SUMMARY OF PRODUCT CHARACTERISTICS

for

Sodium Iodide (^{131}I) Diagnostic Capsules, GE Healthcare

1. NAME OF THE MEDICINAL PRODUCT

Sodium Iodide (^{131}I) Diagnostic Capsules, GE Healthcare

2. QUALITATIVE AND QUANTITATIVE COMPOSITION

Sodium iodide(^{131}I) Diagnostic Capsules are presented as a white capsule. Each capsule contains 3.7 MBq (100 μCi) at the first reference date. At subsequent reference dates, at weekly intervals, the nominal activity per capsule is shown in the table below -

Reference date	Days after first reference	Activity, MBq (μCi)
1	0	3.7 (100)
2	7	2.02 (55)
3	14	1.10 (30)
4	21	0.603 (16)
5	28	0.329 (9)

Iodine-131 is produced by fission of Uranium-235 or by neutron bombardment of stable tellurium in a nuclear reactor. Iodine-131 has a half-life of 8.02 days. It decays by emission of gamma radiations of 365 keV (81.7%), 637 keV (7.2%) and 284 keV (6.1%) and beta radiations of maximal energy of 606 keV to stable Xenon-131.

Excipients with known effect:
Sodium: 85.28 mg/capsule. This needs to be taken into consideration by patients on a sodium controlled diet.

For the full list of excipients, see section 6.1.

3. PHARMACEUTICAL FORM

Capsules, hard.
White, opaque gelatine capsules

4. CLINICAL PARTICULARS

4.1 Therapeutic indications

This medicinal product is for diagnostic use only.
Sodium iodide may be given as a "tracer" dose to study radioiodine kinetics. An estimation of the thyroid uptake and effective half life obtained with a tracer dose can be used to calculate the activity required for radioiodine therapy.

In the management of thyroid carcinoma, sodium iodide is used to identify thyroid remnants and metastases (after ablation).

Thyroid scanning for benign conditions with iodine-131 can be performed but only when radiopharmaceuticals with more favourable dosimetry, e.g. iodine-123 or technetium-99m are not available.

4.2 Posology and method of administration

Posology

Adults

The recommended activities for an adult patient (70 kg) are as follows:

- For thyroid uptake studies: 0.2-3.7 MBq
- For identification of metastases and thyroid remnants after thyroid ablation: a maximum activity of 400 MBq
- For thyroid imaging: 7.4-11 MBq.

Scans are usually performed at 4 hours and then again at 18-24 hours (for scintigraphy also at 72 hours).

Elderly Population
No dose adjustment is recommended based on age.

Renal impairment
Careful consideration of the activity to be administered is required since an increased radiation exposure is possible in these patients.

Paediatric population

The diagnostic activity to be administered to a child over 10 years and adolescent should be a fraction of the adult dose calculated from the body weight/surface area methods according to the following equations:

$$\text{Paediatric dose (MBq)} = \frac{\text{Adult dose (MBq) x child weight (kg)}}{70 \text{ kg}}$$

$$\text{Paediatric dose (MBq)} = \frac{\text{Adult dose (MBq) x child surface } (m^2)}{1.73 \text{ } m^2}$$

Correction factors given for guidance are proposed below.

Fraction of adult dose								
3 kg	=	0.1	22 kg	=	0.50	42 kg	=	0.78
4 kg	=	0.14	24 kg	=	0.53	44 kg	=	0.80
6 kg	=	0.19	26 kg	=	0.56	46 kg	=	0.82
8 kg	=	0.23	28 kg	=	0.58	48 kg	=	0.85
10 kg	=	0.27	30 kg	=	0.62	50 kg	=	0.88
12 kg	=	0.32	32 kg	=	0.65	52-54 kg	=	0.90
14 kg	=	0.36	34 kg	=	0.68	56-58 kg	=	0.92
16 kg	=	0.40	36 kg	=	0.71	60-62 kg	=	0.96
18 kg	=	0.44	38 kg	=	0.73	64-66 kg	=	0.98
20 kg	=	0.46	40 kg	=	0.76	68 kg	=	0.99

(Paediatric Task Group, European Association of Nuclear Medicines)

Method of Administration
The capsule is administered orally together with a drink. It should be swallowed whole.

In patients with suspected gastrointestinal disease, great care should be taken when administering Sodium [^{131}I] iodide. The capsules should be swallowed whole with sufficient fluid to ensure clear passage into the stomach and upper small intestine. Concomitant use of H_2 antagonists or proton pump inhibitors is advised.

