SUMMARY OF PRODUCT CHARACTERISTICS

1. NAME OF THE MEDICINAL PRODUCT

ThyroTop D 0.5-37 MBq hard capsule

2. QUALITATIVE AND QUANTITATIVE COMPOSITION

One hard capsule contains 0.5-37 MBq sodium iodide (^{131}I) at time of calibration.
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%), 637 keV (7.3%) and 284 keV (6.0%) and beta radiations of maximal energy of 606 keV to stable Xenon-131.
Excipient(s) with known effect: One hard capsule contains 143 mg sodium.

3. PHARMACEUTICAL FORM

Hard capsule
Size "0", colourless, transparent, CONI-SNAP type gelatine capsule

4. CLINICAL PARTICULARS

4.1 Therapeutic indications

This medicinal product is for diagnostic use only.

– Thyroid diagnostics

- Examination of radioiodine uptake of thyroid prior to radioisotope treatment of benign thyroid diseases, for determination of individual patient dose. Radioiodine treatment is indicated for the treatment of hyperthyreoidism (Graves Basedow disease, and single or multiple autonomously functioning nodules or diffuse autonomy) in order to final elimination of hyperfunction or size reduction of significantly enlarged but normally functioning nodules, often recidive goiter.
  Method: known quantity of ^{131}I sodium iodide is swallowed by the patient. Radioiodine uptake is measured as a function of the radioactivity intake once or several time after administration. There are various methods for radioiodine uptake measurement. According to the simplest method one measurement is performed: usually 24 hours after administration, but measurement after 7th day is also a known method.
  By performing multiple measurements (usually 4-6 hours, 24 hours and 5-8 days after administration) not only the radioiodine uptake, but its maximum and effective half-life of radioiodine (radioiodine kinetics) can also be determined. I-131 amount needed for the effective therapy can be calculated by using different formulae considering the amount of hyperfunctioning thyroid tissue from these measurement results. (Hyperthyroidism can be treated by fixed amount of radioactivity as well, leaving out the radioiodine uptake measurement of thyroid.)
- Radioiodine whole body scintigraphy after surgery of differentiated papillar or follicular thyroid carcinoma for establishment or exclusion of remnant thyroid, in case of clinical/ laboratory indications for establishment of recurrence or distant metastases (in lymph node, lung, bone, brain etc.), for assessment of efficiency of therapy

4.2 Posology and method of administration

Posology

a) For radioiodine uptake of thyroid in case no accurate dosimetry is needed 0.2-0.5 MBq capsule is enough for measurement 24 h after administration, but one-time measurement 7 days after administration is also a known method

b) For calculation of personalised dose for the radionuclide therapy: capsule of 2-4 MBq is needed and radioiodine uptake should be measured at least in three time point (4-6 hours, 24 hours and 4-7 days after administration). Different formulae can be used for calculation of the amount of radioactivity needed for the therapy using the measurement results

c) 2-4 MBq capsule can be used for thyroid scintigraphy for the establishment of the size of the hyperfunctioning tissue in thyroid nodules

d) For whole body radioiodine scintigraphy in differentiated thyroid cancer 37-185 MBq (usually 74-111 MBq) I-131 is needed. 2-3 capsules should be administered. (Examination performed by higher activity is more sensitive but the stunning phenomenon can decrease the efficiency of the radiotherapy after scintigraphy). Whole body scan is performed by scintillation camera with SPECT, or SPECT/CT 48-72 hours after administration.

Paediatric population

ThyroTop D 0.5-37 MBq hard capsule is generally not advised for the examination of hyperthyreosis in children and adolescents as its radioiodide treatment is generally not inicated, except if the necessity of the treatment outweighs the risk arising from radioactive exposure.

Method of administration

It is advised to control the radioactivity of the capsule prior administration.
The patient takes the capsule on empty stomach with some water. The capsule should be swallowed whole. It is advised to drink 1-2 decilitres of water to facilitate the emptying of the stomach. The patient should not eat for one hour after administration of the capsule.
Radioiodine uptake of thyroid is measured after.

