OFFICIAL JOURNAL

OF THE MINISTER OF HEALTH

Warsaw, 23 December 2014

Item 82

NOTICE

OF THE MINISTER OF HEALTH[1]

of 22 December 2014

on the announcement of the list of reference radiological procedures in nuclear medicine

Pursuant to Article 33g paragraph 7 of the Atomic Law Act of 29 November 2000 (Dz. U. of 2014, items 1512), it is hereby announced that

§ 1. The list of reference radiological procedures in nuclear medicine, constituting an appendix to this Notice, is hereby announced.

§ 2. The reference radiological procedures specified in §1 are applicable from 1 January 2015.[2]

MINISTER OF HEALTH

[1]The Minister of Health is in charge of the health care government administration department pursuant to Article 1 paragraph 2 of the Regulation of the President of the Council of Ministers of 22 September 2014 on the detailed scope of activities of the Minister of Health (Dz. U. item 1268).

[2]This Notice was preceded by the Regulation of the Minister of Health of 6 November 2013 on the announcement of the list of reference radiological procedures in nuclear medicine (Dz. U. of the Minister of Health, item 45).

Appendix to the Notice of the Minister of Health
of ……. 2014
(item …)

LIST OF REFERENCE RADIOLOGICAL PROCEDURES IN NUCLEAR MEDICINE

1. Renal scintigraphy (with possible diuretic test)
2. Static scintigraphy of the kidneys
3. Glomerular filtration rate (GFR) test
4. Salivary gland scintigraphy
5. I-131 treatment of hyperthyroidism in Graves-Basedow disease
6. I-131 treatment of hyperthyroidism in hyperactive nodular goitre
7. I-131 treatment of massive neutral goitre
8. I-131 treatment of hyperthyroidism in children
9. Sr-89 treatment of bone metastases (pain therapy)
10. Sr-153 treatment of bone metastases (pain therapy)
11. Ra-223 treatment of bone metastases (pain therapy)
12. Re-186 treatment of bone metastases (pain therapy)
13. Y-90 treatment of joint diseases
14. Re-186 treatment of joint diseases
15. Er-169 treatment of joint diseases
16. Thyroid scintigraphy (^{99m}Tc)
17. Thyroid scintigraphy (^{131}I/^{123}I)
18. Thyroid scintigraphy (^{99m}Tc-MIBI)
19. Thyroid scintigraphy (^{99m}Tc-DMSA)
20. Thyroid iodine uptake test
21. Evaluation of the thyroid's ^{99m}Tc uptake
22. Intraoperative detection of papillary thyroid cancer metastases (RGS)
23. Parathyroid gland scintigraphy - subtraction
24. Parathyroid gland scintigraphy - dual-phase
25. Parathyroid gland test (SPECT)
26. Intraoperative localisation of parathyroid glands
27. Adrenal medullae scintigraphy (^{131}I/^{123}I MIBG)
28. Adrenal cortex scintigraphy (^{131}I-Norcholesterol)
29. Treatment of Polycythemia Vera
30. Radioimmunotherapy in lymphoma patients
31. PET tomography (18-Fluorodeoxyglucose (^{18}F-FDG))
32. PET tomography (^{68}Ga-DOTA-peptides)
33. PET tomography (^{18}F-sodium fluoride)
34. PET tomography ([^{18}F] FLT-3-deoxy-3[^{18}F]fluorothymidine (FLT))
35. PET tomography (^{18}F-fluoro-ethyl-L-tyrosine (^{18}F-FET))
36. PET tomography (^{18}F-DOPA)
37. PET tomography (^{18}F- and ^{11}C choline)
38. PET tomography (^{11}C-acetate)
39. PET tomography (^{11}C-PIB)
40. Treatment of primary tumours/liver metastases
41. Palliative treatment of peritoneal/pleural metastatic lesions
42. Treatment of thyroid cancer (^{131}I)
43. Treatment (^{131}I-MIBG)
44. Effective Renal Plasma Flow Test (KLIRENS ERPF)

