about Thomson Reuters Micromedex, visit www.micromedex.com.

Information valid as of March 17, 2011.

THOMSON REUTERS™

PENTETATE ZINC TRISODIUM

MICROMEDEX® DRUGPOINTS SUMMARY

DrugPoints Summaries provide information on dosage, pharmacokinetics, cautions, interactions, clinical applications, adverse effects, comparative efficacy, and drug of choice information.

For more information about Thomson Reuters Micromedex, visit www.micromedex.com.

Information valid as of March 17, 2011.

THOMSON REUTERS™

PENTETATE CALCIUM TRISODIUM

MICROMEDEX® DRUGPOINTS SUMMARY

DrugPoints Summaries provide information on dosage, pharmacokinetics, cautions, interactions, clinical applications, adverse effects, comparative efficacy, and drug of choice information.

For more information about Thomson Reuters Micromedex, visit www.micromedex.com.

Information valid as of March 17, 2011.

THOMSON REUTERS™

PRUSSIAN BLUE

MICROMEDEX® DRUGPOINTS SUMMARY

DrugPoints Summaries provide information on dosage, pharmacokinetics, cautions, interactions, clinical applications, adverse effects, comparative efficacy, and drug of choice information.

For more information about Thomson Reuters Micromedex, visit www.micromedex.com.

Information valid as of March 17, 2011.

DRUGDEX® Evaluations

IODINE

0.0 Overview

1) Class

a) This drug is a member of the following class(es):

Antibacterial
Antibacterial Cleansing Agent
Antithyroid Agent
Expectorant
Iodide Supplement
Iodine Supplement
Mineral/Nutriceutical Combination
Parenteral Mineral-Trace Mineral
Radiation Emergency, Thyroid Blocking Agent

2) Dosing Information

a) Iodine

1) Adult

a) Disinfection

1) 2% aqueous solution TOPICALLY for minor wounds
2) 2% tincture TOPICALLY on intact skin
3) 2% in glycerin TOPICALLY on mucous membranes

b) Thyroid storm

1) 5 to 10 drops of Lugol's solution (8 mg iodide/drop) or 1 to 2 drops of saturated solution of potassium iodide (50 mg of iodide/drop) 3 times a day mixed in water or juice

2) Pediatric

a) Disinfection

1) 2% aqueous solution TOPICALLY for minor wounds
2) 2% tincture TOPICALLY on intact skin
3) 2% in glycerin TOPICALLY on mucous membranes

b) Potassium Iodide

1) Adult

a) Cutaneous sporotrichosis

1) initial, 5 drops (using a standard eye-dropper) saturated solution ORALLY 3 times daily; increase as tolerated to 40 to 50 drops ORALLY 3 times daily; continue for 2 to 4 weeks after all lesions have healed (Kauffman et al, 2007)

b) Implementation of protective measures to prevent injury due to radiation sources, Thyroid gland; Prophylaxis

1) 130 mg ORALLY daily (Prod Info IOSTAT(TM) oral tablets, 2005; Prod Info THYROSHIELD(TM) oral solution, 2005)

c) Induction of involution of thyroid

1) 60-250 mg ORALLY 3 times a day for 10 days before surgery

d) Lymphocutaneous sporotrichosis

1) initial, 5 drops (using a standard eye-dropper) saturated solution ORALLY 3 times daily; increase as tolerated to 40 to 50 drops ORALLY 3 times daily; continue for 2 to 4 weeks after all lesions have healed (Kauffman et al, 2007)

2) Pediatric

a) Cutaneous sporotrichosis

1) initial, 1 drop (using a standard eye-dropper) saturated solution ORALLY 3 times daily; increase as tolerated up to MAX of 1 drop/kg or 40 to 50 drops ORALLY 3 times daily (whichever is lowest); continue for 2 to 4 weeks after all lesions have healed (Kauffman et al, 2007)

b) Implementation of protective measures to prevent injury due to radiation sources, Thyroid gland; Prophylaxis

1) over 12 y and weigh 150 lbs or greater, 130 mg ORALLY daily (Prod Info IOSTAT(TM) oral

tablets, 2005; Prod Info THYROSHIELD(TM) oral solution, 2005)
2) over 12 y and weigh 150 lbs or less, 65 mg ORALLY daily (Prod Info IOSTAT(TM) oral tablets, 2005; Prod Info THYROSHIELD(TM) oral solution, 2005)
3) 3 to 12 y, 65 mg ORALLY daily (Prod Info IOSTAT(TM) oral tablets, 2005; Prod Info THYROSHIELD(TM) oral solution, 2005)
4) 1 mo to 3 y, 32.5 mg ORALLY daily (Prod Info IOSTAT(TM) oral tablets, 2005; Prod Info THYROSHIELD(TM) oral solution, 2005)
5) birth to 1 mo, 16.25 mg ORALLY daily (Prod Info IOSTAT(TM) oral tablets, 2005; Prod Info THYROSHIELD(TM) oral solution, 2005)

c) Lymphocutaneous sporotrichosis
1) initial, 1 drop (using a standard eye-dropper) saturated solution ORALLY 3 times daily; increase as tolerated up to MAX of 1 drop/kg or 40 to 50 drops ORALLY 3 times daily (whichever is lowest); continue for 2 to 4 weeks after all lesions have healed (Kauffman et al, 2007)

3) Contraindications
a) **Iodine**
1) hypersensitivity to **iodine**
2) burn patients
b) Potassium Iodide
1) hypersensitivity to iodide products
2) renal disorders
3) **iodine**-induced goiter

4) Serious Adverse Effects
a) Potassium Iodide
1) Goiter, Prolonged or excessive use
2) Hypothyroidism, Prolonged or excessive use
3) Immune hypersensitivity reaction
4) Thyroid adenoma, Prolonged or excessive use

5) Clinical Applications
a) **Iodine**
1) FDA Approved Indications
a) Disinfection
b) Thyroid storm
b) Potassium Iodide
1) FDA Approved Indications
a) Implementation of protective measures to prevent injury due to radiation sources, Thyroid gland; Prophylaxis
2) Non-FDA Approved Indications
a) Cutaneous sporotrichosis
b) Induction of involution of thyroid
c) Lymphocutaneous sporotrichosis

1.0 Dosing Information

Drug Properties

Adult Dosage

Pediatric Dosage

1.1 Drug Properties

A) Information on specific products and dosage forms can be obtained by referring to the Tradename List (Product Index)

B) Synonyms
Ca Iodide
Calcium Iodide
Iodine
KI

K Iodide
Na Iodide
Potassium Iodide
Sodium Iodide
Zinc Iodide
Zn Iodide

C) Physicochemical Properties
1) **Iodine**
a) Molecular Weight
1) 126.9 (Dollery, 1991) (Fleeger, 1992)
2) Potassium Iodide
a) Molecular Weight
1) 166.00
3) Sodium Iodide
a) Molecular Weight
1) Elemental **iodine**: 126.9 (Nichoalds, 1983); Sodium iodide: 149.89 (Fleeger, 1994)

1.3 Adult Dosage

1.3.1 Normal Dosage

Iodine

Potassium Iodide

1.3.1.A Iodine

Oral route

Topical application route

1.3.1.A.1 Oral route

1.3.1.A.1.a Endemic goiter

1) A 400-microgram daily dose of **iodine**, as di-iodotyrosine, has been successfully used to treat patients with ENDEMIC GOITER due to **iodine** deficiency. The **iodine** caused a significant reduction in the size of diffuse goiters (Hintze et al, 1989).

1.3.1.A.2 Topical application route

1.3.1.A.2.a Disinfection

1) For DECONTAMINATION OF MINOR WOUNDS, a 2% aqueous solution applied to the affected area is recommended (AMA Department of Drugs, 1986b). For DISINFECTION OF INTACT SKIN, a 2% tincture in an alcoholic vehicle is used (Goodman & Gilman, 1970; AMA Department of Drugs, 1986b; Osol, 1980a). For DISINFECTION OF MUCOUS MEMBRANES, a 2% solution of **iodine** in glycerin is the preparation of choice (Goodman & Gilman, 1970; Osol, 1980a).

1.3.1.B Potassium Iodide

1.3.1.B.1 Oral route

Cutaneous sporotrichosis

Erythematous condition

Implementation of protective measures to prevent injury due to radiation sources, Thyroid gland; Prophylaxis

Lymphocutaneous sporotrichosis

1.3.1.B.1.a Cutaneous sporotrichosis

1) As an alternative treatment to itraconazole for cutaneous sporotrichosis, the recommended dose of saturated solution of potassium iodide (SSKI) is an initial dose of 5 drops (using a standard eye-dropper) orally 3 times daily, increasing as tolerated to 40 to 50 drops orally 3 times daily. The treatment should be continued for 2 to 4 weeks after all lesions have healed, usually a total of 3 to 6 months (Kauffman et al, 2007).

1.3.1.B.1.b Erythematous condition

1) The usual dose of potassium iodide for the treatment of erythematous dermatoses, including erythema nodosum, nodular vasculitis, and erythema multiforme, is 300 milligrams orally three times a day (Horio et al, 1981; Horio et al, 1983; Schulz & Whiting, 1976a).

1.3.1.B.1.c Implementation of protective measures to prevent injury due to radiation sources, Thyroid gland; Prophylaxis

1) The recommended dose of potassium iodide (KI) as a thyroid-blocking agent following exposure to radioisotopes of **iodine** in adults over 18 through 40 years with predicted radioactive exposures greater than or equal to 10 centigray (cGy) (eg, from a nuclear reactor accident) is 130 milligrams/day (mg) orally. Adults over 40 years of age need KI only when a large internal radiation dose (greater than or equal to 500 cGy) to the thyroid is projected. Pregnant and lactating women should receive 130 mg/day if predicted thyroid exposure is expected to be 5 cGy or greater. Repeat dosing should be avoided in these women if possible to reduce the risk of blocking fetal thyroid function and hypothyroidism in the nursing neonate (FDA, 2001).

2) Therapy should be started as soon as possible prior to or after possible radiation exposure, preferably within 3 to 4 hours, and continue until the risk for significant exposure to radioiodines no longer exists. The thyroid-blocking effect of a single 130-milligram dose persists for 24 hours; daily therapy beyond 7 to 14 days appears unnecessary in the absence of continued exposure (FDA, 2001; Becker, 1987a; Becker et al, 1984); (Schleien, 1983).

1.3.1.B.1.d Lymphocutaneous sporotrichosis

1) As an alternative treatment to itraconazole for lymphocutaneous sporotrichosis, the recommended dose of saturated solution of potassium iodide (SSKI) is an initial dose of 5 drops (using a standard eye-dropper) orally 3 times daily, increasing as tolerated to 40 to 50 drops orally 3 times daily. The treatment should be continued for 2 to 4 weeks after all lesions have healed, usually a total of 3 to 6 months (Kauffman et al, 2007).

1.3.1.B.1.e Important Note

1) Administer enteric coated potassium iodide only when indicated; discontinue immediately if nausea, vomiting, abdominal pain, distention, or GI bleeding occurs.

1.4 Pediatric Dosage

1.4.1 Normal Dosage

Iodine

Potassium Iodide

1.4.1.A Iodine

Oral route

Topical application route

1.4.1.A.1 Oral route

a) EUTHYROID GOITER

1) JUVENILE GOITERS, in children 13 to 15 years of age, respond rapidly to daily treatment with either 150 micrograms of iodide, 100 micrograms of levothyroxine, or 50 micrograms of levothyroxine plus 100 micrograms of iodide (Einenkel et al, 1992a). However, treatment with levothyroxine alone only temporarily blocked the thyroid's tendency to enlarge and withholding or reducing the dose resulted in relapse.

1.4.1.A.2 Topical application route

1.4.1.A.2.a Disinfection

1) For DECONTAMINATION OF MINOR WOUNDS, a 2% aqueous solution applied to the affected area is recommended (AMA Department of Drugs, 1986b). For DISINFECTION OF INTACT SKIN, a 2% tincture in an alcoholic vehicle is used (Goodman & Gilman, 1970; AMA Department of Drugs, 1986b; Osol, 1980a). For DISINFECTION OF MUCOUS MEMBRANES, a 2% solution of **iodine** in glycerin is the preparation of choice (Goodman & Gilman, 1970; Osol, 1980a).

1.4.1.B Potassium Iodide

1.4.1.B.1 Oral route

Cutaneous sporotrichosis

Implementation of protective measures to prevent injury due to radiation sources, Thyroid gland; Prophylaxis

Lymphocutaneous sporotrichosis

1.4.1.B.1.a Cutaneous sporotrichosis

1) As an alternative treatment to itraconazole for cutaneous sporotrichosis, the recommended dose of saturated solution of potassium iodide (SSKI) in children is an initial dose of 1 drop (using a standard eye-dropper) orally 3 times daily, increasing as tolerated to a maximum of 1 drop/kilogram or 40 to 50 drops orally 3 times daily (whichever is lowest). The treatment should be continued for 2 to 4 weeks after all lesions have healed, usually a total of 3 to 6 months (Kauffman et al, 2007).

1.4.1.B.1.b Implementation of protective measures to prevent injury due to radiation sources, Thyroid gland; Prophylaxis

The recommended dose of potassium iodide as a thyroid-blocking agent following exposure to

radioisotopes of **iodine** with predicted radioactive exposures greater than or equal to 5 centigray (eg, from a nuclear reactor accident) is:
Children and adolescents over 3 through 18 years: 65 milligrams/day (adolescents approaching adult size (70 kilograms or greater) should receive 130 milligrams/day)
Infants 1 month through 3 years: 32 milligrams/day
Neonates birth through 1 month: 16 milligrams/day
1) In neonates, repeat dosing should be avoided to minimize the risk of hypothyroidism during the critical phase of brain development. Treated infants should be monitored for hypothyroidism. Saturated potassium iodide solution can be diluted in milk, formula, or water (FDA, 2001).
2) Therapy should be started as soon as possible prior to or after possible radiation exposure, preferably within 3 to 4 hours, and should continue until the risk for significant exposure to radioiodines no longer exists (FDA, 2001). The thyroid-blocking effect of a single 130-milligram dose persists for 24 hours; daily therapy beyond 7 to 14 days appears unnecessary in the absence of continued exposure (FDA, 2001; Becker, 1987a; Becker et al, 1984); (Schleien, 1983).

1.4.1.B.1.c Lymphocutaneous sporotrichosis

1) As an alternative treatment to itraconazole for lymphocutaneous sporotrichosis, the recommended dose of saturated solution of potassium iodide (SSKI) in children is an initial dose of 1 drop (using a standard eye-dropper) orally 3 times daily, increasing as tolerated to a maximum of 1 drop/kilogram or 40 to 50 drops orally 3 times daily (whichever is lowest). The treatment should be continued for 2 to 4 weeks after all lesions have healed, usually a total of 3 to 6 months (Kauffman et al, 2007).

1.4.1.B.1.d Important Note

1) Administer enteric coated potassium iodide only when indicated; discontinue immediately if nausea, vomiting, abdominal pain, distention, or GI bleeding occurs.

2.0 Pharmacokinetics

Onset and Duration

ADME

2.1 Onset and Duration

A) Onset

1) Initial Response

a) Water purification, solution: approximately 15 minutes (Osol, 1980; Kahn & Visscher, 1975; Goodman & Gilman, 1970a).

1) IODINE is rapidly microbicidal; when added to drinking water for emergency decontamination, amebicidal and bactericidal activity is seen within about 15 minutes (Osol, 1980; Kahn & Visscher, 1975; Goodman & Gilman, 1970a).

2.3 ADME

Absorption

Distribution

Metabolism

Excretion

Extracorporeal Elimination

2.3.1 Absorption

A) **Iodine**

1) Bioavailability

a) TOPICAL: Slight (Reynolds, 1990).

1) **IODINE** is only slightly absorbed when applied topically in the usual amounts (Reynolds, 1990).

B) Potassium Iodide

1) Bioavailability

a) ORAL: Potassium iodide is readily absorbed in the intestinal tract (Sterling & Heymann, 2000).

2.3.2 Distribution

A) Distribution Sites

1) Potassium Iodide

a) OTHER DISTRIBUTION SITES

1) Iodide concentrates in the thyroid gland, salivary glands, gastric mucosa, choroid plexus, placenta, and mammary glands (Sterling & Heymann, 2000).

2.3.3 Metabolism

A) Metabolism Sites and Kinetics

1) **IODINE** which is absorbed systemically is rapidly converted to iodide (AMA Department of Drugs, 1986), which is taken up into the thyroid (Reynolds, 1990). With a 100-microgram iodide dose, about 20% is taken up by the thyroid (Hurrell, 1997).

2.3.4 Excretion

A) Kidney

1) **Iodine**

a) Renal Excretion (%)

1) 85% to 90% (Hurrell, 1997).

a) **IODINE** is excreted mainly in the urine in the form of iodides (Reynolds, 1990). With normal intake, 85% to 90% of absorbed iodide is excreted directly in the urine (Hurrell, 1997).

2) Potassium Iodide

a) Renal Excretion (%)

1) 90% (Sterling & Heymenn, 2002).

a) Ninety percent of orally administered potassium iodide is excreted in the urine (Sterling & Heymann, 2000).

B) Other

1) Potassium Iodide

a) OTHER EXCRETION

1) approximately 10% (Sterling & Heymann, 2000).

a) Approximately 10% of an oral dose of potassium iodide is excreted in the sweat, feces, and breast milk (Sterling & Heymann, 2000).

2.3.6 Extracorporeal Elimination

A) Hemodialysis

1) Dialyzable: Yes

a) Clearance of **iodine** 120 mL/minute with standard hemodialysis (high flux F80 dialyzer without ultrafiltration; dialysate flow rate 550 mL/minute) (Kanakiriya et al, 2003).

B) Hemofiltration

1) Dialyzable: Yes

a) Clearance of **iodine** 37 mL/minute on day 1 and 44 mL/minute on day 2 during continuous

venovenous hemodiafiltration (CVVHDF) (high flux F80 dialyzer without ultrafiltration; dialysate and HF flow rate 2 L/hour) (Kanakiriya et al, 2003).

3.0 Cautions

Contraindications

Precautions

Adverse Reactions

Teratogenicity/Effects in Pregnancy/Breastfeeding

Drug Interactions

3.0.A Black Box WARNING

1) Potassium Iodide

a) Oral (Solution)

Consumer packaging

Take potassium iodide (KI) only when public officials tell you. In a nuclear radiation emergency, radioactive **iodine** could be released into the air. KI protects only the thyroid gland from uptake of radioactive **iodine**. Therefore, KI should be used along with other emergency measures that will be recommended to you by public officials.

If you are told to take this medicine, take it one time every 24 hours. Do not take it more often. More KI will not help you. Too much KI may increase the chances of side effects. Do not take this medicine if you know you are allergic to **iodine** (Prod Info THYROSHIELD(TM) oral solution, 2005).

3.1 Contraindications

A) Iodine

1) hypersensitivity to **iodine**

2) burn patients

B) Potassium Iodide

1) hypersensitivity to iodide products

2) renal disorders

3) **iodine**-induced goiter

3.2 Precautions

A) Potassium Iodide

1) acute bronchitis

2) Addison's disease

3) dehydration

4) goiter, autoimmune thyroid disease

5) hyperthyroidism

6) pregnancy, lactation (can cause fetal goiter, infant thyroid suppression)

7) tuberculosis

3.3 Adverse Reactions

Cardiovascular Effects

Dermatologic Effects

Endocrine/Metabolic Effects

Gastrointestinal Effects

Hematologic Effects

Immunologic Effects

Neurologic Effects

Respiratory Effects

Other

3.3.1 Cardiovascular Effects

3.3.1.A Potassium Iodide

Cardiac dysrhythmia

Vasculitis

3.3.1.A.1 Cardiac dysrhythmia

a) Irregular heart beat may occur with potassium iodide (Olin, 1990a).

3.3.1.A.2 Vasculitis

a) Vasculitis has been associated with the use of potassium iodide (Sterling & Heymann, 2000a). Leckhout et al (1987) reported a case of systemic vasculitis attributed to a 12-day course of potassium iodide therapy (300 milligrams 3 times daily). Systemic vasculitis was diagnosed on the basis of significant impairment of renal function, eye involvement (papillitis), and a skin biopsy which showed a leukocytoclasitc vasculitis.

3.3.2 Dermatologic Effects

3.3.2.A Potassium Iodide

Acne

Iododerma

Rash

3.3.2.A.1 Acne

a) Iodides may cause a flare-up of adolescent acne (Olin, 1990a).

3.3.2.A.2 Iododerma

a) Ioderma is a severe skin eruption associated with the use of iodides. It has been reported more frequently in patients with underlying diseases such as rheumatoid arthritis, multiple myeloma, lymphoma, polyarteritis nodosa, or subacute glomerulonephritis. Skin eruptions exhibit various appearances such as bullous, vesicular, petechial, erythematous, or vegetating and can occur anywhere on the body (Sterling & Heymann, 2000a).

3.3.2.A.3 Rash

a) DERMATITIS secondary to iodism may occur with prolonged therapy with inorganic iodides (Olin, 1990a).

b) Use of potassium iodide by nursing mothers may cause a rash in the infant (Olin, 1990a).

3.3.3 Endocrine/Metabolic Effects

Iodine

Potassium Iodide

3.3.3.A Iodine

3.3.3.A.1 Thyroid dysfunction

a) Although **iodine** supplementation has been reported to aggravate postpartum thyroid dysfunction (PPTD) in women with thyroid peroxidase antibody (TPO-Ab) (Kampe et al, 1990), supplementation during pregnancy and the postpartum period at a level typical of vitamin-mineral supplements (150 micrograms per day) did NOT induce or worsen PPTD in moderately deficient, TPO-Ab-positive women (Nohr et al, 2000).

b) A high rate of occurrence of thyroid dysfunction and goiter among Peace Corps volunteers in Niger was attributed to **iodine** excess from issued water purification systems containing based antimicrobial filters. Daily intake of **iodine** from filtered water was at least 50 milligrams (330 times the recommended dietary allowance of 0.15 milligrams). By August, 1998, water filtration systems in Niger were replaced by boiling or microfiltration and chlorine purification (Khan et al, 1998).

c) Administration of pharmacological doses of iodide to euthyroid patients with a previous episode of thyroid dysfunction during recombinant interferon-alpha (rIFN-alpha) treatment for hepatitis induced another episode of thyroid dysfunction (hypothyroidism or hyperthyroidism) in 5 of 8 patients. Patients who did not manifest thyroid dysfunction during rIFN-alpha treatment (n=8) did not develop thyroid dysfunction with excess **iodine** (Minelli et al, 1997).

3.3.3.B Potassium Iodide

Hyperthyroidism

Hypothyroidism

Thyroid adenoma

3.3.3.B.1 Hyperthyroidism

a) In a study of 8 female patients ranging in age from 34 and 66 years, 4 patients with goiter developed THYROTOXICOSIS after daily administration of 5 drops of potassium iodide (180 mg of iodide) for periods ranging from 10 to 18 weeks. Two of the patients became overtly thyrotoxic within 7 to 10 weeks of initiation of potassium iodide therapy. Serum thyroxine levels rose into toxic range. The patients developed weight loss, tachycardia, atrial fibrillation, sweating, and tremor. These signs and symptoms of hyperthyroidism increased when iodide therapy was withdrawn. This was presumably because hormonal synthesis was increased by iodides while secretion of hormone was partially inhibited. The authors suggested that, except when **iodine** deficiency is present or when **iodine** is given for control of pre-existing thyrotoxicosis, large doses of **iodine** patients with goiter or to patients with any underlying thyroid disease (Vagenakis et al, 1972a).

3.3.3.B.2 Hypothyroidism

a) Prolonged use of iodides may lead to hypothyroidism, including MYXEDEMA, in patients sensitive to iodides. **Iodine**-induced GOITER may occur. Concurrent use of antithyroid agents may potentiate the hypothyroid effect of iodides (Olin, 1990a). Children with cystic fibrosis appear to have an exaggerated susceptibility to the goitrogenic effect of iodides (Olin, 1990a); (Rosenstein, 1978).

b) In certain instances, **iodine** administration for months or years can result in HYPOTHYROIDISM called the Wolff-Chaikoff effect. However, most persons receiving long-term iodides are prevented from the development of hypothyroidism by an autoregulatory mechanism. Excess inhibition of **iodine** organification, but this is usually short-lived and does not lead to hypothyroidism despite continued administration of **iodine**. By autoregulatory mechanisms, thyroidal transport declines in the presence of excess **iodine**, allowing the intrathyroidal to fall below the level necessary to inhibit organification (Shopsin et al, 1973). The hypothyroid state may resolve after withdrawal of iodide therapy and may be remedied faster by administration of thyroid hormone.
c) Goiter formation occurs frequently among children given high doses of iodides for respiratory tract problems. Hypothyroidism may occur early or may be delayed for as long as several years. Although goiter formation is usually the first manifestation of thyroid disease, hypothyroidism may occur without palpable thyroid enlargement. Because the symptoms are non-specific and develop gradually, hypothyroidism may go undetected for a prolonged period of time. Patients with Grave's disease and Hashimoto's thyroiditis are especially sensitive to the effects of iodides (Barnes et al, 1975).

3.3.3.B.3 Thyroid adenoma

a) Thyroid ADENOMA may occur from prolonged doses or excessive doses of potassium iodide (Olin, 1990a).

3.3.4 Gastrointestinal Effects

3.3.4.A Potassium Iodide

Gastrointestinal tract finding

Parotitis

Sialoadenitis

3.3.4.A.1 Gastrointestinal tract finding

a) Gastrointestinal distress was reported in individuals receiving potassium iodide as a thyroid blocking agent during the Chernobyl reactor accident. Gastrointestinal distress occurred more frequently in children than adults (FDA, 2001).
b) Nonspecific small bowel lesions (STENOSIS with or without ULCERATIONS) associated with use of enteric-coated potassium iodide tablets has been reported. The lesions may cause HEMORRHAGE, OBSTRUCTION, and PERFORATION, often requiring surgery; DEATH has occurred (Olin, 1990a).