4.3 Contraindications

- Hypersensitivity to the active substance(s) or to any of the excipients listed in section 6.1 (Iodine content of the capsule is a negligible fragment of the daily intake therefor the test can be performed in case of patients suffering from iodine allergy.)
- Pregnancy or lactation as radioiodine treatment is contraindicated in these conditions
- if the patient does not provide an oral or written consent of being examined by using radioiodine
- if the patient obviously is not capable to follow the instrucions on post treatment radiation protections

4.4 Special warnings and precautions for use

Potential for hypersensitivity or 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, the radiation exposure must be justifiable by the likely benefit. The activity to be administered should in every case be as low as reasonably achievable to obtain the required therapeutic effect.

Patients with dysphagia, oesophageal stricture, active gastritis, gastric erosions and peptic ulcer should be handled with suitable precautions in order to avoid the radioactive contamination of the environment caused by vomiting.
Iodine content of the capsule is a negligible fragment of the daily intake therefor the test can be performed in case of patients suffering from iodine allergy.
It is advised to measure the radioactivity of the capsule before use.

Before treatment

Administration of iodine excess has to be avoided (see section 4.5). The iodine history of the patient has to be explored.
A low iodine diet prior to therapy facilitates the uptake in functioning thyroid tissue, therefore two weeks before the use of ThyroTop D 0.5-37 MBq hard capsule the patient should be changed over to low iodine diet.
Thyroid replacement should be stopped prior to radioiodine administration in case following thyroid carcinoma to ensure adequate uptake.
Four weeks prior to the examination thyroxin should be changed for triiodthyronin, but after two weeks it should be also stopped. Evolving hypothyreosis is indicated by serum TSH increase. Efficient radioiodine treatment and scintigraphy prior treatment can be performed if TSH concentration is more than 30IU/L.
If scintigraphy is directly followed by high dose ^{131}I treatment, thyroid hormone treatment can be continued two weeks after therapy. Lately the radioiodine therapy and the scintigraphy prior therapy can be performed if the high TSH level is achieved as follows: the patient discontinues thyroxin just for some days, but prior to the examination and the therapy for two days the patient gets recombinant human TSH (rhTSH: Thyrogen) in form of i.m injection. This method is favourable in particularly for elderly patients suffering from cardiac or other diseases, hardly tolerating the fastly forming hypothyreosis.
Blocking agents used for hyperthyreosis should be discontinued 3-5 days prior examination of radioiodine uptake (beta blockers can be used). If treatment follows the diagnostic, blocking agents can be continued 3-5 days after treatment.

Paediatric population

^{131}I -sodium-iodide therapy is given only in special cases for children and adolescents under 18 year of age therefor ^{131}I-sodium iodide diagnostics is performed only in exceptional cases i.e. if the necessity and importance of obtaining the diagnostic information outweighs the risk associated with the radiation exposure
This medicinal product contains 143 mg sodium per capsule, equivalent to 7.15 % of the WHO recommended maximum daily intake of 2 g sodium for an adult. To be taken into account by patients on a controlled sodium diet.

4.5 Interaction with other medicinal products and other forms of interaction

Hindered radioiodine uptake of thyroid is a problem in case of thyroid scintigraphy (as well as in case of radionuclide therapy of thyroid). That is why administration of inactive iodines should be avoided:
Treatment with Methothyrin, Propycil should be withheld 3-5 days, triiodthyronine and thyroxine, 2 weeks, and 1 month, respectively prior to radioiodine administration. Steroid salicilate and sulphonamides should be discontinued 1 week before radioiodine administration. The patient should be questioned carefully regarding previous medication and procedures involving radiographic contrast media. Many pharmacological agents are known to interact with radioiodine. There are plenty mechanisms which can affect the protein binding, the pharmacokinetics or pharmacodynamics. Therefore it is necessary to take a full drug history and ascertain whether any medications are required to be withheld prior to the administration of ThyroTop D 0.5-37 MBq hard capsule and when if yes.
Treatment with the products listed below should be withheld for the proposed period.

Preparation / Compound	*Withheld prior to treatment*
Antithyroid medicinal products (e.g. carbimazole, methimazole, propylthiouracil, perchlorate)	3-5 days before starting treatment till several days after
Salicylates, steroids, sodium nitroprusside, sodium sulfobromophthalein, anticoagulants, antihistamines, antiparasitics, penicillins, sulphonamides, tolbutamide, thiopental	1 week
Phenylbutazone	1-2 weeks
Containing iodine expectorants and vitamins	3-4 weeks
Thyroid hormone preparations	2-5 weeks
Amiodarone*, benzodiazepines, lithium	4 weeks
Containing iodine preparations for topical use	1-3 month
water-soluble iodine containing iv. Roentgen/CT contrast media	1-2 month
Lipid-soluble iodine containing Roentgen contrast media	6 month