45. Fictitious renal scintigraphy
46. Whole body scintigraphy (thyroid cancer)
47. Oesophageal motility scintigraphy
48. Gastric emptying scintigraphy
49. Myocardial perfusion scintigraphy
50. Hepatic blood pool scintigraphy
51. Gastroesophageal reflux scintigraphy
52. Adrenergic system scintigraphy
53. Three-phase bone scintigraphy
54. Meckel's diverticulum scintigraphy
55. Bone scintigraphy (whole body test)
56. Scintigraphy (^{67}Ga)
57. Scintigraphy ^{99m}Tc -MIBI)
58. Scintigraphy (^{201}Tl)
59. Sentinel lymph node scintigraphy
60. Isotope treatment for neuroendocrine tumours
61. Radioisotope test of the arterial system
62. Brain blood flow test
63. Cholescintigraphy
64. Cisternography
65. Cystography
66. Brain test (18-fluorodeoxyglucose (^{18}F-FDG))
67. Dopaminergic system test (^{18}F-DOPA)
68. Radioisotope phlebography
69. Benzodiazepine receptors system test (Flumazenil)
70. Radioisotope myocardium function test (“gated SPECT”)
71. Dopaminergic system test (^{123}IBZM)
72. Inflammation scintigraphy (tagged antibodies)
73. Dopaminergic system test (beta-Cit)
74. Benzodiazepine receptors system test (Lomazenil)
75. Scintigraphic diagnostics of gastrointestinal bleeding
76. Inflammation scintigraphy (tagged in vitro leukocytes)
77. Lymphoscintigraphy
78. Whole body scintigraphy (^{131}I-MIBG or ^{123}I-MIBG)
79. Radioisotope myocardium function test (tagged blood samples, gated technique)
80. Somastatin receptor scintigraphy (SRS) (^{111}In-OCTREOSCAN)
81. Renal function scintigraphy (Captoprilum test) in renovascular hypertension diagnostics
82. Intraoperational detection of neuroendoctrinal tumours (isotope probe)
83. Lung ventilation scintigraphy
84. Lung perfusion scintigraphy
85. Inflammation scintigraphy (tagged p-monoclonal antibodies)
86. Radioisotope myocardium function test (first-pass technique)
87. Lung ventilation scintigraphy (Technegas)
88. Somastatin receptor scintigraphy (SRS) (^{99m}Tc-Tectrotide)
89. Somastatin receptor scintigraphy (SRS) (Tyr3-octreotide)
90. Liver and spleen scintigraphy
91. Myocardial blood flow test (PET and ^{82}Rb technique)

5. I-131 treatment of hyperthyroidism in Graves-Basedow disease - general section

1. Purpose of the procedure.

Treatment procedure, radioisotope treatment of Graves-Basedow patients.

2. Academic degree (title) as well as first name and last name of the procedure's author(s).

Professor Jerzy Sowiński, MD, PhD; Professor Marek Ruchała MD, PhD; Agata Czarnywojtek, MD, PhD

3. Date of listing the procedure.

……

4. List of diseases to which the given procedure applies in terms of diagnostics or treatment.

Graves-Basedow disease with hyperthyroidism.

5. Primary information on the scientific grounds for diagnostic or treatment methods used in the procedure.

Treatment of mild thyroid diseases using I-131 has been used since 1940s. This method uses the thyroid cells' ability to uptake iodine via a sodium-iodide symporter.

^{131}I is a beta and gamma emitter with a half-life of 8.02 days. It is administered orally, rarely intravenously in the treatment of mild thyroid diseases (Graves-Basedow disease, hyperactive nodular goitre) and various thyroid cancers.

The treatment of hyperthyroidism in the Graves-Basedow disease involves using antithyroid drugs, I-131 radioactive iodine or a surgical procedure. Antithyroid drugs: derivatives of thioimidazole and thiouracile are able to quickly lower the concentration of thyroid hormones: free thyroxine (FT_4) and three triiodothyronine (FT_3), however their action is short-term and most cases involve relapse of hyperthyroidism within few weeks or months from drug withdrawal. Furthermore, antithyroid drugs can cause a series of adverse reactions, including allergic skin reactions and rarely granulocytopenia, or even agranulocytosis and toxic hepatitis. The success of the treatment depends largely on the patient's regular implementation of medical recommendations.

Surgical treatment (subtotal strumectomy or thyroidectomy) is recommended if focal lesions are present around the goitre and for patients with a greatly enlarged thyroid, causing tracheal stenosis, for young patients, especially women planning to become pregnant.