For patient preparation, see section 4.4

4.3 Contraindications

- Hypersensitivity to the active substance or to any of the excipients listed in section 6.1..
- Established or suspected pregnancy or when pregnancy has not been excluded (see section 4.6.)
- For diagnostic purposes in children under 10 years of age.
- Thyroid scanning except in the follow-up of malignant disease or when iodine-123 or technetium-99m is not available.
- Patients with dysphagia, oesophageal stricture, active gastritis, gastric erosions and peptic ulcer.
- Patients with suspected reduced gastrointestinal motility.

4.4 Special warning and special precaution for use

Potential for hypersentitivity of anaphylactic reactions:
If hypersensitivity or anaphylactic reactions occur, the administration of the medicinal product must be discontinued immediately and intravenous treatment initiated, if necessary. To enable immediate action in emergencies, the necessary medicinal products and equipment such as endotracheal tube and ventilator must be immediately available.

Individual benefit/risk justification:
For each patient, exposure to ionising radiation must be justifiable on the basis of likely benefit. The activity administered must be such that the resulting radiation dose is as low as reasonable achievable bearing in mind the need to obtain the intended diagnostic or therapeutic effect.

Renal impairment
Careful consideration of the benefit risk ratio in these patients is required since an increased radiation exposure is possible.

Paediatric population
For information on the use in paediatric population, see sections 4.2.

Iodine-131 for diagnostic studies has not to be used in children under 10 years and is not suitable for administration to children over 10 years old and adolescents unless exceptional

circumstances prevail, due to significantly higher radiation exposure compared with the adult.

Patient preparation:
The patient should be well hydrated before the start of the examination and urged to void as often as possible during the first hours after the examination in order to reduce radiation. Special precautions, such as urinary catheterisation, should be taken following administration of Sodium Iodide (^{131}I) Diagnostic Capsules to patients who are significantly incontinent to minimise risks of radioactive contamination. International guidelines for disposal of radioactive waste must be followed.

Specific warnings:

There is no evidence of an increased incidence of malignancies (cancer, leukaemia or mutations) in man with patients treated for diagnostic purpose with sodium [^{131}I] iodide.

This medicinal product contains 85.28 mg sodium per capsule. This needs to be taken into consideration for patients on a sodium controlled diet.

For precautions with respect to environmental hazard see section 6.6.

4.5 Interaction with other medicinal products and other forms of interaction

Many pharmacological agents are known to interact with radioiodide. These may do so by a variety of mechanisms which can affect the protein binding, the pharmacokinetics or influence the dynamic effects of labelled iodide. It is therefore necessary to take a full drug history and ascertain whether any medications are required to be withheld prior to the administration of sodium [^{131}I] iodide.

For example, the treatment with the following substances should be discontinued:

Active substances	**Withdrawal period prior to administration of sodium [^{131}I} iodide**
Antithyroid agents (e.g. carbimazole, methimazole, propyluracil), perchlorate	2 – 5 days before starting treatment till several days after administration.
Salicylates, steroids, sodium nitroprusside, sodium sulfobromophthalein, anticoagulants, antihistamines, antiparasitics, penicillins, sulphonamides, tolbutamide, thiopental	1 week.
Phenylbutazone	1 - 2 weeks.
Iodine-containing expectorants and vitamins	approx. 2 weeks.
Thyroid hormone preparations	2 – 6 weeks. (see section 4.4 for therapeutic recommendations).
Amiodarone*, benzodiazepines, lithium	approx. 4 weeks.
Iodine-containing preparations for topical use	1 - 9 months.
Water-soluble iodine-containing contrast media	up to 3 months
Oral cholecystographic agents	up to 1 year.

* Due to the long half-life of amiodarone, iodine uptake in the thyroid tissue can be decreased for several months.

4.6 Fertility, pregnancy and lactation

Woman of childbearing potential:

When an administration of radiopharmaceuticals to a woman of childbearing potential is intended, it is important to determine whether or not she is pregnant. Any woman who has missed a period should be assumed to be pregnant until proven otherwise. If in doubt about her potential pregnancy (if the woman has missed a period, if the period is very irregular, etc.), alternative techniques not using ionising radiation (if there are any) should be offered to the patient.

Pregnancy:

The use of Sodium [^{131}I] iodide is contraindicated in pregnant women (see section 4.3).The absorbed dose to the uterus for this agent is likely to be in the range 0.01-22 mGy, and the foetal thyroid gland avidly concentrates iodine during the second and third trimesters.