* iodine uptake in thyroid tissue can be reduced for 3-6 month due to long half-life of Amiodaron

4.6 Fertility, pregnancy and lactation

Women 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

Use of the product is absolutely contraindicated in case of pregnancy and lactation.
Sodium (^{131}I) iodide is contraindicated during established or suspected pregnancy or when pregnancy has not been excluded (pregnancy test performed in 3 days before treatment).
During treatment of pregnant women with radionuclides the foetus is also exposed to radiation. Iodine accumulates in foetal thyroid in second and third trimester. Therefor radioiodine treatment of hyperthyreosis must be postponed, hyperthyreosis should be treated by medicines or by surgery.
If a differentiated thyroid carcinoma is diagnosed during pregnancy, sodium iodide (^{131}I) treatment should be postponed until after the childbirth.

Breast-feeding

^{131}I sodium iodide is excreted into the breast milk.
Before administering a radioactive medicinal product to a mother who is breast feeding, consideration should be given to the possibility of delaying the administration of radionuclide until the mother has ceased breast feeding.
For radioprotection reasons, it is recommended to avoid close contact between mother and infants for at least one week.

4.7 Effects on ability to drive and use machines

ThyroTop D 0.5-37 MBq hard capsule has no or negligible influence on the ability to drive and use machines.

4.8 Undesirable effects

Effective Dose Equivalent is 11mSv/MBq. In case of administration of the maximal proposed activity (37 MBq) adverse reaction are hardly to expected.
Exposure to ionising radiation is linked with cancer induction and a potential for development of hereditary effects. The radiation dose resulting from therapeutic exposure may result in higher incidence of cancer and mutations. In all cases it is necessary to make sure that the risks associated with the radiation are lower than those of the disease.
Nausea, vomiting can occur after administration of high activities (rather therapeutic doses). Precaution should be taken in order to avoid the contamination caused by vomiting.
Allergic reactions after administration of ^{131}I-sodium iodide have been reported very rare.
Use of the product should be avoided after such reactions. Adequate devices (such as medical ventilator and intubator) and medicaments should be available in case of emergency. Itching skin, flushing may occur.
According to MedRA database:

Nervous system disorders	flushing
Gastrointestinal disorders	Nausea, vomiting
Skin and subcutaneous tissue disorders	Skin exanthem, itching

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 national reporting system (In Hungary: www.ogyei.gov.hu).

4.9 Overdose

There is no information on any case with overdose.
Administration of higher activities than prescribed is unnecessary and must be avoided in order to avoid the excess absorbed radiation dose of the patient and his/her environment. Administration of higher activities than needed may cause hypothyreosis.
In case of incidental overdose the actual absorbed radiation dose must be calculated by using the data of the dosimetric table of Chapter 11. Necessity and method of further treatment should be concluded based on these results.
Radiation exposure due to overdose can be reduced by thyroid blocking agents e.g. potassium – perchlorate, vomitory or frequent urination.

5. PHARMACOLOGICAL PROPERTIES

5.1 Pharmacodynamic properties

Pharmacotherapeutic group: thyroid diagnostic radiopharmacon, ATC code: V09F
The pharmacologically active substance of the capsule is iodine-131 as ^{131}I -sodium iodide, which enriches in thyroid leading to selective irradiation of the organ.
The small quantity of ^{131}I I-sodium iodide administered for diagnostic purposes does not produce any pharmacodynamic effects.
More than 90% of the radiation effect of iodine-131 are based on the emitted beta-radiation with maximal energy of 807 keV, main energy 192 keV. Irradiation range in the tissue is maximum 3 mm, main range is 0.4 mm. Exposure outside of the thyroid is negligible.
In case of radioactive iodine intake, amount of iodine entering the body is determined by the specific activity of ^{131}I-sodium iodide, which is not less than 1 GBq/µg. Since the radioactivity administered into the body is not more than 7.4 GBq (therapeutic activity) amount of iodine intake is not more than 7.4 µg, which is 2.4-4.9 % of the optimal daily iodine intake. Therefore, the chemical concentration of the active ingredient of the drug product is negligible. Gamma radiation of ^{131}I provides the diagnostic information and beta particles absorbing in the tissue are responsible for the therapeutic effect. Excretion of radioactive iodine occurs almost entirely via the urine.

