Summary of Product Characteristics

1 NAME OF THE MEDICINAL PRODUCT

IELMAG3 0.2 mg kit for radiopharmaceutical preparation

2 QUALITATIVE AND QUANTITATIVE COMPOSITION

The kit contains two different vials: (1) and (2).
Vial (1) contains 0.2 mg of the mertiatide (mercaptoacetyltriglycine).
Vial (2) contains 2.5 ml phosphate buffer solution.
For the full list of excipients, see section 6.1.

The radionuclide is not part of the kit.

3 PHARMACEUTICAL FORM

Kit for radiopharmaceutical preparation.
Vial 1: white to off-white powder
Vial 2: clear, colourless solution

4 CLINICAL PARTICULARS

4.1 Therapeutic indications

This medicinal product is for diagnostic use only. This is indicated for adults. For paediatric population see section 4.2.

After radiolabelling with sodium pertechnetate(^{99m}Tc) solution, the solution of technetium-(^{99m}Tc) mertiatide, is used for the evaluation of nephrological and urological disorders in particular for the study of function, morphology and perfusion of the kidneys and characterisation of urinary outflow.

4.2 Posology and method of administration

Posology
Adults and elderly population
40 - 200 MBq, depending on the pathology to be studied and the method to be used.

Paediatric population
Although IELMAG3 may be used in paediatric patients, formal studies have not been performed. Clinical experience indicates that, for paediatric use, the activity should be reduced. Because of the variable relationship between the size and body weight of patients, it is sometimes more satisfactory to adjust activities to body surface area.
The use in children and adolescents has to be considered carefully, based upon clinical needs and assessing the risk/benefit ratio in this patient group.
The activity to be administered in children and adolescents may be calculated according to the European Association of Nuclear Medicine (EANM) paediatric dosage card (2016) using the following formula:

A[MBq]Administered = Baseline Activity (11.9 MBq) × Multiple

The activities to be applied are listed in the following table:

Weight [kg]	Activity [MBq]	Weight [kg]	Activity [MBq]
3	15	32	45
4	15	34	46
6	18	36	48
8	20	38	50
10	23	40	51
12	26	42	52

14	28	44	54
16	30	46	55
18	32	48	57
20	34	50	58
22	36	52 - 54	60
24	38	56 - 58	62
26	40	60 - 62	65
28	41	64 - 66	67
30	43	68	69

In very young children, a minimum dose of 15 MBq is necessary in order to obtain images of sufficient quality.

Method of administration
For intravenous use.
This medicinal product should be radiolabelled before administration to the patient.
For patient preparation, see section 4.4.
For instructions on radiolabelling of the medicinal product before administration, see section 12.

Image acquisition
The scintigraphic investigation is usually started immediately after administration.

4.3 Contraindications

Hypersensitivity to the active substance, to any of the excipients listed in section 6.1 or to any of the components of the labelled radiopharmaceutical.

4.4 Special warnings and precautions for use

Pregnancy, see section 4.6.

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 administered should in every case be as low as reasonably achievable to obtain the required diagnostic information.

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 section 4.2.
Careful consideration of the indication is required since the effective dose per MBq is higher than in adults (see section 11).

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 to reduce radiation.

Specific warnings
Sodium content
This medicinal product contains less than 1 mmol sodium (23 mg) per kit [vial (1) and vial (2)], i.e. essentially 'sodium-free'.

Environmental hazard
Precautions with respect to environmental hazard, see section 6.6.

4.5 Interaction with other medicinal products and other forms of interaction

Technetium (^{99m}Tc) mertiatide is not known to interfere with agents commonly prescribed to patients requiring the above-mentioned investigations (e.g. antihypertensives or medicinal agents used to treat or prevent organ transplant rejection).

Under the influence of tubularly secreted hydrochlorothiazide, a reduced tubular secretion of the product has to be expected. This can in principle occur with other drugs that are secreted in the proximal tubule (e.g. nonsteroidal anti-inflammatory drugs). The previous administration of substances such as benzylpenicillin or iodinated contrast media may also cause lower efficiency of the transport mechanism of the tubular cells.
It is reported that co-administration of metoclopramide reduces renal plasma flow. Therapeutic doses may result in reduced clearance values. Dehydration and acidosis can also cause prolonged elimination of the product.