In the case of differentiated thyroid carcinoma diagnosed in pregnancy therefore, radioiodine treatment should be postponed until after the pregnancy has ended. Alternative techniques which do not involve ionising radiation should be considered.

Breastfeeding
Before administering radiopharmaceuticals to a mother who is breastfeeding consideration should be given to the possibility of delaying the administration of radionuclide until the mother has ceased breastfeeding, and to what is the most appropriate choice of radiopharmaceuticals, bearing in mind the secretion of activity in breast milk.

Breastfeeding should be discontinued after sodium [^{131}I] iodide administration.

4.7 Effects on ability to drive or use machines

No studies on the effect on the ability to drive or use machines have been performed.

4.8 Undesirable Effects

The frequencies of undesirable effects are defined as follows:
Very common (≥1/10), common (≥1/100 to <1/10), uncommon (≥1/1,000 to <1/100), rare (≥1/10,000 to <1/1,000), very rare (<1/10,000) and not known (cannot be estimated from the available data)

Immune system disorders
Not known: Hypersensitivity

Gastrointestinal disorders
Not known: Nausea, vomiting

Congenital, familial and genetic disorders
Not known: Congenital thyroid disorders

Exposure to ionising radiation is linked with cancer induction and a potential for development of hereditary defects.

For diagnostic use: As the effective dose is 24.4 mSv when the maximal recommended activity of 400 MBq is administered (thyroid blockage) these adverse reactions are expected to occur with a low probability.

In all cases it is necessary to ensure that the risks of the radiation are less than from the disease itself.

Reporting of suspected adverse reactions
Reporting suspected adverse reactions after authorisation of the medicinal product is important. It allows continued monitoring of the benefit/risk balance of the medicinal product. Healthcare professionals are asked to report any suspected adverse reactions via the national reporting system:

Norway
Statens legemiddelverk
Nettside: www.legemiddelverket.no/meldeskjema

4.9 Overdose

High radiation exposure through overdose can be reduced by means of administration of thyroid blocking agent, such as potassium perchlorate, the use of emetics and promoting a diuresis with frequent voiding of urine.

5. PHARMACOLOGICAL PROPERTIES

5.1 Pharmacodynamic properties

Pharmacotherapeutic group: various thyroid diagnostic radiopharmaceuticals.
ATC Code: V09FX03

Iodide, in the amount used for diagnostic indications, is not known to have any pharmacological effect. More than 90 % of the radiation effects result from beta radiation which has a mean range of 0.5 mm.

5.2 Pharmacokinetic properties

Distribution

After oral administration sodium (^{131}I) iodide is absorbed rapidly from the upper gastrointestinal tract (90 % in 60 minutes). The pharmacokinetics follows that of unlabelled iodide. After entering the bloodstream it is distributed in the extra thyroidal compartment.

Organ uptake

From here it is predominantly taken up by the thyroid or excreted renally. Small amounts of sodium (^{131}I) iodide are taken up by salivary glands, gastric mucosa and would also be localised in breast milk, the placenta and choroids plexus.

Elimination

Urinary excretion is 37-75 % faecal excretion is about 10 % with almost negligible excretion in sweat.

Half-life

The effective half-life of radioiodine in plasma is in the order of 12 hours whereas that for radioiodine taken by the thyroid gland is about 6 days. Thus, after administration of sodium (^{131}I) iodide, approximately 40 % of the activity has an effective half life of 0.4 days and the remaining 60 %, 8 days.

5.3 Preclinical safety data

Because of the small quantities of substance administered compared with the normal food intake of iodine (40-500 µg/day) no acute toxicity is expected or observed.

There are no data available on the toxicity of repeated doses of sodium iodide or on its effects on reproduction in animals or its mutagenic or carcinogenic potential.

6. PHARMACEUTICAL PARTICULARS

6.1 List of excipients

Sodium thiosulphate pentahydrate
Disodium phosphate dihydrate
Sodium hydroxide

Gelatine capsule:
Titanium dioxide (E171)
Gelatine

6.2 Incompatibilities

Not applicable

6.3 Shelf Life

5 weeks after the first activity reference date stated on the label

6.4 Special precautions for storage

Store below 25ºC. Do not freeze
Store in original lead container or in equivalent shielding.

Storage of radiopharmaceuticals should be in accordance with national regulations on radioactive materials.

6.5 Nature and contents of container

The product is stored within a polystyrene container with a push-in cap made from polyethylene. This container is stored within a lead shield.

Pack size: Each pack contains 10 capsules.