5.2 Pharmacokinetic properties

Orally applied ^{131}I -sodium iodide is quickly absorbed in the upper gastrointestinal tract (90 % within 60 min). Absorption is influenced by stomach emptying. Absorbtion is increased with hyperthyroidism and decreased with hypothyroidism.
In studies of the solubility of ^{131}I -sodium iodide hard capsules it was proven that the dissolution took place within 5-12 minutes and the radioactivity was distributed homogeneously on the surface of the gastric mucosa. Studies of the serum activity showed that after a fast rise over 10-20 minutes the equilibrium was reached approximately after 40 minutes. After oral administration of a ^{131}I -sodium iodide the equilibrium was reached at the same time.
The pharmacokinetics is similar to that of non-radioactive, stable iodine. After entrance into the bloodstream iodine-131 distributes in the extratcellular compartment. From there it is absorbed mainly by the thyroid, or it is renally eliminated. The uptake of the iodine into the thyroid reaches its maximum within 24-48 hours; 50% of the maximum peak are reached within five hours.
The uptake is influenced by a number of factors: age of the patient, volume of the thyroid, kidney clearance, amount of the circulating iodide and other medicinal products (see section 4.5. Interaction with other medicinal products and other forms of interaction). Small quantities are taken up by the salivary glands and gastric mucosa and are detectable also in breast milk, in the placenta and the plexus chorioideus.
The iodide taken up to the thyroid follows the well-known metabolism of the thyroid hormones where it is integrated into organic compounds from which the thyroid hormones are synthesised.
The effective radioactive half-life of iodine-131 in the plasma is about 12 hours, while it is about six days when stored in the thyroid.
Therefore, after administration of ^{131}I-sodium iodide about 40% of the activity exhibit an effective radioactive half-life of 0.4 days while the remaining 60% have an effective radioactive half-life of eight days. 37-75% of iodine-131 is eliminated via the kidneys and only a small portion with faeces; elimination via the sweat glands is negligible. Urine excretion is characterised by renal clearance.
Elimination is slower in hypothyreosis and in case of malfunctions of the kidneys and faster in hyperthyroidism.
Mean urine excretion in euthyroid patients with normal kidney function 50-75% of the applied activity were excreted with the urine within 48 hours.

5.3 Preclinical safety data

LD_{50} value expressing the acute toxicity of I-131 introduced orally into the body is 1000 mg/kg body weight for mice and 760 mg/kg body weight for dogs. Optimal iodine intake for adults is 0.15-0.30 mg per day. Specific activity of ^{131}I-sodium iodide is not less than 1 GBq/microgram. Since the radioactivity administered into the body is not more than 37 MBq amount of iodine intake is not more than 0.037 microgram i.e. negligible fraction of the optimal iodine intake. Therefore the product is considered safe in regard of iodine intake.

6. PHARMACEUTICAL PARTICULARS

6.1 List of excipients

Capsule fillers: Disodium hydrogen phosphate dihydrate, sodium thiosulphate, sodium hydroxide, sodium carbonate, sodium hydrogen carbonate, water for injection,
Capsule shell: gelatine

6.2 Incompatibilities

This medicinal product is incompatible to moisture, water and liquids since these substances moistens and softens the capsule, which can bring about the opening of the capsule, spreading off its load and radioactive contamination.
This product must not be mixed with acids; radioactive iodine takes volatile (radical or elemental) form in acidic medium, contaminating the environment.
Radioactive iodine is in the capsule in iodide form (oxidation number is –1). Oxidising agents (e.g. acids) oxidise iodide to elemental iodine (oxidation number is 0), iodate (oxidation number is +5) or periodate (oxidation number: +7). These compounds having oxidation number other than –1, are radiochemical impurities of the product and their formation must be avoided.

6.3 Shelf life

21 days from date of the manufacturing

6.4 Special precautions for storage

Do not store above 25°C. Store in the original packaging to prevent from external radiation exposure. Storage of radiopharmaceuticals should be in accordance with national regulations on radioactive materials.
Protect from moisture, acid fumes and oxidative agents

6.5 Nature and contents of container

1-10 capsules in colourless type I injection vial closed with brombutyl stopper and green aluminium cap. The injection vial is packed in a lead container (wall thickness of the lead container depends on radioactivity) containing paper insert. The lead continer is placed in a tin container with polysyrene foam insert.