I-131 treatment is recommended in the Graves-Basedow disease involving a moderately enlarged or regular thyroid, for elderly people, especially if antithyroid drugs are ineffective or produce adverse reactions. I-131 is also recommended for patients with goitre regrowth following surgical treatment and hyperthyroidism recurrence following I-131 treatment (no sooner than after 6 months).

6. Absolute and relative medical contraindications to use of the procedure.

1) relative:

high-intensity decompensated hyperthyroidism

b) hyperthyroidism caused by excess iodine intake (amiodarone, contrast media);

2) absolute:

a) pregnancy,

b) breast-feeding.

7. **Requirements for the management of pregnant women, breast-feeding women, if required under the procedure, and persons below the age of 16, with special consideration of infants.**

Pregnant women:

I-131 treatment is not used for pregnant women.

Pregnancy must be excluded in women of reproductive age prior to commencing the test (women must sign a relevant statement, run a pregnancy test if required).

It is recommended to take a pregnancy test within 3 days prior to the administration of I-131. The pregnancy test can be skipped if clear data excluding pregnancy is available following an interview, confirmed with the patient's written statement.

It is recommended to use contraception for 4 months after the I-131 treatment.

Breast-feeding women:

I-131 treatment is not used for breast-feeding women.

Due to the release of radioactive iodine into the milk for several days following the I-131's administration, lactation must be inhibited if it is necessary to use this method during breast-feeding.

Persons below the age of 16 (with special consideration of infants):

In terms of therapy safety, the I-131 treatment is not strictly contraindicated for persons below the age of 16 and is used in some cases of the Graves-Basedow disease.

8. Recommended types of radiological equipment and their basic technical parameters important for the used procedure.

Prior to conducting the I-131 treatment, it is necessary to perform scintigraphy following the I-131 or Tc-99m administration, measure the iodine uptake (or the 99mTc uptake) and perform thyroid ultrasonography. The instrumentation requirements regarding these methods are discussed in relevant reference procedures.

Dose calibrator enabling the measurement of the I-131 isotope's activity. The accuracy of the meter's indicator should be evaluated with a source possessing metrological attestation at least once a year.

Radiometer for measuring the dose rate and radioactive contamination as well as monitor for the detection of personal radioactive contamination.

The capsules intended for therapy should be kept in adequate containers that provide protection against beta minus and gamma radiation.

Personal means of protection against beta minus and gamma radiation - lead rubber aprons, goggles, thyroid shields, etc.

Meter for measuring the radioactive iodine content in the personnel's thyroids.

Scintillation gamma camera.

9. Requirements for rooms and auxiliary equipment.

Pursuant to Article 45 of the Atomic Law Act of 29 November 2000, the procedure can be performed in a minimum class III isotope laboratory. Pursuant to Article 46 of the aforementioned act, the rooms in which the procedure is conducted should meet the national legal requirements on the detailed conditions for safe operation of ionising radiation sources.

10. List of personnel taking part in the procedure and required competencies.

1) physician specialised in nuclear medicine or physician in the process of specialisation in nuclear medicine under the supervision of a specialist in nuclear medicine;

2) person who:

a) started university studies in electroradiology after 30 September 2012, featuring at least 1700 hours of education in electroradiology and earned at least the Bachelor's degree or engineer degree,

a) completed university studies in the field or specialisation of electroradiology, featuring at least 1700 hours of education in electroradiology and earned at least the Bachelor's degree or engineer degree,

c) graduated from a public or non-public (with public school rights) post-secondary school and earned the official title of electroradiologist or electroradiology technician, or a diploma confirming their competencies in the electroradiology technician occupation

- and completed training in scintillation camera operation;

3) nurse trained for working with open radioactive sources;

4) medical physicist;

5) a possible participation of a person with documented 10-year work experience as a technician, trained in scintillation camera operation.

11. Rules for the evaluation of referral for examination or treatment.

Qualification for treatment is performed based on a referral issued by a physician (including a basic health care physician). A physician specialised in nuclear medicine (or physician in the process of specialisation) is eligible to determine the validity of the patient's referral for I-131 treatment. The preliminary diagnosis recorded in the referral by the referrer should comply with the aforementioned indications for I-131 treatment. A specialist in nuclear medicine is eligible to disqualify a patient from I-131 treatment in the absence of indications for treatment or in case of contraindications.