3.3.4.A.2 Parotitis

a) Rarely, parotitis may occur with potassium iodide (Olin, 1990a).

3.3.4.A.3 Sialoadenitis

a) Inflammation of the salivary gland can occur with potassium iodide administration (FDA, 2001).

3.3.5 Hematologic Effects

Iodine

Potassium Iodide

3.3.5.A Iodine

3.3.5.A.1 Drug-induced eosinophilia

a) Eosinophilia may occur as a manifestation of hypersensitivity (Reynolds, 1990).

3.3.5.B Potassium Iodide

3.3.5.B.1 Drug-induced eosinophilia

a) Eosinophilia has been associated with potassium iodide use (Sterling & Heymann, 2000a).

3.3.7 Immunologic Effects

Iodine

Potassium Iodide

3.3.7.A Iodine

Immune hypersensitivity reaction

Immune system finding

3.3.7.A.1 Immune hypersensitivity reaction

a) Hypersensitivity reactions may occur after topical application of any (AMA Department of Drugs, 1986a); ANGIOEDEMA, ARTHRALGIAS, CUTANEOUS HEMORRHAGE, eosinophilia, FEVER, LYMPHADENOPATHY, PURPURA, and URTICARIA may occur (Reynolds, 1990).

3.3.7.A.2 Immune system finding

a) Thyroid microsomal autoantibodies appeared in 10% of a group of euthyroid patients receiving iodide 0.2 milligrams/day for endemic goiter. Antibody titers decreased markedly after termination of iodide supplementation (Kahaly et al, 1997).

3.3.7.B Potassium Iodide

3.3.7.B.1 Immune hypersensitivity reaction

a) Patients may be markedly sensitive to iodides; hypersensitivity reactions may occur immediately or hours after administration. Manifestations may include ANGIOEDEMA, cutaneous and MUCOSAL HEMORRHAGES, and symptoms resembling SERUM SICKNESS (FEVER, ARTHRALGIA, LYMPHADENOPATHY, EOSINOPHILIA) (Olin, 1990a). URTICARIA, THROMBOTIC THROMBOCYTOPENIC PURPURA, and fatal PERIARTERITIS have been reported.
b) Potassium iodide may precipitate severe systemic illness in patients with hypocomplementemic vasculitis. Patients with chronic urticaria or systemic lupus erythematosus are at particularly high risk (Curd, 1979).

3.3.9 Neurologic Effects

3.3.9.A Potassium Iodide

3.3.9.A.1 Central nervous system finding

a) Central nervous system effects may include CONFUSION, NUMBNESS, TINGLING, pain, or WEAKNESS in the hands or feet, and weakness or heaviness of the legs (Olin, 1990a).

3.3.15 Respiratory Effects

3.3.15.A Potassium Iodide

3.3.15.A.1 Pulmonary edema

a) Pulmonary edema has been associated with potassium iodide use (Sterling & Heymann, 2000a).

3.3.16 Other

3.3.16.A Potassium Iodide

Iodine poisoning

Poisoning, chronic

3.3.16.A.1 Iodine poisoning

a) IODISM may develop, particularly with administration of large doses over prolonged periods. Manifestations include skin eruptions, oral burning, CORYZA, EYE IRRITATION, EYELID EDEMA, FRONTAL HEADACHE, PULMONARY EDEMA, gastric disturbances, and inflammation of the tonsils, pharynx, larynx, and submaxillary and parotid glands. Signs and symptoms generally resolve spontaneously within a few days of discontinuing therapy (Olin, 1990a).

3.3.16.A.2 Poisoning, chronic

a) (Kurtz & Aber, 1982) reported the case of a 73-year-old male with a 15-year history of ingestion of 10 drops a day of potassium iodide for a 15-year history of paroxysmal nocturnal fevers, shaking, chills, night sweats, coughing and vomiting. He was hospitalized for fever and was found to be anemic. The potassium iodide was discontinued and after 14 days the patient reported a decrease in severity of night sweats, an absence of fever, an improvement in appetite and a general sense of well being. In addition, the anemia had resolved. The patient was diagnosed with potassium iodide-induced fever. Although the pathogenesis of iodide fever is not fully understood, it may be due to a hypersensitivity mechanism in which activated **iodine** combines with a protein moiety to produce an immunogenic molecule.

3.4 Teratogenicity/Effects in Pregnancy/Breastfeeding

A) Teratogenicity/Effects in Pregnancy

1) Iodine

a) Thomson Pregnancy Rating: Fetal risk has been demonstrated.

1) Evidence has demonstrated fetal abnormalities or risks when used during pregnancy or in women

of childbearing potential. An alternative to this drug should be prescribed during pregnancy or in women of childbearing potential.

See Drug Consult reference: PREGNANCY RISK CATEGORIES

b) Crosses Placenta: Yes

c) Clinical Management

1) Excess **iodine** is harmful to the unborn fetus; use of potassium iodide, ammonium iodide or sodium iodide during pregnancy has been associated with goiter, hypothyroidism, respiratory problems, enlarged heart, compression of the trachea, and death in infants (Pennington, 1990). Iodides, including topical applications and douches, are best avoided during pregnancy and lactation. However, nutritional supplement doses of vitamins and minerals are generally considered safe during pregnancy. Dietary **iodine** requirements are increased during pregnancy to a recommended dietary reference intake of 220 micrograms daily, an amount 47% over nonreproducing adult women (Picciano, 2003).

d) Literature Reports

1) Iodide readily crosses the placenta. Fetal thyroid begins to concentrate
gestation, and can be affected by exposure to potassium iodide during this period and thereafter. Rare cases of fetal goiter, with or without hypothyroidism, and potential airway obstruction, have been reported (Arena & Drew, 1986). A literature review of iodide-induced fetal goiter reported over a 17-year period revealed 14 of 49 cases in which tracheal compression resulted in death (Mehta et al, 1983). In the majority of the cases, maternal asthma was the indication for iodide therapy.

2) Use of felsol powders, historically an **iodine**-containing antitussive, was associated with fetal goiter in eight infants when used by women during various times in pregnancy (Schardein, 1985). Fetal goiter can cause choking in the newborn (Parmalee et al, 1940) and neurological disorders (Crepin, 1978). Fetal goiter appears to be caused by a rebound effect from excess
goiter has been reviewed (Klevit, 1969).

3) Chronic topical maternal use of povidone-**iodine** during pregnancy has been associated with clinical and biochemical hypothyroidism in the infant (Danziger et al, 1987). Vaginal douching with povidone-**iodine** solution during early pregnancy increased the
and fetal thyroid (Mahillon et al, 1989).

4) **Iodine** supplementation during pregnancy (150 micrograms per day) in a geographical region of mild to moderate **iodine** deficiency decreased maternal TSH (thyroid stimulating hormone) and increased neonatal TSH in comparison to values when mothers were not supplemented with
The unexpected finding of reduced TSH in the neonates was thought not to be of clinical significance, as all had normal thyroid hormone values (Nohr & Laurberg, 2000).

2) Potassium Iodide

a) Thomson Pregnancy Rating: Fetal risk has been demonstrated.

1) Evidence has demonstrated fetal abnormalities or risks when used during pregnancy or in women of childbearing potential. An alternative to this drug should be prescribed during pregnancy or in women of childbearing potential.

See Drug Consult reference: PREGNANCY RISK CATEGORIES

b) Crosses Placenta: Yes

c) Clinical Management

1) Due to reports of fetal goiter, tracheal compression, and death with extended use, potassium iodide should not be used during pregnancy (except for short-term use prior to surgery).

d) Literature Reports

1) Potassium iodide readily crosses the placenta. Fetal thyroid begins to concentrate
14 weeks gestation, and can be affected by exposure to potassium iodide during this period and thereafter. Rare cases of fetal goiter, with or without hypothyroidism, and potential airway obstruction, have been reported. A literature review of iodide-induced fetal goiter reported over a 17-year period revealed 14 of 49 cases in which tracheal compression resulted in death (Mehta et al, 1983a). In the majority of the cases, maternal asthma was the indication for iodide therapy.

2) Neonatal hyperthyroidism was reported in an infant following prenatal exposure to carbimazole and potassium iodide for the treatment of maternal Graves' disease (Domenech et al, 1985). The infant also had anomalies such as gynecomastia, bone age advancement, elevated FSH and estradiol, and irregular skin pigment on the neck and trunk, which led investigators to suspect McCune-Albright syndrome.

B) Breastfeeding

1) **Iodine**

a) American Academy of Pediatrics Rating: Maternal medication usually compatible with breastfeeding. (Anon, 2001)
b) World Health Organization Rating: Compatible with breastfeeding. Monitor infant for side effects. (Anon, 2002)
c) Thomson Lactation Rating: Infant risk is minimal.
1) The weight of an adequate body of evidence and/or expert consensus suggests this drug poses minimal risk to the infant when used during breastfeeding.
d) Clinical Management
1) The American Academy of Pediatrics has rated **iodine** as compatible with breastfeeding (Anon: Committee on Drugs & American Academy of Pediatrics, 1994). However, significant infant exposure has been reported (Postellon & Aronow, 1982) and some experts continue to advise against use of **iodine** preparations which can result in significant systemic levels (Lawrence & Lawrence, 1999). **Iodine** applied to intact skin is minimally absorbed. However, systemic or excessive use of vaginal preparations containing **iodine**, should be avoided in lactating women. **Iodine** (iodide) concentrates in breast milk, achieving much higher concentrations than in maternal plasma, which could result in significant infant exposure and possible thyroid dysfunction or goiter (Atkinson et al, 1982).
e) Literature Reports
1) Chronic topical maternal use of povidone-**iodine** during pregnancy and breast feeding has been associated with clinical and biochemical hypothyroidism in the infant (Danziger et al, 1987). In a single case, excessive maternal use of povidone **iodine** vaginal gel resulted in high milk/plasma ratios and high infant serum levels of **iodine**. An **iodine**-like odor was also noted on the infant (Postellon & Aronow, 1982).
2) One case of severe transient congenital hypothyroidism has been reported in a breastfed infant whose mother performed vaginal douching with povidone-**iodine** (20 days). Douching was discontinued and maternal milk and urine levels were normal seven days later. The infant was treated with 25 micrograms L-T4 per day for seven days and thyroid function remained normal two months later. Simple routine urine **iodine** transient hypothyroidism early, decreasing length of treatment and stress on the infant (Delange & Chanoine, 1988).

2) Potassium Iodide
a) American Academy of Pediatrics Rating: Maternal medication usually compatible with breastfeeding. (Anon, 2001)
b) World Health Organization Rating: Avoid breastfeeding if possible. Monitor infant for side effects. (Anon, 2002)
c) Thomson Lactation Rating: Infant risk cannot be ruled out.
1) Available evidence and/or expert consensus is inconclusive or is inadequate for determining infant risk when used during breastfeeding. Weigh the potential benefits of drug treatment against potential risks before prescribing this drug during breastfeeding.
d) Clinical Management
1) **Iodine** (iodide) concentrates in breast milk, achieving much higher concentrations than in maternal plasma, which could result in significant infant exposure and possible thyroid dysfunction or goiter(Anderson, 1991). Administration of potassium iodide to lactating women in the event of a radiation emergency may pose a risk of hypothyroidism in the nursing infant; however, these women should receive the drug for their own protection. Repeat dosing should be avoided if possible(Anon, 2004).
e) Literature Reports
1) No human studies regarding the use potassium iodide during lactation have been published.

3) Drug Levels in Breastmilk
a) Parent Drug
1) Milk to Maternal Plasma Ratio
a) 6.3 (Atkinson et al, 1988)

3.5 Drug Interactions

Drug-Drug Combinations

Intravenous Admixtures

3.5.1 Drug-Drug Combinations

Acenocoumarol

Anisindione

Bugleweed

Bugleweed

Dicumarol

Lithium

Phenindione

Phenprocoumon

Warfarin

3.5.1.A Acenocoumarol

1) Interaction Effect: decreased anticoagulant effectiveness

2) Summary: In hyperthyroid patients, the metabolism of vitamin K clotting factors is increased, resulting in increased sensitivity to oral anticoagulants (Prod Info Tapazole(R), 2000; Chute et al, 1994). Antithyroid drugs, by reducing the extent of hyperthyroidism, decrease the metabolism of clotting factors and thus reduce the effects of oral anticoagulants (Hansten, 1980). On the other hand, patients on anticoagulant therapy who are euthyroid due to antithyroid agents may develop marked hypoprothrombinemia if the antithyroid medications are ceased and they become thyrotoxic again (Vagenakis et al, 1972). In one case report, treating patients with both methimazole and warfarin necessitates intensive and frequent monitoring, since alterations in thyroid function affect the response to anticoagulation (Busenbark & Cushnie, 2006).

3) Severity: moderate

4) Onset: delayed

5) Substantiation: probable

6) Clinical Management: In patients receiving oral anticoagulant therapy, the prothrombin time ratio or international normalized ratio (INR) should be closely monitored with the addition and withdrawal of treatment with antithyroid drugs, and should be reassessed periodically during concurrent therapy. Increased anticoagulant doses may be required to maintain the desired level of anticoagulation.

7) Probable Mechanism: decreased metabolism of clotting factors

8) Literature Reports

a) One case report describes changes in thyroid hormone concentrations that significantly affected warfarin-induced anticoagulation in a patient with Graves' disease. A 54-year old man was treated with methimazole 30 mg/day for hyperthyroidism and enoxaparin then warfarin for atrial fibrillation. In the following 3 months after discharge, the patient's warfarin was repeatedly increased to 85 mg/week to achieve and maintain a therapeutic INR (range 2 - 3). The patient remained adequately anticoagulated for 12 weeks, when the methimazole dose was decreased to 10 mg/day. Continued hypothyroidism necessitated a stop of methimazole for 5 days, then resumed at a dose of 5 mg/day. This resulted in a supratherapeutic INR, and the warfarin was decreased to 60 mg/week. What followed was a pattern of methimazole dosage adjustments leading to significant changes in thyroid function, and subsequent changes in INR. After approximately 14 months of warfarin therapy, Two ECGs confirmed sustained normal sinus rhythm and anticoagulation was discontinued (Busenbark & Cushnie, 2006).

3.5.1.B Anisindione

1) Interaction Effect: decreased anticoagulant effectiveness

2) Summary: In hyperthyroid patients, the metabolism of vitamin K clotting factors is increased, resulting in increased sensitivity to oral anticoagulants (Prod Info Tapazole(R), 2000; Chute et al, 1994). Antithyroid drugs, by reducing the extent of hyperthyroidism, decrease the metabolism of clotting factors and thus reduce the effects of oral anticoagulants (Hansten, 1980). On the other hand, patients on anticoagulant therapy who are euthyroid due to antithyroid agents may develop marked hypoprothrombinemia if the antithyroid medications are ceased and they become thyrotoxic again (Vagenakis et al, 1972). In one case report, treating patients with both methimazole and warfarin necessitates intensive and frequent monitoring, since alterations in thyroid function affect the response to anticoagulation (Busenbark & Cushnie, 2006).
3) Severity: moderate
4) Onset: delayed
5) Substantiation: probable
6) Clinical Management: In patients receiving oral anticoagulant therapy, the prothrombin time ratio or international normalized ratio (INR) should be closely monitored with the addition and withdrawal of treatment with antithyroid drugs, and should be reassessed periodically during concurrent therapy. Increased anticoagulant doses may be required to maintain the desired level of anticoagulation.
7) Probable Mechanism: decreased metabolism of clotting factors
8) Literature Reports
a) One case report describes changes in thyroid hormone concentrations that significantly affected warfarin-induced anticoagulation in a patient with Graves' disease. A 54-year old man was treated with methimazole 30 mg/day for hyperthyroidism and enoxaparin then warfarin for atrial fibrillation. In the following 3 months after discharge, the patient's warfarin was repeatedly increased to 85 mg/week to achieve and maintain a therapeutic INR (range 2 - 3). The patient remained adequately anticoagulated for 12 weeks, when the methimazole dose was decreased to 10 mg/day. Continued hypothyroidism necessitated a stop of methimazole for 5 days, then resumed at a dose of 5 mg/day. This resulted in a supratherapeutic INR, and the warfarin was decreased to 60 mg/week. What followed was a pattern of methimazole dosage adjustments leading to significant changes in thyroid function, and subsequent changes in INR. After approximately 14 months of warfarin therapy, Two ECGs confirmed sustained normal sinus rhythm and anticoagulation was discontinued (Busenbark & Cushnie, 2006).

3.5.1.C Bugleweed

1) Interaction Effect: reduced uptake of **iodine**
2) Summary: Bugleweed interfered with uptake of radioactive
reports and should not be used in conjunction with it for either treatment or diagnostic purposes (Keller et al, 1993a).
3) Severity: moderate
4) Onset: rapid
5) Substantiation: theoretical
6) Clinical Management: Avoid concomitant use of bugleweed with
7) Probable Mechanism: not specified
8) Literature Reports
a) At least 14 uncontrolled clinical trials or case series have been reported in the German medical literature supporting the efficacy of various extracts of Lycopus europaeus or Lycopus virginicus (bugleweed), sometimes with Leonurus cardiaca (motherwort) herb added, in relieving symptoms of hyperthyroidism (Keller et al, 1993).

3.5.1.D Bugleweed

1) Interaction Effect: additive antithyroid effects
2) Summary: Lycopus europaeus and Lycopus virginicus (bugleweed) have antithyroid activity and should not be taken with drugs that are intended to alter thyroid function (Sourgens et al, 1982; Sourgens et al, 1980). Some practitioners of natural medicine have used bugleweed to decrease the required dose of these drugs but expert supervision is required (Keller et al, 1993c).
3) Severity: moderate
4) Onset: rapid
5) Substantiation: theoretical

6) Clinical Management: Avoid concomitant use of bugleweed with antithyroid agents.
7) Probable Mechanism: bugleweed may decreased T3 levels, possibly the result of peripheral T4 deiodination, bugleweed may change the conformation of TSH, and inhibit cAMP
8) Literature Reports
a) Oral administration of an ethanol extract of Lycopus europaeus 1000 milligrams/kilogram (mg/kg) resulted in significant reductions (p less than 0.05) in T3 levels beginning at 6 hours and lasting for more than 24 hours compared to controls. T4 levels were significantly decreased compared to controls only after 24 hours. A reduction in thyroid-stimulating hormone (TSH) occurred after 24 hours compared to controls in a study using male Wistar rats. Significant increases in TSH compared to controls were reported at 9 and 12 hours (p values not reported). Oral administration of 200 mg/kg resulted in increases in TSH to 129+/-25 nanogram/milliliter (ng/mL) compared to 26+/-10 ng/mL in control animals. Intraperitoneal (IP) injection of Lycopus europaeus 50 milligrams resulted in significant decreases in T3 (p less than 0.05) and TSH levels at 3 hours (p less than 0.01). At 6 hours the effect was less although TSH remained significantly reduced compared to controls (p less than 0.05). At 9 hours T3, T4 (p less than 0.05 compared to controls), and TSH levels were all increased compared to controls. T4 levels were not significantly different compared to controls at 3 and 6 hours. Male Wistar rats received ethanol preparations of Lycopus europaeus orally by gavage or by IP injections. Rats were sacrificed and thyroid and pituitary glands were examined 3 to 24 hours after treatment. Rats were also sacrificed at 10, 30, 60, and 180 minutes after treatment for evaluation of absorption and metabolism of plant constituents (Winterhoff et al, 1988).
b) At least 14 uncontrolled clinical trials or case series have been reported in the German medical literature supporting the efficacy of various extracts of Lycopus europaeus or Lycopus virginicus (bugleweed), sometimes with Leonurus cardiaca (motherwort) herb added, in relieving symptoms of hyperthyroidism (Keller et al, 1993b).

3.5.1.E Dicumarol

1) Interaction Effect: decreased anticoagulant effectiveness
2) Summary: In hyperthyroid patients, the metabolism of vitamin K clotting factors is increased, resulting in increased sensitivity to oral anticoagulants (Prod Info Tapazole(R), 2000; Chute et al, 1994). Antithyroid drugs, by reducing the extent of hyperthyroidism, decrease the metabolism of clotting factors and thus reduce the effects of oral anticoagulants (Hansten, 1980). On the other hand, patients on anticoagulant therapy who are euthyroid due to antithyroid agents may develop marked hypoprothrombinemia if the antithyroid medications are ceased and they become thyrotoxic again (Vagenakis et al, 1972). In one case report, treating patients with both methimazole and warfarin necessitates intensive and frequent monitoring, since alterations in thyroid function affect the response to anticoagulation (Busenbark & Cushnie, 2006).
3) Severity: moderate
4) Onset: delayed
5) Substantiation: probable
6) Clinical Management: In patients receiving oral anticoagulant therapy, the prothrombin time ratio or international normalized ratio (INR) should be closely monitored with the addition and withdrawal of treatment with antithyroid drugs, and should be reassessed periodically during concurrent therapy. Increased anticoagulant doses may be required to maintain the desired level of anticoagulation.
7) Probable Mechanism: decreased metabolism of clotting factors
8) Literature Reports
a) One case report describes changes in thyroid hormone concentrations that significantly affected warfarin-induced anticoagulation in a patient with Graves' disease. A 54-year old man was treated with methimazole 30 mg/day for hyperthyroidism and enoxaparin then warfarin for atrial fibrillation. In the following 3 months after discharge, the patient's warfarin was repeatedly increased to 85 mg/week to achieve and maintain a therapeutic INR (range 2 - 3). The patient remained adequately anticoagulated for 12 weeks, when the methimazole dose was decreased to 10 mg/day. Continued hypothyroidism necessitated a stop of methimazole for 5 days, then resumed at a dose of 5 mg/day. This resulted in a supratherapeutic INR, and the warfarin was decreased to 60 mg/week. What followed was a pattern of methimazole dosage adjustments leading to significant changes in thyroid function, and subsequent changes in INR. After approximately 14 months of warfarin therapy, Two ECGs confirmed sustained normal sinus rhythm and anticoagulation was discontinued (Busenbark & Cushnie, 2006).

3.5.1.F Lithium

1) Interaction Effect: increased hypothyroid effect

2) Summary: Concomitant potassium iodide and lithium therapy may result in hypothyroidism. This effect is related to a synergistic hypothyroid effect of both lithium and iodide (Jorgensen et al, 1973).

3) Severity: moderate

4) Onset: delayed

5) Substantiation: theoretical

6) Clinical Management: Concurrent therapy with lithium and potassium iodide should be avoided if possible. If deemed clinically appropriate, consider monitoring thyroid function tests periodically during therapy.

7) Probable Mechanism: additive hypothyroid effects

3.5.1.G Phenindione

1) Interaction Effect: decreased anticoagulant effectiveness

2) Summary: In hyperthyroid patients, the metabolism of vitamin K clotting factors is increased, resulting in increased sensitivity to oral anticoagulants (Prod Info Tapazole(R), 2000; Chute et al, 1994). Antithyroid drugs, by reducing the extent of hyperthyroidism, decrease the metabolism of clotting factors and thus reduce the effects of oral anticoagulants (Hansten, 1980). On the other hand, patients on anticoagulant therapy who are euthyroid due to antithyroid agents may develop marked hypoprothrombinemia if the antithyroid medications are ceased and they become thyrotoxic again (Vagenakis et al, 1972). In one case report, treating patients with both methimazole and warfarin necessitates intensive and frequent monitoring, since alterations in thyroid function affect the response to anticoagulation (Busenbark & Cushnie, 2006).

3) Severity: moderate

4) Onset: delayed

5) Substantiation: probable

6) Clinical Management: In patients receiving oral anticoagulant therapy, the prothrombin time ratio or international normalized ratio (INR) should be closely monitored with the addition and withdrawal of treatment with antithyroid drugs, and should be reassessed periodically during concurrent therapy. Increased anticoagulant doses may be required to maintain the desired level of anticoagulation.

7) Probable Mechanism: decreased metabolism of clotting factors

8) Literature Reports

a) One case report describes changes in thyroid hormone concentrations that significantly affected warfarin-induced anticoagulation in a patient with Graves' disease. A 54-year old man was treated with methimazole 30 mg/day for hyperthyroidism and enoxaparin then warfarin for atrial fibrillation. In the following 3 months after discharge, the patient's warfarin was repeatedly increased to 85 mg/week to achieve and maintain a therapeutic INR (range 2 - 3). The patient remained adequately anticoagulated for 12 weeks, when the methimazole dose was decreased to 10 mg/day. Continued hypothyroidism necessitated a stop of methimazole for 5 days, then resumed at a dose of 5 mg/day. This resulted in a supratherapeutic INR, and the warfarin was decreased to 60 mg/week. What followed was a pattern of methimazole dosage adjustments leading to significant changes in thyroid function, and subsequent changes in INR. After approximately 14 months of warfarin therapy, Two ECGs confirmed sustained normal sinus rhythm and anticoagulation was discontinued (Busenbark & Cushnie, 2006).

3.5.1.H Phenprocoumon

1) Interaction Effect: decreased anticoagulant effectiveness

2) Summary: In hyperthyroid patients, the metabolism of vitamin K clotting factors is increased, resulting in increased sensitivity to oral anticoagulants (Prod Info Tapazole(R), 2000; Chute et al, 1994). Antithyroid drugs, by reducing the extent of hyperthyroidism, decrease the metabolism of clotting factors and thus reduce the effects of oral anticoagulants (Hansten, 1980). On the other hand, patients on anticoagulant therapy who are euthyroid due to antithyroid agents may develop marked hypoprothrombinemia if the antithyroid medications are ceased and they become thyrotoxic again (Vagenakis et al, 1972). In one case report, treating patients with both methimazole and warfarin necessitates intensive and frequent

monitoring, since alterations in thyroid function affect the response to anticoagulation (Busenbark & Cushnie, 2006).
3) Severity: moderate
4) Onset: delayed
5) Substantiation: probable
6) Clinical Management: In patients receiving oral anticoagulant therapy, the prothrombin time ratio or international normalized ratio (INR) should be closely monitored with the addition and withdrawal of treatment with antithyroid drugs, and should be reassessed periodically during concurrent therapy. Increased anticoagulant doses may be required to maintain the desired level of anticoagulation.
7) Probable Mechanism: decreased metabolism of clotting factors
8) Literature Reports
a) One case report describes changes in thyroid hormone concentrations that significantly affected warfarin-induced anticoagulation in a patient with Graves' disease. A 54-year old man was treated with methimazole 30 mg/day for hyperthyroidism and enoxaparin then warfarin for atrial fibrillation. In the following 3 months after discharge, the patient's warfarin was repeatedly increased to 85 mg/week to achieve and maintain a therapeutic INR (range 2 - 3). The patient remained adequately anticoagulated for 12 weeks, when the methimazole dose was decreased to 10 mg/day. Continued hypothyroidism necessitated a stop of methimazole for 5 days, then resumed at a dose of 5 mg/day. This resulted in a supratherapeutic INR, and the warfarin was decreased to 60 mg/week. What followed was a pattern of methimazole dosage adjustments leading to significant changes in thyroid function, and subsequent changes in INR. After approximately 14 months of warfarin therapy, Two ECGs confirmed sustained normal sinus rhythm and anticoagulation was discontinued (Busenbark & Cushnie, 2006).