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 local 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.
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.
Opening the packaging:

- Tear off the cover of the tin container
- Remove the upper part of the foam insert
- Lift the lead container containing vial with the capsules out from the tin can and put it on the working area. Manipulate from behind appropriate radiation-shielding.
- Remove the upper part of the lead container
- Hold the vial with forceps and remove the aluminium cap of the glass vial by using a decapper
- Remove the stopper of the glass vial with forceps
- Now the capsules can be easily taken out from the vial

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

7. MARKETING AUTHORISATION HOLDER

Institute of Isotopes Co., Ltd., ✉ 1535 Budapest, P.O.B. 851
Konkoly-Thege Miklós út 29-33. , H-1121 Budapest, Hungary
Tel.: 36 1 391 0859; 395 0860 Fax: 36 1 395 9070
E-mail: radiopharmacy@izotop.hu

8. MARKETING AUTHORISATION NUMBER(S)

OGYI-T-9681/05 1-10 capsules in type I injection vial, and lead container with paper insert

9. DATE OF FIRST AUTHORISATION/RENEWAL OF THE AUTHORISATION

Date of first authorisation: 27 July 2016
Date of latest renewal: 19. Marc 2021

10. DATE OF REVISION OF THE TEXT

19. Marc 2021

11. DOSIMETRY

Tabulated radiation dosimetry, as reported in ICRP publication No 53 (1987) and ICRP publication No 60 (1990) are reported. The ICRP model refers to intravenous administration. Since absorption of radioiodine is rapid and complete, this model is applicable in case of oral administration also but there is a further radiation dose to the stomach 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 is increased by about 30 % for [^{131}I].
Mainly the thyroid is affected by the radiation. The radiation exposure of other organs is usually only in the range of some thousandths of that of the thyroid. It also depends on the supply of stabile iodine with food (uptake of radioactive iodine increases up to 90 % in iodine deficiency areas, drops down to 5 % in iodine-rich areas). Further, it depends on the thyroid function (euthyreosis, hyperthyreosis or hypothyreosis) and whether there is iodine-storing tissue in the body (e.g. after thyroidectomy), presence of iodine-storing metastases or whether the thyroid was blocked. Thus the radiation exposure of all other organs is higher or lower depending on the iodine level in the thyroid.

Radiation exposure (Thyroid blocked, uptake 0%)
The organs or tissues receiving the highest dose are marked with * in the table.

^{131}I 8.02 days	Absorbed dose per unit activity administered (mGy/MBq)				
Organ	Adult	15 years	10 years	5 years	1 year
Adrenal glands	0.037	0.042	0.067	0.11	0.2
*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	0.04	0.064	0.1	0.19
*Small intestine	0.038	0.047	0.075	0.12	0.22
*Wall of upper large intestine	0.037	0.045	0.07	0.12	0.21
*Wall of lower large intestine	0.043	0.052	0.082	0.13	0.23
*Kidneys	0.065	0.08	0.12	0.17	0.31
Liver	0.033	0.04	0.065	0.1	0.2
Lungs	0.031	0.038	0.06	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 tissues	0.032	0.039	0.062	0.10	0.19
Effective dose equivalent (mSv/MBq)	0.064	0.081	0.126	0.198	0.374

Bladder wall contributes to 47.6% of the effective dose.

Partial blocking:
Effective dose equivalent (mSv/MBq) at small uptake in the thyroid.

Uptake 0.5%	0.50	0.79	1.20	2.60	4.90
Uptake 1.0%	0.90	1.42	2.10	4.70	9.30
Uptake 2.0%	1.60	2.6	4.20	9.30	17

Thyroid uptake: 15%

^{131}I 8.02 days	Absorbed dose per unit activity administered (mGy/MBq)				
Organ	Adult	15 years	10 years	5 years	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 intestine	0.28	0.35	0.62	1.0	2.0
*Wall of upper large intestine	0.059	0.065	0.10	0.16	0.28
*Wall of lower large intestine	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 equivalent (mSv/MBq)	11.1	17.9	26.8	58.7	107

Thyroid uptake: 35%

^{131}I 8.02 days	Absorbed dose per unit activity administered (mGy/MBq)				
Organ	Adult	15 years	10 years	5 years	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 intestine	0.28	0.35	0.62	1.0	2.0
*Wall of upper large intestine	0.058	0.065	0.10	0.17	0.30
*Wall of lower large intestine	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 equivalent (mSv/MBq)	25.6	41.5	62.3	137	248