12. Description of the potential for drug interactions.

No interaction between the I-131 and other drugs is described.

13. Description of possible sources of procedural or technical errors.

1) error in calculating the I-131 therapeutic action;

2) dose calibrator failure;

3) error in identifying the patient;

4) error in identifying the prepared therapeutic action.

14. Information on circumstances requiring special attention and care when using the procedure.

1) anti-thyroid drugs are usually administered to patients prior to I-131 treatment. The objective of pharmacological treatment is to lower FT_3 and FT_4 concentrations to the correct values or slightly above reference values. The drugs' adverse effects include lowering the iodine uptake and shortening the effective half-time of iodine in the thyroid. In order to minimise the antithyroid drugs' negative effects, it is recommended to stop administering the drugs prior to the I-131 treatment: derivatives of thioimidazole at least 2 days prior to the treatment dose's administration, propylthouracil at least 2-3 weeks (even 8 weeks, if possible). In case of serious hyperthyroidisim, it is possible to administer antithyroid drugs again a few days after administering the I-131 therapeutic dose;

2) in the antithyroid drugs withdrawal period, the hyperthyroidism symptoms should be relieved by using beta-adrenolytic drugs, mainly propranolol, unless there are contraindications. The doses of these drugs are selected individually, according to the clinical situation:

3) I-131 treatment is not recommended if the hyperthyroidism is caused by the use of agents containing

iodine, mainly amiodarone. These drugs substantially lower the thyroid's iodine uptake. I-131 treatment can be used several months and even 2 years after discontinuing the use of an agent containing iodine;

4) in case of urinary incontinence, it is required to take special care due to the high risk of contaminating the environment. It is necessary to consider conducting the I-131 treatment in an isotope therapy ward. Following I-131 administration, patients require strict cooperation between the physicians, nurses and support personnel, and the radiological protection inspector.

15. Description of the patient's preparation for examination or treatment, taking into account the rules of the patient's radiological protection.

Prior to treatment, it is recommended to conduct a series of examinations:

1) physical examination with special consideration of the course of treatment and previous treatment of hyperthyroidism, using amiodarone and other drugs containing iodine, as well as conducting examinations with the use of contrast media containing iodine;

2) FT_4 and TSH concentrations, also FT_3 concentration if necessary;

3) Anti-TSHR antibodies, if necessary;

4) iodine uptake measurement performed at least twice, i.e. 4-6h and 24h after administering the I-131 diagnostic dose. If the iodine uptake <20%, I-131 treatment is not strictly contraindicated, but it is necessary to consider other treatment methods; iodine uptake measurement is not strictly necessary when using fixed I-131 doses or if the aim of the treatment is thyroid tissue ablation by using the I-131's high activity;

5) thyroid scintigraphy with the use of Tc-99m or I-131 to evaluate the goitre size and active thyroid tissue distribution;

6) thyroid ultrasonography with evaluation of the thyroid's volume and focal lesions;

7) fine needle biopsy in the case of the Graves-Basedow disease with tumours, if necessary;

8) ophthalmic evaluation, if necessary;

9) the choice of adequate examinations and consultations depends on the patient's clinical condition and is made by the physician that qualifies the patient for I-131 treatment.

Prior to the I-131 treatment, the patient should be informed orally and in writing about the treatment's course, the expected effects, risk of hyperthyroidism relapse and need for repeated treatment, as well as probability of hypothyroidism. Special attention must be paid to the rules of radiological protection, the purpose of which is to minimise the exposure of family members, including children and community members to ionising radiation.

After clearing all doubts, the patient should sign a statement of informed consent for treatment. The treating physician should confirm the training in writing. The signed document must be kept along with the patient's documentation at the institution that administers the I-131 treatment.

16. List of issues requiring further examination or therapeutic measures after using the procedure.

After the I-131 treatment, the patient remains under specialised care carried out by a specialist in nuclear medicine or person in the process of specialisation.

The first follow-up visit usually takes place after approx. 4-6 weeks. In case of high initial FT_3 or FT_4 concentrations and for patients with thyroid-associated orbitopathy, it is recommended for the follow-up visit to take place after 1-3 weeks. Aside from clinical evaluation, it is also reasonable to designate FT_3, FT_4 and TSH concentrations. The use and selection of laboratory tests depends on the physician's

individual evaluation. The purpose of the clinical examination and/or laboratory tests in the initial phase is to exclude hyperthyroidism exacerbation.