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
Radionuclide procedures carried out on pregnant women also involve radiation doses to the foetus. Only essential investigations should therefore be carried out during pregnancy, when the likely benefit far exceeds the risk incurred by the mother and foetus.

Breast-feeding
Before administering radiopharmaceuticals 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, and to what is the most appropriate choice of radiopharmaceuticals, bearing in mind the secretion of activity into breast milk.
If the administration is considered necessary, breast-feeding should be interrupted for 24 hours and the expressed feeds discarded.
Moreover, for radioprotection reasons, the mother is recommended to avoid close contact with the baby during the initial 24 hours following injection.

Fertility
Effects on fertility are not known.

4.7 Effects on ability to drive and use machines

No studies on the effects on the ability to drive and use machines have been performed.

4.8 Undesirable effects

Information on adverse reactions is available from spontaneous reporting.

Tabulated list of adverse reactions
The following table includes the adverse reactions sorted by system organ classes according to MedDRA. The frequencies are defined as follows: very common ≥ 1/10; common from ≥ 1/100 to < 1/10; uncommon from ≥ 1/1,000 to < 1/100, rare from ≥ 1/10,000 to < 1/1,000; very rare < 1/10,000; frequency not known (cannot be estimated from the available data).

System Organ Class (SOC)	***Adverse reactions***	***Frequency***
Immune system disorders	Mild anaphylactoid reactions such as urticarial rash, swelling of eyelids and coughing	Very rare
Nervous System disorders	Mild vasovagal reactions	Not known
	Cerebral convulsion[1]	Not known

[1] Seen in a 15 days old child. Causal relationship not established.

Exposure to ionising radiation is linked with cancer induction and a potential for development of hereditary defects. For diagnostic nuclear medicine investigations current evidence suggests that these adverse effects might only occur with low frequency because of the low radiation doses incurred.

For most diagnostic nuclear medical procedures, the radiation dose delivered (E) is less than 20 mSv. The effective dose is of 1.4 mSv for an adult and 0.44 mSv for a 1-year-old child after injection of the maximal recommended activity of 200 and 20 MBq respectively.

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
HPRA Pharmacovigilance
Website: www.hpra.ie

4.9 Overdose

In the event of administration of a radiation overdose with technetium (^{99m}Tc) mertiatide the absorbed dose to the patient should be reduced where possible by increasing the elimination of the radionuclide from the body by forced diuresis and frequent bladder voiding. It might be helpful to estimate the effective dose that was applied.

5 PHARMACOLOGICAL PROPERTIES

5.1 Pharmacodynamic properties

Pharmacotherapeutic group: radiopharmaceuticals, ATC-Code: V09CA03

Pharmacodynamic effects
No pharmacodynamic effect is known for technetium (^{99m}Tc) mertiatide at the chemical doses envisaged.
Measuring the counts rate in the kidneys, over time, allows the evaluation of the renal perfusion, function and urinary outflow.

5.2 Pharmacokinetic properties

Distribution
After intravenous injection technetium (^{99m}Tc) mertiatide is rapidly cleared from the blood by the kidneys.

Organ uptake
Technetium (^{99m}Tc) mertiatide binds in a 78 - 90 % proportion to plasma proteins. In normal renal function 70 % of the administered activity is excreted within 30 minutes and more than 95 % within 3 hours. These values are dependent on the pathology of the kidneys and the urogenital system.

Elimination
The mechanism of excretion is predominantly based on tubular secretion. Glomerular filtration accounts for 11 % of total clearance.

Half-life
Technetium (^{99m}Tc) mertiatide has a physical half-life of 6.01 hours.

5.3 Preclinical safety data

It has been reported that no acute, subacute, subchronic or mutagenic effects have been observed in preclinical studies. However, no detailed information is available for these studies.