Thyroid uptake: 55%

^{131}I 8.02 days	Absorbed dose per unit activity administered (mGy/MBq)				
Organ	Adult	15 years	10 years	5 years	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 intestine	0.28	0.35	0.62	1.0	2.0
*Wall of upper large intestine	0.058	0.067	0.11	0.18	0.32
*Wall of lower large intestine	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 equivalent (mSv/MBq)	40.2	65.0	100	214	391

12. INSTRUCTIONS FOR PREPARATION OF RADIOPHARMACEUTICALS
The capsules are ready for use. Determine the activity before use.
Any unused medicinal product or waste material should be disposed of in accordance with local requirements.

IZOTOP

PACKAGE LEAFLET: INFORMATION FOR THE USER
ThyroTop D 0.5 – 37 MBq hard capsule
Sodium iodide (^{131}I)

Read all of this leaflet carefully before this medicine is used for your examination because it contains important information for you
- Keep this leaflet. You may need to read it again.
- If you have any further questions, ask your nuclear medicine doctor.
- If you get any side effects, talk to your nuclear medicine doctor. This includes any possible side effects not listed in this leaflet. See section 4.

What is in this leaflet

1. What ThyroTop D 0.5 – 37 MBq hard capsule is and what it is used for

This medicine is a radiopharmaceutical product for diagnostic use only.
ThyroTop D 0.5 -37 MBq hard capsule is a radioactive medicine, which can be used to design the individual patient dose of radionuclide therapy and for determination of thyroidal uptake of radioiodine and its saturation curve. This medicine can be used only in nuclear medicine departments.
The gelatine capsule itself is colourless and contains white powder. After oral administration of the capsule, sodium iodide (^{131}I) gets into the blood stream and reaches the thyroid, the salivary glands, placenta, gastric mucosa and plexus chorioideus and breast milk in case of lactation.

2. What you need to know before ThyroTop D 0.5 – 37 MBq hard capsule is used

Do not take ThyroTop D 0.5 – 37 MBq hard capsule
- if you are allergic to any of the other ingredients of this medicine (listed in section 6).
- if you are pregnant, or breastfeeding
- if you do not consent to the nuclear medicine examination
- if you are not capable to follow the instructions on post treatment radiation protections

Warnings and precautions
Talk to your nuclear medicine doctor before taking ThyroTop D 0.5 – 37 MBq hard capsule.
In case of patients having dysphagia, oesophageal stricture, active gastritis, gastric erosions and peptic ulcer suitable precautions have to be taken in order to avoid the radioactive contamination of the environment caused by vomiting. ^{131}I content of ThyroTop D 0.5 – 37 MBq hard capsule is a negligible portion of the daily iodine intake therefor this examination can be carried out in case of patients suffering from iodine allergy.
Children and adolescents
ThyroTop D 0.5-37 MBq hard capsule is generally not advised to the examination of hyperthyreosis in children and adolescents under 18 years old as its radioiodine treatment is generally not inicated, except if the necessity of the treatment outweighs the risk arising from radioactive exposure.
Other medicines and ThyroTop D 0.5 – 37 MBq hard capsule
Tell your nuclear medicine doctor if you are taking, have recently taken or might take any other medicines.
ThyroTop D 0.5 – 37 MBq hard capsule with food and drink
Take the capsule on empty stomach, swallow whole. You may drink some water with it. Drink 1-2 decilitre water. Do not eat for one hour.
Pregnancy and breast-feeding
You must inform the nuclear medicine doctor before the administration of ThyroTop D 0.5-37 MBq hard capsule if there is a possibility you might be pregnant, if you have missed your period or if you are breast-feeding. When in doubt, it is important to consult your nuclear medicine doctor who will supervise the procedure.
ThyroTop D 0.5 – 37 MBq hard capsule must not be used if you are pregnant or breast-feeding. In case of breast-feeding mothers treatment should be postponed after finishing breast-feeding or breast feeding should be stopped. For radiation protection reasons close contact between mother and baby should be avoided for at least one week.
Driving and using machines
You may drive or operate machines. In occurrence of unexpected adverse reactions driving and/or working with machines should be reconsidered.
ThyroTop D 0.5 – 37 MBq hard capsule contains sodium
This medicine contains 143 mg sodium (main component of cooking/table salt) in each capsule. This is equivalent to 7.15 % of the recommended maximum daily dietary intake of sodium for an adult and to be taken into consideration if you are on a controlled sodium diet.