6.6 Special precautions for disposal and other handling

General warning
Radiopharmaceuticals should be received, used and administered only by authorised persons in designated clinical settings. Their receipt, storage, use, transfer and disposal are subject to the regulations and/or appropriate licences of the competent official organisation.

Radiopharmaceuticals should be prepared in a manner which satisfies both radiation safety and pharmaceutical quality requirements. Appropriate aseptic precautions should be taken.

Administration procedures should be carried out in a way to minimise risk of contamination of the medicinal product and irradiation of the operators. Adequate shielding is mandatory.

The administration of radiopharmaceuticals creates risks for other persons from external radiation or contamination from spill of urine, vomiting etc. Radiation protection precautions in accordance with national regulations must therefore be taken.

Any unused medicinal product or waste material should be disposed of in accordance with local requirements for radioactive material.

7 MARKETING AUTHORISATION HOLDER

GE Healthcare Buchler GmbH & Co. KG
Gieselweg 1
38110 Braunschweig
Germany

8 MARKETING AUTHORISATION NUMBER

NO MTnr: 8349

9. DATE OF FIRST AUTHORISATION

06.10.2004

10. DATE OF REVISION OF THE TEXT

04.12.2023

11. DOSIMETRY

The ICRP model refers to intravenous administration. Since absorption of radioiodide is rapid and complete, this model is applicable in case of oral administration also but there is a further radiation dose to the stomach wall in addition to that due to gastric and salivary excretion. Assuming that the mean residence time in the stomach is 0.5 hr, the absorbed dose to the stomach wall increases by about 30 % for iodine-131 however the effective dose is virtually identical..

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The effective dose resulting from the administration of a (maximal recommended) activity of 3.7 MBq for an adult weighing 70 kg is between 0.23 mSv (0% thyroid uptake) and 142.08 mSv (55% uptake). For an administered activity of 3.7 MBq the typical radiation dose to the target organ (thyroid) is between 0.11 mGy (0% uptake) and 2923 mGy (55% uptake) and the dose to the bladder wall is between 2.26 mGy (0%) and 1.07 mGy (55% uptake).

The table below shows the dosimetry as calculated according to the Publication 53 and 60 of the ICRP (International on Radiological Protection, Radiation Dose to Patients from Radiopharmaceuticals).

IODIDE Thyroid blocked, uptake 0%

	Absorbed dose per unit activity administered (mGy/MBq)				
Organ	**Adult**	**15 Year**	**10 Year**	**5 Year**	**1 Year**
Adrenals	0.037	0.042	0.067	0.11	0.20
Bladder wall	0.61	0.75	1.1	1.8	3.4
Bone surfaces	0.032	0.038	0.061	0.097	0.19
Breast	0.033	0.033	0.052	0.085	0.17
GI tract					
Stomach wall	0.034	0.040	0.064	0.10	0.19
Small intest	0.038	0.047	0.075	0.12	0.22
ULI wall	0.037	0.045	0.070	0.12	0.21
LLI wall	0.043	0.052	0.082	0.13	0.23
Kidneys	0.065	0.080	0.12	0.17	0.31
Liver	0.033	0.040	0.065	0.10	0.20
Lungs	0.031	0.038	0.060	0.096	0.19
Ovaries	0.042	0.054	0.084	0.13	0.24
Pancreas	0.035	0.043	0.069	0.11	0.21
Red marrow	0.035	0.042	0.065	0.10	0.19
Spleen	0.034	0.040	0.065	0.10	0.20
Testes	0.037	0.045	0.075	0.12	0.23
Thyroid	0.029	0.038	0.063	0.10	0.20
Uterus	0.054	0.067	0.11	0.17	0.30
Other tissue	0.032	0.039	0.062	0.10	0.19
Effective Dose (mSv/MBq)	**0.061**	**0.078**	**0.120**	**0.190**	**0.368**

Bladder wall contributes to 50.0 % of the effective dose.

