PRODUCT MONOGRAPH

INCLUDING PATIENT MEDICATION INFORMATION

DRAXIMAGE® SODIUM IODIDE I 131 CAPSULES, USP THERAPEUTIC

(Sodium Iodide I 131 Capsules, USP for oral use)
Capsule, 74 MBq to 7400 MBq

DRAXIMAGE® SODIUM IODIDE I 131 SOLUTION, USP THERAPEUTIC

(Sodium Iodide I 131 Solution, USP for oral use)
Solution, 74 MBq to 7400 MBq per vial

Therapeutic Radiopharmaceutical Agent

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RECENT MAJOR LABEL CHANGES

7 WARNING AND PRECAUTIONS	6/2023
7 WARNINGS AND PRECAUTIONS, 7.1.1 Pregnant Women	6/2023
7 WARNINGS AND PRECAUTIONS, 7.1.2 Breastfeeding	6/2023
7 WARNINGS AND PRECAUTIONS, 7.1.3 Pediatrics	6/2023
7 WARNINGS AND PRECAUTIONS, 7.1.4 Geriatrics	6/2023

TABLE OF CONTENTS

Sections or subsections that are not applicable at the time of authorization are not listed

PART I: HEALTH PROFESSIONAL INFORMATION

1 INDICATIONS

DRAXIMAGE® SODIUM IODIDE I 131 CAPSULES, USP THERAPEUTIC (Sodium Iodide I 131 Capsules, USP) and DRAXIMAGE® SODIUM IODIDE I 131 SOLUTION, USP THERAPEUTIC (Sodium Iodide I 131 Solution, USP) [DRAXIMAGE® SODIUM IODIDE I 131 CAPSULES / SOLUTION, USP THERAPEUTIC] are indicated for:

- The treatment of hyperthyroidism (diffuse toxic goiter and single or multiple toxic nodular goiter);
- The treatment of recurrent hyperthyroidism after surgery;
- The therapy of some thyroid carcinomas such as functioning metastatic papillary or follicular carcinoma of the thyroid.

1.1 Pediatrics

Pediatrics (< 18 years of age): No data are available to Health Canada; therefore, Health Canada has not authorized an indication for pediatric use.

1.2 Geriatrics

Geriatrics (> 65 years of age): No data are available to Health Canada. There is no evidence from clinical studies and experience to suggest that use in the geriatric population is associated with differences in safety or effectiveness (see 7.1 Special Populations).

2 CONTRAINDICATIONS

DRAXIMAGE® SODIUM IODIDE I 131 CAPSULES / SOLUTION, USP THERAPEUTIC are contraindicated in:

- Patients with vomiting and diarrhea (see 7 WARNINGS AND PRECAUTIONS).
- Patients receiving concurrent anti-thyroid therapy (see 7 WARNINGS AND PRECAUTIONS and 9.4 Drug-Drug Interactions).
- Pregnancy (see 7.1.1 WARNINGS AND PRECAUTIONS).
- Lactation (see 7.1.2 WARNINGS AND PRECAUTIONS).

DRAXIMAGE® SODIUM IODIDE I 131 CAPSULES / SOLUTION, USP THERAPEUTIC is contraindicated in patients who are hypersensitive to this drug or to any ingredient in the formulation, including any non-medicinal ingredient or component of the container. For a complete listing, see 6 DOSAGE FORMS, STRENGTHS, COMPOSITION AND PACKAGING. The molar concentration of NaI is well below to induce an allergic reaction, thus, is not contraindicated in patients with iodine allergy. However, hypersensitivity reactions may occur in relation with excipients, or chemical component of the capsule (in the case of the capsule dosage form), such as sodium thiosulfate (see 8 ADVERSE REACTIONS).

3 SERIOUS WARNINGS AND PRECAUTIONS BOX

DRAXIMAGE® SODIUM IODIDE I 131 CAPSULES / SOLUTION, USP THERAPEUTIC should be used only by those health professionals who are appropriately qualified in the use of radioactive prescribed substances in or on humans (see 12 SPECIAL HANDLING INSTRUCTIONS).

4 DOSAGE AND ADMINISTRATION

4.1 Dosing Considerations

DRAXIMAGE® SODIUM IODIDE I 131 CAPSULES / SOLUTION, USP THERAPEUTIC is contraindicated in pregancy. Obtain a pregnancy test in females of reproductive potential and verify the absence of pregnancy within 24 hours prior to administration of treatment (see 7 WARNINGS AND PRECAUTIONS).

4.2 Recommended Dose and Dosage Adjustment

Individualization of Therapy

The recommended activity for orally administered sodium iodide I 131 capsules or solution is based on the thyroid gland uptake as well as the size of the gland. Thyroidal uptake and size should be determined by the physician prior to treatment and may be useful in calculating the therapeutic dose to be administered to the individual patient.

Treatment of Hyperthyroidism

The recommended dose is 148 MBq to 370 MBq (4 mCi to 10 mCi) administered orally. Certain disorders such as toxic nodular goiter may require larger doses. Anti-thyroid drugs should be discontinued for 3 to 4 days prior to the administration of the dose and withheld for 7 to 14 days afterwards.

Treatment of Thyroid Carcinoma

The recommended dose is 3.7 GBq to 5.55 GBq (100 mCi to 150 mCi) administered orally for ablation of normal thyroid tissue. For subsequent treatments, the recommended dose is 3.7 GBq to 7.4 GBq (100 mCi to 200 mCi).

4.4 Administration

DRAXIMAGE® SODIUM IODIDE I 131 CAPSULES / SOLUTION, USP THERAPEUTIC are ready for oral administration to patients. Prior to DRAXIMAGE® SODIUM IODIDE I 131 CAPSULES / SOLUTION, USP THERAPEUTIC administration:

- Obtain a pregnancy test in females of reproductive potential prior to administration to verify the absence of pregnancy (see 2 CONTRAINDICATIONS and 7.1.1 Pregnant Women).
- Instruct patients to fast at least 2 hours before and 2 hours after administration to ensure absorption.