6 PHARMACEUTICAL PARTICULARS

6.1 List of excipients

Vial (1):
Stannous chloride dihydrate
Disodium (R,R)-tartrate dihydrate
Sodium hydroxide
Hydrochloric acid

Vial (2):
Sodium monohydrogenphosphate dihydrate
Sodium dihydrogenphosphate dihydrate
Hydrochloric acid
Water for injections

6.2 Incompatibilities

Not known. However, in order not to compromise the stability of technetium (^{99m}Tc) mertiatide, preparations should not be administered together with other drugs.

This medicinal product must not be mixed with other medicinal products except those mentioned in section 12.

6.3 Shelf life

Kit: 15 months
After radiolabelling: 8 hours.
Do not store above 25 °C after radiolabelling.

6.4 Special precautions for storage

Kit: Store in a refrigerator (2 - 8 °C).
Store in the original package in order to protect from light.
For storage conditions after radiolabelling of the medicinal product, see section 6.3.
Storage of radiopharmaceuticals should be in accordance with national regulations on radioactive materials.

6.5 Nature and contents of container

Glass vial (10 ml) closed with a butyl rubber stopper and sealed with an aluminium crimp cap.
IELMAG3 is supplied in one box containing five vials of powder (active substance: mertiatide) and five vials of 2.5 ml sterile phosphate buffer solution.

6.6 Special precautions for disposal and other handling

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.
Contents of the vials are intended only for use in the preparation of technetium (^{99m}Tc) mertiatide and are not to be administered directly to the patient without first undergoing the preparative procedure.
For instructions on radiolabelling of the medicinal product before administration, see section 12.
If at any time in the preparation of this product the integrity of a vial is compromised, it should not be used.
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 content of the kit before radiolabelling is not radioactive. However, after [sodium pertechnetate (^{99m}Tc) solution, Ph. Eur.] is added, adequate shielding of the final preparation must be maintained.
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 product or waste material should be disposed of in accordance with local requirements.

7 MARKETING AUTHORISATION HOLDER

ROTOP Pharmaka GmbH
Bautzner LandstraBe 400
01328 Dresden
Germany

8 MARKETING AUTHORISATION NUMBER

PA2226/001/001

9 DATE OF FIRST AUTHORISATION/RENEWAL OF THE AUTHORISATION

Date of First Authorisation: 9th August 2013
Date of Last Renewal: 22nd January 2018.

10 DATE OF REVISION OF THE TEXT

January 2026

11 DOSIMETRY

Technetium (^{99m}Tc) is produced by means of a (^{99}Mo/^{99m}Tc) generator and decays with the emission of gamma radiation with a mean energy of 141 keV and a half-life of 6.01 hours to technetium (^{99}Tc) which, in view of its long half-life of 2.13 x 10^5years can be regarded as quasi stable.

The data listed below are from ICRP 128 published in 2015 and are calculated according to the following assumptions:

- In the normal case, following intravenous administration of technetium (^{99m}Tc) mertiatide, the substance is rapidly distributed in the extracellular fluid and excreted entirely by the renal system according to the kidney-bladder model. Total body retention is described by a tri-exponential function (Stabin et al., 1992). The renal transit time is assumed to be 4 minutes, as for Hippuran.
- When renal function is bilaterally impaired, it is assumed that the clearance rate of the substance is one-tenth of that of the normal case, that the renal transit time is increased to 20 minutes, and that a fraction of 0.04 is taken up in the liver.
- As an example of acute unilateral renal blockage, it is assumed that a fraction of 0.5 of the administered radiopharmaceutical is taken up by one kidney, slowly released to the blood with a half-time of 5 days and subsequently excreted by the other kidney, which is assumed to function normally.