Incomplete blockage:
Effective dose (mSv/MBq) with little uptake in the thyroid.

uptake: 0.5 %	0.395	0.648	0.953	2.01	3.74
uptake 1.0 %	0.802	1.28	1.91	4.07	7.48
uptake 2.0 %	1.50	2.41	3.60	7.77	14.3

Thyroid uptake 15%

	Absorbed dose per unit activity administered (mGy/MBq)				
Organ	**Adult**	**15 Year**	**10 Year**	**5 Year**	**1 Year**
Adrenals	0.036	0.043	0.071	0.11	0.22
Bladder wall	0.52	0.64	0.98	1.5	2.9
Bone surfaces	0.047	0.067	0.094	0.14	0.24
Breast	0.043	0.043	0.081	0.13	0.25
GI tract					
Stomach wall	0.46	0.58	0.84	1.5	2.9
Small intest	0.28	0.35	0.62	1.0	2.0
ULI wall	0.059	0.065	0.10	0.16	0.28
LLI wall	0.042	0.053	0.082	0.13	0.23
Kidneys	0.060	0.075	0.11	0.17	0.29
Liver	0.032	0.041	0.068	0.11	0.22
Lungs	0.053	0.071	0.12	0.19	0.33
Ovaries	0.043	0.059	0.092	0.14	0.26
Pancreas	0.052	0.062	0.10	0.15	0.27
Red marrow	0.054	0.074	0.099	0.14	0.24
Spleen	0.042	0.051	0.081	0.12	0.23
Testes	0.028	0.035	0.058	0.094	0.18
Thyroid	210	340	510	1100	2000
Uterus	0.054	0.068	0.11	0.17	0.31
Other tissue	0.065	0.089	0.14	0.22	0.40
Effective Dose (mSv/MBq)	**10.5**	**17.1**	**25.6**	**56.0**	**102**

Thyroid uptake 35%

	Absorbed dose per unit activity administered (mGy/MBq)				
Organ	**Adult**	**15 Year**	**10 Year**	**5 Year**	**1 Year**
Adrenals	0.042	0.050	0.087	0.14	0.28
Bladder wall	0.40	0.50	0.76	1.2	2.3
Bone surfaces	0.076	0.12	0.16	0.23	0.35
Breast	0.067	0.066	0.13	0.22	0.40
GI tract					
Stomach wall	0.46	0.59	0.85	1.5	3.0
Small intest	0.28	0.35	0.62	1.0	2.0
ULI wall	0.058	0.065	0.10	0.17	0.30
LLI wall	0.040	0.051	0.080	0.13	0.24
Kidneys	0.056	0.072	0.11	0.17	0.29
Liver	0.037	0.049	0.082	0.14	0.27
Lungs	0.090	0.12	0.21	0.33	0.56
Ovaries	0.042	0.057	0.090	0.14	0.27
Pancreas	0.054	0.069	0.11	0.18	0.32
Red marrow	0.086	0.12	0.16	0.22	0.35
Spleen	0.046	0.059	0.096	0.15	0.28
Testes	0.026	0.032	0.054	0.089	0.18
Thyroid	500	790	1200	2600	4700
Uterus	0.050	0.063	0.10	0.16	0.30
Other tissue	0.11	0.16	0.26	0.41	0.71
Effective Dose (mSv/MBq)	**24.4**	**39.6**	**59.4**	**130**	**237**

Thyroid uptake 55%

	Absorbed dose per unit activity administered (mGy/MBq)				
Organ	**Adult**	**15 Year**	**10 Year**	**5 Year**	**1 Year**
Adrenals	0.049	0.058	0.11	0.17	0.34
Bladder wall	0.29	0.36	0.54	0.85	1.6
Bone surfaces	0.11	0.17	0.22	0.32	0.48
Breast	0.091	0.089	0.19	0.31	0.56
GI tract					
Stomach wall	0.46	0.59	0.86	1.5	3.0
Small intest	0.28	0.35	0.62	1.0	2.0
ULI wall	0.058	0.067	0.11	0.18	0.32
LLI wall	0.039	0.049	0.078	0.13	0.24
Kidneys	0.051	0.068	0.10	0.17	0.29
Liver	0.043	0.058	0.097	0.17	0.33
Lungs	0.13	0.18	0.30	0.48	0.80
Ovaries	0.041	0.056	0.090	0.15	0.27
Pancreas	0.058	0.076	0.13	0.21	0.38
Red marrow	0.12	0.18	0.22	0.29	0.46
Spleen	0.051	0.068	0.11	0.17	0.33
Testes	0.026	0.031	0.052	0.087	0.17
Thyroid	790	1200	1900	4100	7400
Uterus	0.046	0.060	0.099	0.16	0.30
Other tissue	0.16	0.24	0.37	0.59	1.0
Effective Dose (mSv/MBq)	**38.4**	**62.0**	**93.3**	**205**	**373**

12. INSTRUCTIONS FOR PREPARATION OF RADIOPHARMACEUTICALS

The product is a capsule for oral administration and should be used according to section 4.2.

Any unused medicinal product or waste material should be disposed of in accordance with local requirements.