Subsequent follow-up visits should take place at 1-3 month intervals (depending on the clinical condition). Their purpose is to conduct a preliminary evaluation of the I-131 treatment's effectiveness, detect possible hypothyroidism and modify adjunctive pharmacological treatment.

The final effect of I-131 treatment is usually evaluated after approx. 6 months. If hyperthyroidism persists in this period, it is necessary to evaluate the indications for repeated I-131 treatment.

If hyperthyroidism symptoms persist, it is recommended to use anti-thyroid drugs and, depending on the symptoms, beta-adrenolytic drugs and sedatives. If the I-131 treatment causes hypothyroidism confirmed by increased TSH concentrations, it is necessary to commence treatment with replacement doses of L-thyroxin.

If radiation-induced thyroiditis occurs, it is recommended to commence short-term use of non-steroidal anti-inflammatory drugs.

Due to the increased risk of hypothyroidism, the patient should remain under constant care of a specialist in nuclear medicine (or person in the process of specialisation).

17. List of scientific literature applicable to the described procedure, including recommendations of the European Commission and scientific societies.

1) Stokkel M.P.M., Handkiewicz-Junak D., Lassmann M., Dietlein M., Luster M.; EANM procedure guidelines for therapy of benign thyroid disease. Eur J Nucl Med Mol Imaging 2010; 37: 2218-28;

2) Dietlein M., Dressier J., Grunwald F., Leisner B., Moser E., Reiners C., Schicha H., Schneider P., Schober O.; Deutsche Gesellschaft fur Nuklearmedizin. Leitlinie zur Radiojodtherapie (RIT) bei benignen Schilddrusenerkrankungcn (Version 4). Nuklearmedizin 2007; 46: 220-3;

3) Cooper D.S., Doherty G.M., Haugen B.R., Kloos R.T., Lee S.L., Mandel S.J. i inni; Revised American Thyroid Association management guidelines for patients with thyroid nodules and differentiated thyroid cancer. Thyroid 2009; 19: 1167-214;

4) Bahn R.S., Burch H.B., Cooper D.S., Garber J.R., Greenlee M.C., Klein I., Laurberg P., McDougall I.R., Montori V.M., Rivkees S.A., Ross D.S., Sosa J.A., Stan M.N.; Hyperthyroidism and other causes of thyrotoxicosis: management guidelines of the American Thyroid Association and American Association of Clinical Endocrinologists. Thyroid 2011; 21 (6): 593-646;

5) Bartalena L., Baldeschi L., Dickinson A., Eckstein A., Kendall-Taylor P., Marcocci C. i inni; Consensus statement of the European Group on Graves' orbitopathy (EUGOGO) on management of GO. Eur J Endocrinol. 2008; 158: 273-85;

6) Królicki L., Karbownik-Lewińska M., Lewiński A. (red.); Choroby tarczycy - kompendium [Thyroid diseases - A compendium]. Czelej Publishing House. Lublin 2008;

7) Atomic Law Act of 29 November 2000 (Dz. U. of 2014, items 1512);

8) Regulation of the Minister of Health of 18 February 2011 on the conditions for the safe use of ionising radiation for all types of medical exposure (Dz. U. of 2013, item 1015).

I-131 treatment of hyperthyroidism in Graves-Basedow disease - detailed section

1. Therapeutic radiopharmaceuticals available and recommended for use (description, preparation, quality control).

I-131 is available as sodium iodide (Nal) for oral or intravenous administration. I-131 is administered

intravenously in exceptional cases, i.e. when the patient has issues with swallowing or vomiting.

Na-I-131 capsules or liquid are used for oral administration. The advantage of liquid is the ability to prepare any therapeutic activity at the facility directly prior to administration. The use of this form of iodide comes with greater risk of contamination. Capsules are therefore most commonly used. They are delivered by the manufacturer with various activities, depending on the demand. Pursuant to current regulations, capsules are transported and stored in containers able to absorb beta and gamma radiation. I-131 capsules are administered via suitable applicators that reduce the risk of dropping the capsule and eliminating the possibility of the capsule's direct contact with skin.