3.5.1.l Warfarin
1) Interaction Effect: decreased anticoagulant effectiveness
2) Summary: In hyperthyroid patients, the metabolism of vitamin K clotting factors is increased, resulting in increased sensitivity to oral anticoagulants (Prod Info Tapazole(R), 2000; Chute et al, 1994). Antithyroid drugs, by reducing the extent of hyperthyroidism, decrease the metabolism of clotting factors and thus reduce the effects of oral anticoagulants (Hansten, 1980). On the other hand, patients on anticoagulant therapy who are euthyroid due to antithyroid agents may develop marked hypoprothrombinemia if the antithyroid medications are ceased and they become thyrotoxic again (Vagenakis et al, 1972). In one case report, treating patients with both methimazole and warfarin necessitates intensive and frequent monitoring, since alterations in thyroid function affect the response to anticoagulation (Busenbark & Cushnie, 2006).
3) Severity: moderate
4) Onset: delayed
5) Substantiation: probable
6) Clinical Management: In patients receiving oral anticoagulant therapy, the prothrombin time ratio or international normalized ratio (INR) should be closely monitored with the addition and withdrawal of treatment with antithyroid drugs, and should be reassessed periodically during concurrent therapy. Increased anticoagulant doses may be required to maintain the desired level of anticoagulation.
7) Probable Mechanism: decreased metabolism of clotting factors
8) Literature Reports
a) One case report describes changes in thyroid hormone concentrations that significantly affected warfarin-induced anticoagulation in a patient with Graves' disease. A 54-year old man was treated with methimazole 30 mg/day for hyperthyroidism and enoxaparin then warfarin for atrial fibrillation. In the following 3 months after discharge, the patient's warfarin was repeatedly increased to 85 mg/week to achieve and maintain a therapeutic INR (range 2 - 3). The patient remained adequately anticoagulated for 12 weeks, when the methimazole dose was decreased to 10 mg/day. Continued hypothyroidism necessitated a stop of methimazole for 5 days, then resumed at a dose of 5 mg/day. This resulted in a supratherapeutic INR, and the warfarin was decreased to 60 mg/week. What followed was a pattern of methimazole dosage adjustments leading to significant changes in thyroid function, and subsequent changes in INR. After approximately 14 months of warfarin therapy, Two ECGs confirmed sustained normal sinus rhythm and anticoagulation was discontinued (Busenbark & Cushnie, 2006).

3.5.5 Intravenous Admixtures

Drugs

Solutions

3.5.5.1 Drugs

Iodine

Sodium Iodide

3.5.5.1.A Iodine

Alprostadil

Ampicillin

Chloramphenicol

Chloramphenicol Sodium Succinate

Cimetidine

Diatrizoate Meglumine

Diatrizoate Meglumine/Diatrizoate Sodium

Diatrizoate Sodium

Diatrizoate Sodium/Diatrizoate Meglumine

Diazepam

Diphenhydramine

Epinephrine

Erythromycin Gluceptate

Gentamicin

Heparin

Heparin Sodium

Hydrocortisone Sodium Succinate

Iohexol

Iopamidol

Iothalamate

Iothalamate Meglumine

Ioxaglate

Ioxaglate Meglumine

Ioxaglate Meglumine/Ioxaglate Sodium

Ioxaglate Sodium

Lidocaine

Meperidine

Methylprednisolone Sodium Succinate

Metrizamide

Nitroglycerin

Papaverine

Papaverine Hydrochloride

Phentolamine

Protamine

Tolazoline

Urokinase

Vasopressin

3.5.5.1.A.1 Alprostadil

a) Compatible

1) Alprostadil 4 U/mL with iopamidol 5 mL of a solution containing
change after mixing (Kim et al, 1992at)

2) Alprostadil 4 U/mL with DIATRIZOATE MEGLUMINE 5 mL of a solution containing **iodine** 282 mg/mL, no change after mixing (Kim et al, 1992au)

3) Alprostadil 4 U/mL with DIATRIZOATE SODIUM 5 mL of a solution containing
300 mg/mL, no change after mixing (Kim et al, 1992au)

4) Alprostadil 4 U/mL with iothalamate 5 mL of a solution containing
change after mixing (Kim et al, 1992bq)

5) Alprostadil 4 U/mL with iohexol 5 mL of solution containing
change after mixing (Kim et al, 1992br)

6) Alprostadil 4 U/mL with ioxaglate 5 mL of a solution containing
change after mixing (Kim et al, 1992bs)

3.5.5.1.A.2 Ampicillin

a) Compatible

1) Ampicillin 100 mg/mL with ioxaglate 5 mL of a solution containing
change after mixing (Kim et al, 1992k)

2) Ampicillin 100 mg/mL with iothalamate 5 mL of a solution containing
no change after mixing (Kim et al, 1992t)

3) Ampicillin 30 mg/mL with DIATRIZOATE MEGLUMINE 5 mL of a solution containing **iodine** 283 mg/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989g)

4) Ampicillin 100 mg/mL with DIATRIZOATE MEGLUMINE 5 mL of a solution containing **iodine** 282 mg/mL , no change after mixing (Kim et al, 1992w)

5) Ampicillin 30 mg/mL with iopamidol 5 mL of a solution containing
visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989k)

6) Ampicillin 100 mg/mL with iopamidol 5 mL of a solution containing
change after mixing (Kim et al, 1992ab)

7) Ampicillin 30 mg/mL with iohexol 5 mL of a solution containing

visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989ai)
8) Ampicillin 100 mg/mL with iohexol 5 mL of solution containing
change after mixing (Kim et al, 1992bi)
9) Ampicillin 30 mg/mL with DIATRIZOATE MEGLUMINE AND DIATRIZOATE SODIUM 5 mL of a solution containing **iodine**
temperature (Irving & Burbridge, 1989g)
10) Ampicillin 30 mg/mL with ioxaglate meglumine and ioxaglate sodium 5 mL of a solution containing **iodine** 320 mg/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989bf).
11) Ampicillin 100 mg/mL with DIATRIZOATE SODIUM 5 mL of a solution containing 300 mg/mL, no change after mixing (Kim et al, 1992w)
12) Ampicillin 30 mg/mL with iothalamate meglumine 5 mL of an solution containing 282 mg/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989bh)

3.5.5.1.A.3 Chloramphenicol

a) Compatible

1) Chloramphenicol 33 mg/mL with IOTHALAMATE MEGLUMINE 5 mL of a solution containing 282 mg **iodine**/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989ab)
2) Chloramphenicol 33 mg/mL with DIATRIZOATE MEGLUMINE 5 mL of a solution containing 283 mg **iodine**/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989aj)
3) Chloramphenicol 33 mg/mL with iohexol 5 mL of a solution containing 300 mg **iodine**/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989aq)
4) Chloramphenicol 33 mg/mL with iopamidol 5 mL of a solution containing 300 mg **iodine**/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989aw)
5) Chloramphenicol 33 mg/mL with DIATRIZOATE MEGLUMINE AND DIATRIZOATE SODIUM 5 mL of a solution containing 292.5 mg
at room temperature (Irving & Burbridge, 1989aj)
6) Chloramphenicol 33 mg/mL with 5 mL of an ioxaglate meglumine and ioxaglate sodium solution containing 320 mg **iodine**
(Irving & Burbridge, 1989bc)

3.5.5.1.A.4 Chloramphenicol Sodium Succinate

a) Compatible

1) Chloramphenicol sodium succinate 200 mg/mL with ioxaglate 5 mL of a solution containing **iodine** 320 mg/mL, no change after mixing (Kim et al, 1992h)
2) Chloramphenicol sodium succinate 200 mg/mL with iothalamate 5 mL of a solution containing **iodine** 282 mg/mL, no change after mixing (Kim et al, 1992an)
3) Chloramphenicol sodium succinate 200 mg/mL with DIATRIZOATE SODIUM 5 mL of a solution containing **iodine** 300 mg/mL, no change after mixing (Kim et al, 1992ay)
4) Chloramphenicol sodium succinate 200 mg/mL with DIATRIZOATE MEGLUMINE 5 mL of a solution containing **iodine** 282 mg/mL , no change after mixing (Kim et al, 1992ay)
5) Chloramphenicol sodium succinate 200 mg/mL with iopamidol 5 mL of a solution containing **iodine** 300 mg/mL, no change after mixing (Kim et al, 1992bu)
6) Chloramphenicol sodium succinate 200 mg/mL with iohexol 5 mL of solution containing **iodine** 300 mg/mL, no change after mixing (Kim et al, 1992ci)

3.5.5.1.A.5 Cimetidine

a) Conflicting Data

1) Incompatible

a) Cimetidine 100 mg/mL with ioxaglate 5 mL of a solution containing

mg/mL, precipitate persisting after centrifugation (Kim et al, 1992ax)
b) Cimetidine 100 mg/mL with DIATRIZOATE MEGLUMINE 5 mL of a solution containing **iodine** 282 mg/mL , resulted a white suspension that persisted longer than 1 minute (Kim et al, 1992bw)
c) Cimetidine 150 mg/1 mL with ioxaglate meglumine (39.3%) and ioxaglate sodium (19.6%) 5 mL, formation of a thread-like precipitate was reported (Shah & Gerlock, 1987c)
d) Cimetidine 150 mg/mL with ioxaglate meglumine and ioxaglate sodium 5 mL of a solution containing 320 mg
reported which persisted for a 2-hour study period at room temperature (Irving & Burbridge, 1989au)

2) Compatible
a) Cimetidine 150 mg/mL with iohexol 5 mL of a solution containing 300 mg
visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989c)
b) Cimetidine 100 mg/mL with iohexol 5 mL of solution containing
no change after mixing (Kim et al, 1992f)
c) Cimetidine 150 mg/mL with iopamidol 5 mL of a solution containing 300 mg **iodine**/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989j)
d) Cimetidine 100 mg/mL with iopamidol 5 mL of a solution containing
mg/mL, no change after mixing (Kim et al, 1992aa)
e) Cimetidine 100 mg/mL with DIATRIZOATE SODIUM 5 mL of a solution containing **iodine** 300 mg/mL, no change after mixing (Kim et al, 1992bv)
f) Cimetidine 150 mg/mL with DIATRIZOATE MEGLUMINE 5 mL of a solution containing 283 mg **iodine**/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989as)
g) Cimetidine 150 mg/mL with iothalamate meglumine 5 mL of a solution containing 282 mg **iodine**/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989av)
h) Cimetidine 150 mg/mL with DIATRIZOATE MEGLUMINE AND DIATRIZOATE SODIUM 5 mL of a solution containing 292.5 mg
hours at room temperature (Irving & Burbridge, 1989as)
i) Cimetidine 100 mg/mL with iothalamate 5 mL of a solution containing
mg/mL, no change after mixing (Kim et al, 1992cp)

3.5.5.1.A.6 Diatrizoate Meglumine

a) Conflicting Data

1) Incompatible
a) DIATRIZOATE MEGLUMINE 5 mL of a solution containing
meperidine 25 mg/mL, precipitate persisting after centrifugation (Kim et al, 1992u)
b) DIATRIZOATE SODIUM AND DIATRIZOATE MEGLUMINE 5 mL of a solution containing 292.5 mg **iodine**
precipitate formed which cleared within 5 minutes, but delayed precipitation was observed in 1 hour at room temperature (Irving & Burbridge, 1989r)
c) DIATRIZOATE SODIUM 8% and DIATRIZOATE MEGLUMINE 52% - Renografin(R) - 1 or 2 mL with diphenhydramine 1 mL, concentration not specified, physically compatible for 1 hour but a precipitate was detected after 48 hours in direct admixture in syringe; temperature not specified (Marshall et al, 1965; Trissel, 1988)
d) Diatrizoate sodium and diatrizoate meglumine 5 mL of a solution containing 292.5 mg **iodine**/mL with papaverine 32 mg/mL, a transient precipitate formed which cleared within 5 minutes, but delayed precipitation was observed in 2 hours at room temperature (Irving & Burbridge, 1989z)
e) DIATRIZOATE MEGLUMINE 5 mL of a solution containing
papaverine 30 mg/mL, precipitate persisting after centrifugation (Kim et al, 1992ba)
f) Diatrizoate meglumine 5 mL of a solution containing 283 mg
papaverine 32 mg/mL, a transient precipitate formed which cleared within 5 minutes at room temperature (Irving & Burbridge, 1989z)

g) DIATRIZOATE MEGLUMINE 5 mL of a solution containing protamine 10 mg/mL, precipitate persisting after centrifugation (Kim et al, 1992bk).
h) DIATRIZOATE MEGLUMINE (Renografin(R) - 76), reported to form a thick, gelatinous precipitate when prepared in a 1 to 1 admixture in serum (Martin & Taylor, 1976); precipitate formation reported if the dye is not flushed out of the catheter prior to administration of the protamine (Iannone, 1975)
i) DIATRIZOATE MEGLUMINE 5 mL of a solution containing 283 mg protamine 10 mg/mL, immediate formation of a precipitate was reported which persisted for a 2-hour study period at room temperature (Irving & Burbridge, 1989b)
j) DIATRIZOATE MEGLUMINE 5 mL of a solution containing diphenhydramine 50 mg/mL , precipitate persisting after centrifugation (Kim et al, 1992bj)
k) DIATRIZOATE MEGLUMINE 5 mL of a solution containing 283 mg diphenhydramine 12.5 mg/0.25 mL, a transient precipitate formed which cleared within 5 minutes, but delayed precipitation was observed in 1 hour at room temperature (Irving & Burbridge, 1989r)
l) Cimetidine 100 mg/mL with DIATRIZOATE MEGLUMINE 5 mL of a solution containing **iodine** 282 mg/mL , resulted a white suspension that persisted longer than 1 minute (Kim et al, 1992bw)
m) DIATRIZOATE MEGLUMINE 5 mL of a solution containing diazepam 5 mg/mL, resulted a white suspension that persisted longer than 1 minute (Kim et al, 1992cf)
n) DIATRIZOATE MEGLUMINE 5 mL of a solution containing phentolamine 10 mg/mL, resulted a white suspension that disappeared within 1 minute (Kim et al, 1992cm)

2) Compatible

a) DIATRIZOATE MEGLUMINE 5 mL of a solution containing urokinase 1200 U/mL, no change after mixing (Kim et al, 1992)
b) DIATRIZOATE MEGLUMINE 5 mL of a solution containing 283 mg gentamicin 800 mcg/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989d)
c) DIATRIZOATE MEGLUMINE 5 mL of a solution containing gentamicin 40 mg/mL, no change after mixing (Kim et al, 1992o)
d) DIATRIZOATE MEGLUMINE 5 mL of a solution containing tolazoline 25 mg/mL, no change after mixing (Kim et al, 1992p)
e) DIATRIZOATE SODIUM 5 mL of a solution containing tolazoline 25 mg/mL, no change after mixing (Kim et al, 1992p)
f) Ampicillin 30 mg/mL with DIATRIZOATE MEGLUMINE 5 mL of a solution containing **iodine** 283 mg/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989g)
g) Ampicillin 100 mg/mL with DIATRIZOATE MEGLUMINE 5 mL of a solution containing **iodine** 282 mg/mL , no change after mixing (Kim et al, 1992w)
h) DIATRIZOATE MEGLUMINE 5 mL of a solution containing nitroglycerin 120 mcg/mL, no change after mixing (Kim et al, 1992z)
i) DIATRIZOATE MEGLUMINE (Hypaque 60%(R)) 5 mL of a solution containing **iodine** 283 mg/mL with methylprednisolone sodium succinate (Solu-Medrol(R)) 10 mg/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989m)
j) DIATRIZOATE MEGLUMINE AND DIATRIZOATE SODIUM 5 mL of a solution containing 292.5 mg **iodine**
hours at room temperature (Irving & Burbridge, 1989d)
k) Erythromycin gluceptate (10 mg/mL with 5 mL of a diatrizoate meglumine solution containing **iodine** 283 mg/mL visually compatible for 2 hours at room temperature) (Irving & Burbridge, 1989p)
l) DIATRIZOATE MEGLUMINE AND DIATRIZOATE SODIUM 5 mL of a solution containing 292.5 mg **iodine**
visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989s)
m) DIATRIZOATE MEGLUMINE 5 mL of a solution containing

vasopressin 20 U/mL, no change after mixing (Kim et al, 1992ae)
n) DIATRIZOATE MEGLUMINE 5 mL of a solution containing 283 mg epinephrine 1 mg/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989v)
o) DIATRIZOATE MEGLUMINE 5 mL of a solution containing epinephrine 1 mg/mL, no change after mixing (Kim et al, 1992al)
p) DIATRIZOATE MEGLUMINE 5 mL of a solution containing 283 mg heparin sodium 5,000 U/0.5 mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989y)
q) DIATRIZOATE MEGLUMINE 5 mL of a solution containing heparin 1000 U/mL, no change after mixing (Kim et al, 1992aq)
r) Alprostadil 4 U/mL with DIATRIZOATE MEGLUMINE 5 mL of a solution containing **iodine** 282 mg/mL, no change after mixing (Kim et al, 1992au)
s) Diatrizoate sodium and diatrizoate meglumine 5 mL of a solution containing 292.5 mg **iodine**/mL with papaverine 32 mg/mL, a transient precipitate formed which cleared within 5 minutes, but delayed precipitation was observed in 2 hours at room temperature (Irving & Burbridge, 1989ac)
t) DIATRIZOATE MEGLUMINE 5 mL of a solution containing 283 mg hydrocortisone sodium succinate 10 mg/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989s)
u) DIATRIZOATE MEGLUMINE 5 mL of a solution containing hydrocortisone sodium succinate 167.09 mg/mL, no change after mixing (Kim et al, 1992bc)
v) Diatrizoate meglumine 5 mL of a solution containing 283 mg papaverine 32 mg/mL, a transient precipitate formed which cleared within 5 minutes at room temperature (Irving & Burbridge, 1989ac) DIATRIZOATE SODIUM AND DIATRIZOATE MEGLUMINE
w) Diatrizoate sodium and diatrizoate meglumine 5 mL of a solution containing 292.5 mg **iodine**/mL with papaverine 32 mg/mL, a transient precipitate formed which cleared within 5 minutes, but delayed precipitation was observed in 2 hours at room temperature (Irving & Burbridge, 1989ac)
x) Chloramphenicol 33 mg/mL with DIATRIZOATE MEGLUMINE 5 mL of a solution containing 283 mg **iodine**/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989aj)
y) DIATRIZOATE MEGLUMINE 5 mL of a solution containing lidocaine 5 mg/mL, no change after mixing (Kim et al, 1992bf)
z) Chloramphenicol sodium succinate 200 mg/mL with DIATRIZOATE MEGLUMINE 5 mL of a solution containing
1992ay)
aa) DIATRIZOATE MEGLUMINE AND DIATRIZOATE SODIUM 5 mL of a solution containing 292.5 mg **iodine**
hours at room temperature (Irving & Burbridge, 1989v)
ab) Cimetidine 150 mg/mL with DIATRIZOATE MEGLUMINE 5 mL of a solution containing 283 mg **iodine**/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989as)
ac) Cimetidine 150 mg/mL with DIATRIZOATE MEGLUMINE AND DIATRIZOATE SODIUM 5 mL of a solution containing 292.5 mg
hours at room temperature (Irving & Burbridge, 1989as)
ad) DIATRIZOATE MEGLUMINE (5 mL of a solution containing 283 mg erythromycin gluceptate 10 mg/mL visually compatible for 2 hours at room temperature) (Irving & Burbridge, 1989)
ae) Chloramphenicol 33 mg/mL with DIATRIZOATE MEGLUMINE AND DIATRIZOATE SODIUM 5 mL of a solution containing 292.5 mg
hours at room temperature (Irving & Burbridge, 1989aj)
af) Ampicillin 30 mg/mL with DIATRIZOATE MEGLUMINE AND DIATRIZOATE SODIUM 5 mL of a solution containing
hours at room temperature (Irving & Burbridge, 1989g)
ag) DIATRIZOATE MEGLUMINE and DIATRIZOATE SODIUM (MD-60(R)) 5 mL of a

solution containing **iodine** 292.5 mg/mL with methylprednisolone sodium succinate (Solu-Medrol(R)) 10 mg/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989m)

3.5.5.1.A.7 Diatrizoate Meglumine/Diatrizoate Sodium

a) Compatible

1) Erythromycin gluceptate (10 mg/mL with 5 mL of a diatrizoate meglumine and diatrizoate sodium solution containing **iodine**
temperature) (Irving & Burbridge, 1989p)

3.5.5.1.A.8 Diatrizoate Sodium

a) Conflicting Data

1) Incompatible

a) DIATRIZOATE SODIUM AND DIATRIZOATE MEGLUMINE 5 mL of a solution containing 292.5 mg **iodine**
precipitate formed which cleared within 5 minutes, but delayed precipitation was observed in 1 hour at room temperature (Irving & Burbridge, 1989r)

b) DIATRIZOATE SODIUM 8% and DIATRIZOATE MEGLUMINE 52% - Renografin(R) - 1 or 2 mL with diphenhydramine 1 mL, concentration not specified, physically compatible for 1 hour but a precipitate was detected after 48 hours in direct admixture in syringe; temperature not specified (Marshall et al, 1965; Trissel, 1988)

c) Diatrizoate sodium and diatrizoate meglumine 5 mL of a solution containing 292.5 mg **iodine**/mL with papaverine 32 mg/mL, a transient precipitate formed which cleared within 5 minutes, but delayed precipitation was observed in 2 hours at room temperature (Irving & Burbridge, 1989z)

d) DIATRIZOATE SODIUM 5 mL of a solution containing
papaverine 30 mg/mL, resulted a white suspension that disappeared within 1 minute (Kim et al, 1992ba)

e) DIATRIZOATE SODIUM 5 mL of a solution containing
diphenhydramine 50 mg/mL , precipitate persisting after centrifugation (Kim et al, 1992bj)

f) DIATRIZOATE SODIUM 5 mL of a solution containing
protamine 10 mg/mL , precipitate persisting after centrifugation (Kim et al, 1992bk)

g) DIATRIZOATE SODIUM 5 mL of a solution containing
meperidine 25 mg/mL, precipitate persisting after centrifugation (Kim et al, 1992u)

h) DIATRIZOATE SODIUM 5 mL of a solution containing
phentolamine 10 mg/mL, resulted a white suspension that disappeared within 1 minute (Kim et al, 1992cm)

2) Compatible

a) DIATRIZOATE SODIUM 5 mL of a solution containing
urokinase 1200 U/mL, no change after mixing (Kim et al, 1992)

b) DIATRIZOATE SODIUM 5 mL of a solution containing
gentamicin 40 mg/mL, no change after mixing (Kim et al, 1992o)

c) DIATRIZOATE SODIUM 5 mL of a solution containing
nitroglycerin 120 mcg/mL, no change after mixing (Kim et al, 1992z)

d) DIATRIZOATE MEGLUMINE AND DIATRIZOATE SODIUM 5 mL of a solution containing 292.5 mg **iodine**
hours at room temperature (Irving & Burbridge, 1989d)

e) DIATRIZOATE SODIUM 5 mL of a solution containing
vasopressin 20 U/mL, no change after mixing (Kim et al, 1992ae)

f) DIATRIZOATE MEGLUMINE AND DIATRIZOATE SODIUM 5 mL of a solution containing 292.5 mg **iodine**
visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989s)

g) DIATRIZOATE SODIUM 5 mL of a solution containing
heparin 1000 U/mL, no change after mixing (Kim et al, 1992aq)

h) Alprostadil 4 U/mL with DIATRIZOATE SODIUM 5 mL of a solution containing

iodine 300 mg/mL, no change after mixing (Kim et al, 1992au)
i) Diatrizoate sodium and diatrizoate meglumine 5 mL of a solution containing 292.5 mg **iodine**/mL with papaverine 32 mg/mL, a transient precipitate formed which cleared within 5 minutes, but delayed precipitation was observed in 2 hours at room temperature (Irving & Burbridge, 1989ac)
j) Chloramphenicol sodium succinate 200 mg/mL with DIATRIZOATE SODIUM 5 mL of a solution containing **iodine**
k) DIATRIZOATE SODIUM 5 mL of a solution containing
hydrocortisone sodium succinate 167.09 mg/mL, no change after mixing (Kim et al, 1992bc)
l) DIATRIZOATE SODIUM 5 mL of a solution containing
lidocaine 5 mg/mL, no change after mixing (Kim et al, 1992bf)
m) DIATRIZOATE SODIUM 5 mL of a solution containing
epinephrine 1 mg/mL, no change after mixing (Kim et al, 1992al)
n) DIATRIZOATE MEGLUMINE AND DIATRIZOATE SODIUM 5 mL of a solution containing 292.5 mg **iodine**
hours at room temperature (Irving & Burbridge, 1989v)
o) Cimetidine 100 mg/mL with DIATRIZOATE SODIUM 5 mL of a solution containing **iodine** 300 mg/mL, no change after mixing (Kim et al, 1992bv)
p) Cimetidine 150 mg/mL with DIATRIZOATE MEGLUMINE AND DIATRIZOATE SODIUM 5 mL of a solution containing 292.5 mg
hours at room temperature (Irving & Burbridge, 1989as)
q) DIATRIZOATE SODIUM 5 mL of a solution containing
diazepam 5 mg/mL, no change after mixing (Kim et al, 1992cb)
r) Chloramphenicol 33 mg/mL with DIATRIZOATE MEGLUMINE AND DIATRIZOATE SODIUM 5 mL of a solution containing 292.5 mg
hours at room temperature (Irving & Burbridge, 1989aj)
s) Ampicillin 30 mg/mL with DIATRIZOATE MEGLUMINE AND DIATRIZOATE SODIUM 5 mL of a solution containing
hours at room temperature (Irving & Burbridge, 1989g)
t) DIATRIZOATE MEGLUMINE and DIATRIZOATE SODIUM (MD-60(R)) 5 mL of a solution containing **iodine** 292.5 mg/mL with methylprednisolone sodium succinate (Solu-Medrol(R)) 10 mg/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989m)
u) Ampicillin 100 mg/mL with DIATRIZOATE SODIUM 5 mL of a solution containing **iodine** 300 mg/mL, no change after mixing (Kim et al, 1992w)