Normal renal function
Absorbed doses: Technetium (^{99m}Tc) mertiatide

	Dose absorbed per activity administered [mGy/MBq]				
Organ	**Adults**	**15-year-olds**	**10-year-olds**	**5-year-olds**	**1-year-olds**
Adrenals	0.00039	0.00051	0.00082	0.00120	0.00250
Bladder	0.11000	0.14000	0.17000	0.18000	0.32000
Bone surfaces	0.00130	0.00160	0.00210	0.00240	0.00430
Brain	0.00010	0.00013	0.00022	0.00035	0.00061
Breast	0.00010	0.00014	0.00024	0.00039	0.00082
Gall bladder	0.00057	0.00087	0.00200	0.00170	0.00280
GI-tract					
Stomach	0.00039	0.00049	0.00097	0.00130	0.00250
SI	0.00230	0.00300	0.00420	0.00460	0.00780
Colon	0.00340	0.00430	0.00590	0.00600	0.00980
ULI	0.00170	0.00230	0.00340	0.00400	0.00670
LLI	0.00570	0.00700	0.00920	0.00870	0.01400
Heart	0.00018	0.00024	0.00037	0.00057	0.00120
Kidneys	0.00340	0.00420	0.00590	0.00840	0.01500
Liver	0.00031	0.00043	0.00075	0.00110	0.00210
Lungs	0.00015	0.00021	0.00033	0.00050	0.00100

Muscles	0.00140	0.00170	0.00220	0.00240	0.00410
Oesophagus	0.00013	0.00018	0.00028	0.00044	0.00082
Ovaries	0.00540	0.00690	0.00870	0.00870	0.01400
Pancreas	0.00040	0.00050	0.00093	0.00130	0.00250
Red marrow	0.00093	0.00120	0.00160	0.00150	0.00210
Skin	0.00046	0.00057	0.00083	0.00097	0.00180
Spleen	0.00036	0.00049	0.00079	0.00120	0.00230
Testes	0.00370	0.00530	0.00810	0.00870	0.01600
Thymus	0.00013	0.00018	0.00028	0.00044	0.00082
Thyroid	0.00013	0.00016	0.00027	0.00044	0.00082
Uterus	0.01200	0.01400	0.01900	0.01900	0.03100
Remaining organs	0.00130	0.00160	0.00210	0.00220	0.00360
Effective dose [mSv/MBq]	**0.00700**	**0.00900**	**0.01200**	**0.01200**	**0.02200**
Bladder wall contributes up to 80 % of the effective dose.					
Effective dose if the bladder is emptied 1 or 0.5 hours after administration:					
1 hour	0.00250	0.00310	0.00450	0.00640	0.00640
30 min	0.00170	0.00210	0.00290	0.00390	0.00680

The effective dose resulting from the administration of the maximum recommended activity of 200 MBq for an adult weighing 70 kg is about 1.4 mSv.
For an administered activity of 200 MBq the typical radiation dose to the target organ (kidneys)is 0.68 mGy and the typical radiation dose to the critical organ (urinary bladder wall)is 21.6 mGy.

Abnormal renal function Absorbed doses: Technetium (^{99m}Tc) mertiatide					
	Dose absorbed per activity administered [mGy/MBq]				
Organ	**Adults**	**15-year-olds**	**10-year-olds**	**5-year-olds**	**1-year-olds**
Adrenals	0.00160	0.00210	0.00320	0.00480	0.00860
Bladder	0.08300	0.11000	0.13000	0.13000	0.23000
Bone surfaces	0.00220	0.00270	0.00380	0.00500	0.00910
Brain	0.00061	0.00077	0.00130	0.00200	0.00360
Breast	0.00054	0.00070	0.00110	0.00170	0.00320
Gall bladder	0.00160	0.00220	0.00380	0.00460	0.00640
GI-tract					
Stomach	0.00120	0.00150	0.00260	0.00350	0.00610
SI	0.00270	0.00350	0.00500	0.00600	0.01000
Colon	0.00350	0.00440	0.00610	0.00690	0.01100
ULI	0.00220	0.00300	0.00430	0.00560	0.00930
LLI	0.00510	0.00630	0.00850	0.00860	0.01400
Heart	0.00091	0.00120	0.00180	0.00270	0.00480
Kidneys	0.01400	0.01700	0.02400	0.03400	0.05900
Liver	0.00140	0.00180	0.00270	0.00380	0.00660
Lungs	0.00079	0.00110	0.00160	0.00240	0.00450
Muscles	0.00170	0.00210	0.00290	0.00360	0.00640
Oesophagus	0.00074	0.00097	0.00150	0.00230	0.00410
Ovaries	0.00490	0.00630	0.00810	0.00870	0.01400
Pancreas	0.00150	0.00190	0.00290	0.00430	0.00740
Red marrow	0.00150	0.00190	0.26000	0.00310	0.00500
Skin	0.00078	0.00096	0.00150	0.00200	0.00380
Spleen	0.00150	0.00190	0.00290	0.00430	0.00740
Testes	0.00340	0.00470	0.00710	0.00780	0.01400
Thymus	0.00074	0.00097	0.00150	0.00230	0.00410