- Instruct patients to hydrate before and after administration of sodium iodide I 131 and to void frequently to enhance urinary elimination of the radioiodide that is not absorbed by the thyroid gland (see 7 WARNINGS AND PRECAUTIONS).
- Instruct patients to maintain a low-iodide diet two weeks prior to radioiodide administration and continue for several days during the uptake or imaging process (see 7 WARNINGS AND PRECAUTIONS and 9 DRUG INTERACTIONS).
- Instruct patients to discontinue the anti-thyroid therapy three days before administration of sodium iodide I 131 (see 7 WARNINGS AND PRECAUTIONS and 9 DRUG INTERACTIONS).
- For patients with a history of renal impairment, evaluate renal function for therapeutic planning and consider dosimetry (see 7 WARNINGS AND PRECAUTIONS).
- Obtain a complete blood count within one month of therapy. If patients show leukopenia or thrombocytopenia, dosimetry should be used to determine a safe sodium iodide I 131 activity, while delivering less than 2 Gy to the bone marrow (see 7 WARNINGS AND PRECAUTIONS).

4.7 Instructions for Preparation and Use

Drug Handling

DRAXIMAGE® SODIUM IODIDE I 131 CAPSULES / SOLUTION, USP THERAPEUTIC are radioactive drugs and should be handled with appropriate safety measures to minize radiation exposure to the patient and healthcare worker (see 7 WARNINGS AND PRECAUTIONS).

- Use waterproof gloves during the entire handling and administration procedure.
- Maintain adequate shielding during the life of the product.
- Open the vial in a well ventilated hood to avoid exposure to trace levels of volatile I-131 which may be present.
- Measure patient dose by a suitable radioactivity calibration system immediately prior to administration.

Directions for Quality Control

DRAXIMAGE® SODIUM IODIDE I 131 SOLUTION, USP THERAPEUTIC should be inspected visually for particulate matter and discoloration prior to administration whenever solution and container permit. The solution should not be used if cloudy, discolored, or found to contain particulate matter. However, it is well known that glass tends to darken in the presence of high radioactivity.

4.8 Radiation Dosimetry

- The biokinetic modeling and radiation dose distributions associated with thyroid uptake of iodide I 131 depend on dietary intake of stable iodide and presume normal production of thyroid hormone. Table 1 shows a range of uptake percentages in an average adult (73.7 kg reference model). Table 1 is not intended to be used for treatment planning.

- For a thyroid blocked from iodide uptake in the production of hormones, the effective half-life of iodide I 131 is approximately 1.4 hours; for “low” to “high” uptake, the effective half-life of I 131 ranges from approximately 80 hours to 90 hours.

Table 1*. Absorbed dose per unit activity sodium iodide I 131 administered orally (mGy/MBq) in adult (73.7 kg reference model)

Organ	Thyroid uptake of I 131 (% administered activity A_0) 24 h after oral administration			
	Blocked thyroid (0% A_0)	**Low uptake† (16% A_0)**	**Medium uptake† (26% A_0)**	**High uptake† (36% A_0)**
Adrenals	0.044	0.051	0.055	0.059
Bone surfaces	0.03	0.089	0.12	0.16
Brain	0.021	0.093	0.13	0.17
Breast	0.02	0.038	0.048	0.058
Gallbladder wall	0.037	0.043	0.046	0.049
Gastrointestinal tract				
Esophagus	0.024	0.1	0.14	0.19
Stomach wall	0.87	0.77	0.71	0.66
Small intestine wall	0.035	0.033	0.032	0.032
Colon wall	0.14	0.14	0.14	0.14
(Upper large intestine wall)	0.12	0.12	0.12	0.12
(Lower large intestine wall)	0.17	0.17	0.17	0.16
Heart wall	0.062	0.089	0.1	0.12
Kidneys	0.27	0.27	0.27	0.27
Liver	0.05	0.093	0.12	0.14
Lungs	0.053	0.1	0.13	0.15
Muscles	0.026	0.084	0.12	0.15
Ovaries	0.038	0.037	0.036	0.035
Pancreas	0.06	0.064	0.066	0.068
Red marrow	0.031	0.072	0.095	0.12
Salivary glands	0.27	0.22	0.19	0.16
Skin	0.019	0.043	0.057	0.071
Spleen	0.064	0.069	0.072	0.075
Testes	0.025	0.024	0.023	0.22
Thymus	0.024	0.1	0.14	0.19
Thyroid	2.2	280‡	430‡	580‡
Urinary bladder wall	0.54	0.45	0.39	0.34
Uterus	0.045	0.042	0.04	0.038
Remaining organs	0.029	0.084	0.11	0.15
Effective dose per administered activity (mSv/MBq)	0.28	14‡	22‡	29‡

* Table 1 is not intended for treatment planning.

† These columns are not applicable to estimate organ or effective doses in patients following thyroidectomy. In patients with thyroid cancer following thyroidectomy, organ and effective doses can be estimated from the “blocked”-thyroid-uptake values.

‡ These values presume unimpeded production of thyroid hormone and may not be applicable to estimate thyroid dose and effective dose in patients who have had previous treatment with I 131 for hyperthyroidism.

5 OVERDOSAGE

In case of exposure to a radioactive dose of sodium iodide I 131 exceeding the intended therapeutic dose, provide general supportive care, promote frequent voiding, monitor for bone marrow and thyroid suppression. Consider administering a thyroid blocking agent (e.g. potassium iodide (KI) or perchlorate) promptly within 4 to 6 hours after the exposure. Assess the benefit of administering a thyroid blocking agent against the risk of failure of sodium iodide I 131 therapy. Appropriate replacement therapy is recommended if hypothyroidism occurs.

In case of any reportable radiation overdose, please contact the Canadian Nuclear Safety Commission.

6 DOSAGE FORMS, STRENGTHS, COMPOSITION AND PACKAGING

DRAXIMAGE® SODIUM IODIDE I 131 CAPSULES, USP THERAPEUTIC

Route of Administration	Dosage Form / Strength / Composition	Non-medicinal Ingredients
Oral	Capsules 74 MBq to 7400 MBq (2 mCi to 200 mCi) / capsule Sodium Iodide I 131, USP	Each white gelatin capsule also contains: < 0.3 mg of Disodium Edetate Dihydrate, < 3.3 mg of Sodium Thiosulfate Pentahydrate absorbed onto approximately 400 mg Sodium Phosphate Dibasic.