3.5.5.1.A.9 Diatrizoate Sodium/Diatrizoate Meglumine

a) Conflicting Data
1) Incompatible
a) DIATRIZOATE SODIUM AND DIATRIZOATE MEGLUMINE 5 mL of a solution containing 292.5 mg **iodine**
precipitate was reported which persisted for a 2-hour study period at room temperature (Irving & Burbridge, 1989b)
2) Compatible
a) DIATRIZOATE SODIUM AND DIATRIZOATE MEGLUMINE (5 mL of a solution containing 292.5 mg **iodine**
compatible for 2 hours at room temperature) (Irving & Burbridge, 1989)

3.5.5.1.A.10 Diazepam

a) Conflicting Data
1) Incompatible
a) DIATRIZOATE MEGLUMINE 5 mL of a solution containing
diazepam 5 mg/mL, resulted a white suspension that persisted longer than 1 minute (Kim et al, 1992cf)
2) Compatible

a) Diazepam 5 mg/mL with ioxaglate 5 mL of a solution containing
no change after mixing (Kim et al, 1992d)
b) Diazepam 5 mg/mL with iohexol 5 mL of solution containing
change after mixing (Kim et al, 1992bt)
c) DIATRIZOATE SODIUM 5 mL of a solution containing
diazepam 5 mg/mL, no change after mixing (Kim et al, 1992cb)
d) Diazepam 5 mg/mL with iothalamate 5 mL of a solution containing
mg/mL, no change after mixing (Kim et al, 1992ce)
e) Diazepam 5 mg/mL with iopamidol 5 mL of a solution containing
no change after mixing (Kim et al, 1992cj)

3.5.5.1.A.11 Diphenhydramine

a) Conflicting Data

1) Incompatible

a) DIATRIZOATE SODIUM AND DIATRIZOATE MEGLUMINE 5 mL of a solution containing 292.5 mg **iodine**
precipitate formed which cleared within 5 minutes, but delayed precipitation was observed in 1 hour at room temperature (Irving & Burbridge, 1989r)
b) DIATRIZOATE SODIUM 8% and DIATRIZOATE MEGLUMINE 52% - Renografin(R) - 1 or 2 mL with diphenhydramine 1 mL, concentration not specified, physically compatible for 1 hour but a precipitate was detected after 48 hours in direct admixture in syringe; temperature not specified (Marshall et al, 1965; Trissel, 1988)
c) Diphenhydramine 12.5 mg/0.25 mL with ioxaglate meglumine and ioxaglate sodium 5 mL of a solution containing 320 mg
was reported which persisted for a 2-hour study period at room temperature (Irving & Burbridge, 1989u)
d) Diphenhydramine 50 mg/1 mL with ioxaglate meglumine (39.3%) and ioxaglate sodium (19.6%) 5 mL, formation of a dense, cloudy precipitate was reported (Shah & Gerlock, 1987a)
e) DIATRIZOATE SODIUM 5 mL of a solution containing
diphenhydramine 50 mg/mL , precipitate persisting after centrifugation (Kim et al, 1992bj)
f) DIATRIZOATE MEGLUMINE 5 mL of a solution containing
diphenhydramine 50 mg/mL , precipitate persisting after centrifugation (Kim et al, 1992bj)
g) DIATRIZOATE MEGLUMINE 5 mL of a solution containing 283 mg
diphenhydramine 12.5 mg/0.25 mL, a transient precipitate formed which cleared within 5 minutes, but delayed precipitation was observed in 1 hour at room temperature (Irving & Burbridge, 1989r)
h) Diphenhydramine 50 mg/mL with ioxaglate 5 mL of a solution containing
mg/mL, precipitate persisting after centrifugation (Kim et al, 1992cg)

2) Compatible

a) Diphenhydramine 50 mg/mL with iohexol 5 mL of a solution containing 300 mg **iodine**/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989a)
b) Diphenhydramine 50 mg/mL with iohexol 5 mL of solution containing
mg/mL, no change after mixing (Kim et al, 1992e)
c) Diphenhydramine 50 mg/mL with iopamidol 5 mL of a solution containing 300 mg **iodine**/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989e)
d) Diphenhydramine 50 mg/mL with iopamidol 5 mL of a solution containing
300 mg/mL, no change after mixing (Kim et al, 1992r)
e) Diphenhydramine 50 mg/mL with iothalamate 5 mL of a solution containing
282 mg/mL, no change after mixing (Kim et al, 1992bh)
f) Diphenhydramine 1 mL with IOTHALAMATE MEGLUMINE (60%) - Conray(R) - 1, 2, 5, 10, 20 or 40 mL, concentration not specified, no precipitate detected within 48 hours in direct admixture in syringe; temperature not specified (Marshall et al, 1965a; Trissel,

1988a)
g) Diphenhydramine 12.5 mg/0.25 mL with iothalamate meglumine (60%) - Conray(R) 5 mL of a solution containing 282 mg
room temperature (Irving & Burbridge, 1989al)
h) Diphenhydramine 1 mL with iothalamate meglumine (80%) - Angio-Conray(R) - 1, 2, 5, 10, 20 or 40 mL, concentration not specified, no precipitate detected within 48 hours in direct admixture in syringe; temperature not specified (Marshall et al, 1965a; Trissel, 1988a)
i) Diphenhydramine, concentration not specified, with iothalamate meglumine, % unspecified, 5 mL, no precipitate formation was detected in direct admixture in syringe; duration not specified (Stevens, 1975; Trissel, 1988a)

3.5.5.1.A.12 Epinephrine

a) Compatible

1) Epinephrine 1 mg/mL with ioxaglate meglumine and ioxaglate sodium 5 mL of a solution containing 320 mg **iodine**/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989i)
2) Epinephrine 1 mg/1 mL with ioxaglate meglumine (39.3%) and ioxaglate sodium (19.6%) 5 mL, clear solution reported; conditions not specified (Shah & Gerlock, 1987)
3) Epinephrine 1 mg/mL with iohexol 5 mL of a solution containing 300 mg
visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989o)
4) Epinephrine 1 mg/mL with iohexol 5 mL of solution containing
change after mixing (Kim et al, 1992ac)
5) Epinephrine 1 mg/mL with iothalamate 5 mL of a solution containing
no change after mixing (Kim et al, 1992ah)
6) Epinephrine 1 mg/mL with ioxaglate 5 mL of a solution containing
change after mixing (Kim et al, 1992ai)
7) DIATRIZOATE MEGLUMINE 5 mL of a solution containing 283 mg
epinephrine 1 mg/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989v)
8) DIATRIZOATE MEGLUMINE 5 mL of a solution containing
epinephrine 1 mg/mL, no change after mixing (Kim et al, 1992al)
9) Epinephrine 1 mg/mL with iopamidol 5 mL of a solution containing 300 mg
visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989aa)
10) Epinephrine 1 mg/mL with iopamidol 5 mL of a solution containing
no change after mixing (Kim et al, 1992ar)
11) Epinephrine 1 mg/mL with iothalamate meglumine 5 mL of a solution containing 282 mg **iodine**/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989ak)
12) DIATRIZOATE SODIUM 5 mL of a solution containing
epinephrine 1 mg/mL, no change after mixing (Kim et al, 1992al)
13) DIATRIZOATE MEGLUMINE AND DIATRIZOATE SODIUM 5 mL of a solution containing 292.5 mg **iodine**/mL with epinephrine 1 mg/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989v)

3.5.5.1.A.13 Erythromycin Gluceptate

a) Compatible

1) Iohexol (5 mL of a solution containing 300 mg
10 mg/mL visually compatible for 2 hours at room temperature) (Irving & Burbridge, 1989)
2) Erythromycin gluceptate (10 mg/mL with 5 mL of a diatrizoate meglumine and diatrizoate sodium solution containing **iodine**
temperature) (Irving & Burbridge, 1989p)
3) Erythromycin gluceptate (10 mg/mL with 5 mL of a diatrizoate meglumine solution containing **iodine** 283 mg/mL visually compatible for 2 hours at room temperature) (Irving & Burbridge, 1989p)
4) Erythromycin gluceptate (10 mg/mL with iopamidol 5 mL of a solution containing 300 mg

iodine/mL visually compatible for 2 hours at room temperature) (Irving & Burbridge, 1989af)
5) Erythromycin gluceptate (10 mg/mL with 5 mL of an iothalamate meglumine solution containing **iodine** 282 mg/mL visually compatible for 2 hours at room temperature) (Irving & Burbridge, 1989ao)
6) DIATRIZOATE MEGLUMINE (5 mL of a solution containing 283 mg
erythromycin gluceptate 10 mg/mL visually compatible for 2 hours at room temperature) (Irving & Burbridge, 1989)
7) Iothalamate meglumine (5 mL of a solution containing 282 mg
erythromycin gluceptate 10 mg/mL visually compatible for 2 hours at room temperature) (Irving & Burbridge, 1989)
8) Erythromycin gluceptate 10 mg/mL with 5 mL of an ioxaglate meglumine and ioxaglate sodium solution containing 320 mg
temperature (Irving & Burbridge, 1989ay)
9) Erythromycin gluceptate (10 mg/mL with iohexol 5 mL of a solution containing 300 mg/mL visually compatible for 2 hours at room temperature) (Irving & Burbridge, 1989az)
10) DIATRIZOATE SODIUM AND DIATRIZOATE MEGLUMINE (5 mL of a solution containing 292.5 mg **iodine**/mL with erythromycin gluceptate 10 mg/mL visually compatible for 2 hours at room temperature) (Irving & Burbridge, 1989)
11) Iopamidol (5 mL of a solution containing 300 mg
gluceptate 10 mg/mL visually compatible for 2 hours at room temperature) (Irving & Burbridge, 1989)

3.5.5.1.A.14 Gentamicin

a) Conflicting Data
1) Incompatible
a) Ioxaglate meglumine and ioxaglate sodium 5 mL of a solution containing 320 mg **iodine**/mL with gentamicin 800 mcg/mL, a transient precipitate was reported which cleared within 5 minutes at room temperature (Irving & Burbridge, 1989n)
b) Gentamicin 40 mg/mL with ioxaglate 5 mL of a solution containing
mg/mL, precipitate persisting after centrifugation (Kim et al, 1992cn)
2) Compatible
a) Gentamicin 40 mg/mL with iothalamate 5 mL of a solution containing
mg/mL, no change after mixing (Kim et al, 1992c)
b) DIATRIZOATE MEGLUMINE 5 mL of a solution containing 283 mg
gentamicin 800 mcg/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989d)
c) DIATRIZOATE MEGLUMINE 5 mL of a solution containing
gentamicin 40 mg/mL, no change after mixing (Kim et al, 1992o)
d) DIATRIZOATE SODIUM 5 mL of a solution containing
gentamicin 40 mg/mL, no change after mixing (Kim et al, 1992o)
e) DIATRIZOATE MEGLUMINE AND DIATRIZOATE SODIUM 5 mL of a solution containing 292.5 mg **iodine**
hours at room temperature (Irving & Burbridge, 1989d)
f) Gentamicin 800 mcg/mL with iothalamate meglumine 5 mL of a solution containing 282 mg **iodine**/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989q)
g) Gentamicin 40 mg/mL with iohexol 5 mL of solution containing
no change after mixing (Kim et al, 1992bm)
h) Gentamicin 800 mcg/mL with iohexol 5 mL of a solution containing 300 mg **iodine**/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989am)
i) Gentamicin 800 mcg/mL with iopamidol 5 mL of a solution containing 300 mg **iodine**/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989an)
j) Gentamicin 40 mg/mL with iopamidol 5 mL of a solution containing
mg/mL, no change after mixing (Kim et al, 1992bo)

3.5.5.1.A.15 Heparin

a) Compatible

1) DIATRIZOATE MEGLUMINE 5 mL of a solution containing 283 mg heparin sodium 5,000 U/0.5 mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989y)

2) DIATRIZOATE MEGLUMINE 5 mL of a solution containing heparin 1000 U/mL, no change after mixing (Kim et al, 1992aq)

3) DIATRIZOATE SODIUM 5 mL of a solution containing 1000 U/mL, no change after mixing (Kim et al, 1992aq)

4) Heparin 1000 U/mL with ioxaglate 5 mL of a solution containing change after mixing (Kim et al, 1992aw)

5) Heparin 1000 U/mL with iothalamate 5 mL of a solution containing no change after mixing (Kim et al, 1992bn)

6) Heparin 1000 U/mL with iohexol 5 mL of solution containing change after mixing (Kim et al, 1992cd)

7) Heparin 1000 U/mL with iopamidol 5 mL of a solution containing change after mixing (Kim et al, 1992ch)

3.5.5.1.A.16 Heparin Sodium

a) Compatible

1) Heparin sodium 5,000 U/0.5 mL with iothalamate meglumine 5 mL of a solution containing 282 mg **iodine**/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989f)

2) Heparin sodium 5,000 U/0.5 mL with iopamidol 5 mL of a solution containing 300 mg **iodine**/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989ar)

3) Heparin sodium 5,000 U/0.5 mL with iohexol 5 mL of a solution containing 300 mg **iodine**/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989bd)

4) Heparin sodium 5,000 units/0.5 mL with 5 mL of an ioxaglate meglumine and ioxaglate sodium solution containing 320 mg temperature (Irving & Burbridge, 1989); another source, however, describes conditions under which these 2 drugs were found to be incompatible (Shah & Gerlock, 1987d)

3.5.5.1.A.17 Hydrocortisone Sodium Succinate

a) Compatible

1) Hydrocortisone sodium succinate 167.09 mg/mL with ioxaglate 5 mL of a solution containing **iodine** 320 mg/mL, no change after mixing (Kim et al, 1992x)

2) Hydrocortisone sodium succinate 10 mg/mL with ioxaglate meglumine and ioxaglate sodium 5 mL of a solution containing 320 mg room temperature (Irving & Burbridge, 1989h)

3) DIATRIZOATE MEGLUMINE AND DIATRIZOATE SODIUM 5 mL of a solution containing 292.5 mg **iodine**/mL with hydrocortisone sodium succinate 10 mg/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989s)

4) Hydrocortisone sodium succinate 167.09 mg/mL with iothalamate 5 mL of a solution containing **iodine** 282 mg/mL, no change after mixing (Kim et al, 1992ak)

5) Hydrocortisone sodium succinate 10 mg/mL with iopamidol 5 mL of a solution containing 300 mg **iodine**/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989w)

6) Hydrocortisone sodium succinate 167.09 mg/mL with iopamidol 5 mL of a solution containing **iodine** 300 mg/mL, no change after mixing (Kim et al, 1992ap)

7) DIATRIZOATE MEGLUMINE 5 mL of a solution containing 283 mg hydrocortisone sodium succinate 10 mg/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989s)

8) DIATRIZOATE MEGLUMINE 5 mL of a solution containing

hydrocortisone sodium succinate 167.09 mg/mL, no change after mixing (Kim et al, 1992bc)
9) DIATRIZOATE SODIUM 5 mL of a solution containing
hydrocortisone sodium succinate 167.09 mg/mL, no change after mixing (Kim et al, 1992bc)
10) Hydrocortisone sodium succinate 10 mg/mL with iothalamate meglumine 5 mL of a solution containing 282 mg **iodine**
(Irving & Burbridge, 1989ap)
11) Hydrocortisone sodium succinate 10 mg/mL with iohexol 5 mL of a solution containing 300 mg **iodine**/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989be)
12) Hydrocortisone sodium succinate 167.09 mg/mL with iohexol 5 mL of solution containing **iodine** 300 mg/mL, no change after mixing (Kim et al, 1992cl)

3.5.5.1.A.18 Iohexol

a) Compatible

1) Iohexol 5 mL of solution containing
change after mixing (Kim et al, 1992b)
2) Iohexol (5 mL of a solution containing 300 mg
10 mg/mL visually compatible for 2 hours at room temperature) (Irving & Burbridge, 1989)
3) Diphenhydramine 50 mg/mL with iohexol 5 mL of a solution containing 300 mg **iodine**/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989a)
4) Diphenhydramine 50 mg/mL with iohexol 5 mL of solution containing
no change after mixing (Kim et al, 1992e)
5) Cimetidine 150 mg/mL with iohexol 5 mL of a solution containing 300 mg
visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989c)
6) Cimetidine 100 mg/mL with iohexol 5 mL of solution containing
change after mixing (Kim et al, 1992f)
7) Iohexol 5 mL of solution containing
change after mixing (Kim et al, 1992n)
8) Epinephrine 1 mg/mL with iohexol 5 mL of a solution containing 300 mg
visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989o)
9) Epinephrine 1 mg/mL with iohexol 5 mL of solution containing
change after mixing (Kim et al, 1992ac)
10) Iohexol 5 mL of solution containing
no change after mixing (Kim et al, 1992ad)
11) Iohexol 5 mL of solution containing
change after mixing (Kim et al, 1992af)
12) Iohexol 5 mL of a solution containing 300 mg
visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989t)
13) Iohexol 5 mL of solution containing
change after mixing (Kim et al, 1992ag)
14) Iohexol 5 mL of solution containing
change after mixing (Kim et al, 1992as)
15) Ampicillin 30 mg/mL with iohexol 5 mL of a solution containing
visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989ai)
16) Ampicillin 100 mg/mL with iohexol 5 mL of solution containing
change after mixing (Kim et al, 1992bi)
17) Gentamicin 40 mg/mL with iohexol 5 mL of solution containing
change after mixing (Kim et al, 1992bm)
18) Gentamicin 800 mcg/mL with iohexol 5 mL of a solution containing 300 mg
visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989am)
19) Alprostadil 4 U/mL with iohexol 5 mL of solution containing
change after mixing (Kim et al, 1992br)
20) Diazepam 5 mg/mL with iohexol 5 mL of solution containing
change after mixing (Kim et al, 1992bt)
21) Chloramphenicol 33 mg/mL with iohexol 5 mL of a solution containing 300 mg **iodine**/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989aq)

22) Iohexol 5 mL of solution containing
change after mixing (Kim et al, 1992by)
23) Iohexol (Omnipaque(R)) 5 mL of a solution containing
methylprednisolone sodium succinate (Solu- Medrol(R)) 10 mg/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989ax)
24) Erythromycin gluceptate (10 mg/mL with iohexol 5 mL of a solution containing
300 mg/mL visually compatible for 2 hours at room temperature) (Irving & Burbridge, 1989az)
25) Iohexol 5 mL of solution containing
change after mixing (Kim et al, 1992cc)
26) Iohexol 5 mL of a solution containing 300 mg
visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989ba)
27) Heparin 1000 U/mL with iohexol 5 mL of solution containing
change after mixing (Kim et al, 1992cd)
28) Chloramphenicol sodium succinate 200 mg/mL with iohexol 5 mL of solution containing **iodine** 300 mg/mL, no change after mixing (Kim et al, 1992ci)
29) Heparin sodium 5,000 U/0.5 mL with iohexol 5 mL of a solution containing 300 mg **iodine**/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989bd)
30) Hydrocortisone sodium succinate 10 mg/mL with iohexol 5 mL of a solution containing 300 mg **iodine**/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989be)
31) Hydrocortisone sodium succinate 167.09 mg/mL with iohexol 5 mL of solution containing **iodine** 300 mg/mL, no change after mixing (Kim et al, 1992cl)
32) Iohexol 5 mL of solution containing
mixing (Kim et al, 1992cq)

3.5.5.1.A.19 Iopamidol

a) Compatible

1) Iopamidol 5 mL of a solution containing
no change after mixing (Kim et al, 1992i)
2) Iopamidol 5 mL of a solution containing
no change after mixing (Kim et al, 1992l)
3) Diphenhydramine 50 mg/mL with iopamidol 5 mL of a solution containing 300 mg **iodine**/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989e)
4) Diphenhydramine 50 mg/mL with iopamidol 5 mL of a solution containing
mg/mL, no change after mixing (Kim et al, 1992r)
5) Iopamidol 5 mL of a solution containing
change after mixing (Kim et al, 1992v)
6) Iopamidol 5 mL of a solution containing
no change after mixing (Kim et al, 1992y)
7) Cimetidine 150 mg/mL with iopamidol 5 mL of a solution containing 300 mg
visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989j)
8) Cimetidine 100 mg/mL with iopamidol 5 mL of a solution containing
no change after mixing (Kim et al, 1992aa)
9) Ampicillin 30 mg/mL with iopamidol 5 mL of a solution containing
visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989k)
10) Ampicillin 100 mg/mL with iopamidol 5 mL of a solution containing
no change after mixing (Kim et al, 1992ab)
11) Iopamidol 5 mL of a solution containing
no change after mixing (Kim et al, 1992am)
12) Hydrocortisone sodium succinate 10 mg/mL with iopamidol 5 mL of a solution containing 300 mg **iodine**/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989w)
13) Hydrocortisone sodium succinate 167.09 mg/mL with iopamidol 5 mL of a solution containing **iodine** 300 mg/mL, no change after mixing (Kim et al, 1992ap)
14) Epinephrine 1 mg/mL with iopamidol 5 mL of a solution containing 300 mg

visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989aa)
15) Epinephrine 1 mg/mL with iopamidol 5 mL of a solution containing
no change after mixing (Kim et al, 1992ar)
16) Alprostadil 4 U/mL with iopamidol 5 mL of a solution containing
change after mixing (Kim et al, 1992at)
17) Iopamidol 5 mL of a solution containing
mcg/mL, no change after mixing (Kim et al, 1992az)
18) Erythromycin gluceptate (10 mg/mL with iopamidol 5 mL of a solution containing 300 mg **iodine**/mL visually compatible for 2 hours at room temperature) (Irving & Burbridge, 1989af)
19) Iopamidol 5 mL of a solution containing
no change after mixing (Kim et al, 1992bd)
20) Iopamidol 5 mL of a solution containing 300 mg
visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989ag)
21) Iopamidol 5 mL of a solution containing
no change after mixing (Kim et al, 1992be)
22) Iopamidol 5 mL of a solution containing 300 mg
visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989ah)
23) Gentamicin 800 mcg/mL with iopamidol 5 mL of a solution containing 300 mg **iodine**/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989an)
24) Gentamicin 40 mg/mL with iopamidol 5 mL of a solution containing
no change after mixing (Kim et al, 1992bo)
25) Chloramphenicol sodium succinate 200 mg/mL with iopamidol 5 mL of a solution containing **iodine** 300 mg/mL, no change after mixing (Kim et al, 1992bu)
26) Heparin sodium 5,000 U/0.5 mL with iopamidol 5 mL of a solution containing 300 mg **iodine**/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989ar)
27) Iopamidol (Isovue(R)) 5 mL of a solution containing
methylprednisolone sodium succinate (Solu- Medrol(R)) 10 mg/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989at)
28) Chloramphenicol 33 mg/mL with iopamidol 5 mL of a solution containing 300 mg **iodine**/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989aw)
29) Iopamidol 5 mL of a solution containing
no change after mixing (Kim et al, 1992ca)
30) Heparin 1000 U/mL with iopamidol 5 mL of a solution containing
change after mixing (Kim et al, 1992ch)
31) Diazepam 5 mg/mL with iopamidol 5 mL of a solution containing
change after mixing (Kim et al, 1992cj)
32) Iopamidol (5 mL of a solution containing 300 mg
gluceptate 10 mg/mL visually compatible for 2 hours at room temperature) (Irving & Burbridge, 1989)

3.5.5.1.A.20 Iothalamate

a) Conflicting Data
1) Incompatible
a) Iothalamate 5 mL of a solution containing
mg/mL, precipitate persisting after centrifugation (Kim et al, 1992co)
2) Compatible
a) Iothalamate 5 mL of a solution containing
U/mL, no change after mixing (Kim et al, 1992a)
b) Gentamicin 40 mg/mL with iothalamate 5 mL of a solution containing
mg/mL, no change after mixing (Kim et al, 1992c)
c) Iothalamate 5 mL of a solution containing
mg/mL, no change after mixing (Kim et al, 1992j)
d) Ampicillin 100 mg/mL with iothalamate 5 mL of a solution containing
mg/mL, no change after mixing (Kim et al, 1992t)

e) Heparin sodium 5,000 U/0.5 mL with iothalamate meglumine 5 mL of a solution containing 282 mg **iodine**/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989f)
f) Epinephrine 1 mg/mL with iothalamate 5 mL of a solution containing
mg/mL, no change after mixing (Kim et al, 1992ah)
g) Hydrocortisone sodium succinate 167.09 mg/mL with iothalamate 5 mL of a solution containing **iodine** 282 mg/mL, no change after mixing (Kim et al, 1992ak)
h) Chloramphenicol sodium succinate 200 mg/mL with iothalamate 5 mL of a solution containing **iodine** 282 mg/mL, no change after mixing (Kim et al, 1992an)
i) Iothalamate 5 mL of a solution containing
U/mL, no change after mixing (Kim et al, 1992ao)
j) Iothalamate 5 mL of a solution containing
mg/mL, no change after mixing (Kim et al, 1992av)
k) Iothalamate 5 mL of a solution containing
mg/mL, no change after mixing (Kim et al, 1992bb)
l) Iothalamate meglumine 5 mL of a solution containing 282 mg
papaverine 32 mg/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989ae)
m) Diphenhydramine 50 mg/mL with iothalamate 5 mL of a solution containing
282 mg/mL, no change after mixing (Kim et al, 1992bh)
n) Iothalamate 5 mL of a solution containing
mcg/mL, no change after mixing (Kim et al, 1992bl)
o) Heparin 1000 U/mL with iothalamate 5 mL of a solution containing
mg/mL, no change after mixing (Kim et al, 1992bn)
p) Alprostadil 4 U/mL with iothalamate 5 mL of a solution containing
mg/mL, no change after mixing (Kim et al, 1992bq)
q) Iothalamate 5 mL of a solution containing
mg/mL, no change after mixing (Kim et al, 1992bz)
r) Diazepam 5 mg/mL with iothalamate 5 mL of a solution containing
mg/mL, no change after mixing (Kim et al, 1992ce)
s) Cimetidine 100 mg/mL with iothalamate 5 mL of a solution containing
mg/mL, no change after mixing (Kim et al, 1992cp)
t) Iothalamate 5 mL of a solution containing
no change after mixing (Kim et al, 1992cr)