Thyroid	0.00073	0.00095	0.00150	0.00240	0.00440
Uterus	0.01000	0.01200	0.01600	0.01600	0.02700
Remaining organs	0.00170	0.00210	0.00280	0.00340	0.00600
Effective dose [mSv/MBq]	**0.00610**	**0.00780**	**0.01000**	**0.01100**	**0.19000**

The effective dose resulting from the administration of the maximum recommended activity of 200 MBq for an adult weighing 70 kg is about 1.22 mSv.
For an administered activity of 200 MBq the typical radiation dose to the target organ (kidneys) is 2.8 mGy and the typical radiation dose to the critical organ (urinary bladder wall) is 16.6 mGy.

Acute unilateral renal blockage Absorbed doses: Technetium (^{99m}Tc) mertiatide					
	Dose absorbed per activity administered [mGy/MBq]				
Organ	**Adults**	**15-year-olds**	**10-year-olds**	**5-year-olds**	**1-year-olds**
Adrenals	0.01100	0.01400	0.02200	0.03200	0.05500
Bladder	0.05600	0.07100	0.09100	0.09300	0.17000
Bone surfaces	0.00310	0.00400	0.00580	0.00840	0.01700
Brain	0.00011	0.00014	0.00023	0.00039	0.00075
Breast	0.00038	0.00051	0.00100	0.00160	0.00300
Gall bladder	0.00620	0.00730	0.01000	0.01600	0.02300
GI-tract					
Stomach	0.00390	0.00440	0.00700	0.00930	0.01200
SI	0.00430	0.00550	0.00850	0.01200	0.01900
Colon	0.00390	0.00500	0.00720	0.00920	0.00150
ULI	0.00400	0.00510	0.00760	0.01000	0.01600
LLI	0.00380	0.00480	0.00670	0.00820	0.01300
Heart	0.00130	0.00160	0.00270	0.00400	0.00610
Kidneys	0.20000	0.24000	0.33000	0.47000	0.81000
Liver	0.00440	0.00540	0.00810	0.01100	0.01700
Lungs	0.00110	0.00160	0.00250	0.00390	0.00720
Muscles	0.00220	0.00270	0.00370	0.00510	0.00890
Oesophagus	0.00038	0.00054	0.00085	0.00150	0.00230
Ovaries	0.00380	0.00510	0.00710	0.00920	0.01500
Pancreas	0.00740	0.00900	0.01300	0.01800	0.02900
Red marrow	0.00300	0.00360	0.00500	0.00600	0.00830
Skin	0.00082	0.00100	0.00150	0.00220	0.00420
Spleen	0.00980	0.01200	0.01800	0.02600	0.04000
Testes	0.00200	0.00290	0.00450	0.00500	0.00980
Thymus	0.00038	0.00054	0.00085	0.00150	0.00230
Thyroid	0.00017	0.00023	0.00045	0.00092	0.00160
Uterus	0.00720	0.00870	0.01200	0.01300	0.02200
Remaining organs	0.00210	0.00260	0.00360	0.00470	0.00800
Effective dose [mSv/MBq]	**0.01000**	**0.01200**	**0.01700**	**0.02200**	**0.03800**

The effective dose resulting from the administration of the maximum recommended activity of 200 MBq for an adult weighing 70 kg is about 2.0 mSv.
For an administered activity of 200 MBq the typical radiation dose to the target organ (kidneys) is 40 mGy and the typical radiation dose to the critical organ (urinary bladder wall) is 11.2 mGy.