3. How ThyroTop D 0.5 – 37 MBq hard capsule is used

There are strict laws on the use, handling and disposal of radioactive products for medical treatment. ThyroTop D 0.5 – 37 MBq hard capsule will only be used in specialised, controlled areas. This medicine will only be given to you by people who are trained and qualified to use it safely. These people will take special care to use this medicine safely and they will talk to you about what they are doing.
The nuclear medicine doctor supervising the procedure will decide on the right dose of ThyroTop D 0.5 – 37 MBq hard capsule for you. It will be the smallest quantity necessary to get the desired effect.

You should take the capsule orally.
Your nuclear medicine doctor will decide the amount of the administered activity, considering your condition.
Take the capsule on empty stomach, swallow whole. You may drink some water with it. Drink 1-2 decilitre of water. Do not eat for one hour. Radioiodine uptake of thyroid is measured after.

If you have been given more ThyroTop D 0.5 – 37 MBq hard capsule than you should

An overdose is unlikely because you will only receive a single dose of ThyroTop D 0.5 – 37 MBq hard capsule precisely controlled by the nuclear medicine doctor supervising the procedure. However, in the case of an overdose, you will receive the appropriate treatment.
Should you have any further question on the use of ThyroTop D 0.5 – 37 MBq hard capsule, please ask the nuclear medicine doctor who supervises the procedure.

4. Possible side effects

Like all medicines, this medicine can cause side effects, although not everybody gets them.
This radiopharmaceutical will deliver low amounts of ionising radiation associated with the least risk of cancer and hereditary abnormalities.
Allergic reactions after administration of ThyroTop D 0.5 – 37 MBq hard capsule have been reported very rare (less than one of 10000 patients). Other possible side effects: nausea, womiting, itching, flushing.
Reporting of side effects
If you get any side effects, talk to your nuclear medicine doctor or nurse. This includes any possible side effects not listed in this leaflet. You can also report side effects directly via national reporting system (In Hungary: www.ogyei.gov.hu). By reporting side effects you can help provide more information on the safety of this medicine.

5. How ThyroTop D 0.5 – 37 MBq hard capsule is stored

You will not have to store this medicine. This medicine is stored under the responsibility of the specialist in appropriate premises. It will be stored in accordance with national regulation on radioactive materials.
The following information is intended for the specialist only.
Keep this medicine out of the sight and reach of children and persons not authorised for use, handling and transport.
Do not store above 25°C. Store in the original packaging to prevent from external radiation exposure. Storage of radiopharmaceuticals should be in accordance with national regulations on radioactive materials,
Protect from moisture, acid fumes and oxidative agents.
ThyroTop D 0.5 – 37 MBq hard capsule must not be used after the expiry date which is stated on the label after 'EXP'.

6. Contents of the pack and other information

What ThyroTop D 0.5 – 37 MBq hard capsule contains
- The active substance is sodium iodide (^{131}I). Each hard capsule contains 0.5-37 MBq of sodium iodide (^{131}I).
- Excipients: Disodium hydrogen phosphate dihydrate, sodium thiosulphate, sodium hydroxide, sodium carbonate, sodium hydrogen carbonate, water for injection, capsule shell: gelatine

What ThyroTop D 0.5 – 37 MBq hard capsule looks like and contents of the pack
Size '0' colourless, transparent, CONI-SNAP type hard gelatine capsule
Packaging: 1-10 capsules in colourless type I injection vial closed with grey brombutyl stopper and green aluminium cap. The injection vial is packed in a lead container (wall thickness of the lead container depends on radioactivity) containing paper insert. The lead continer is placed in a tin container with polysyrene foam insert.

Marketing Authorisation Holder and Manufacturer
Institute of Isotopes Co. Ltd.
1121 Budapest, Konkoly Thege Miklós str. 29-33.
✉ 1535 Budapest, P.O.B. 851.
Tel.: 36 1 391 0859; 36 1 391 0860 Fax: 36 1 395 9070
E-mail: radiopharmacy@izotop.hu

OGYI-T-9681/05 1-10 capsules in type I injection vial, in lead container with paper insert

This leaflet was last revised in Marc 2021.

OGYÉI/72673/2020