DRAXIMAGE® SODIUM IODIDE I 131 CAPSULES, USP THERAPEUTIC are white gelatin capsules containing sodium iodide I-131 for therapeutic use by oral administration. The capsules are available containing the desired quantity of I-131 assayed for the required date. The specific activity of sodium iodine I-131 is designated as carrier-free.

DRAXIMAGE® SODIUM IODIDE I 131 SOLUTION, USP THERAPEUTIC

Route of Administration	Dosage Form / Strength / Composition	Non-medicinal Ingredients
Oral	Solution 74 MBq to 7400 MBq (2 mCi to 200 mCi) / vial Sodium Iodide I 131, USP	Each mL of aqueous solution contains: < 2 mg of Disodium Edetate Dihydrate, < 4.4 mg of Sodium Thiosulfate Pentahydrate, < 40 mg of Disodium Phosphate Anhydrous.

DRAXIMAGE® SODIUM IODIDE I 131 SOLUTION, USP THERAPEUTIC is an aqueous solution containing sodium iodide I-131 for therapeutic use by oral administration. The pH of the solution is between 7.5 and 9. The solution is available containing the desired quantity of I-131 calibrated for the required date. The specific activity of sodium iodine I-131 is designated as carrier-free.

6.1 Physical Characteristics

Iodine I 131 decays by beta emission and associated gamma emission with a physical half-life of 8.02 days. The principal radiation emissions are listed in Table 2.

Table 2. Principal Radiation Emission Data from Decay of Sodium Iodide I 131

Radiation	Mean % per Disintegration	Mean Energy (kev)
Beta-1	2.1	69.4
Beta-3	7.2	96.6
Beta-4	89.4	191.6
Gamma-7	6.1	284.3
Gamma-14	81.2	364.5
Gamma-18	7.1	637.0

6.2 External Radiation

The specific gamma-ray constant for iodide I 131 is 4.26 x 10^{-13} C•m^2•kg^{-1}•MBq^{-1}•s^{-1} (2.2 R•cm^2/mCi•hr). The first half-value thickness of lead (Pb) for iodide I 131 is 0.27 cm. A range of values for the relative attenuation of the radiation emitted by iodide I 131 that results from the interposition of various thicknesses of Pb is shown in Table 3. For example, the use of 2.59 cm of Pb will decrease the external radiation exposure by a factor of about 100.

Table 3. Radiation Attenuation of Iodide I 131 by Lead Shielding

Shield Thickness (Pb) cm	Coefficient of Attenuation
0.27	0.5
0.56	0.25
0.99	10^{-1}
2.59	10^{-2}
4.53	10^{-3}

To correct for physical decay of iodide I 131, the fractions that remain at selected intervals after the time of calibration are shown in Table 4.

Table 4. Physical Decay Chart Iodine I 131: Half-life 8.02 Days

Days	Fraction Remaining	Days	Fraction Remaining	Days	Fraction Remaining	Days	Fraction Remaining
0*	1.000	8	0.503	16	0.253	24	0.127
1	0.918	9	0.461	17	0.232	25	0.116
2	0.842	10	0.423	18	0.213	26	0.107
3	0.773	11	0.388	19	0.195	27	0.098
4	0.709	12	0.356	20	0.179	28	0.090
5	0.651	13	0.327	21	0.164	29	0.083
6	0.597	14	0.300	22	0.151	30	0.076
7	0.548	15	0.275	23	0.138		

* Calibration Time

7 WARNINGS AND PRECAUTIONS

Please see 3 SERIOUS WARNINGS AND PRECAUTIONS BOX.

General

The product should be administered under the supervision of a health professional who is experienced in the use of radiopharmaceuticals. Appropriate management of therapy and complications is only possible when adequate diagnostic and treatment facilities are readily available.

The radiopharmaceutical product may be received, used and administered only by authorized persons in designated clinical settings. Its receipt, storage, use, transfer and disposal are subject to the regulations and/or appropriate licenses of local competent official organizations.

As in the use of any other radioactive material, care should be taken to minimize radiation exposure to patients consistent with proper patient management, and to minimize radiation exposure to occupational workers.

Immune

Sensitivity

Hypersensitivity reactions including anaphylaxis may occur in patients who receive sodium iodide I 131. The molar concentration of NaI is well below to induce an allergic reaction. However hypersensitivity reactions may occur in relation with excipients or chemical component of the capsule, such as sodium thiosulfate. Obtain and document an allergy history, particularily a sulfite allergy. Emergency resuscitation equipment and personnel should be immediately available (see 8 ADVERSE REACTIONS).

Monitoring and Laboratory Tests

DRAXIMAGE® SODIUM IODIDE I 131 CAPSULES / SOLUTION, USP THERAPEUTIC are contraindicated in pregnancy because of the risk of fetal hypothyroidism. Obtain a pregnancy test in females of reproductive potential and verify the absence of pregnancy within 24 hours prior to administration of treatment (see 7.1 Special Populations).

Obtain a complete blood count within one month of therapy. If patients show leukopenia, or thrombocytopenia, dosimetry should be used to determine a safe sodium iodide I 131 activity, while delivering less than 2 Gy to the bone marrow. (see 8 ADVERSE REACTIONS).

Radiation Contamination

As in the use of any radioactive material, care should be taken to minimize radiation exposure to patients consistent with proper patient management, and to minimize radiation exposure to occupational workers.

Household Contacts

Instruct patients to follow radiation safety precautions after receiving DRAXIMAGE® SODIUM IODIDE I 131 CAPSULES / SOLUTION, USP THERAPEUTIC to minimize the radiation contamination of other persons or the environment. Patients should avoid close contact with others, especially pregnant women and children, and take care to avoid contamination of other persons or the environment with body fluids.

Patients and Healthcare Providers

DRAXIMAGE® SODIUM IODIDE I 131 CAPSULES / SOLUTION, USP THERAPEUTIC contributes to a patient's overall long-term cumulative radiation exposure, which is associated with an increased risk of cancer. Follow safe handling and administration to minimize radiation exposure to the patient and healthcare providers.