12 INSTRUCTIONS FOR PREPARATION OF RADIOPHARMACEUTICALS

Radiolabelling should be done using an eluate with a radioactive concentration between 40 and 500 MBq/ml. Only eluates obtained from a generator, which has been eluted once in the preceding 24 hours, should be used.

The content of vial (1) is labelled with sodium pertechnetate (^{99m}Tc) solution at room temperature. The radiolabelling reaction is stopped after 15 minutes by adding the buffer solution.
Withdrawals should be performed under aseptic conditions. The vials must not be opened before disinfecting the stopper, the solution should be withdrawn via the stopper using a single dose syringe fitted with suitable protective shielding and a disposable sterile needle or using an authorized automated application system.
If the integrity of a vial is compromised, the product should not be used.

Method of preparation
The radiopharmaceutical is prepared according to the following labelling instructions immediately before use:

- The radiolabelling procedure has to be carried out under aseptic conditions.
- Place vial (1) into an adequate lead shielding. Swab the rubber septum with an appropriate disinfectant and let it dry.
- Inject 8 ml of sodium pertechnetate (^{99m}Tc) solution into vial (1) using a syringe. Then withdraw the same volume of nitrogen from the vial with the same syringe for pressure compensation.
- Shake the vial carefully in order to moisten. The complete content of the vial is for complete dissolution of any powder.
- After 15 minutes reaction time transfer a volume of 2 ml buffer solution from vial (2) into vial (1) using a new syringe. Then withdraw the same volume of nitrogen from the vial with the same syringe for pressure compensation.
- Shake carefully for good mixing. Determine the total radioactivity and calculate the volume to be injected.

Properties of the product after radiolabelling:
Appearance: clear to slightly opalescent, colourless, aqueous solution.
pH: 7.1 - 7.5

Quality control
The following methods may be used:

HPLC method
The radiochemical purity of the labelled substance is examined by high-performance liquid chromatography (HPLC) using a suitable detector of radioactivity, on a 25 cm RP18 column, flow rate 1.0 ml/min.
Mobile phase A is a 93:7 mixture of phosphate solution (1.36 g KH_2PO_4, adjusted with 0.1 M NaOH to pH 6) and ethanol.
Mobile phase B is a 1:9 mixture of water and methanol.
Use a gradient elution program with the following parameters:

Time (min):	Flow (ml/min):	% A	% B
10	1	100	0
15	1	0	100

The technetium (^{99m}Tc) mertiatide peak appears at the end of the passage of mobile phase A.

The injection volume is 10 µl and the total count rate per channel must not exceed 30,000.

Specification:

	t = 0	after 8 hours
Technetium (^{99m}Tc) mertiatide	≥ 94 %	≥ 94 %
hydrophilic impurities	≤ 3.0 %	≤ 3.0 %
lipophilic impurities	≤ 4.0 %	≤ 4.0 %

Simplified rapid procedure (Sep-Pak)
This method is based on cartridges, which are widely used as sample pre-treatment of aqueous solutions for chromatography.
Stepwise process
The cartridge (e.g. Sep-Pak Plus C 18, Waters) is washed with 10 ml absolute ethanol, followed by 10 ml 0.001 M hydrochloric acid. Remaining residues of the solutions are removed by 5 ml of air.
0.05 ml technetium (^{99m}Tc) mertiatide solution is applied on the cartridge. Elute with 10 ml of 0.001 M hydrochloric acid and collect this first eluate A (hydrophilic impurities).
Next, elute the cartridge with ethanol/ 9 g/l sodium chloride solution in a ratio of 1:1. This second eluate B contains technetium (^{99m}Tc) mertiatide. The cartridge C contains the lipophilic impurities.

Measure the radioactivity of each portion. Sum up the radioactivity of the eluates and the cartridge as 100 % and calculate the respective percentages.