3.5.5.1.A.21 Iothalamate Meglumine

a) Compatible

1) Iothalamate meglumine 5 mL of a solution containing 282 mg
10 mg/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989l)
2) Gentamicin 800 mcg/mL with iothalamate meglumine 5 mL of a solution containing 282 mg **iodine**/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989q)
3) Chloramphenicol 33 mg/mL with IOTHALAMATE MEGLUMINE 5 mL of a solution containing 282 mg **iodine**/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989ab)
4) Iothalamate meglumine (Conray-60(R)) 5 mL of a solution containing
with methylprednisolone sodium succinate (Solu-Medrol(R)) 10 mg/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989ad)
5) Iothalamate 5 mL of a solution containing
no change after mixing (Kim et al, 1992bb)
6) Iothalamate meglumine 5 mL of a solution containing 282 mg
32 mg/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989ae)
7) Epinephrine 1 mg/mL with iothalamate meglumine 5 mL of a solution containing 282 mg **iodine**/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989ak)
8) Diphenhydramine 1 mL with IOTHALAMATE MEGLUMINE (60%) - Conray(R) - 1, 2, 5, 10, 20 or 40 mL, concentration not specified, no precipitate detected within 48 hours in

direct admixture in syringe; temperature not specified (Marshall et al, 1965a; Trissel, 1988a)
9) Diphenhydramine 12.5 mg/0.25 mL with iothalamate meglumine (60%) - Conray(R) 5 mL of a solution containing 282 mg
temperature (Irving & Burbridge, 1989al)
10) Diphenhydramine 1 mL with iothalamate meglumine (80%) - Angio-Conray(R) - 1, 2, 5, 10, 20 or 40 mL, concentration not specified, no precipitate detected within 48 hours in direct admixture in syringe; temperature not specified (Marshall et al, 1965a; Trissel, 1988a)
11) Diphenhydramine, concentration not specified, with iothalamate meglumine, % unspecified, 5 mL, no precipitate formation was detected in direct admixture in syringe; duration not specified (Stevens, 1975; Trissel, 1988a)
12) Erythromycin gluceptate (10 mg/mL with 5 mL of an iothalamate meglumine solution containing **iodine** 282 mg/mL visually compatible for 2 hours at room temperature) (Irving & Burbridge, 1989ao)
13) Hydrocortisone sodium succinate 10 mg/mL with iothalamate meglumine 5 mL of a solution containing 282 mg **iodine**
(Irving & Burbridge, 1989ap)
14) Cimetidine 150 mg/mL with iothalamate meglumine 5 mL of a solution containing 282 mg **iodine**/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989av)
15) Iothalamate meglumine (5 mL of a solution containing 282 mg
erythromycin gluceptate 10 mg/mL visually compatible for 2 hours at room temperature) (Irving & Burbridge, 1989)
16) Ampicillin 30 mg/mL with iothalamate meglumine 5 mL of an solution containing 282 mg/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989bh)

3.5.5.1.A.22 Ioxaglate

a) Conflicting Data

1) Incompatible

a) Ioxaglate 5 mL of a solution containing
mg/mL, resulted a white suspension that persisted longer than 1 minute (Kim et al, 1992m)
b) Ioxaglate 5 mL of a solution containing
resulted a white suspension that disappeared within 1 minute (Kim et al, 1992q)
c) Cimetidine 100 mg/mL with ioxaglate 5 mL of a solution containing
mg/mL, precipitate persisting after centrifugation (Kim et al, 1992ax)
d) Ioxaglate 5 mL of a solution containing
mg/mL, precipitate persisting after centrifugation (Kim et al, 1992bg).
e) Diphenhydramine 50 mg/mL with ioxaglate 5 mL of a solution containing
mg/mL, precipitate persisting after centrifugation (Kim et al, 1992cg)
f) Gentamicin 40 mg/mL with ioxaglate 5 mL of a solution containing
mg/mL, precipitate persisting after centrifugation (Kim et al, 1992cn)

2) Compatible

a) Diazepam 5 mg/mL with ioxaglate 5 mL of a solution containing
no change after mixing (Kim et al, 1992d)
b) Ioxaglate 5 mL of a solution containing
U/mL, no change after mixing (Kim et al, 1992g)
c) Chloramphenicol sodium succinate 200 mg/mL with ioxaglate 5 mL of a solution containing **iodine** 320 mg/mL, no change after mixing (Kim et al, 1992h)
d) Ampicillin 100 mg/mL with ioxaglate 5 mL of a solution containing
mg/mL, no change after mixing (Kim et al, 1992k)
e) Ioxaglate 5 mL of a solution containing
resulted a white suspension that disappeared within 1 minute (Kim et al, 1992s)
f) Hydrocortisone sodium succinate 167.09 mg/mL with ioxaglate 5 mL of a solution containing **iodine** 320 mg/mL, no change after mixing (Kim et al, 1992x)
g) Epinephrine 1 mg/mL with ioxaglate 5 mL of a solution containing
mg/mL, no change after mixing (Kim et al, 1992ai)

h) Ioxaglate 5 mL of a solution containing
U/mL, no change after mixing (Kim et al, 1992aj)
i) Heparin 1000 U/mL with ioxaglate 5 mL of a solution containing
no change after mixing (Kim et al, 1992aw)
j) Ioxaglate 5 mL of a solution containing
mcg/mL, no change after mixing (Kim et al, 1992bp)
k) Alprostadil 4 U/mL with ioxaglate 5 mL of a solution containing
no change after mixing (Kim et al, 1992bs)
l) Ioxaglate 5 mL of a solution containing
mg/mL, no change after mixing (Kim et al, 1992bx)
m) Ioxaglate 5 mL of a solution containing
no change after mixing (Kim et al, 1992ck)

3.5.5.1.A.23 Ioxaglate Meglumine

a) Conflicting Data

1) Incompatible

a) Ioxaglate meglumine and ioxaglate sodium 5 mL of a solution containing 320 mg **iodine**/mL with gentamicin 800 mcg/mL, a transient precipitate was reported which cleared within 5 minutes at room temperature (Irving & Burbridge, 1989n)
b) Diphenhydramine 12.5 mg/0.25 mL with ioxaglate meglumine and ioxaglate sodium 5 mL of a solution containing 320 mg
was reported which persisted for a 2-hour study period at room temperature (Irving & Burbridge, 1989u)
c) Diphenhydramine 50 mg/1 mL with ioxaglate meglumine (39.3%) and ioxaglate sodium (19.6%) 5 mL, formation of a dense, cloudy precipitate was reported (Shah & Gerlock, 1987a)
d) Ioxaglate meglumine (39.3%) and ioxaglate sodium (19.6%) 5 mL of a solution containing 320 mg **iodine**/mL with papaverine 32 mg/mL, immediate formation of a precipitate was reported which persisted for a 2-hour study period at room temperature (Irving & Burbridge, 1989x)
e) Ioxaglate meglumine (39.3%) and ioxaglate sodium (19.6%) 5 mL with papaverine 30 mg/1 mL, undiluted, formation of a dense, cloudy, white precipitate was reported (Shah & Gerlock, 1987b); however, ioxaglate meglumine (39.3%) and ioxaglate sodium (19.6%) 5 mL with papaverine 30 mg/1 mL diluted in 10 mL of Sodium chloride 0.9%, formation of a white suspension though minimal precipitate formation was reported (Shah & Gerlock, 1987b) .
f) Cimetidine 150 mg/1 mL with ioxaglate meglumine (39.3%) and ioxaglate sodium (19.6%) 5 mL, formation of a thread-like precipitate was reported (Shah & Gerlock, 1987c)
g) Cimetidine 150 mg/mL with ioxaglate meglumine and ioxaglate sodium 5 mL of a solution containing 320 mg
reported which persisted for a 2-hour study period at room temperature (Irving & Burbridge, 1989au)

2) Compatible

a) Hydrocortisone sodium succinate 10 mg/mL with ioxaglate meglumine and ioxaglate sodium 5 mL of a solution containing 320 mg
at room temperature (Irving & Burbridge, 1989h)
b) Epinephrine 1 mg/mL with ioxaglate meglumine and ioxaglate sodium 5 mL of a solution containing 320 mg
temperature (Irving & Burbridge, 1989i)
c) Epinephrine 1 mg/1 mL with ioxaglate meglumine (39.3%) and ioxaglate sodium (19.6%) 5 mL, clear solution reported; conditions not specified (Shah & Gerlock, 1987)
d) Erythromycin gluceptate 10 mg/mL with 5 mL of an ioxaglate meglumine and ioxaglate sodium solution containing 320 mg
at room temperature (Irving & Burbridge, 1989ay)
e) Chloramphenicol 33 mg/mL with 5 mL of an ioxaglate meglumine and ioxaglate sodium solution containing 320 mg

temperature (Irving & Burbridge, 1989bc)

f) Heparin sodium 5,000 units/0.5 mL with 5 mL of an ioxaglate meglumine and ioxaglate sodium solution containing 320 mg
at room temperature (Irving & Burbridge, 1989); another source, however, describes conditions under which these 2 drugs were found to be incompatible (Shah & Gerlock, 1987d)

g) Ampicillin 30 mg/mL with ioxaglate meglumine and ioxaglate sodium 5 mL of a solution containing **iodine** 320 mg/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989bf).

h) Ioxaglate meglumine and ioxaglate sodium solution 5 mL containing 320 mg **iodine**/mL with methylprednisolone sodium succinate 10 mg/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989bg)

3.5.5.1.A.24 Ioxaglate Meglumine/Ioxaglate Sodium

a) Incompatible

1) Ioxaglate meglumine and ioxaglate sodium 5 mL of a solution containing 320 mg **iodine**/mL with protamine 10 mg/mL, immediate formation of a precipitate was reported which persisted for a 2-hour study period at room temperature (Irving & Burbridge, 1989bb)

3.5.5.1.A.25 Ioxaglate Sodium

a) Conflicting Data

1) Incompatible

a) Ioxaglate meglumine and ioxaglate sodium 5 mL of a solution containing 320 mg **iodine**/mL with gentamicin 800 mcg/mL, a transient precipitate was reported which cleared within 5 minutes at room temperature (Irving & Burbridge, 1989n)

b) Diphenhydramine 12.5 mg/0.25 mL with ioxaglate meglumine and ioxaglate sodium 5 mL of a solution containing 320 mg
was reported which persisted for a 2-hour study period at room temperature (Irving & Burbridge, 1989u)

c) Diphenhydramine 50 mg/1 mL with ioxaglate meglumine (39.3%) and ioxaglate sodium (19.6%) 5 mL, formation of a dense, cloudy precipitate was reported (Shah & Gerlock, 1987a)

d) Ioxaglate meglumine (39.3%) and ioxaglate sodium (19.6%) 5 mL of a solution containing 320 mg **iodine**/mL with papaverine 32 mg/mL, immediate formation of a precipitate was reported which persisted for a 2-hour study period at room temperature (Irving & Burbridge, 1989x)

e) Ioxaglate meglumine (39.3%) and ioxaglate sodium (19.6%) 5 mL with papaverine 30 mg/1 mL, undiluted, formation of a dense, cloudy, white precipitate was reported (Shah & Gerlock, 1987b); however, ioxaglate meglumine (39.3%) and ioxaglate sodium (19.6%) 5 mL with papaverine 30 mg/1 mL diluted in 10 mL of Sodium chloride 0.9%, formation of a white suspension though minimal precipitate formation was reported (Shah & Gerlock, 1987b) .

f) Cimetidine 150 mg/1 mL with ioxaglate meglumine (39.3%) and ioxaglate sodium (19.6%) 5 mL, formation of a thread-like precipitate was reported (Shah & Gerlock, 1987c)

g) Cimetidine 150 mg/mL with ioxaglate meglumine and ioxaglate sodium 5 mL of a solution containing 320 mg
reported which persisted for a 2-hour study period at room temperature (Irving & Burbridge, 1989au)

2) Compatible

a) Hydrocortisone sodium succinate 10 mg/mL with ioxaglate meglumine and ioxaglate sodium 5 mL of a solution containing 320 mg
at room temperature (Irving & Burbridge, 1989h)

b) Epinephrine 1 mg/mL with ioxaglate meglumine and ioxaglate sodium 5 mL of a solution containing 320 mg
temperature (Irving & Burbridge, 1989i)

c) Epinephrine 1 mg/1 mL with ioxaglate meglumine (39.3%) and ioxaglate sodium (19.6%) 5 mL, clear solution reported; conditions not specified (Shah & Gerlock, 1987)
d) Erythromycin gluceptate 10 mg/mL with 5 mL of an ioxaglate meglumine and ioxaglate sodium solution containing 320 mg
at room temperature (Irving & Burbridge, 1989ay)
e) Chloramphenicol 33 mg/mL with 5 mL of an ioxaglate meglumine and ioxaglate sodium solution containing 320 mg
temperature (Irving & Burbridge, 1989bc)
f) Heparin sodium 5,000 units/0.5 mL with 5 mL of an ioxaglate meglumine and ioxaglate sodium solution containing 320 mg
at room temperature (Irving & Burbridge, 1989); another source, however, describes conditions under which these 2 drugs were found to be incompatible (Shah & Gerlock, 1987d)
g) Ampicillin 30 mg/mL with ioxaglate meglumine and ioxaglate sodium 5 mL of a solution containing **iodine** 320 mg/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989bf).
h) Ioxaglate meglumine and ioxaglate sodium solution 5 mL containing 320 mg **iodine**/mL with methylprednisolone sodium succinate 10 mg/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989bg)

3.5.5.1.A.26 Lidocaine

a) Compatible
1) Iopamidol 5 mL of a solution containing
change after mixing (Kim et al, 1992v)
2) Iohexol 5 mL of solution containing
change after mixing (Kim et al, 1992as)
3) DIATRIZOATE SODIUM 5 mL of a solution containing
5 mg/mL, no change after mixing (Kim et al, 1992bf)
4) DIATRIZOATE MEGLUMINE 5 mL of a solution containing
lidocaine 5 mg/mL, no change after mixing (Kim et al, 1992bf)
5) Ioxaglate 5 mL of a solution containing
change after mixing (Kim et al, 1992ck)
6) Iothalamate 5 mL of a solution containing
change after mixing (Kim et al, 1992cr)

3.5.5.1.A.27 Meperidine

a) Conflicting Data
1) Incompatible
a) DIATRIZOATE MEGLUMINE 5 mL of a solution containing
meperidine 25 mg/mL, precipitate persisting after centrifugation (Kim et al, 1992u)
b) DIATRIZOATE SODIUM 5 mL of a solution containing
meperidine 25 mg/mL, precipitate persisting after centrifugation (Kim et al, 1992u)
2) Compatible
a) Iothalamate 5 mL of a solution containing
mg/mL, no change after mixing (Kim et al, 1992j)
b) Iopamidol 5 mL of a solution containing
mg/mL, no change after mixing (Kim et al, 1992y)
c) Ioxaglate 5 mL of a solution containing
mg/mL, no change after mixing (Kim et al, 1992bx)
d) Iohexol 5 mL of solution containing
after mixing (Kim et al, 1992cq)

3.5.5.1.A.28 Methylprednisolone Sodium Succinate

a) Compatible
1) DIATRIZOATE MEGLUMINE (Hypaque 60%(R)) 5 mL of a solution containing

283 mg/mL with methylprednisolone sodium succinate (Solu-Medrol(R)) 10 mg/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989m)
2) Iothalamate meglumine (Conray-60(R)) 5 mL of a solution containing
with methylprednisolone sodium succinate (Solu-Medrol(R)) 10 mg/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989ad)
3) Iopamidol (Isovue(R)) 5 mL of a solution containing
methylprednisolone sodium succinate (Solu- Medrol(R)) 10 mg/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989at)
4) Iohexol (Omnipaque(R)) 5 mL of a solution containing
methylprednisolone sodium succinate (Solu- Medrol(R)) 10 mg/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989ax)
5) Ioxaglate meglumine and ioxaglate sodium solution 5 mL containing 320 mg
with methylprednisolone sodium succinate 10 mg/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989bg)
6) DIATRIZOATE MEGLUMINE and DIATRIZOATE SODIUM (MD-60(R)) 5 mL of a solution containing **iodine** 292.5 mg/mL with methylprednisolone sodium succinate (Solu-Medrol(R)) 10 mg/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989m)

3.5.5.1.A.29 Metrizamide

a) Compatible
1) Metrizamide 48.25% **iodine**
mg/mL, no precipitate observed, observation time and other conditions not specified (Pilla et al, 1986)

3.5.5.1.A.30 Nitroglycerin

a) Compatible
1) DIATRIZOATE MEGLUMINE 5 mL of a solution containing
nitroglycerin 120 mcg/mL, no change after mixing (Kim et al, 1992z)
2) DIATRIZOATE SODIUM 5 mL of a solution containing
nitroglycerin 120 mcg/mL, no change after mixing (Kim et al, 1992z)
3) Iohexol 5 mL of solution containing
change after mixing (Kim et al, 1992ad)
4) Iopamidol 5 mL of a solution containing
mcg/mL, no change after mixing (Kim et al, 1992az)
5) Iothalamate 5 mL of a solution containing
mcg/mL, no change after mixing (Kim et al, 1992bl)
6) Ioxaglate 5 mL of a solution containing
mcg/mL, no change after mixing (Kim et al, 1992bp)

3.5.5.1.A.31 Papaverine

a) Conflicting Data
1) Incompatible
a) Ioxaglate meglumine (39.3%) and ioxaglate sodium (19.6%) 5 mL of a solution containing 320 mg **iodine**/mL with papaverine 32 mg/mL, immediate formation of a precipitate was reported which persisted for a 2-hour study period at room temperature (Irving & Burbridge, 1989x)
b) Ioxaglate meglumine (39.3%) and ioxaglate sodium (19.6%) 5 mL with papaverine 30 mg/1 mL, undiluted, formation of a dense, cloudy, white precipitate was reported (Shah & Gerlock, 1987b); however, ioxaglate meglumine (39.3%) and ioxaglate sodium (19.6%) 5 mL with papaverine 30 mg/1 mL diluted in 10 mL of Sodium chloride 0.9%, formation of a white suspension though minimal precipitate formation was reported (Shah & Gerlock, 1987b) .
c) Diatrizoate sodium and diatrizoate meglumine 5 mL of a solution containing 292.5 mg **iodine**/mL with papaverine 32 mg/mL, a transient precipitate formed which cleared within 5 minutes, but delayed precipitation was observed in 2 hours at room

temperature (Irving & Burbridge, 1989z)
d) DIATRIZOATE SODIUM 5 mL of a solution containing
papaverine 30 mg/mL, resulted a white suspension that disappeared within 1 minute (Kim et al, 1992ba)
e) Ioxaglate 5 mL of a solution containing
mg/mL, precipitate persisting after centrifugation (Kim et al, 1992bg).
f) DIATRIZOATE MEGLUMINE 5 mL of a solution containing
papaverine 30 mg/mL, precipitate persisting after centrifugation (Kim et al, 1992ba)
g) Diatrizoate meglumine 5 mL of a solution containing 283 mg
papaverine 32 mg/mL, a transient precipitate formed which cleared within 5 minutes at room temperature (Irving & Burbridge, 1989z)

2) Compatible
a) Iohexol 5 mL of solution containing
no change after mixing (Kim et al, 1992af)
b) Iohexol 5 mL of a solution containing 300 mg
visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989t)
c) Diatrizoate sodium and diatrizoate meglumine 5 mL of a solution containing 292.5 mg **iodine**/mL with papaverine 32 mg/mL, a transient precipitate formed which cleared within 5 minutes, but delayed precipitation was observed in 2 hours at room temperature (Irving & Burbridge, 1989ac)
d) Iothalamate 5 mL of a solution containing
mg/mL, no change after mixing (Kim et al, 1992bb)
e) Iothalamate meglumine 5 mL of a solution containing 282 mg
papaverine 32 mg/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989ae)
f) Iopamidol 5 mL of a solution containing
mg/mL, no change after mixing (Kim et al, 1992be)
g) Iopamidol 5 mL of a solution containing 300 mg
mg/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989ah)
h) Diatrizoate meglumine 5 mL of a solution containing 283 mg
papaverine 32 mg/mL, a transient precipitate formed which cleared within 5 minutes at room temperature (Irving & Burbridge, 1989ac) DIATRIZOATE SODIUM AND DIATRIZOATE MEGLUMINE
i) Diatrizoate sodium and diatrizoate meglumine 5 mL of a solution containing 292.5 mg **iodine**/mL with papaverine 32 mg/mL, a transient precipitate formed which cleared within 5 minutes, but delayed precipitation was observed in 2 hours at room temperature (Irving & Burbridge, 1989ac)

3.5.5.1.A.32 Papaverine Hydrochloride

a) Compatible
1) Metrizamide 48.25% **iodine**
mg/mL, no precipitate observed, observation time and other conditions not specified (Pilla et al, 1986)

3.5.5.1.A.33 Phentolamine

a) Conflicting Data
1) Incompatible
a) Ioxaglate 5 mL of a solution containing
mg/mL, resulted a white suspension that persisted longer than 1 minute (Kim et al, 1992m)
b) DIATRIZOATE SODIUM 5 mL of a solution containing
phentolamine 10 mg/mL, resulted a white suspension that disappeared within 1 minute (Kim et al, 1992cm)
c) DIATRIZOATE MEGLUMINE 5 mL of a solution containing
phentolamine 10 mg/mL, resulted a white suspension that disappeared within 1 minute

(Kim et al, 1992cm)
d) Iothalamate 5 mL of a solution containing
mg/mL, precipitate persisting after centrifugation (Kim et al, 1992co)
2) Compatible
a) Iopamidol 5 mL of a solution containing
mg/mL, no change after mixing (Kim et al, 1992l)
b) Iohexol 5 mL of solution containing
no change after mixing (Kim et al, 1992n)

3.5.5.1.A.34 Protamine
a) Conflicting Data
1) Incompatible
a) DIATRIZOATE SODIUM AND DIATRIZOATE MEGLUMINE 5 mL of a solution containing 292.5 mg **iodine**
precipitate was reported which persisted for a 2-hour study period at room temperature (Irving & Burbridge, 1989b)
b) DIATRIZOATE SODIUM 5 mL of a solution containing
protamine 10 mg/mL , precipitate persisting after centrifugation (Kim et al, 1992bk)
c) DIATRIZOATE MEGLUMINE 5 mL of a solution containing
protamine 10 mg/mL, precipitate persisting after centrifugation (Kim et al, 1992bk).
d) DIATRIZOATE MEGLUMINE (Renografin(R) - 76), reported to form a thick, gelatinous precipitate when prepared in a 1 to 1 admixture in serum (Martin & Taylor, 1976); precipitate formation reported if the dye is not flushed out of the catheter prior to administration of the protamine (Iannone, 1975)
e) DIATRIZOATE MEGLUMINE 5 mL of a solution containing 283 mg
protamine 10 mg/mL, immediate formation of a precipitate was reported which persisted for a 2-hour study period at room temperature (Irving & Burbridge, 1989b)
f) Ioxaglate meglumine and ioxaglate sodium 5 mL of a solution containing 320 mg **iodine**/mL with protamine 10 mg/mL, immediate formation of a precipitate was reported which persisted for a 2-hour study period at room temperature (Irving & Burbridge, 1989bb)
2) Compatible
a) Iothalamate meglumine 5 mL of a solution containing 282 mg
protamine 10 mg/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989l)
b) Iothalamate 5 mL of a solution containing
mg/mL, no change after mixing (Kim et al, 1992av)
c) Iopamidol 5 mL of a solution containing
mg/mL, no change after mixing (Kim et al, 1992bd)
d) Iopamidol 5 mL of a solution containing 300 mg
mg/mL, visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989ag)
e) Iohexol 5 mL of solution containing
change after mixing (Kim et al, 1992cc)
f) Iohexol 5 mL of a solution containing 300 mg
visually compatible for 2 hours at room temperature (Irving & Burbridge, 1989ba)

3.5.5.1.A.35 Tolazoline
a) Conflicting Data
1) Incompatible
a) Ioxaglate 5 mL of a solution containing
resulted a white suspension that disappeared within 1 minute (Kim et al, 1992q)
2) Compatible
a) DIATRIZOATE MEGLUMINE 5 mL of a solution containing
tolazoline 25 mg/mL, no change after mixing (Kim et al, 1992p)
b) DIATRIZOATE SODIUM 5 mL of a solution containing

tolazoline 25 mg/mL, no change after mixing (Kim et al, 1992p)
c) loxaglate 5 mL of a solution containing
resulted a white suspension that disappeared within 1 minute (Kim et al, 1992s)
d) Iohexol 5 mL of solution containing
change after mixing (Kim et al, 1992by)
e) Iothalamate 5 mL of a solution containing
mg/mL, no change after mixing (Kim et al, 1992bz)
f) Iopamidol 5 mL of a solution containing
no change after mixing (Kim et al, 1992ca)

3.5.5.1.A.36 Urokinase

a) Compatible
1) DIATRIZOATE SODIUM 5 mL of a solution containing
1200 U/mL, no change after mixing (Kim et al, 1992)
2) Iothalamate 5 mL of a solution containing
no change after mixing (Kim et al, 1992a)
3) Iohexol 5 mL of solution containing
change after mixing (Kim et al, 1992b)
4) DIATRIZOATE MEGLUMINE 5 mL of a solution containing
urokinase 1200 U/mL, no change after mixing (Kim et al, 1992)
5) loxaglate 5 mL of a solution containing
change after mixing (Kim et al, 1992g)
6) Iopamidol 5 mL of a solution containing
no change after mixing (Kim et al, 1992i)

3.5.5.1.A.37 Vasopressin

a) Compatible
1) DIATRIZOATE SODIUM 5 mL of a solution containing
vasopressin 20 U/mL, no change after mixing (Kim et al, 1992ae)
2) Iohexol 5 mL of solution containing
change after mixing (Kim et al, 1992ag)
3) DIATRIZOATE MEGLUMINE 5 mL of a solution containing
vasopressin 20 U/mL, no change after mixing (Kim et al, 1992ae)
4) loxaglate 5 mL of a solution containing
change after mixing (Kim et al, 1992aj)
5) Iopamidol 5 mL of a solution containing
change after mixing (Kim et al, 1992am)
6) Iothalamate 5 mL of a solution containing
no change after mixing (Kim et al, 1992ao)

3.5.5.1.B Sodium Iodide

Aminophylline

Anileridine Hydrochloride

Carbenicillin

Codeine

Codeine Phosphate

Dextran 70

Erythromycin Lactobionate

Levorphanol

Magnesium Sulfate

Meperidine

Meperidine Hydrochloride

Metaraminol Bitartrate

Methadone

Methicillin

Methylprednisolone

Methylprednisolone Sodium Succinate

Morphine

Norepinephrine

Penicillin G Potassium

Pentobarbital

Procaine

Procaine Hydrochloride

Sodium Bicarbonate

Thiopental

Trimethaphan Camsylate

3.5.5.1.B.1 Aminophylline

a) Compatible

1) Aminophylline 500 mg/L with sodium iodide 1 g/L, physically compatible; conditions not specified (Parker, 1970b)

2) Aminophylline 500 or 1000 mg with methylprednisolone sodium succinate (Solu-Medrol(R)) 40 or 80 mg and Sodium iodide 500 or 1000 mg in Dextrose 5% in water 500 or 1000 mL, visually compatible with a clear solution for up to 24 hours; conditions not specified (Tech Info Solu-Medrol(R), 1978)(Trissel, 1988b)

3) Aminophylline 1 g/L with sodium iodide 1 g/L and methylprednisolone sodium succinate 80 mg/L or aminophylline 500 mg/L with sodium iodide 500 mg/L and methylprednisolone sodium succinate 40 mg/L, visually compatible for 24 hours in Dextrose 5% in water; temperature not specified (Trissel, 1988b)

4) Aminophylline 1 g/L with sodium iodide 1 g/L and methylprednisolone sodium succinate 80 mg/L or aminophylline 500 mg/L with sodium iodide 500 mg/L and methylprednisolone sodium succinate 40 mg/L, visually compatible for 24 hours in Dextrose 5% in water; temperature not specified (Trissel, 1988c)

5) Methylprednisolone 40 mg/L with sodium iodide 500 mg/L and aminophylline 500 mg/L give clear solutions for 24 hours; temperature not specified (Trissel, 1988d)

6) Methylprednisolone 80 mg/L with sodium iodide 1 g/L and aminophylline 1 g/L give clear solutions for 24 hours; temperature not specified (Trissel, 1988d).