Radiation-Induced Thyroiditis

Sodium iodide I 131 may cause thyroiditis with gland enlargement and release of thyroid hormone, which may cause or aggravate hyperthyroidism, thyroid storm and thyrotoxic cardiac disease (see 8 ADVERSE REACTIONS). When treating hyperthyroidism, consider pre-treatment anti-thyroid medication to help deplete the thyroid hormone content within the gland. Discontinue the anti-thyroid medication at least three days before administration of sodium iodide I 131 (see 9 DRUG INTERACTIONS). Consider a beta-blocker pre or post-treatment to minimize the risk of hyperthyroidism and thyroid storm.

Thyroiditis may cause gland enlargement resulting in tenderness and swelling of the neck, pain on swallowing, sore throat, and cough; which may occur approximately the third day after sodium iodide I 131 administration. Consider management with pain-reliever or anti-inflammatory medications.

Radiation-induced Toxicities

Sodium Iodide I 131 may cause radiation induced toxicities (see 8 ADVERSE REACTIONS):

- Dose-dependent fatalities (bone marrow suppression, malignancy).
- Dose-dependent hematopoietic suppression which manifests as a transient thrombocytopenia or neutropenia 3 to 5 weeks following sodium iodide I 131 administrations, may lead to increased susceptibility to infections or bleeding.
- Salivary gland toxicity: sialadenitis, xerostomia.
- Lacrimal gland toxicity: conjuctivitis, xerophthalmia, and epiphora.
- Increased risk of developing new solid tumors and leukemias.

Advise good hydration for one week following sodium iodide I 131 administration and stimulate salivary flow via a sialagogue (e.g. sugar-free candy or gum, pilocarpine, and ascorbic acid) to reduce radiation exposure to the salivary glands.

Advise patients to void frequently after administration of radioiodide to enhance excretion.

Reproductive Health: Female and Male Potential

Advise females and males of reproductive potential to use effective contraception during treatment with DRAXIMAGE® SODIUM IODIDE I 131 CAPSULES / SOLUTION, USP THERAPEUTIC and for at least 6 months after the last dose (see 2 CONTRAINDICATIONS).

- **Fertility and Function**

  Females

  Fertility may be impaired with DRAXIMAGE® SODIUM IODIDE I 131 CAPSULES / SOLUTION, USP THERAPEUTIC treatment. Transient amenorrhea and ovarian insufficiency have been observed after sodium iodide I 131 therapy in females. The literature describes reports of transient menstrual cycle irregularities, including amenorrhea, and ovarian failure in females treated with cumulative doses of 1000 MBq to 59 000 MBq (27 mCi to 1595 mCi) sodium iodide I 131. According to current patient management guidelines, the effects on fertility occurred in up to 27% of women treated with sodium iodide I-131, which may resolve 10 months after treatment.

  Males

  Fertility may be impaired with DRAXIMAGE® SODIUM IODIDE I 131 CAPSULES / SOLUTION, USP THERAPEUTIC treatment. Discuss sperm banking for males who are expected to receive a high cumulative dose of sodium iodide I 131. Transient dose-related impairment of testicular function after sodium iodide I 131 therapy has been reported in the published literature. The literature describes reports of males treated with sodium iodide I 131 at doses of 370 MBq to 22 000 MBq (10 mCi to 595 mCi) resulting in transient impaired testicular function (including spermatogenesis). The risk of persistent testicular dysfunction increases after administration of repeated or high cumulative radioiodide exposure.

- **Teratogenic Risk**

DRAXIMAGE® SODIUM IODIDE I 131 CAPSULES / SOLUTION, USP THERAPEUTIC is contraindicated in pregnancy because sodium iodide I 131 crosses the placenta and fetal exposure can lead to neonatal hypothyroidism. Multiple reports in the published literature describe hypothyroidism in the neonates following in utero exposure to sodium iodide I 131. Some cases of neonatal hypothyroidism were severe and irreversible. Verify pregnancy status of females of reproductive potential prior to initiating treatment (see 4 DOSAGE AND ADMINISTRATION and 7.1 Special Populations).

Risk of Decreased Effectiveness in Therapy

Certain food or drugs may alter the thyroid uptake of sodium iodide I 131 and diminish its effectiveness. Recent intake of stable iodide in any form, or the use of thyroid or anti-thyroid drugs may diminish thyroid uptake of sodium iodide I 131 (see 9 DRUG INTERACTIONS).

7.1 Special Populations

7.1.1 Pregnant Women

DRAXIMAGE® SODIUM IODIDE I 131 CAPSULES / SOLUTION, USP THERAPEUTIC is contraindicated in pregancy because fetal exposure can lead to neonatal hypothyroidism, which in some cases is severe and irreversible (see 7 WARNINGS AND PRECAUTIONS). Data from the published literature describe reports of neonatal thyroid abnormalities after fetal exposure; including agenesis of the thyroid and hypothyroidism (see Fetal/Neonatal Adverse Reactions). No animal reproductive studies have been conducted.

Fetal/Neonatal Adverse Reactions

A fetus exposed to sodium iodide I 131 can develop neonatal hypothyroidism. Delay in diagnosis of neonatal hypothyroidism after exposure to sodium iodide I 131 in utero can result in severe sequela such as cognitive impairment and delayed bone age. Monitor thyroid function in any infant born after in utero exposure to sodium iodide I 131.

Sodium iodide I 131 crosses the placenta and the fetal thyroid begins to concentrate iodide during the 10^{th} to 12^{th} week of gestation. In literature reports of maternal exposures to sodium iodide I 131 at doses of 333 MBq to 8,325 MBq (9 mCi to 225 mCi) during 4 to 26 weeks gestational age, the most common adverse outcomes were hypothyroid infants and children.

DRAXIMAGE® SODIUM IODIDE I 131 CAPSULES / SOLUTION, USP THERAPEUTIC should only be administered to a woman of childbearing capacity when appropriate contraceptive measures have been taken or when pregnancy tests results are negative (see 2 CONTRAINDICATIONS).