Be aware to elute slowly (drop-wise).
Calculation:

$$\text{Radiochemical purity [\%]} = \frac{\text{radioactivity of second eluate (B) [MBq]}}{\text{sum of radioactivity (A + B + C) [MBq]}} \times 100\ \%$$

Specification:
Technetium (^{99m}Tc) mertiatide ≥ 94 %
Sum of impurities: ≤ 6.5 %

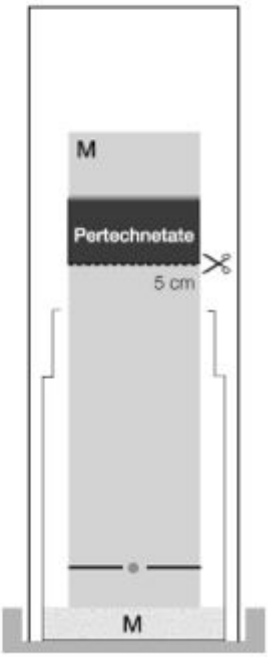
Simplified TLC procedure
This method is used for:

a) Determination of technetium (^{99m}Tc) pertechnetate (impurity A)

Chromatographic system:

TLC plate:	ITLC-SA
Solvent:	Methyl ethyl ketone (MEK)
Sample:	1 - 2 microlitre
Start:	1.0 cm from lower end
Running distance:	6 - 8 cm
Development time:	approx. 10 minutes, immediately after sample application
Detector:	a suitable detector

Evaluation:



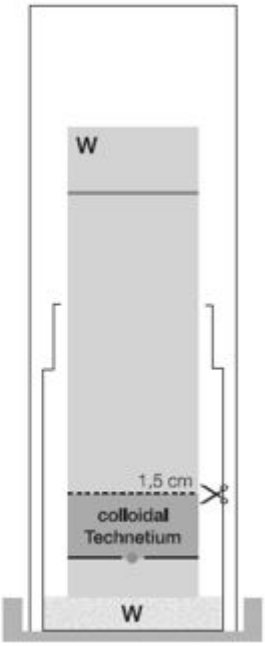
Detection by radio activity counters without spatial resolution
Technetium (^{99m}Tc) pertechnetate migrates with the solvent front (R_f= 0.8 to 1.0). If you do not have a scanner, you cut the strip 5 cm from the bottom. Measure separately the radioactivity of both parts. Put the activity of the upper part in relation to the total activity.

Detection by radio-TLC scanner
The activity distribution is measured and plotted as a chromatogram. Calculate the percentages of the individual peaks.

$$\text{Technetium } (^{99m}\text{Tc}) \text{ pertechnetate [\%]} = \frac{\text{Activity upper part [MBq]}}{\text{Total activity [MBq]}} \times 100\ \%$$

Specification for technetium (^{99m}Tc) pertechnetate (impurity A): ≤ 5.0 %

b) Determination of colloidal technetium (^{99m}Tc) (impurity B)



Chromatographic system:

TLC plate:	ITLC-SA
Solvent:	Water for injection (Wfl)
Sample:	1 - 2 microlitre
Start:	1.0 cm from lower end
Running distance:	6 - 8 cm
Development time:	approx. 10 minutes, immediately after sample application
Detector:	a suitable detector

Evaluation:

Detection by radio activity counters without spatial resolution

Colloidal technetium (^{99m}Tc) (hydrolysed reduced technetium (^{99m}Tc)) remains at the starting point (R_f = 0.0 to 0.1). If you do not have a scanner, you cut the strip 1.5 cm from the bottom. Measure separately the radioactivity of both parts. Put the activity of the lower part in relation to the total activity.

Detection by radio-TLC scanner

The activity distribution is measured and plotted as a chromatogram. Calculate the percentages of the individual peaks.

$$\text{Colloidal technetium } (^{99m}\text{Tc})\,[\%] = \frac{\text{Activity lower part [MBq]}}{\text{Total Activity [MBq]}} \times 100$$

%

Specification for colloidal technetium (^{99m}Tc) (impurity B): ≤ 2.0 %

Calculation of radiochemical purity (specification ≥ 94 %)

Radiochemical Purity = 100 % - (A [%] + B [%])