2. Dosimetry data (effective dose and organ dose) after radiopharmaceutical activity unit administration.

Table 1: Effective unit doses for I-131 - sodium iodide - capsules for adult diagnostics and therapy depending on the thyroid iodine uptake.

Absorbed dose per activity unit administered to the patient [mGy (MBq)$^{-1}$]					
Thyroid iodine uptake	**15%**	**25%**	**35%**	**45%**	**55%**
Adrenal glands	0.036	0.039	0.042	0.046	0.049
Bladder wall	0.52	0.46	0.4	0.34	0.29
Bone surface	0.047	0.061	0.076	0.091	0.11
Mammary gland	0.043	0.055	0.067	0.079	0.091
Stomach wall	0.46	0.46	0.46	0.46	0.46
Small intestine	0.28	0.28	0.28	0.28	0.28
Upper section of large intestine	0.059	0.059	0.058	0.059	0.058
Lower section of large intestine	0.042	0.041	0.04	0.04	0.039
Kidneys	0.06	0.058	0.056	0.053	0.051
Liver	0.032	0.035	0.037	0.04	0.043
Lungs	0.053	0.072	0.09	0.11	0.13
Ovaries	0.043	0.043	0.042	0.042	0.041
Pancreas	0.052	0.053	0.054	0.056	0.058
Bone marrow	0.054	0.07	0.086	0.1	0.12
Spleen	0.042	0.044	0.046	0.049	0.051
Testicles	0.028	0.027	0.026	0.026	0.026
Thyroid	210	360	500	640	790
Uterus	0.054	0.052	0.05	0.048	0.046
Other organs	0.065	0.09	0.11	0.14	0.16
Effective dose equivalent [mSv (MBq)$^{-1}$]	**6.6**	**11**	**15**	**19**	**24**

3. Specification of a radiopharmaceutical's required therapeutic activity ensuring optimal treatment results.

The effectiveness of treatment of the Graves-Basedow disease depends on the I-131's therapeutic activity. Optimal activity selection is difficult, because high therapeutic activities indeed give the highest cure rates, but relatively often cause hypothyroidism. On the other hand, low activities lead to hypothyroidism less often, but their effectiveness is low. Furthermore, as shown by multiannual experimentation, the effectiveness of I-131 treatment of mild thyroid diseases is affected by a series of other factors, most of which is immeasurable and cannot be contained in a single pattern.

Two methods of specifying the therapeutic activity are currently being used: individual dose calculation method and fixed dose method.

The currently recommended I-131 activities were chosen empirically. I-131 activity (A) is calculated by taking into account the target tissue mass (m), maximum thyroid iodine uptake (U) and the desired absorbed dose (D), according to the following formula:

$$A\,[MBq] = 27{,}2\frac{\mathbf{m}\,[\mathbf{g}] \cdot D\,[Gy]}{\mathbf{U}\,[\%] \cdot T\,[d]}$$

It is recommended for the desired absorbed dose to be approx. 150Gy, if the objective is to achieve euthyreosis, and 200-300Gy for a desired thyroid tissue ablation. The activities used in practice amount from 3 to 30mCi (111 — 1110 MBq).

The fixed dose method does not require the aforementioned calculations and assumes the use of doses depending on the thyroid's size. This method demonstrates a higher share of hyperthyroidism relapse and occurrence of hypothyroidism after treatment.

4. Description of possible complications, recommended preventive treatment and possible post-complication therapy.

The I-131 treatment of patients with the Graves-Basedow disease involves the risk of occurrence or exacerbation of thyroid-associated orbitopathy. This complication can especially occur in patients with high concentrations of anti-TSHR antibodies and smokers. It is recommended to administer steroid protection drugs to prevent these symptoms from occurring in patients with orbitopathy or high risk of orbitopathy. It involves the use of a prednisone dose of 0.4-0.5 mg per kg of body weight daily, starting on 1-3 days after I-131 treatment. The dosage is maintained for 2-4 weeks and then reduced for another month until withdrawal. In cases of mild orbitopathy, it is possible to use lower shielding doses (approx. 0.2 mg per kg of body weight daily for 6 weeks).