7.1.2 Breastfeeding

DRAXIMAGE® SODIUM IODIDE I 131 CAPSULES / SOLUTION, USP THERAPEUTIC is contraindicated in lactating women because sodium iodide I 131 concentrates in the breast via increased expression of the sodium iodide symporter in breast tissue and can lead to hypothyroidism in the infant through breastfeeding. In addition, to minimize the absorbed radiation dose to the breast tissue, breastfeeding and breast pumping should be discontinued for at least 6 weeks before administration of sodium iodide I 131.Infants exposed to sodium iodide I 131 through breast milk are at risk for development of hypothyroidism because sodium iodide I 131 is distributed into breast milk and may reach concentrations equal to or greater than concentrations in maternal plasma.

Published literature describes sodium iodide I 131 transfer into breast milk and uptake by the thyroid of the breastfed infant. The amount of sodium Iodide I 131 detected in the breast milk at 36 to 48 hours after administration is 1% to 27% of the injected dose (with injected doses between 1.1 MBq (0,0297 mCi) to 5143 MBq (139 mCi)).

7.1.3 Pediatrics

Pediatrics (< 18 years of age): No data are available to Health Canada; therefore, Health Canada has not authorized an indication for pediatric use. Because of the increased absorbed radiation dose from I 131 in pediatric patents, the risks and benefits from therapy with DRAXIMAGE® SODIUM IODIDE I 131 CAPSULES / SOLUTION, USP THERAPEUTIC must be assessed before consideration is given to the use of this radiopharmaceutical in pediatric patients. Pediatric patients are at an increased lifetime risk for malignancy from radiation exposure.

7.1.4 Geriatrics

Geriatrics (> 65 years of age): Clinical experience has not identified differences in safety or effectiveness in geriatric patients compared to younger patients. However, elderly patients are more likely to have decreased renal function and radiation exposure is greater in patients with impaired renal function.

7.1.5 Renal Impairment

DRAXIMAGE® SODIUM IODIDE I 131 CAPSULES / SOLUTION, USP THERAPEUTIC is primarily excreted by the kidneys. Renal function impairment decreases excretion of sodium iodide I 131 and increases the radiation exposure and risk of radiation toxicity. For patients with a history of renal impairment, evaluate renal function for therapeutic planning and consider dosimetry. Sodium Iodide I 131 is dialyzable. Hemodialysis can be used to reduce total body radiation exposure (see 10 CLINICAL PHARMACOLOGY).

8 ADVERSE REACTIONS

8.1 Adverse Drug Reaction Overview

The following clinically significant adverse reactions are described below and elsewhere in the labelling:

- Immune (see 7 WARNINGS AND PRECAUTIONS)
- Radiation-induced Thyroiditis (see 7 WARNINGS AND PRECAUTIONS)
- Radiation-induced Toxicities (see 7 WARNINGS AND PRECAUTIONS)
- Renal Impairment (see 7.1 Special Populations)
- Reproductive Health: Female and Male Potential (see 7 WARNINGS AND PRECAUTIONS)
- Risk of Decreased Effectiveness of Therapy (see 7 WARNINGS AND PRECAUTIONS)

With the use of large doses of sodium iodide I 131, potential side effects include acute radiation sickness, salivary and lacrimal gland dysfunction, hemorrhage and swelling in tumors, hyperthyroidism, bone marrow suppression (leukopenia, thrombocytopenia, anemia, blood dyscrasia), acute leukemia, and chromosomal abnormalities.

Sodium iodide I 131 may cause thyroiditis with release of thyroid hormone, which may aggravate hyperthyroidism and thyrotoxic cardiac disease. Thyroiditis may cause gland enlargement resulting in tenderness and swelling of the neck, pain on swallowing, sore throat, and cough.

About 25% of patients become hypothyroid during the first year post-therapy, while the remainder become hypothyroid at a rate of 2% to 3% per year.

Although rare, hypersensitivity reactions such as itching, rash, hives and anaphylaxis may occur in patients who receive sodium iodide I 131. Nausea, vomiting, rash, chest pain and tachycardia have also been reported.

Following I 131 therapy for thyroid carcinoma with metastases to the brain, cerebral edema has been reported as a possible complication.

8.5 Post-Market Adverse Reactions

The following adverse reactions have been reported during post-approval use of sodium iodide I 131 (Table 5). Because these reactions are reported voluntarily from a population of uncertain size, it is not always possible to reliably estimate their frequency or establish a causal relationship to drug exposure.

Table 5. Postmarket Adverse Reactions by System Organ Class

System Organ Class*	Symptoms*
Cardiac disorders	Chest pain, tachycardia
Congenital, familial and genetic disorders	Chromosomal abnormalities, congenital hypothyroidism
Endocrine disorders	Hyperthyroidism, hypoparathyroidism, hypothyroidism, thyrotoxic crisis
Eye disorders	Lacrimal gland dysfunction
Gastrointestinal disorders	Gastritis, nausea, salivary gland dysfunction, sialadenitis, vomiting
General disorders and administration site conditions	Local swelling of thyroid or sites of iodide avid tumor
Hematologic and lymphatic disorders including fatalities	Anemia, blood dyscrasia, bone marrow depression, leukopenia, thrombocytopenia
Immune system disorders	Bronchospasm
Neoplasms benign, malignant and unspecified (including cysts and polyps)	Acute leukemia, solid cancer
Nervous system disorders	†Cerebral edema, headache
Respiratory, thoracic and mediastinal disorders	‡Pulmonary fibrosis, ‡radiation pneumonitis
Skin and subcutaneous tissue disorders	Hives, itching, rash

* In alphabetical order
† In patients with iodide-avid brain metastases
‡ In patients with iodide-avid lung metastases

9 DRUG INTERACTIONS

9.1 Serious Drug Interactions

Concomitant use of bone marrow depressants may enhance the depression of the hematopoietic system caused by the use of large doses of sodium iodide I-131 (see 7 WARNINGS AND PRECAUTIONS).