3.5.5.1.B.2 Anileridine Hydrochloride

a) Incompatible

1) Anileridine hydrochloride incompatible with sodium iodide; conditions not specified

(Kramer et al, 1971)

3.5.5.1.B.3 Carbenicillin

a) Incompatible

1) Carbenicillin with sodium iodide, carbenicillin deteriorates when mixed either by drip or Soluset(R); conditions not specified (VanDerLinde et al, 1977a)

3.5.5.1.B.4 Codeine

a) Incompatible

1) Codeine stated to be physically incompatible with sodium iodide; conditions not specified (Patel & Phillips, 1966i)

3.5.5.1.B.5 Codeine Phosphate

a) Incompatible

1) Sodium iodide (physically incompatible with codeine phosphate; conditions not specified) (Patel & Phillips, 1966f)

3.5.5.1.B.6 Dextran 70

a) Compatible

1) Sodium iodide 1 g/L with dextran 70 6% in Dextrose 5% in water or Sodium chloride 0.9% physically compatible for 24 hours; conditions not specified (Kirkland et al, 1961a; Smith, 1965)

3.5.5.1.B.7 Erythromycin Lactobionate

a) Compatible

1) Erythromycin lactobionate 1 g/L with sodium iodide 1 g/L, physically compatible and erythromycin stable for 24 hours at 25 degrees C in Dextrose 5% in water (Parker, 1969a)

3.5.5.1.B.8 Levorphanol

a) Incompatible

1) Levorphanol with sodium iodide, incompatible; conditions not specified (Bogash, 1955)

3.5.5.1.B.9 Magnesium Sulfate

a) Incompatible

1) Magnesium sulfate with sodium iodide, incompatible with concentrated solutions of sodium iodide; conditions not specified (VanDerLinde et al, 1977)

3.5.5.1.B.10 Meperidine

a) Incompatible

1) Sodium iodide (physically incompatible with meperidine; drug concentrations not specified) (Patel & Phillips, 1966j)

3.5.5.1.B.11 Meperidine Hydrochloride

a) Incompatible

1) Meperidine hydrochloride (Demerol(R)) stated to be physically incompatible with sodium iodide; conditions not specified (Patel & Phillips, 1966a)

3.5.5.1.B.12 Metaraminol Bitartrate

a) Incompatible

1) Metaraminol bitartrate with sodium iodide, may form precipitate; conditions not specified (VanDerLinde et al, 1977b)

3.5.5.1.B.13 Methadone

a) Incompatible

1) Methadone with sodium iodide, physically incompatible; no conditions specified (Patel & Phillips, 1966)

3.5.5.1.B.14 Methicillin

a) Compatible

1) Methicillin 1 g/L with sodium iodide 1 g/L, stated to be physically compatible; conditions not specified (Parker, 1970f)

3.5.5.1.B.15 Methylprednisolone

a) Compatible

1) Methylprednisolone 40 mg/L with sodium iodide 500 mg/L and aminophylline 500 mg/L give clear solutions for 24 hours; temperature not specified (Trissel, 1988d)

2) Methylprednisolone 80 mg/L with sodium iodide 1 g/L and aminophylline 1 g/L give clear solutions for 24 hours; temperature not specified (Trissel, 1988d).

3.5.5.1.B.16 Methylprednisolone Sodium Succinate

a) Compatible

1) Aminophylline 500 or 1000 mg with methylprednisolone sodium succinate (Solu-Medrol(R)) 40 or 80 mg and Sodium iodide 500 or 1000 mg in Dextrose 5% in water 500 or 1000 mL, visually compatible with a clear solution for up to 24 hours; conditions not specified (Tech Info Solu-Medrol(R), 1978)(Trissel, 1988b)

2) Aminophylline 1 g/L with sodium iodide 1 g/L and methylprednisolone sodium succinate 80 mg/L or aminophylline 500 mg/L with sodium iodide 500 mg/L and methylprednisolone sodium succinate 40 mg/L, visually compatible for 24 hours in Dextrose 5% in water; temperature not specified (Trissel, 1988b)

3) Aminophylline 1 g/L with sodium iodide 1 g/L and methylprednisolone sodium succinate 80 mg/L or aminophylline 500 mg/L with sodium iodide 500 mg/L and methylprednisolone sodium succinate 40 mg/L, visually compatible for 24 hours in Dextrose 5% in water; temperature not specified (Trissel, 1988c)

3.5.5.1.B.17 Morphine

a) Incompatible

1) Morphine stated to be physically incompatible with sodium iodide; conditions not specified (Patel & Phillips, 1966d)

2) Sodium iodide (stated to be physically incompatible with morphine; no conditions specified) (Patel & Phillips, 1966e; Kramer et al, 1971a)

3.5.5.1.B.18 Norepinephrine

a) Incompatible

1) Norepinephrine with sodium iodide, stated to be physically incompatible; conditions not specified (Patel & Phillips, 1966g)

2) Norepinephrine (levarterenol) with sodium
conditions not stated (VanDerLinde et al, 1977d)

3) Sodium iodide (stated to be physically incompatible with norepinephrine; conditions not specified) (Patel & Phillips, 1966h)

3.5.5.1.B.19 Penicillin G Potassium

a) Compatible

1) Penicillin G potassium 5 million U/L with sodium iodide 1 g/L, physically compatible; conditions not specified; penicillin G potassium 1 million U/L with sodium iodide 1 g/L, penicillin activity retained for 24 hours at 25 degrees C; solution not specified (Parker, 1969d)

3.5.5.1.B.20 Pentobarbital

a) Compatible

1) Pentobarbital 500 mg/10 mL with sodium iodide 1 g/10 mL, physically compatible in syringe; conditions not specified (Jones et al, 1961a)

3.5.5.1.B.21 Procaine

a) Conflicting Data

1) Incompatible

a) Sodium iodide (with procaine physically incompatible; conditions not specified) (Patel & Phillips, 1966b)

2) Compatible

a) Sodium iodide (1 g/L with procaine 1 g/L physically compatible in Sodium chloride 0.9%; conditions not specified) (Kirkland et al, 1961)

3.5.5.1.B.22 Procaine Hydrochloride

a) Incompatible

1) Procaine hydrochloride stated to be physically incompatible with sodium iodide; conditions not specified (Patel & Phillips, 1966c)

3.5.5.1.B.23 Sodium Bicarbonate

a) Compatible

1) Sodium bicarbonate 2.4 mEq/L with sodium iodide 1 g/L, physically compatible for 24 hours in Dextrose 5% in water; temperature not specified (Trissel, 1990)

3.5.5.1.B.24 Thiopental

a) Compatible

1) Sodium iodide (1 g/10 mL with thiopental 75 mg/3 mL physically compatible in syringe) (Jones et al, 1961)

3.5.5.1.B.25 Trimethaphan Camsylate

a) Incompatible

1) Sodium iodide with trimethaphan camsylate, reported incompatible; conditions not stated (VanDerLinde et al, 1977c)

3.5.5.2 Solutions

Iodine

Sodium Iodide

3.5.5.2.A Iodine

3.5.5.2.A.1 SODIUM CHLORIDE

a) Compatible

1) Sodium chloride 0.9% compatible with sodium iodide; conditions not specified (Fowler, 1967)

3.5.5.2.B Sodium Iodide

DEXTROSE 10% IN SODIUM CHLORIDE 0.9%

DEXTROSE 10% IN WATER

DEXTROSE 5% IN SODIUM CHLORIDE 0.225%

DEXTROSE 5% IN SODIUM CHLORIDE 0.45%

DEXTROSE 5% IN SODIUM CHLORIDE 0.9%

DEXTROSE 5% IN WATER

Fructose 10% (Levugen(R) 10%) in water

Invert sugar 10% (Travert(R) 10%) in electrolyte 1

Invert sugar 10% (Travert(R) 10%) in electrolyte 2

Sodium lactate 1/6 M

TOTAL PARENTERAL NUTRITION

3.5.5.2.B.1 DEXTROSE 10% IN SODIUM CHLORIDE 0.9%

a) Compatible

1) DEXTROSE 10% IN SODIUM CHLORIDE 0.9% compatible with sodium iodide; conditions not specified (Fowler, 1967a)

3.5.5.2.B.2 DEXTROSE 10% IN WATER

a) Compatible

1) DEXTROSE 10% IN WATER compatible with sodium iodide; conditions not specified (Fowler, 1967a)

3.5.5.2.B.3 DEXTROSE 5% IN SODIUM CHLORIDE 0.225%

a) Compatible

1) DEXTROSE 5% IN SODIUM CHLORIDE 0.225% compatible with sodium iodide; conditions not specified (Fowler, 1967a)

3.5.5.2.B.4 DEXTROSE 5% IN SODIUM CHLORIDE 0.45%

a) Compatible

1) DEXTROSE 5% IN SODIUM CHLORIDE 0.45% compatible with sodium iodide; conditions not specified (Fowler, 1967a)

3.5.5.2.B.5 DEXTROSE 5% IN SODIUM CHLORIDE 0.9%

a) Compatible

1) DEXTROSE 5% IN SODIUM CHLORIDE 0.9% compatible with sodium iodide; conditions not specified (Fowler, 1967a)

3.5.5.2.B.6 DEXTROSE 5% IN WATER

a) Compatible

1) DEXTROSE 5% IN WATER compatible with sodium iodide; conditions not specified (Fowler, 1967a)

3.5.5.2.B.7 Fructose 10% (Levugen(R) 10%) in water

a) Compatible

1) Fructose 10% (Levugen(R) 10%) in water with sodium iodide 2 g/1000 mL, visually compatible for 24 hours; conditions not specified (Dixon & Weshalek, 1972)

3.5.5.2.B.8 Invert sugar 10% (Travert(R) 10%) in electrolyte 1

a) Compatible

1) Invert sugar 10% (Travert(R) 10%) in electrolyte 1 with sodium iodide 2 g/1000 mL, visually compatible for 24 hours; conditions not specified (Dixon & Weshalek, 1972a)

3.5.5.2.B.9 Invert sugar 10% (Travert(R) 10%) in electrolyte 2

a) Compatible

1) Invert sugar 10% (Travert(R) 10%) in electrolyte 2 with sodium iodide 2 g/1000 mL, visually compatible for 24 hours; conditions not specified (Dixon & Weshalek, 1972a)

3.5.5.2.B.10 Sodium lactate 1/6 M

a) Compatible

1) Sodium iodide 2 g/1000 mL in 1/6 molar sodium lactate in water, visually compatible for 24 hours; conditions not specified (Dixon & Weshalek, 1972b)

3.5.5.2.B.11 TOTAL PARENTERAL NUTRITION

a) Compatible

1) Sodium iodide 100 mg/L with total parenteral nutrition (ProcalAmine(R)), visually compatible with no precipitate (conditions not specified); composition of total parenteral nutrition listed below (Prod Info ProcalAmine(R), 1985):

Amino acids	3%
Glycerol	3%
Electrolytes	present

4.0 Clinical Applications

Monitoring Parameters

Patient Instructions

Place In Therapy

Mechanism of Action / Pharmacology

Therapeutic Uses

Comparative Efficacy / Evaluation With Other Therapies

4.1 Monitoring Parameters

A) Therapeutic

1) Physical Findings

a) Patients should be monitored for prompt wound healing, or the absence of infection.

B) Toxic

1) Physical Findings

a) Patients should be monitored for hypersensitivity, or for the development of

4.2 Patient Instructions

A) Potassium Iodide (By mouth)

Potassium Iodide

Loosens mucus in your chest and lungs. Also protects your thyroid gland from radiation.

When This Medicine Should Not Be Used:
You should not use this medicine if you have had an allergic reaction to potassium iodide. You should not use this medicine if you have an overactive thyroid or goiter (due to lack of

How to Use This Medicine:
Liquid

Your doctor will tell you how much of this medicine to use and how often. Do not use more medicine or use it more often than your doctor tells you to.
Measure the oral liquid medicine with a marked measuring spoon, oral syringe, or medicine cup.
Drink half a glass (4 ounces) of water when you take this medicine.

If a Dose is Missed:

If you miss a dose or forget to use your medicine, use it as soon as you can. If it is almost time for your next dose, wait until then to use the medicine and skip the missed dose. Do not use extra medicine to make up for a missed dose.

How to Store and Dispose of This Medicine:

Store the medicine in a closed container at room temperature, away from heat, moisture, and direct light.
Keep the bottle tightly closed after use.
Ask your pharmacist, doctor, or health caregiver about the best way to dispose of any leftover medicine after you have finished your treatment. You will also need to throw away old medicine after the expiration date has passed.
Keep all medicine away from children and never share your medicine with anyone.

Drugs and Foods to Avoid:
Ask your doctor or pharmacist before using any other medicine, including over-the-counter medicines, vitamins, and herbal products.

Warnings While Using This Medicine:

Make sure your doctor knows if you are pregnant or breast feeding.

Possible Side Effects While Using This Medicine:
Call your doctor right away if you notice any of these side effects:

Allergic reaction: Itching or hives, swelling in your face or hands, swelling or tingling in your mouth or throat, chest tightness, trouble breathing.
Confusion, weakness, uneven heartbeat, shortness of breath, or numbness or tingling in your hands, feet or lips.

If you notice these less serious side effects, talk with your doctor:
Lumps in your armpits or neck.
Metallic taste in your mouth.
Mild nausea, vomiting, or diarrhea.
Mild skin rash.
Pain in your joints.
Skin rash.
Stomach pain.

If you notice other side effects that you think are caused by this medicine, tell your doctor.

4.3 Place In Therapy

A) Iodine

1) Iodine solutions are widely used in the treatment of superficial wounds. The toxicity profile of of the lowest of all the topical antiseptics. It is highly effective in the decontamination of intact skin and minor wounds, and these factors combined with its low cost make it a useful addition to most formularies. However, the routine use of older **iodine** preparations has probably been superseded by the advent of povidone- preparations, which retain antiseptic activity in the presence of body secretions, tissue fluids, and surfactants.

B) Potassium Iodide

1) Potassium iodide is used preoperatively to reduce vascularity of the thyroid gland prior to thyroidectomy, as an antithyroid agent in the management of thyroid storm, and after radioactive disease.

2) Potassium iodide is used to treat erythematous dermatoses, including erythema nodosum, erythema multiforme, and nodular vasculitis.

3) Potassium iodide is the drug of choice for treatment of lymphocutaneous sporotrichosis.

4) Potassium iodide is used as a thyroid blocking agent following exposure to radioisotopes of from a nuclear reactor accident.

5) Potassium iodide is used for adjunctive treatment as an expectorant in respiratory tract disorders such as chronic obstructive pulmonary disease (bronchitis, emphysema, and bronchial asthma), cystic fibrosis, and chronic sinusitis and to help prevent postsurgical atelectasis. Objective evidence of clinical efficacy as an expectorant is lacking. Because of the availability of more effective and safer expectorants, other agents usually are preferred.

4.4 Mechanism of Action / Pharmacology

A) Iodine

1) MECHANISM OF ACTION

a) Free **iodine** captures electrons to form iodide ions. oxidizing carbohydrates, lipids, amino acids, and proteins, thus killing the organism (AMA Department of Drugs, 1986).

b) Elemental **iodine** is a very effective antimicrobial agent. Sufficient concentrations and contact time will kill all bacteria, fungi, protozoa, viruses, and yeasts (AMA Department of Drugs, 1986). Spores, however, are highly resistant to aqueous solutions, but alcoholic solutions of against spores (Osol, 1980).

c) Iodine cannot penetrate tissue without rapid conversion to iodide ions, which are devoid of antimicrobial activity. Thus, **iodine** solutions (with the exception of povidone- the tissue surface (AMA Department of Drugs, 1986).

B) Potassium Iodide

1) MECHANISM OF ACTION

a) Iodides are readily absorbed from the gastrointestinal tract and concentrated primarily in respiratory tract secretions. They enhance secretion of respiratory fluids, thus decreasing mucus viscosity, and also may stimulate breakdown of fibrinoid material in inflammatory exudate. Objective evidence of clinical efficacy is lacking (Olin, 1990).

b) In erythematous dermatoses, the antiinflammatory effect of potassium iodide may be due to an immunosuppressive effect mediated by heparin (Schulz & Whiting, 1976).

c) When administered after exposure to radioisotopes of accumulation of iodide by the thyroid. Mechanisms of action include saturation of the iodide transport

system of the thyroid, inhibition of intrathyroidal organification of iodide, and dilution of the isotope atoms with nonradioactive **iodine** atoms. It also increases the rate of urinary excretion of I-131 iodide atoms and thus decreases whole-body radiation dose (Becker, 1987).

2) REVIEW ARTICLES

a) A review article discussing the use of potassium iodide for the treatment of inflammatory dermatoses; also addresses pharmacology and adverse effects (Sterling & Heymann, 2000).

4.5 Therapeutic Uses

Iodine

Potassium Iodide

4.5.A Iodine

Disinfection

Endemic goiter

Skin ulcer

Thyroid storm

Total parenteral nutrition

4.5.A.1 Disinfection

FDA Labeled Indication

a) Overview

FDA Approval: Adult, yes; Pediatric, yes
Efficacy: Adult, Effective; Pediatric, Effective
Recommendation: Adult, Class IIa; Pediatric, Class IIa
Strength of Evidence: Adult, Category B; Pediatric, Category B

See Drug Consult reference: RECOMMENDATION AND EVIDENCE RATINGS

b) Summary:

IODINE is an effective antiseptic agent for use on intact skin
Tincture of 2% **IODINE** should be used, not the older, stronger 7% tincture (which has been known to cause burns)

c) Adult:

1) **IODINE** 2% tincture is the preferred preparation for decontamination of intact skin prior to venipuncture because it dries faster (AMA Department of Drugs, 1986b; Osol, 1980a). The alcoholic vehicle facilitates spreading and penetration (Goodman & Gilman, 1970).

2) Although the older 7% tincture is also effective, it has caused severe burns, and should probably not be used for this purpose (AMA Department of Drugs, 1986b).

4.5.A.2 Endemic goiter

a) Overview

FDA Approval: Adult, no; Pediatric, no
Efficacy: Adult, Evidence favors efficacy; Pediatric, Evidence favors efficacy
Recommendation: Adult, Class IIa; Pediatric, Class IIa
Strength of Evidence: Adult, Category B; Pediatric, Category B

See Drug Consult reference: RECOMMENDATION AND EVIDENCE RATINGS

b) Summary:

IODINE may be effective treatment for endemic goiter caused by
Reduction in goiter size has occurred following

c) Adult:

1) A 400-microgram daily dose of **IODINE**

patients with endemic GOITER due to **IODINE**
in the size of diffuse goiters (Hintze et al, 1989).
2) Iodine supplementation of euthyroid subjects with endemic goiter normalized thyroid volume but resulted in reversible thyroid dysfunction and autoimmunity in some subjects. Sixty-two subjects with untreated endemic goiter were given either
The mean reduction in goiter size was 38% with I treatment, which was sustained at 18 months. Serum TSH and T3 levels were stable in both groups, but T4 rose with I treatment. Thyroglobulin levels declined during I therapy and rose again during follow-up. Three subjects taking I developed thyroid microsomal autoantibody titers; 2 of the 3 manifested I-induced hypothyroidism, the other hyperthyroidism. Thyroid dysfunctions and antibody titers decreased after I withdrawal (Kahaly et al, 1997a).

d) Pediatric:

1) Iron deficiency anemia reduces the efficacy of
endemic goiter in the Ivory Coast, 51 children with endemic goiter and adequate iron status (group 1) and 53 children with endemic goiter and iron deficiency anemia (group 2) were given a single oral dose of iodized poppy seed oil providing 200 milligrams of
dosing, thyroid volume decreased in both groups, but significantly more so in group 1 (45% vs 22%, p less than 0.001). At 15 and 30 weeks post-dose, the prevalence of goiter was 62% and 64%, respectively, in group 2 and 31% and 12%, respectively, in group 1. The regression of hemoglobin and percentage change in thyroid volume was significant (r(2)=0.606, p less than 0.001) (Zimmerman et al, 2000).

4.5.A.3 Skin ulcer

a) Overview

FDA Approval: Adult, no; Pediatric, no
Efficacy: Adult, Evidence is inconclusive
Recommendation: Adult, Class III
Strength of Evidence: Adult, Category B

See Drug Consult reference: RECOMMENDATION AND EVIDENCE RATINGS

b) Summary:

IODINE-containing ointment was beneficial for treatment of diabetic ulcers of the lower extremities in one small study
The cost of **IODINE** therapy was lower than standard therapy

c) Adult:

1) The results of a small study involving 12 diabetic patients with cavity foot ulcers indicate that cadexomer **iodine** ointment is as effective as standard topical therapy (gentamicin solution, streptodornase/streptokinase, dry saline gauze) in the treatment of exuding diabetic cavity foot ulcers and at a lower cost. Cadexomer **iodine** ointment contains 0.9%
modified starch matrix. This ointment has been shown to be highly fluid-absorbing, antibacterial, and able to dissolve debris and necrotic tissue (Apelqvist & Ragnarson Tennvall, 1996).