Hypothyroidism is the main and a common side effect. Its frequency varies depending on the population and dose days. Hypothyroidism can occur at various times following I-131 treatment: from several weeks to over a dozen years. Patients therefore require periodical examinations of the TSH concentration throughout their whole lives. If the TSH concentration increases, it is recommended to administer replacement doses of L-thyroxine.

Hypothyroidism occurring after treatment with high "ablation" doses of I-131 is an expected effect of therapy for some patients with severe Graves-Basedow diseases, accompanied by thyroid-associated orbitopathy. Obviously, as in any other case, it requires using substitute doses of L-thyroxine.

The I-131 treatment can cause a temporary increase in FT_3 and FT_4 concentrations within a few days from the therapeutic dose's administration. If the initial concentrations of these hormones are high, it is possible that the symptoms will become exacerbated, including the occurrence of atrial fibrillation, circulatory failure or even thyrotoxic crisis. Prior to administering the I-131 therapeutic activity, such patients require preparation by using anti-thyroid drugs and beta-adrenolytic drugs. In the case of contraindications to using anti-thyroid drugs (e.g. agranulocytosis, hepatic impairment), it is possible to administer I with the shielding of beta-adrenolytic drugs or possibly steroids, provided that the patient's clinical condition is strictly examined and their hormone concentrations are regularly evaluated (in hospital conditions in the best-case scenario).

Patients with a large goitre which causes tracheal stenosis should rather be treated surgically, because a possible transient thyroid tissue swelling after I-131 administration can lead to respiratory failure. In the case of contraindications against surgical treatment, I-131 treatment should be conducted with steroid shielding if the tracheal stenosis is within 1 cm.

Symptoms of radiation-induced thyroiditis are rarely observed and usually happen after administering higher therapeutic activity units; symptoms are resolved spontaneously or after administering non-steroid anti-inflammatory drugs.

Occasional symptoms of sialadenitis can be observed; symptoms are resolved spontaneously or after administering non-steroid anti-inflammatory drugs.

The treatment does not cause a hypersensitivity reaction, even in patients with known iodine allergy, due to the very low mass of iodine in the I-131 treatment does (approx. 1/1000 of the daily iodine supply).

An explicit increase in the risk of cancer diseases, including thyroid cancer, in patients treated with I-131 has not yet been demonstrated.

5. Guidelines for the development of operating instructions for treated patients.

Prior to the I-131 treatment, it is necessary to inform the patient about the operating rules intended to minimise exposure to ionising radiation of the people around them, mainly children and pregnant women.

1) hospital conditions: I-131 treatment must be conducted in hospital conditions only when the recommended therapeutic activity unit (administered once) exceeds 800MBq (22mCi) or when is impossible to comply with the radiological protection rules in outpatient conditions. For medical reasons, hospitalisation is recommended when there is a risk of acute complications, e.g. thyrotoxic crisis, arrhythmia, respiratory failure. Pursuant to the regulations, I-131 treatment can be conducted at a hospital only in isotope wards, within supervised premises. Following the administration of an I-131 therapeutic dose, the patients cannot leave the isotope therapy ward. Visitors cannot enter the ward. During their stay in the hospital, the patient must use dedicated toilets connected to the radioactive sewage decontamination system.

   In direct contact with a patient treated with I-131, the personnel must comply with the radiological protection rules, including maintaining distance from the patient and limiting the time spent near the patient to the essential minimum. If it is necessary to spend time near the patient, it is recommended to wear protective aprons that provide protection against gamma radiation.

2) outpatient conditions: in most cases, I-131 treatment can be conducted in outpatient conditions, provided that radiological protection precautions are taken. Pursuant to the Regulation of the Minister of Health of 18 February 2011 on the conditions for the safe use of ionising radiation for all types of medical exposure, I-131 treatment can be conducted in outpatient conditions up to the activity of 800 MBq (22mCi);

3) after leaving the hospital:

   following I-131 treatment, it is especially recommended that the patient:

   a) sleeps alone,

   b) stays out of reach of children up to 10 years old and pregnant women for at least 7 days,

   c) limits meetings with adults,

   d) keeps a greater distance from people,

   e) avoids large crowds, limits the use of public transport means,

   f) follows the rules of personal hygiene and keeps toilets clean;

In the case of numerous contacts with people during the patient's professional work, it is necessary to consider providing the patient with a certificate of temporary incapacity for work.