9.4 Drug-Drug Interactions

- Concomitant use of bone marrow depressants may enhance the depression of the hematopoietic system caused by the use of large doses of sodium iodide I 131 [see 7 WARNINGS AND PRECAUTIONS].
- Many drugs and iodide-containing foods interfere with the accumulation of radioiodide by the thyroid. Review the patient's history, current medications, and recent diagnostic tests prior to the administration of sodium iodide I 131 [see 7 WARNINGS AND PRECAUTIONS].
- Advise patients to discontinue taking the following products before they undergo the procedure as shown in Table 6.

The drugs listed in Table 6 are based on either drug interaction case reports or studies, or potential interactions.

Table 6. Pharmaceuticals / OTCs / Agents Blocking Radioiodine Uptake

Type of Medication	Recommended time of withdrawal
Thionamide medications (e.g., propylthiouracil, methimazole, carbimazole)	3 days
Multivitamins containing iodide	10 days
Natural or synthetic thyroid hormones triiodothyronine thyroxine	 2 weeks 4 weeks
Kelp, agar, carrageenan, Lugol solution	3 weeks
Saturated solution of potassium iodide	3 weeks
Topical iodide (e.g., surgical skin preparation)	3 weeks
Intravenous radiographic contrast agents Water soluble Lipophilic	 2 months 6 months
Amiodarone	6 months

9.5 Drug-Food Interactions

Many iodide-containing foods (goitrogenic foods) interfere with the accumulation of radioiodide by the thyroid. Advise patients to maintain a low-iodide diet two weeks prior to radioiodide administration [Iodide-containing foods such as iodized salt, dairy products, egg yolks, seafood, turkey and liver] and continue for several days during the uptake or imaging process.

9.6 Drug-Herb Interactions

Interactions with herbal products have not been established.

9.7 Drug-Laboratory Test Interactions

Interactions with laboratory tests have not been established.

10 CLINICAL PHARMACOLOGY

10.1 Mechanism of Action

Iodide is actively transported by the sodium-iodide symporter (NIS) protein, in thyroid follicular cells. Iodide is concentrated in follicular cells to levels up to 50 times higher than in the plasma. Iodide is metabolically oxidized by thyroid peroxidase to iodinium (I+) which in turn iodinates tyrosine residues of thyroglobulin (tri or tetra-iodinated tyrosine). The beta emission of I 131 is responsible for the therapeutic effect.

10.2 Pharmacodynamics

The relationship between the extent of iodide I 131 exposure and pharmacologic effects has not been explored in clinical trials.

10.3 Pharmacokinetics

Absorption: Sodium iodide is rapidly absorbed from the gastrointestinal tract.

Distribution: Following absorption, iodide I 131 is distributed within the extra-cellular space. It is actively transported by the sodium-iodide symporter (NIS) protein, and binds to thyroglobulin resulting in accumulation in the thyroid. The thyroid uptake of iodide is usually increased in hyperthyroidism and in goiter, and is decreased in hypothyroidism. It should be noted that the uptake of radioactive iodide is a function of stable iodide concentration in the serum and the functional state of the thyroid. About 10% to 25% of the administered dose is selectively concentrated from the blood by the normal thyroid gland. The iodine concentrating mechanism of the thyroid, termed the iodide trap or pump, accounts for an iodide concentration of some 25 times plasma levels, but may increase as much as 50 times under certain conditions. Iodine is also accumulated but not organified by the stomach mucosa, choroid plexus, breast, salivary glands, liver, gall bladder, and kidneys; the remainder within the extracellular fluid.

Metabolism: Trapped iodide is oxidized to iodine and organically incorporated so rapidly that the iodide trap of the thyroid contains less than 0.2% free iodide in comparison to the organically

bound iodine. This process results in further concentration of iodine in the thyroid gland to about 500 times that in the blood.

The thyroid uses iodine to form thyroid hormones (thyroxine [T4], triiodothyronine [T3]) by iodination of tyrosine residues in thyroiglobulin. The iodinated organic compounds chiefly consist of thyroxine (T4) and triiodothyronine (T3), which are bound by thyroglobulin in the follicular colloid. T4 and T3 are released by enzymatic proteolysis of thyroglobulin into the blood where they are specifically bound and transported by plasma thyroid binding proteins. These reactions are primarily under the control of anterior pituitary gland release of thyroid stimulating hormone (TSH) and hypothalamic thyroid release factor (TRF).

In thyroidal follicular cells iodide is oxidized through the action of thyroid peroxidase to iodinium (I+) which in turn iodinates tyrosine residues of thyroglobulin.

Elimination: Sodium Iodide I 131 is excreted in urine and feces. The normal range of urinary excretion is 37 to 75% of the administered dose, varying with the thyroid and renal function of the patient. Approximately 60% to 90% of the administered dose is excreted in the urine within 24 hours. Fecal excretion is about 10%.

11 STORAGE, STABILITY AND DISPOSAL

DRAXIMAGE® SODIUM IODIDE I 131 CAPSULES / SOLUTION, USP THERAPEUTIC should be stored upright at all times at room temperature (15 °C to 30 °C). Expiry date is stated on the label accompanying the product vial.

12 SPECIAL HANDLING INSTRUCTIONS

As in the use of any other radioactive material, care should be taken to minimize radiation exposure to patients consistent with proper patient management, and to minimize radiation exposure to occupational workers.

Radiopharmaceuticals should be used by or under the control of physicians who are qualified by specific training and experience in the safe use and handling of radionuclide, and whose experience and training have been approved by the appropriate governmental agency authorised to license the use of radionuclides.

PART II: SCIENTIFIC INFORMATION

13 PHARMACEUTICAL INFORMATION

Drug Substance

Proper name:	Sodium Iodide (^{131}I)
Chemical name:	Sodium Iodide (^{131}I)
Molecular formula and molecular mass:	NaI; 153.99 g/mol
Physicochemical properties:	White granular or colorless crystals Odorless Solubility: 184 g/100 mL water @ 25°C

Product Characteristics

DRAXIMAGE® SODIUM IODIDE I 131 CAPSULES, USP THERAPEUTIC re white gelatin capsules containing sodium iodide I-131 for therapeutic use by oral administration. Each gelatin capsule also contains < 0.3 mg of Disodium Edetate Dihydrate and < 3.3 mg of Sodium Thiosulfate Pentahydrate absorbed onto approximately 400 mg Sodium Phosphate Dibasic.