4.5.A.4 Thyroid storm

FDA Labeled Indication

a) Overview

FDA Approval: Adult, yes; Pediatric, no
Efficacy: Adult, Effective
Recommendation: Adult, Class I
Strength of Evidence: Adult, Category B

See Drug Consult reference: RECOMMENDATION AND EVIDENCE RATINGS

b) Summary:

IODINE (as Lugol's Solution, potassium iodide, or sodium iodide) has been effective in combination with other agents in managing thyroid storms (Carter et al, 1975; Duncan & Jones, 1973)
IODINE is rapid acting and should be used only on a short-term basis in patients with thyroid storm

4.5.A.5 Total parenteral nutrition

See Drug Consult reference: TRACE MINERAL SUPPLEMENTATION IN TPN

4.5.B Potassium Iodide

Cutaneous sporotrichosis

Erythematous condition

Implementation of protective measures to prevent injury due to radiation sources, Thyroid gland; Prophylaxis

Induction of involution of thyroid

Iodine deficiency; Treatment and Prophylaxis

Livedoid vasculitis

Lymphocutaneous sporotrichosis

4.5.B.1 Cutaneous sporotrichosis

a) Overview

FDA Approval: Adult, no; Pediatric, no
Efficacy: Adult, Evidence favors efficacy; Pediatric, Evidence favors efficacy
Recommendation: Adult, Class IIb; Pediatric, Class IIb
Strength of Evidence: Adult, Category B; Pediatric, Category B

See Drug Consult reference: RECOMMENDATION AND EVIDENCE RATINGS

b) Summary:

Saturated solution of potassium iodide (SSKI) is recommended in adults and children as an alternative treatment for patients not responding to itraconazole for cutaneous sporotrichosis (Kauffman et al, 2007).

c) Adult:

1) Saturated solution of potassium iodide (SSKI) is recommended as an alternative treatment for patients not responding to itraconazole for cutaneous sporotrichosis. Treatment should be continued for 2 to 4 weeks after all lesions have healed, usually a total of 3 to 6 months. Adverse effects such as metallic taste, nausea, abdominal pain and rash are frequent among patients treated with SSKI. Cure rates ranging from 80% to 100% have been reported with SSKI in clinical trials and case reports (Kauffman et al, 2007).

d) Pediatric:

1) Saturated solution of potassium iodide (SSKI) is recommended as an alternative treatment for patients not responding to itraconazole for cutaneous sporotrichosis. Treatment should be continued for 2 to 4 weeks after all lesions have healed, usually a total of 3 to 6 months. Adverse effects such as metallic taste, nausea, abdominal pain and rash are frequent among children treated with SSKI. Cure rates ranging from 80% to 100% have been reported with SSKI in clinical trials and case reports (Kauffman et al, 2007).

4.5.B.2 Erythematous condition

a) Overview

FDA Approval: Adult, no; Pediatric, no
Efficacy: Adult, Evidence is inconclusive
Recommendation: Adult, Class IIb
Strength of Evidence: Adult, Category C

See Drug Consult reference: RECOMMENDATION AND EVIDENCE RATINGS

b) Summary:

Has been used for erythematous dermatoses, including erythema nodosum, nodular vasculitis, and erythema multiforme

4.5.B.3 Implementation of protective measures to prevent injury due to radiation sources, Thyroid gland; Prophylaxis

FDA Labeled Indication

a) Overview

FDA Approval: Adult, yes; Pediatric, yes
Efficacy: Adult, Effective; Pediatric, Effective
Recommendation: Adult, Class IIa; Pediatric, Class IIa
Strength of Evidence: Adult, Category B; Pediatric, Category B

See Drug Consult reference: RECOMMENDATION AND EVIDENCE RATINGS

b) Summary:

Potassium iodide is used following radiation exposure (eg, nuclear reactor accident) to block uptake by the thyroid of radioactive
risk of radiation-induced thyroid neoplasms
Combination therapy of potassium iodide, methimazole, and thyroxine protected thyroid function better than did potassium iodide alone in children being treated with metaiodobenzylguanidine for neuroblastoma

c) Adult:

1) General Information

Potassium iodide (KI) reduces the risk of thyroid cancer in radiation emergencies involving the release of radioactive **iodine**. KI protects the thyroid in radiation emergencies by saturating the gland with non-radioactive **iodine**. This blocks the uptake of radioactive
or contaminated water, milk, or other foods. The Food and Drug Administration (FDA) recommends that state and local public health officials should consider the use of KI depending on the measured radiation exposure, and the age of the person exposed.
There is an inverse relationship between the risk of thyroid cancer and age. Younger individuals are at higher risk for thyroid cancer than older individuals. The FDA recommends the following KI doses based on age, predicted thyroid exposure, and pregnancy and lactation status:

AGE
Adults over 40 yrs
Adults over 18 through 40 yrs
Pregnant or lactating women
Children over 3 through 18 years(**)
Children over 1 month through 3 yrs
Birth through 1 month
(*)...A centigray (cGY) is a unit of measure of radiation exposure in humans; 1cGy=1 REM
(**)..Adolescents approaching adult size (70 kilograms or greater) should receive an adult dose (130 mg)
(&)...mg = milligrams

These doses can block approximately 90% of radioiodine absorption if the first dose is taken a few hours before or immediately after exposure. Even if the dose is taken 3 to 4 hours after exposure, the drug can still block about 50% of radioiodine absorption. The recommended dose should be taken daily until the risk of exposure to radioiodines no longer exists. The protective effects of KI last approximately 24 hours. Potassium iodide does not reduce body uptake of other radioactive substances nor provide protection against other effects of radiation exposure.
KI, though generally well tolerated, has been associated with some side effects including mild gastrointestinal distress (more frequent in children), and rash. Transient hypothyroidism was observed in 0.37% of the neonates treated with KI following Chernobyl. Due to the potential consequences of transient hypothyroidism on brain development, the FDA recommends that all neonates treated with KI be monitored by measuring TSH and treating hypothyroidism should it develop. It is also recommended that repeat dosing be avoided in pregnant and lactating women, and neonates to minimize the risk of hypothyroidism.
KI in a tablet form or as a fresh saturated solution should be used. The solution can be diluted in milk, water, or formula. KI is also available as an ingredient in prescription drugs for treating

asthma and other lung disorders; however, these prescription products are not suitable for use in a radiation emergency. The high dosage in prescription tablets, for example, exceeds that approved for thyroid blocking. Also, the enteric coating on these tablets delays absorption and may impede the effectiveness in a radiation emergency.

The safe and effective use of KI as a thyroid blocking agent depends on a determination by local public health authorities that a radiation emergency has occurred that is likely to release radioactivity, and that the benefits of using KI outweigh its risks. Since the use of KI is not without risk, special labeling for the consumer must accompany the drug, stating that it should be taken only when directed by public health authorities (FDA, 2001; Becker, 1987a; Becker et al, 1984; Crocker, 1984).

d) Pediatric:

1) Combination therapy with thyroxine, methimazole, and potassium iodide (referred to as DBR prophylaxis: dilute, block, and replace) afforded better protection of the thyroid gland than did potassium iodide alone when children with neuroblastoma were being diagnosed and/or treated with metaiodobenzylguanidine (MIBG). A cohort of 34 children (age range 0.5 to 128 months) with confirmed or suspected neuroblastoma were given daily thyroxine 100 micrograms/meter(2) in 1 dose, methimazole 0.5 milligrams/kilogram body mass in 2 doses, and potassium iodide 90 milligrams in 3 doses. All were administered orally. Thyroxine and methimazole were started 1 day before MIBG, and potassium iodide was started on the morning of administration of MIBG. Thyroid protection was given for 3 days when 123I- MIBG was administered (diagnosis). For patients receiving 131I-MIBG (treatment), thyroxine and methimazole were given for 4 weeks and potassium iodide for 2 weeks. Protection was continued between times of administration of MIBG. Thyrotropin elevation was used as a measure of thyroid damage. At the end of follow-up, which ranged from 1 to 34 months (mean 19 months), 15 (65%) of the 23 evaluable patients had no thyrotropin elevation (TE), 4 (17%) had transient TE, and 4 (17%) had permanent TE. In a historic control group who received only potassium iodide for thyroid protection while receiving MIBG, 29 of 42 (48%) had no TE, 4 (9%) had transient TE, and 18 (43%) had permanent TE. Of patients receiving DBR, the proportion with permanent TE was significantly less than corresponding proportion of patients who received only potassium iodide (p=0.038). In the entire DBR group (n=34), 11 patients (33.5%) showed radioiodide uptake on at least 1 occasion, compared to 35 of 42 patients (83%) who received only potassium iodide (p=0.000 by Pearson chi-square test). DBR was associated with no liver toxicity, bone marrow toxicity, or other side effects. There were no signs of hyperthyroidism, and all thyroid parameters returned to normal within 2 months (van Santen et al, 2003).

4.5.B.4 Induction of involution of thyroid

a) Overview

FDA Approval: Adult, no; Pediatric, no
Efficacy: Adult, Effective; Pediatric, Effective
Recommendation: Adult, Class IIa; Pediatric, Class IIa
Strength of Evidence: Adult, Category B; Pediatric, Category B

See Drug Consult reference: RECOMMENDATION AND EVIDENCE RATINGS

b) Summary:

Potassium iodide is used concurrently with an antithyroid agent to induce thyroid involution prior to thyroidectomy. (Feek et al, 1980)

Potassium iodide 15 milligrams/day up to 250 milligrams 3 times a day is used 10 to 14 days preoperatively to reduce vascularity of the thyroid gland prior to thyroidectomy (Reynolds, 1990)

It is given in doses of 100 to 150 milligrams orally prior to administration of
to saturate the thyroid gland when uptake of radioiodine by the thyroid is not desired; potassium **iodine** also is given for up to 2 weeks after radioiodine treatment (Reynolds, 1990)

4.5.B.5 Iodine deficiency; Treatment and Prophylaxis

a) Overview

FDA Approval: Adult, no; Pediatric, no
Efficacy: Pediatric, Evidence favors efficacy
Recommendation: Pediatric, Class IIb
Strength of Evidence: Pediatric, Category B

See Drug Consult reference: RECOMMENDATION AND EVIDENCE RATINGS

b) Summary:

Potassium iodide is used for prophylaxis and treatment of areas where diet is deficient in **iodine**
It is given as iodized salt (Reynolds, 1990)

c) Pediatric:

1) A 10% potassium iodide solution administered as 8.7 milligrams (mg) 29.7 mg every month corrected **iodine** deficiency more effectively than did larger, less frequent doses. School children (n=305), aged 7 to 13 years, in an area of Zimbabwe known to have a high rate of **iodine** deficiency diseases, were given one of 5 dosages of solution: 8.7 mg every 2 weeks, 29.7 mg every month, 148.2 mg every 3 months, 382 mg every 6 months, and 993 mg once. The study extended for 13 months. At 6 months, thyroglobulin had decreased in all groups and had normalized in the first 2 groups to levels of populations. At 13 months, standardized thyroid volume (taking increased body height into account) was less than baseline volumes in the first 2 groups and remained unchanged in the other 3 groups. Although total annual dose of **iodine** was greater in the groups with the less frequent administration, the smaller, more frequent doses were more effective. Potassium iodide given at intervals greater than 3 months is less effective than is **iodine**

4.5.B.6 Livedoid vasculitis

a) Overview

FDA Approval: Adult, no; Pediatric, no
Efficacy: Adult, Evidence favors efficacy
Recommendation: Adult, Class IIb
Strength of Evidence: Adult, Category C

See Drug Consult reference: RECOMMENDATION AND EVIDENCE RATINGS

b) Summary:

Oral potassium iodide cured livedo vasculitis in a reported case

c) Adult:

1) Oral potassium iodide resolved the skin lesions of a 25-year-old woman with livedo vasculitis that had been refractory to treatment with steroids and an immunosuppressant. The woman presented with multiple small ulcers, white atrophic scars, telangiectasias, hyperpigmentation, and erythematous nodules on her lower legs and ankles. Histological evidence of ischemic necrosis of the epidermis, vascular occlusion of the small arterioles with fibrinoid deposition in the walls, fresh microthrombi in capillaries with perivascular lymphocytic infiltrate, and mild chronic panniculitis led to the diagnosis of lived vasculitis. Six months of treatment with steroids alone or steroids plus an immunosuppressant brought no improvement. After institution of oral potassium iodide treatment 300 milligrams 3 times per day, a good response was evident at 4 weeks, with complete cure of the skin ulcers in 2 months (Abraham et al, 2003).

4.5.B.7 Lymphocutaneous sporotrichosis

a) Overview

FDA Approval: Adult, no; Pediatric, no
Efficacy: Adult, Evidence favors efficacy; Pediatric, Evidence favors efficacy
Recommendation: Adult, Class IIb; Pediatric, Class IIb
Strength of Evidence: Adult, Category B; Pediatric, Category B

See Drug Consult reference: RECOMMENDATION AND EVIDENCE RATINGS

b) Summary:

Saturated solution of potassium iodide (SSKI) is recommended in adults and children as an alternative treatment for patients not responding to itraconazole for lymphocutaneous sporotrichosis (Kauffman et al, 2007).

c) Adult:

1) Saturated solution of potassium iodide (SSKI) is recommended as an alternative treatment for patients not responding to itraconazole for lymphocutaneous sporotrichosis. Treatment should be continued for 2 to 4 weeks after all lesions have healed, usually a total of 3 to 6 months. Adverse effects such as metallic taste, nausea, abdominal pain and rash are frequent among patients treated

with SSKI. Cure rates ranging from 80% to 100% have been reported with SSKI in clinical trials and case reports (Kauffman et al, 2007).

d) Pediatric:

1) Saturated solution of potassium iodide (SSKI) is recommended as an alternative treatment for patients not responding to itraconazole for lymphocutaneous sporotrichosis. Treatment should be continued for 2 to 4 weeks after all lesions have healed, usually a total of 3 to 6 months. Adverse effects such as metallic taste, nausea, abdominal pain and rash are frequent among children treated with SSKI. Cure rates ranging from 80% to 100% have been reported with SSKI in clinical trials and case reports (Kauffman et al, 2007).

4.6 Comparative Efficacy / Evaluation With Other Therapies

Levothyroxine

Povidone Iodine

4.6.A Levothyroxine

4.6.A.1 Goiter

a) A daily dose of **iodine** (400 micrograms), as di-iodotyrosine, or a combination of levothyroxine(75 mcg) and **iodine** (200 mcg) is at least as effective as levothyroxine (150 mcg/day) alone in the treatment of endemic goiter due to **iodine** deficiency (Hintze & Emrich D Kobberling, 1989). All 3 therapies, initially, produced a significant reduction in the size of diffuse goiters; however, only the levothyroxine-treated group experienced a rebound increase in goiter size.

b) JUVENILE GOITERS, in children 13 to 15 years of age, respond rapidly to daily treatment with either 150 mcg of iodide, 100 mcg of levothyroxine, or 50 mcg of levothyroxine plus 100 mcg of iodide (Einenkel et al, 1992). However, treatment with levothroxine alone only temporarily blocked the thyroid's tendency to enlarge and withholding or reducing the dose resulted in relapse.

4.6.B Povidone Iodine

4.6.B.1 Disinfection, Skin

a) Tincture of **iodine** (2% **iodine** tincture in 47% alcohol) was superior to povidone disinfecting skin prior to phlebotomy. The tincture of isopropyl alcohol applicator to be used for a 1- minute scrub before using the gauze pad containing tincture of **iodine**. One or the other of the disinfecting methods was used for the collection of 3,851 blood samples by trained and experienced phlebotomists. The rates of infection of blood samples by skin flora were 3.8% for povidone **iodine** and 2.4% for

6.0 References

1. AMA Department of Drugs: AMA Drug Evaluations, 6th. American Medical Association, Chicago, IL, 1986a.
2. AMA Department of Drugs: AMA Drug Evaluations, 6th. American Medical Association, Chicago, IL, 1986b.
3. AMA Department of DrugsAMA Department of Drugs: AMA Drug Evaluations, 6th. American Medical Association, Chicago, IL, 1986.
4. Abraham Z, Rozenbaum M, Portnoy E, et al: Severe livedo vasculitis treted with potassium iodide. Rheumatol Int 2003; 23:96-98.
5. Abrams CK, Siram SM, Galsim C, et al: Selenium deficiency in long-term parenteral nutrition. Nutr Clin Prac 1992; 7:175-178.

6. Anderson PO: Drug use during breast-feeding. Clin Pharm 1991; 10:594-624.
7. Anon: AMA DE, 6th edition,, American Medical Association, Chicago, 1986.
8. Anon: American Academy of Pediatrics Committee on Drugs: The transfer of drugs and other chemicals into human milk. Pediatrics 2001; 108(3):776-789.
9. Anon: Breastfeeding and Maternal Medication. World Health Organization, Geneva, Switzerland, 2002.
10. Anon: Committee on Drugs & American Academy of Pediatrics: The transfer of drugs and other chemicals into human milk. Pediatrics 1994; 93:137-150.
11. Anon: Dietary reference intakes for thiamin, riboflavin, niacin, vitamin B6, folate, vitamin B12, pantothenic acid, biotin, and choline. Institute of Medicine of the National Academies. . 1998a. Available from URL: http://books.nap.edu/books/030906552/html. As accessed accessed 3/31/2004.
12. Anon: Dietary reference intakes for vitamin A, vitamin K, arsenic, boron, chromium, copper, manganese, molybdenum, nickel, silicon, vanadium, and zinc. Institute of Medicine of the National Academies. . 2002. Available from URL: http://www.nap.edu/openbook/030907294/html. As accessed Accessed March 31, 2004.
13. Anon: Guidance: Potassium iodide as a thyroid blocking agent in radiation emergencies. US Food and Drug Administration Center for Drug Evaluation and Research (CDER). Rockville, MD, USAAvailable from URL: http://www.fda.gov/cder/guidance/4825fnl.htm#Acknowledgements. As accessed 09/22/04.
14. Anon: Recommended Dietary Allowances, 10th. National Academy Press, Washington, DC, 1989.
15. Anonymous. **Iodine** deficiency disorders eliminated by the year 2000.. WHO Features 143: 1–3., 1990.
16. Another reason for **iodine** prophylaxis.. The Lancet 335: 1433–34., 1990.
17. Apelqvist J & Ragnarson Tennvall G: Cavity foot ulcers in diabetic patients: a comparative study of cadexomer **iodine** ointment and standard treatment: an economic analysis alongside a clinical trial. Acta Derm Venerol (Stockh) 1996; 76:231-235.
18. Arena JM & Drew RHArena JM & Drew RH (Eds): Poisoning, 5th. Charles C Thomas, Springfield, IL, 1986.
19. Atkinson HC, Begg EJ, & Darlow BA: Drugs in human milk. Clinical pharmacokinetic considerations. Clin Pharmacokinet 1988; 14:217-240.
20. Atkinson HC, Begg EJ, & Darlow BA: Drugs in human milk: clinical pharmacokinetic considerations. JAMA 1982; 247:463.
21. Aursnes J: Ototoxic effect of **iodine** disinfectants.. Acta Otolaryngol 1982; 93(3-4):219-26.
22. Aursnes J: Ototoxic effect of **iodine** disinfectants.. Acta Otolaryngol 1982a; 93(3-4):219-26.
23. Barnes ND, O'Connell EJ, & Cloutier MD: Iodide-induced (SSKI) hypothyroidism in infancy. Ann Allergy 1975; 35:305-308.
24. Becker DV, Braverman LE, Dunn JT, et al: The use of reactor accident: report of the Environmental Hazards Committee of the American Thyroid Association. JAMA 1984; 252:659-661.
25. Becker DV: Reactor accidents: public health strategies and their medical implications. JAMA 1987; 258:649-654.
26. Becker DV: Reactor accidents: public health strategies and their medical implications. JAMA 1987a; 258:649-654.
27. Bogash RC: Compatibilities and incompatibilities of some parenteral medication. Bull Am Soc Hosp Pharm 1955; 12:445-448.
28. Busenbark LA & Cushnie SA: Effect of graves' disease and methimazole on warfarin anticoagulation. Ann Pharmacother 2006; 40(6):1200-1203.
29. Carter JN, Eastman CJ, Kilham HA, et al: Rational therapy for thyroid storm. Aust N Z J Med 1975; 5(5):458-461.
30. Chanoine JP, Bourdoux P, & Thi NB: **Iodine** contamination of urine samples by test strips.. Clin Chem 1987a; 33(10):1935.
31. Chanoine JP, Bourdoux P, & Vo Thi NB: **Iodine** contamination of urine samples by test strips.. Clin Chem 1987; 33(10):1935.
32. Chute JP, Dahut WL, Shakir KM, et al: Enhancement of warfarin induced hypoprothrombinemia by hyperthyroidism. Blood 1994; 84(suppl 1):674a.
33. Committee on Nutritional Status during Pregnancy.. National Academy of Sciences. Washington, DC: National Academy Press, 1-23., 1990.
34. Cooper R: Potassium iodide for radiation exposure.. DICP 1988; 22:33-4.
35. Crepin G: Danger of **iodine** drugs in the pregnant woman. Phlebologie 1978; 31:279-285.
36. Crocker DG: Nuclear reactor accidents - the use of KI as a blocking agent against radioiodine uptake in the thyroid - a review. Health Physics 1984; 46:1265-1279.
37. Danziger, Y, & Pertzelan A: Transient congenital hypothyroidism after topical

Arch Dis Child 1987; 62:295-296.
38. Delange F & Burgi H: **Iodine** deficiency disorders in Europe.. Bull WHO 1989; 67(3):317-25.
39. Delange F & Chanoine JP: Topical **iodine**, breastfeeding, and neonatal hypothyroidism. Arch Dis Child 1988; 63:106-107.
40. Dixon FW & Weshalek J: Physical compatibility of nine drugs in various intravenous solutions. Am J Hosp Pharm 1972; 29:822-823.
41. Dixon FW & Weshalek J: Physical compatibility of nine drugs in various intravenous solutions. Am J Hosp Pharm 1972a; 29:822-823.
42. Dixon FW & Weshalek J: Physical compatibility of nine drugs in various intravenous solutions. Am J Hosp Pharm 1972b; 29:822-823.
43. Dollery C: Therapeutic drugs, Churchill Livingstone, Edinburgh, 1991, pp 149-51.
44. Dollery C: Therapeutic drugs, Churchill Livingstone, Edinburgh, 1991a, pp 149-51.
45. Domenech E, Santisteban M, Moya M, et al: Transient neonatal hyperthyroidism in the child of a treated hyperthyroid mother. Subsequent appearance of sexual precocity. (Spanish). Anales Espanoles de Pediatria 1985; 22:281-287.
46. Drug-induced goiters in the fetus and in children and adults.. Medical Letter., 7/24/70.
47. Duncan G & Jones D: Thyroid crisis: a case report and current treatment. J S C Med Assoc 1973; 69(10):377-380.
48. Einenkel D, Bauch KH, & Benker G: Treatment of juvenile goitre with levothyroxine, iodide or a combination of both: the value of ultrasound grey-scale analysis. Acta Endocrinologica 1992; 127:301-306.
49. Einenkel D, Bauch KH, & Benker G: Treatment of juvenile goitre with levothyroxine, iodide or a combination of both: the value of ultrasound grey-scale analysis. Acta Endocrinologica 1992a; 127:301-306.
50. FDA: Guidance: Potassium iodide as a thyroid blocking agent in radiation emergencies. U.S. Department of Health and Human Services, Food and Drug Administration, Center for Drug Evaluation and Research. Available at: www.fda.gov/cder/guidance/4825fnl.htm (cited 03/03/2002), November 2001.
51. FDA: Guidance: Potassium iodide as a thyroid blocking agent in radiation emergencies. U.S. Department of Health and Human Services, Food and Drug Administration, Center for Drug Evaluation and Research. Available at: www.fda.gov/cder/guidance/4825fnl.htm (cited 03/03/2002), November 2001a.
52. Feek C, Sawers J, & Irvine J: Combination of potassium iodide and propranolol in preparation of patients with Graves' disease for thyroid surgery.. N Eng J Med 1980; 302:883-5.
53. Fleeger CA: USAN 1993. USAN and the USP dictionary of drug names, The United States Pharmacopeial Convention, Inc, Rockville, MD, 1992, pp 333.
54. Fleeger: USP dictionary of USAN and international drug names 1995, The United States Pharmacopeial Convention, Rockville, MD, 1994, pp 618.
55. Fleming CR: Trace element metabolism in adult patients requiring total parenteral nutrition. Am J Clin Nutr 1989; 49:573-579.
56. Fowler TJ: Some incompatibilities of intravenous admixtures. Am J Hosp Pharm 1967; 24:450-457.
57. Fowler TJ: Some incompatibilities of intravenous admixtures. Am J Hosp Pharm 1967a; 24:450-457.
58. Fradkin J & Wolff J: Iodide-induced thyrotoxicosis.. Medicine 1983; 62(1):1-20.
59. Goodman LS & Gilman A (Eds): The Pharmacological Basis of Therapeutics, 4th. Macmillan Publishing Co, New York, NY, 1970.
60. Goodman LS & Gilman AGoodman LS & Gilman A (Eds): The Pharmacological Basis of Therapeutics, 4th. Macmillan Publishing Co, New York, NY, 1970a.
61. Goodman and Gilman: Goodman and Gilman, The pharmacological Basis of Therapeutics, 7th edition,, Macmillan, New York, NY, 1985.
62. Gottardi W: The influence of the chemical behavior of containing **iodine**.. J Hosp Infect 1985; 6 Suppl A:1-11.
63. Gottardi W: The influence of the chemical behavior of containing **iodine**.. J Hosp Infect 1985a; 6 Suppl A:1-11.
64. Grant J: Chemical disinfection: choices and application.. Trop Doct 1977; 7(2):73-5.
65. Gruters A, L"Allemand D, & Heidemann PH: Incidence of hyperthyrotropinemia.. Eur J Pediatr 1983; 140(4):299-300.
66. Haddad LM & Winchester JF: Clinical management of poisoning and drug overdose, W. B. Saunders Co., Philadelphia, 1983, pp 697-703.
67. Haddad LM & Winchester JF: Clinical management of poisoning and drug overdose., W. B. Saunders Co., Philadelphia, 1983a, pp 697-703.
68. Hansten PD: Oral anticoagulants and drugs which alter thyroid function. Drug Intell Clin Pharm 1980; 14:331-334.

69. Hetzel B.: **Iodine** deficiency disorders (IDD) and their eradication.. The Lancet 1126–9., 11/12/83.
70. Hintze G & Emrich D Kobberling J: Treatment of endemic goitre due to levothyroxine or both: results of a multicentre trial. Eur J Clin Invest 1989; 19:527-534.
71. Hintze G, Emrich D, Kobberling J, et al: Treatment of endemic goitre due to levothyroxine or both: results of a multicentre trial. Eur J Clin Invest 1989; 19:527-534.
72. Horio T, Danno K, Okamoto H, et al: Potassium iodide in erythema nodosum and other erythematous dermatoses. J Am Acad Dermatol 1983; 9:77-81.
73. Horio T, Imamura S, Danno K, et al: Potassium iodide in the treatment of erythema nodosum and nodular vasculitis. Arch Dermatol 1981; 117:29-31.
74. Hurrell RF: Bioavailability of **iodine**. Eur J Clin Nutr 1997; 51(suppl 1):S9-S12.
75. Iannone LA: Protamine-renografin chemical embolus. Am Heart J 1975; 90:678-679.
76. Institute for Safe Medication Practices: ISMP's list of confused drug names. Institute for Safe Medication Practices. Huntingdon Valley, PA. 2005. Available from URL: http://ismp.org/Tools/confuseddrugnames.pdf.
77. **Iodine** Tincture bottle label.. Cumberland-Swan—US., Rec 8/93.
78. Iodopen product information (LyphoMed—US). Rev, 5/84.
79. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989; 173:91-92.
80. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989a; 173:91-92.
81. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989aa; 173:91-92.
82. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989ab; 173:91-92.
83. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989ac; 173:91-92.
84. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989ad; 173:91-92.
85. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989ae; 173:91-92.
86. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989af; 173:91-92.
87. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989ag; 173:91-92.
88. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989ah; 173:91-92.
89. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989ai; 173:91-92.
90. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989aj; 173:91-92.
91. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989ak; 173:91-92.
92. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989al; 173:91-92.
93. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989am; 173:91-92.
94. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989an; 173:91-92.
95. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989ao; 173:91-92.
96. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989ap; 173:91-92.
97. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989aq; 173:91-92.
98. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989ar; 173:91-92.
99. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989as; 173:91-92.
100. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989at;

173:91-92.
101. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989au; 173:91-92.
102. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989av; 173:91-92.
103. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989aw; 173:91-92.
104. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989ax; 173:91-92.
105. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989ay; 173:91-92.
106. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989az; 173:91-92.
107. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989b; 173:91-92.
108. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989ba; 173:91-92.
109. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989bb; 173:91-92.
110. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989bc; 173:91-92.
111. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989bd; 173:91-92.
112. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989be; 173:91-92.
113. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989bf; 173:91-92.
114. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989bg; 173:91-92.
115. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989bh; 173:91-92.
116. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989c; 173:91-92.
117. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989d; 173:91-92.
118. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989e; 173:91-92.
119. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989f; 173:91-92.
120. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989g; 173:91-92.
121. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989h; 173:91-92.
122. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989i; 173:91-92.
123. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989j; 173:91-92.
124. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989k; 173:91-92.
125. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989l; 173:91-92.
126. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989m; 173:91-92.
127. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989n; 173:91-92.
128. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989o; 173:91-92.
129. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989p;

173:91-92.
130. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989q; 173:91-92.
131. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989r; 173:91-92.
132. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989s; 173:91-92.
133. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989t; 173:91-92.
134. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989u; 173:91-92.
135. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989v; 173:91-92.
136. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989w; 173:91-92.
137. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989x; 173:91-92.
138. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989y; 173:91-92.
139. Irving HD & Burbridge BE: Incompatibility of contrast agents with intravascular medications. Radiology 1989z; 173:91-92.
140. Ishida T, Himeno K, Torigoe Y, et al: Selenium deficiency in a patient with Crohn's disease receiving long-term total parenteral nutrition. Intern Med 2003; 42:154-157.
141. Jawetz E.: Disinfectants and antiseptics. In: Katzung BG, editor. Basic and clinical pharmacology., Appleton and Lange, Norwalk, CT, 1992, pp 691-4.
142. Jawetz E: Disinfectants and antiseptics In: Jawetz E: Basic and clinical pharmacology, Appleton and Lange, Norwalk, 1992, pp 691-4.
143. Jones RW, Stanko GL, & Gross HM: Pharmaceutical compatibilities of Pentothal and Nembutal. Am J Hosp Pharm 1961a; 18:700-704.
144. Jones RW, Stanko GL, & Gross HM: Pharmaceutical compatibilities of pentothal and nembutal. Am J Hosp Pharm 1961; 18:700-704.
145. Jorgensen JV, Brandrup F, & Schroll M: Possible synergism between 223:192-193.
146. Kahaly G, Dienes HP, Beyer J, et al: Randomized, double blind, placebo-controlled trial of low dose iodide in endemic goiter. J Clin Endocrinol Metab 1997; 82:4049-4053.
147. Kahaly G, Dienes HP, Beyer J, et al: Randomized, double blind, placebo-controlled trial of low dose iodide in endemic goiter. J Clin Endocrinol Metab 1997a; 82:4049-4053.
148. Kahn FH & Visscher BR: Water disinfection in the wilderness. West J Med 1975; 122:450-453.
149. Kampe O, Jansson R, Karlsson FA, et al: Effects of L-thyroxine and iodide on the development of autoimmune postpartum thyroiditis. J Clin Endocrinol Metab 1990; 70:1014-1018.
150. Kanakiriya S, De Chazal I, Nath KA, et al: **Iodine** toxicity treated with hemodialysis and continuous venovenous hemodiafiltration. Am J Kidney Dis 2003; 41(3):702-728.
151. Kauffman CA, Bustamante B, Chapman SW, et al: Clinical practice guidelines for the management of sporotrichosis: 2007 update by the Infectious Diseases Society of America. Clin Infect Dis 2007; 45(10):1255-1265.
152. Keller K, Hansel R, & Chandler RFKeller K, Hansel R, & Chandler RF (Eds): Adverse Effects of Herbal Drugs, 1, Springer-Verlag, Berlin, Germany, 1993.
153. Keller K, Hansel R, & Chandler RFKeller K, Hansel R, & Chandler RF (Eds): Adverse Effects of Herbal Drugs, 1, Springer-Verlag, Berlin, Germany, 1993a.
154. Keller K, Hansel R, & Chandler RFKeller K, Hansel R, & Chandler RF (Eds): Adverse Effects of Herbal Drugs, 1, Springer-Verlag, Berlin, Germany, 1993b.
155. Keller K, Hansel R, & Chandler RFKeller K, Hansel R, & Chandler RF (Eds): Adverse Effects of Herbal Drugs, 1, Springer-Verlag, Berlin, Germany, 1993c.
156. Khan LK, Li R, Gootnick D, et al: Thyroid abnormalities related to Lancet 1998; 352(9139):1519.
157. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992; 27:45-49.
158. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic

agents. Invest Radiol 1992a; 27:45-49.
159. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992aa; 27:45-49.
160. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992ab; 27:45-49.
161. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992ac; 27:45-49.
162. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992ad; 27:45-49.
163. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992ae; 27:45-49.
164. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992af; 27:45-49.
165. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992ag; 27:45-49.
166. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992ah; 27:45-49.
167. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992ai; 27:45-49.
168. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992aj; 27:45-49.
169. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992ak; 27:45-49.
170. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992al; 27:45-49.
171. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992am; 27:45-49.
172. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992an; 27:45-49.
173. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992ao; 27:45-49.
174. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992ap; 27:45-49.
175. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992aq; 27:45-49.
176. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992ar; 27:45-49.
177. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992as; 27:45-49.
178. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992at; 27:45-49.
179. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992au; 27:45-49.
180. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992av; 27:45-49.
181. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992aw; 27:45-49.
182. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992ax; 27:45-49.
183. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992ay; 27:45-49.
184. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992az; 27:45-49.
185. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992b; 27:45-49.
186. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992ba; 27:45-49.
187. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic

agents. Invest Radiol 1992bb; 27:45-49.
188. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992bc; 27:45-49.
189. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992bd; 27:45-49.
190. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992be; 27:45-49.
191. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992bf; 27:45-49.
192. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992bg; 27:45-49.
193. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992bh; 27:45-49.
194. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992bi; 27:45-49.
195. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992bj; 27:45-49.
196. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992bk; 27:45-49.
197. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992bl; 27:45-49.
198. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992bm; 27:45-49.
199. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992bn; 27:45-49.
200. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992bo; 27:45-49.
201. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992bp; 27:45-49.
202. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992bq; 27:45-49.
203. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992br; 27:45-49.
204. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992bs; 27:45-49.
205. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992bt; 27:45-49.
206. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992bu; 27:45-49.
207. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992bv; 27:45-49.
208. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992bw; 27:45-49.
209. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992bx; 27:45-49.
210. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992by; 27:45-49.
211. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992bz; 27:45-49.
212. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992c; 27:45-49.
213. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992ca; 27:45-49.
214. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992cb; 27:45-49.
215. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992cc; 27:45-49.
216. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic

agents. Invest Radiol 1992cd; 27:45-49.
217. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992ce; 27:45-49.
218. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992cf; 27:45-49.
219. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992cg; 27:45-49.
220. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992ch; 27:45-49.
221. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992ci; 27:45-49.
222. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992cj; 27:45-49.
223. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992ck; 27:45-49.
224. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992cl; 27:45-49.
225. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992cm; 27:45-49.
226. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992cn; 27:45-49.
227. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992co; 27:45-49.
228. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992cp; 27:45-49.
229. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992cq; 27:45-49.
230. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992cr; 27:45-49.
231. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992d; 27:45-49.
232. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992e; 27:45-49.
233. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992f; 27:45-49.
234. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992g; 27:45-49.
235. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992h; 27:45-49.
236. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992i; 27:45-49.
237. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992j; 27:45-49.
238. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992k; 27:45-49.
239. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992l; 27:45-49.
240. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992m; 27:45-49.
241. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992n; 27:45-49.
242. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992o; 27:45-49.
243. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992p; 27:45-49.
244. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992q; 27:45-49.
245. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic

agents. Invest Radiol 1992r; 27:45-49.
246. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992s; 27:45-49.
247. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992t; 27:45-49.
248. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992u; 27:45-49.
249. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992v; 27:45-49.
250. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992w; 27:45-49.
251. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992x; 27:45-49.
252. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992y; 27:45-49.
253. Kim SH, Lee HK, & Han MC: Incompatibility of water-soluble contrast media and intravascular pharmacologic agents. Invest Radiol 1992z; 27:45-49.
254. Kirkland WD, Jones RW, Ellis JR, et al: Compatibility studies of parenteral admixtures. Am J Hosp Pharm 1961; 18:694-699.
255. Kirkland WD, Jones RW, Ellis JR, et al: Compatibility studies of parenteral admixtures. Am J Hosp Pharm 1961a; 18:694-699.
256. Klevit HDKlevit HD: In: Gardner LI (ed): Endocrine and Genetic Diseases of Childhood, WB Saunders, Philadelphia, PA, 1969, pp 246-247.
257. Knoben J & Anderson P: Handbook of clinical drug data, Drug Intelligance Publications, Inc., Hamilton, IL, 1993, pp 175.
258. Kramer W, Inglott A, & Cluxton R: Some physical and chemical incompatibilities of drugs for IV administration. Drug Intell Clin Pharm 1971; 5:211-228.
259. Kramer W, Inglott A, & Cluxton R: Some physical and chemical incompatibilities of drugs for IV administration. Drug Intell Clin Pharm 1971a; 5:211-228.
260. Kumpf VJ: Parenteral iron supplementation. Nutr Clin Prac 1996; 11:139-146.
261. Kurtz SC & Aber RC: Potassium iodide as a cause of prolonged fever. Arch Intern Med 1982; 142:1543-1544.
262. L"Allemand D, Gruters A, & Beyer P: **Iodine** in contrast agents and skin disinfectants is the major cause for hypothyroidism in premature infants during intensive care.. Horm Res 1987; 28(1):42-9.
263. Lawrence RA & Lawrence RMLawrence RA & Lawrence RM: Breastfeeding, A Guide for the Medical Profession, 5th. Mosby, St Louis, MO, 1999.
264. Leung FY: Trace elements in parenteral micronutrition. Clin Biochem 1995; 28:561-566.
265. Little JR, Murray PR, Traynor PS, et al: A randomized trial of povidone-venipuncture site disinfection: effects on rates of blood culture contamination. Am J Med 1999; 107:119-125.
266. Mahillon I, Peers W, Bourdoux P, et al: Effect of vaginal douching with povidone-on the **iodine** supply to mother and fetus. Biol Neonate 1989; 56(4):210-217.
267. Marshall TR, Ling JT, Follis G, et al: Pharmacological incompatibility of contrast media with various drugs and agents. Radiology 1965; 84:536-539.
268. Marshall TR, Ling JT, Follis G, et al: Pharmacological incompatibility of contrast media with various drugs and agents. Radiology 1965a; 84:536-539.
269. Martin CM & Taylor G: Chemical incompatibility of Renografin 76 and protamine sulfate. Am Heart J 1976; 91:675.
270. Marz RB: Medical Nutrition From Marz, Omni-Press, Portland, OR, 1997.
271. McEvoy & Gerald K.: AHFS Drug Information, American Society of Health-System Pharmacists, Bethesda, ME, 1990.
272. Mehta PS, Mehta SJ, & Vorherr H: Congenital iodide goiter and hypothyroidism: a review. Obstet Gynecol Surv 1983; 38:237-247.
273. Mehta PS, Mehta SJ, & Vorherr H: Congenital iodide goiter and hypothyroidism: a review. Obstet Gynecol Surv 1983a; 38:237-247.
274. Minelli R, Braverman LE, Giuberti T, et al: Effects of excess euthyroid patients with a previous episode of thyroid dysfunction induced by interferon-alpha treatment. Clin Endocrinol 1997; 47:357-361.
275. National Research Council. Recommended dietary allowances. 10th ed.. Washington, DC: National Academy Press, 213-7., 1989.

276. National Research Council: Dietary Reference Intakes for calcium, phosphorus, magnesium, vitamin D, and fluoride. Standing Committee on the Scientific Evaluation of Dietary Reference Intakes, Food and Nutrition Board, Institute of Medicine, National Academy Press, Washington, DC. Available at: http://www.nap.edu, 1997.
277. Nelson J, Moxness K, Jensen M, et al: Mayo Clinic Diet Manual: A Handbook of Nutrition Practices, 7th edition. Mosby, St. Louis, Missouri, 1994.
278. Nichoalds G: Iodide. In: Clinical guide to parenteral micronutrition. First Edition, Educational Publications, Melrose Park, IL, 1983, pp 157-63.
279. Nicoloff J: Thyroid storm and myxedema coma.. Med Clinic of N Am 1985; 69:1005-17.
280. Nicoloff J: Thyroid storm and myxedema coma.. Med Clinic of N Am 1985a; 69:1005-17.
281. Nohr SB & Laurberg P: Opposite variations in maternal and neonatal thyroid function induced by supplementation during pregnancy. J Clin Endocrinol Metab 2000; 85(2):623-627.
282. Nohr SB, Jorgensen A, Pedersen KM, et al: Postpartum thyroid dysfunction in pregnant thyroid peroxidase antibody-positive women living in an area with mild to moderate
safe?. J Clin Endocrinol Metab 2000; 85:3191-3198.
283. Nutrition and Electrolytes Advisory Panel meeting.. ., 1/95.
284. Olin B (Ed): Facts and Comparisons, JB Lippincott Co, St Louis, MO, 1990a.
285. Olin BOlin B (Ed): Facts and Comparisons, JB Lippincott Co, St Louis, MO, 1990.
286. Osol A (Ed): Remington's Pharmaceutical Sciences, 16th. Mack Publishing Co, Easton, PA, 1980a.
287. Osol AOsol A (Ed): Remington's Pharmaceutical Sciences, 16th. Mack Publishing Co, Easton, PA, 1980.
288. Package insert. Potassium iodide, (Lilly), Rev Rec 1/89., 6/88.
289. Panel comment from Strong **Iodine** monograph.. ., 1991 revision cycle.
290. Panel comment, 1991
291. Panel comment.. ., 1991 revision cycle.
292. Panel comment.. ., 1991.
293. Panel consensus.. ., 1991.
294. Parker EA: Compatibility digest. Aminophyllin intravenous. Am J Hosp Pharm 1970b; 27:67-69.
295. Parker EA: Compatibility digest. Erythrocin lactobionate injection. Am J Hosp Pharm 1969a; 26:412-413.
296. Parker EA: Compatibility digest. Potassium penicillin G injection-(buffered). Am J Hosp Pharm 1969d; 26:543-544.
297. Parker EA: Compatibility digest. Staphcillin injection. Am J Hosp Pharm 1970f; 27:67-68.
298. Parmalee AH, Allen E, & Stein IF: Three cases of congenital goiter. Am J Obstet Gynecol 1940; 40:145-147.
299. Patel JA & Phillips GL: Guide to physical compatibility of intravenous drug admixtures. Am J Hosp Pharm 1966; 23:409-411.
300. Patel JA & Phillips GL: Guide to physical compatibility of intravenous drug admixtures. Am J Hosp Pharm 1966a; 23:409-411.
301. Patel JA & Phillips GL: Guide to physical compatibility of intravenous drug admixtures. Am J Hosp Pharm 1966b; 23:409-411.
302. Patel JA & Phillips GL: Guide to physical compatibility of intravenous drug admixtures. Am J Hosp Pharm 1966c; 23:409-411.
303. Patel JA & Phillips GL: Guide to physical compatibility of intravenous drug admixtures. Am J Hosp Pharm 1966d; 23:409-411.
304. Patel JA & Phillips GL: Guide to physical compatibility of intravenous drug admixtures. Am J Hosp Pharm 1966e; 23:409-411.
305. Patel JA & Phillips GL: Guide to physical compatibility of intravenous drug admixtures. Am J Hosp Pharm 1966f; 23:409-411.
306. Patel JA & Phillips GL: Guide to physical compatibility of intravenous drug admixtures. Am J Hosp Pharm 1966g; 23:409-411.
307. Patel JA & Phillips GL: Guide to physical compatibility of intravenous drug admixtures. Am J Hosp Pharm 1966h; 23:409-411.
308. Patel JA & Phillips GL: Guide to physical compatibility of intravenous drug admixtures. Am J Hosp Pharm 1966i; 23:409-411.
309. Patel JA & Phillips GL: Guide to physical compatibility of intravenous drug admixtures. Am J Hosp Pharm 1966j; 23:409-411.
310. Pennington JAT: A review of **iodine** toxicity reports. J Am Dietetic Assoc 1990; 90:1571-1581.
311. Picciano MF: Pregnancy and lactation: Physiological adjustments, nutritional requirements and the role of dietary supplements. J Nutr 2003; 133:1997S-2002S.
312. Pilla TJ, Beshany SE, & Shields JB: Incompatibility of Hexabrix and papaverine. Am J Roentgenol 1986; 146:1300-1301.

313. Postellon DC & Aronow R: **Iodine** in mother's milk. JAMA 1982; 247:463.
314. Product Information: IOSTAT(TM) oral tablets, potassium iodide oral tablets. Anbex Inc., New York, NY, 2005.
315. Product Information: Infed(R), iron dextran. Schein Pharmaceutical, Inc, Florham Park, NJ, 1996.
316. Product Information: Iodopen. LyphoMed, US, 84.
317. Product Information: ProcalAmine(R). American McGaw, Irvine, CA, 1985.
318. Product Information: THYROSHIELD(TM) oral solution, potassium iodide oral solution. Fleming & Company, Pharmaceuticals, St Louis, MO, 2005.
319. Product Information: Tapazole(R), methimazole. Eli Lilly and Company, Indianapolis, IN, 2000.
320. Reynolds JEF (ed): Martindale: The Extra Pharmacopoeia (electronic version). MICROMEDEX, Inc.. Denver, Colorado. 1990.
321. Reynolds JEF (ed): Martindale: The Extra Pharmacopoeia (electronic version). MICROMEDEX, Inc.. Denver, Colorado. 1990a.
322. SSKI product information. rev rec 2/86, Lyne Labs., 2/84.
323. Santos E & Mazzaferri E: Thyrotoxicosis.. Postgrad Med 1990; 87(5):277-94.
324. Schardein JLSchardein JL: Chemically Induced Birth Defects, Marcel Dekker, Inc, New York, NY, 1985.
325. Schulz EJ & Whiting DA: Treatment of erythema nodosum and nodular vasculitis with potassium iodide. Br J Dermatol 1976; 94:75-78.
326. Schulz EJ & Whiting DA: Treatment of erythema nodosum and nodular vasculitis with potassium iodide. Br J Dermatol 1976a; 94:75-78.
327. Selwyn S: Evaluation of skin disinfectants in vivo by excision biopsy and other methods.. J Hosp Infect 1985; 6 Suppl A:37-43.
328. Selwyn S: Evaluation of skin disinfectants in vivo by excision biopsy and other methods.. J Hosp Infect 1985a; 6 Suppl A:37-43.
329. Shah SJ & Gerlock AJ: Incompatibility of hexabrix and papaverine in peripheral arteriography. Radiology 1987; 162:619-620.
330. Shah SJ & Gerlock AJ: Incompatibility of hexabrix and papaverine in peripheral arteriography. Radiology 1987a; 162:619-620.
331. Shah SJ & Gerlock AJ: Incompatibility of hexabrix and papaverine in peripheral arteriography. Radiology 1987b; 162:619-620.
332. Shah SJ & Gerlock AJ: Incompatibility of hexabrix and papaverine in peripheral arteriography. Radiology 1987c; 162:619-620.
333. Shah SJ & Gerlock AJ: Incompatibility of hexabrix and papaverine in peripheral arteriography. Radiology 1987d; 162:619-620.
334. Shopsin B, Shenkman L, Blum M, et al: **Iodine** and lithium-induced hypothyroidism: documentation of synergism. Am J Med 1973; 55(5):695-699.
335. Smith MC: The dextrans. Am J Hosp Pharm 1965; 22:273-275.
336. Solomons NW: Trace elements In: Rombeau JL & Caldwell MD (Eds): Clinical Nutrition: Parenteral Nutrition, 2nd. WB Saunders Co, Philadelphia, PA, 1993.
337. Sourgens H, Winterhoff H, Gumbinger HG, et al: Antihormonal effects of plant extracts on hypophyseal hormones in the rat. Acta Endocrinol 1980; 234(suppl):49.
338. Sourgens H, Winterhoff H, Gumbinger HG, et al: Antihormonal effects of plant extracts. TSH- and prolactin-suppressing properties of Lithospermum officinale and other plants. Planta Med 1982; 45:77-86.
339. Sterling JB & Heymann WR: Potassium iodide in dermatology: A 19th century drug for the 21st century-uses, pharmacology, adverse effects, and contraindications. J Am Acad Dermatol 2000; 43:691-697.
340. Sterling JB & Heymann WR: Potassium iodide in dermatology: A 19th century drug for the 21st century-uses, pharmacology, adverse effects, and contraindications. J Am Acad Dermatol 2000a; 43:691-697.
341. Stevens JS: Incompatibility of diphenhydramine hydrochloride (Benadryl(R)) with meglumine iodipamide (Cholografin(R)). Radiology 1975; 117:224-225.
342. Todd CH & Dunn JT: Intermittent oral administration of potassium iodide solution for the correction of deficiency. Am J Clin Nutr 1998; 67:1279-1283.
343. Trissel LA: Handbook on Injectable Drugs, 5th. American Society of Hospital Pharmacists, Bethesda, MD, 1988.
344. Trissel LA: Handbook on Injectable Drugs, 5th. American Society of Hospital Pharmacists, Bethesda, MD, 1988a.
345. Trissel LA: Handbook on Injectable Drugs, 5th. American Society of Hospital Pharmacists, Bethesda, MD, 1988b.
346. Trissel LA: Handbook on Injectable Drugs, 5th. American Society of Hospital Pharmacists, Bethesda, MD, 1988c.

347. Trissel LA: Handbook on Injectable Drugs, 5th. American Society of Hospital Pharmacists, Bethesda, MD, 1988d.
348. Trissel LA: Handbook on Injectable Drugs, 6th. American Society of Hospital Pharmacists, Bethesda, MD, 1990.
349. Vagenakis AG, Cote R, Miller ME, et al: Enhancement of warfarin-induced hypoprothrombinemia by thyrotoxicosis. Johns Hopkins Med J 1972; 131:69-73.
350. Vagenakis AG, Wang CA, Burger A, et al: Iodide-induced thyrotoxicosis in Boston. N Engl J Med 1972a; 287(11):523-527.
351. VanDerLinde LP, Campbell RK, & Jackson E: Guidelines for the intravenous administration of drugs. Drug Intell Clin Pharm 1977; 11:30-55.
352. VanDerLinde LP, Campbell RK, & Jackson E: Guidelines for the intravenous administration of drugs. Drug Intell Clin Pharm 1977a; 11:30-55.
353. VanDerLinde LP, Campbell RK, & Jackson E: Guidelines for the intravenous administration of drugs. Drug Intell Clin Pharm 1977b; 11:30-55.
354. VanDerLinde LP, Campbell RK, & Jackson E: Guidelines for the intravenous administration of drugs. Drug Intell Clin Pharm 1977c; 11:30-55.
355. VanDerLinde LP, Campbell RK, & Jackson E: Guidelines for the intravenous administration of drugs. Drug Intell Clin Pharm 1977d; 11:30-55.
356. Vanderpas J, Rivera-Vanderpas T, Bourdoux P, et al: Reversibility of severe hypothyroidism with supplementary **iodine** in patients with endemic cretinism.. N Engl J Med 1986; 315:791-5.
357. White JJ, Wallace CK, & Burnett LS: Skin disinfection.. Johns Hopkins Med J 1970; 126(3):169-76.
358. White JJ, Wallace CK, & Burnett LS: Skin disinfection.. Johns Hopkins Med J 1970a; 126(3):169-76.
359. Winterhoff H, Gumbinger HG, & Sourgens H: On the antigonadotropic activity of Lithospermum and Lycopus species and some of their phenolic constituents. Planta Medica 1988; 54(2):101-106.
360. World Health Organization (WHO) Pharmaceuticals Newsletter 1992 Oct. 10: 5-6., 1992.
361. de los Santos E & Mazzaferri E: Thyrotoxicosis.. Postgrad Med 1990; 87(5):277-94.
362. van Santen HM, de Kraker J, van Eck BLF, et al: Improved radiation protection of the thyroid gland with thyroxine, methimazole, and potassium iodide during diagnostic and therapeutic use of radiolabeled metaiodobenzylguanidine in children with neuroblastoma. Cancer 2003; 98:389-96.