DRAXIMAGE® SODIUM IODIDE I 131 SOLUTION, USP THERAPEUTIC is an aqueous solution containing sodium iodide I-131 for therapeutic use by oral administration. Each mL of aqueous solution contains < 2 mg of Disodium Edetate Dihydrate, < 4.4 mg of Sodium Thiosulfate Pentahydrate and < 40mg of Disodium Phosphate Anhydrous. The pH of the solution is between 7.5 and 9.

The capsules and the solution are available containing the desired quantity of I-131 calibrated for the required date. The specific activity of sodium iodine I-131 is designated as carrier-free.

Sodium Iodide Solution is designated chemically as Na^{131}I and has a molecular weight of 153.99 g/mol, CAS 7790-26-3.

14 CLINICAL TRIALS

The clinical trial data on which the original indications were authorized is not available.

15 MICROBIOLOGY

No microbiological information is required for this drug product.

16 NON-CLINICAL TOXICOLOGY

Species	Route of administration	LD_{50}
Mice	Intraperitoneal	1690 ± 85 mg/kg
Mice	Intravenous	> 1500 mg/kg
Mice	Oral	1650 ± 90 mg/kg

PATIENT MEDICATION INFORMATION

READ THIS FOR SAFE AND EFFECTIVE USE OF YOUR MEDICINE

DRAXIMAGE® SODIUM IODIDE I 131 CAPSULES, USP THERAPEUTIC (Sodium Iodide I 131 Capsules, USP for oral use)

DRAXIMAGE® SODIUM IODIDE I 131 SOLUTION, USP THERAPEUTIC (Sodium Iodide I 131 Solution, USP for oral use)

Read this carefully before you receive DRAXIMAGE® SODIUM IODIDE I 131 CAPSULES or SOLUTION, USP THERAPEUTIC. This leaflet is a summary and will not tell you everything about this drug. Talk to your healthcare professional about your medical condition and treatment and ask if there is any new information about DRAXIMAGE® SODIUM IODIDE I 131 CAPSULES or SOLUTION, USP THERAPEUTIC.

Serious Warnings and Precautions

- DRAXIMAGE® SODIUM IODIDE I 131 CAPSULES or SOLUTION, USP THERAPEUTIC should be used only by those health professionals who are appropriately qualified in the use of radioactive prescribed substances in or on humans.

What is DRAXIMAGE® SODIUM IODIDE I 131 CAPSULES or SOLUTION, USP THERAPEUTIC used for?

- DRAXIMAGE® SODIUM IODIDE I 131 CAPSULES or SOLUTION, USP THERAPEUTIC is used to treat an overactive thyroid.
- DRAXIMAGE® SODIUM IODIDE I 131 CAPSULES or SOLUTION, USP THERAPEUTIC is also used to treat certain cancers of the thyroid.

How does DRAXIMAGE® SODIUM IODIDE I 131 CAPSULES or SOLUTION, USP THERAPEUTIC work?

DRAXIMAGE® SODIUM IODIDE I 131 CAPSULES or SOLUTION, USP THERAPEUTIC is a radioactive form of iodide. Iodide is an essential element that is part of our normal diet and is used by the thyroid to make thyroid hormone. The radioactive iodide in DRAXIMAGE® SODIUM IODIDE I 131 CAPSULES or SOLUTION, USP THERAPEUTIC is captured by the thyroid and the radioactivity then destroys some of the thyroid tissue.

What are the ingredients in DRAXIMAGE® SODIUM IODIDE I 131 CAPSULES or SOLUTION, USP THERAPEUTIC?

Medicinal ingredient: Sodium Iodide (^{131}I)

Non-medicinal ingredients: **Capsules:** Each white gelatin capsule also contains: Disodium edetate dihydrate, sodium phosphate dibasic and sodium thiosulfate pentahydrate.

Solution: Each mL of solution contains: Disodium edetate dihydrate, disodium phosphate anhydrous and sodium thiosulfate pentahydrate.

DRAXIMAGE® SODIUM IODIDE I 131 CAPSULES or SOLUTION, USP THERAPEUTIC comes in the following dosage forms:

- Capsules: 74 MBq to 7400 MBq (2 mCi to 200 mCi) per capsule
- Solution: 74 MBq to 7400 MBq (2 mCi to 200 mCi) per vial

Do not use DRAXIMAGE® SODIUM IODIDE I 131 CAPSULES or SOLUTION, USP THERAPEUTIC if:

- you are pregnant;
- you are breastfeeding;
- you are vomitting, have diarrhea;
- you are taking anti-thyroid medication.

To help avoid side effects and ensure proper use, talk to your healthcare professional before you receive DRAXIMAGE® SODIUM IODIDE I 131 CAPSULES or SOLUTION, USP THERAPEUTIC. Talk about any health conditions or problems you may have, including if you:

- are or think you might be pregnant;
- are a nursing mother who is breastfeeding an infant;
- are feeling nauseous, have been vomitting, or have diarrhea;
- have kidney problems;
- are being treated for hyperthyroidism (symptoms of hyperthyroidism and thyroid crisis may arise during the post-treatment period);
- are allergic to sulfites. DRAXIMAGE® SODIUM IODIDE I 131 CAPSULES, USP THERAPEUTIC may contain sodium thiosulfate;
- recently received medication containing iodide including contract dye for x-rays or CT scans.

Other warnings you should know about:

Drink plenty of fluids to hydrate, go to the toilet as much as possible, and use a sialagogue (a drug or substance that increases the flow rate of saliva) after receiving DRAXIMAGE® SODIUM IODIDE I 131 CAPSULES or SOLUTION, USP THERAPEUTIC to help reduce the amount of radiation to your organs.

Follow your doctor's instructions after receiving this medication to avoid radiation exposure to other people.

- Radioactive iodine will pass out through your urine, feces, saliva and sweat. Be cautious of your personal hygiene; wash your hands frequently and do not share dishes or personal items such as toothbrushes or towels. Wash items promptly after using;
- Men should sit on the toilet when urinating to avoid any splashing of urine;

- Use a tissue to wipe the toilet bowl, flush the toilet twice and rinse the sink and tub after use;
- Avoid close contact with others and maintain a distance of a least 3 feet from women who are pregnant and children under 18 years old;
- Avoid activities where you may be close to others people for more than 5 minutes, for example, movie theaters, sporting events and public transportation;
- Sleep in a separate room.

Embryo-Fetal Toxicity

A fetus exposed to sodium iodide I 131 can develop neonatal hypothyroidism. Delay in diagnosis of neonatal hypothyroidism after exposure to sodium iodide I 131 in utero can result in severe sequelae such as cognitive impairment and delayed bone growth.

Contraception

Females and males of reproductive potential should use effective contraception during treatment with DRAXIMAGE® SODIUM IODIDE I 131 CAPSULES or SOLUTION and for at least six months after the last dose of DRAXIMAGE® SODIUM IODIDE I 131 CAPSULES or SOLUTION.

Infertility

Females

Fertility may be impaired with DRAXIMAGE® SODIUM IODIDE I 131 CAPSULES or SOLUTION treatment. Transient amenorrhea and ovarian insufficiency have been observed after sodium iodide I 131 therapy in females.

Males

Fertility may be impaired with DRAXIMAGE® SODIUM IODIDE I 131 CAPSULES or SOLUTION treatment. Sperm banking should be considered for males who are expected to receive a high cumulative dose of sodium iodide I 131.

Lactation

Sodium iodide I 131 concentrates in breast tissue with lacation. Discontinue breast feeding at least 6 weeks prior to administration of sodium iodide I 131 to allow sufficient time to avoid excess concentration of sodium iodide I 131 in breast tissue. If sodium iodide I 131 is administered in the postpartum period, breastfeeding and breast pumping should be stopped for the remainder of the postpartum period.

Tell your healthcare professional about all the medicines you take, including any drugs, vitamins, minerals, natural supplements or alternative medicines.

The following may interact with DRAXIMAGE® SODIUM IODIDE I 131 CAPSULES or SOLUTION, USP THERAPEUTIC:

- Thionamide medications (e.g., propylthiouracil, methimazole, carbimazole);
- Multivitamins containing iodide;
- Natural or synthetic: thyroid hormones, triiodothyronine, thyroxine;
- Kelp, agar, carrageenan, Lugol solution;
- Saturated solution of potassium iodide;
- Topical iodide (e.g. surgical skin preparation);
- Intravenous radiographic contrast agents: Water soluble, Lipophilic;
- Amiodarone.

A number of prescription and non-prescription drugs may interact with DRAXIMAGE® SODIUM IODIDE I 131 CAPSULES or SOLUTION, USP THERAPEUTIC. Make sure your doctor knows all of the drugs you are taking.

How to take DRAXIMAGE® SODIUM IODIDE I 131 CAPSULES or SOLUTION, USP THERAPEUTIC:

DRAXIMAGE® SODIUM IODIDE I 131 CAPSULES or SOLUTION, USP THERAPEUTIC will be given to you by a health professional who is experienced in the use of radiopharmaceuticals.

Usual dose:

The recommended dose for orally administered sodium iodide I 131 capsules or solution will be determined by the physician prior to treatment, based on the thyroid gland uptake as well as the size of the gland.

Overdose:

If you think you, or a person you are caring for, have received too much DRAXIMAGE® SODIUM IODIDE I 131 CAPSULES or SOLUTION, USP THERAPEUTIC, contact your healthcare professional, hospital emergency department or Canadian Nuclear Safety Commission immediately, even if there are no symptoms.

What are possible side effects from using DRAXIMAGE® SODIUM IODIDE I 131 CAPSULES or SOLUTION, USP THERAPEUTIC?

These are not all the possible side effects you may feel when taking DRAXIMAGE® SODIUM IODIDE I 131 CAPSULES or SOLUTION, USP THERAPEUTIC. If you experience any side effects not listed here, contact your healthcare professional.

The radiation may cause local swelling, sore throat, cough, dry mouth and pain on swallowing. It may also cause nausea, headache and vomiting. You may be advised to consider symptomatic management with pain-relievers or anti-inflammatory medications.

Most known serious side effects will only be detected by blood tests. If you think you are having any serious side effects of receiving DRAXIMAGE® SODIUM IODIDE I 131 CAPSULES or SOLUTION, USP THERAPEUTIC contact your doctor or pharmacist.

Serious side effects and what to do about them		
Symptom / effect	**Talk to your healthcare professional**	
	Only if severe	**In all cases**
Pain or swelling of neck	**X**	
Pain or swelling of salivary gland	**X**	
Lacrimal gland dysfunction: no tears, dry eyes, increased tearing	**X**	
chest pain, rapid heartbeat, sweating		**X**
shortness of breath, stridor		**X**
itching , skin rash, hives	**X**	

If you have a troublesome symptom or side effect that is not listed here or becomes bad enough to interfere with your daily activities, talk to your healthcare professional.

Reporting Side Effects

You can report any suspected side effects associated with the use of health products to Health Canada by:

- Visiting the Web page on Adverse Reaction Reporting (https://www.canada.ca/en/health-canada/services/drugs-health-products/medeffect-canada/adverse-reaction-reporting/drug.html) for information on how to report online, by mail or by fax; or
- Calling toll-free at 1-866-234-2345.

NOTE: Contact your health professional if you need information about how to manage your side effects. The Canada Vigilance Program does not provide medical advice.

Storage:

Store upright at all times at room temperature (15°C to 30°C).

Keep out of reach and sight of children.

If you want more information about DRAXIMAGE® SODIUM IODIDE I 131 CAPSULES or SOLUTION, USP THERAPEUTIC:

- Talk to your healthcare professional.
- Find the full product monograph that is prepared for healthcare professionals and includes this Patient Medication Information by visiting the Health Canada website; the manufacturer's https://www.jubilantradiopharma.com or by calling 1-888-633-5343 / 514-630-7080.

This leaflet was prepared by:

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Last Revised: