1. NAME OF THE MEDICINAL PRODUCT

GalenVita 0.74 GBq radionuclide generator
GalenVita 1.11 GBq radionuclide generator
GalenVita 1.48 GBq radionuclide generator
GalenVita 1.85 GBq radionuclide generator
GalenVita 2.22 GBq radionuclide generator
GalenVita 2.59 GBq radionuclide generator
GalenVita 2.96 GBq radionuclide generator
GalenVita 3.33 GBq radionuclide generator
GalenVita 3.70 GBq radionuclide generator

2. QUALITATIVE AND QUANTITATIVE COMPOSITION

The radionuclide generator contains germanium (^{68}Ge) as mother nuclide which decays to the daughter nuclide gallium (^{68}Ga). The germanium (^{68}Ge) used for the production of the (^{68}Ge/^{68}Ga) generator is no carrier added. The total radioactivity due to germanium (^{68}Ge) and gamma-ray-emitting impurities in the eluate is not more than 0.001%.

The GalenVita 0.74 –3.70 GBq radionuclide generator is a system for the elution of sterile gallium (^{68}Ga) chloride solution for radiolabelling in accordance with Ph. Eur. 2464. This solution is eluted from a column on which the mother nuclide germanium (^{68}Ge), parent of gallium (^{68}Ga), is fixed. The system is shielded. Physical characteristics of both mother and daughter nuclides are summarised in table 1.

Table 1: Physical characteristics of germanium (^{68}Ge) and gallium (^{68}Ga)

	^{68}Ge	**^{68}Ga**
Half-life	270.95 days	67.71 minutes
Type of physical decay	Electron capture	Positron emission
X-rays	9.225 keV (13.1 %) 9.252 keV (25.7 %) 10.26 keV (1.64 %) 10.264 keV (3.2 %) 10.366 keV (0.03 %)	8.616 keV (1.37 %) 8.639 keV (2.69 %) 9.57 keV (0.55 %)
Gamma-rays		511 keV (178.28 %), 578.55 keV (0.03 %) 805.83 keV (0.09 %), 1077.34 keV (3.22 %) 1260.97 keV (0.09 %) 1883.16 keV (0.14 %)
Beta+		Energy max. Energy 352.60 keV 821.71 keV (1.20 %) 836.00 keV 1899.01 keV (87.94 %)

Data derived from nudat (www.nndc.bnl.gov)

4 ml of the eluate from the radionuclide generator with highest strength (3.70 GBq) contains a potential maximum of 3700 MBq of ^{68}Ga and 37.0 kBq of ^{68}Ge (0.001 % breakthrough in the eluate). This corresponds to 2.4 ng of gallium and 0.14 ng of germanium.

The quantity of gallium (^{68}Ga) chloride solution for radiolabelling Ph. Eur. that may be eluted from the radionuclide generator is dependent on the quantity of germanium (^{68}Ge) present on the date/time of elution, the volume of eluent used (typically 4 ml) and the elapsed time since the previous elution. If

mother and daughter nuclides are in equilibrium, more than 55 % of the present gallium (^{68}Ga) activity can be eluted.

Table 2 summarises the activity on the radionuclide generator, the minimum activities obtained by elution at the start of the shelf-life and at the end of the shelf-life as well as the potential maxima of ^{68}Ga and ^{68}Ge in the eluate.

Table 2: Activity on the radionuclide generator and activity obtained by elution

Strength, GBq	Activity inside the radionuclide generator at the start of shelf-life*, GBq	Activity inside the radionuclide generator at the end of shelf-life*, GBq	Eluted activity at the start of shelf life**, GBq	Potential maximum amount of 68Ga in 4 ml eluate, GBq / ng	Potential maximum amount of 68Ge in 4 ml eluate, kBq / ng	Eluted activity at the end of shelf-life**, GBq
0.74	0.74	0.29	NLT 0.41	0.74 / 0.49	7.4 / 0.03	NLT 0.16
1.11	1.11	0.44	NLT 0.61	1.11 / 0.73	11.1 / 0.04	NLT 0.24
1.48	1.48	0.58	NLT 0.81	1.48 / 0.98	14.8 / 0.06	NLT 0.32
1.85	1.85	0.73	NLT 1.02	1.85 / 1.22	18.5 / 0.07	NLT 0.40
2.22	2.22	0.87	NLT 1.22	2.22 / 1.47	22.2 / 0.08	NLT 0.47
2.59	2.59	1.02	NLT 1.42	2.59 / 1.71	25.9 / 0.10	NLT 0.56
2.96	2.96	1.16	NLT 1.63	2.96 / 1.96	29.6 / 0.11	NLT 0.64
3.33	3.33	1.31	NLT 1.83	3.33 / 2.20	33.3 / 0.13	NLT 0.72
3.70	3.70	0.91	NLT 2.04	3.70 / 2.45	37.0 / 0.14	NLT 0.50

NLT = not less than
** The actual activity inside the radionuclide generator may deviate by ± 10 % from the nominal strength*
*** In equilibrium*

More detailed explanations and examples for elutable activities at various time points are given in section 12.

For the full list of excipients, see section 6.1.

3. PHARMACEUTICAL FORM

Radionuclide generator.

The radionuclide generator is presented as a case with two handles and an inlet and an outlet port.

The radionuclide generator provides after elution a sterile gallium (^{68}Ga) chloride solution for radiolabelling. The solution is clear and colourless.

4. CLINICAL PARTICULARS

4.1. Therapeutic indications

This radionuclide generator is not intended for direct use in patients.

The sterile eluate (gallium (^{68}Ga) chloride solution) from the radionuclide generator GalenVita is indicated for *in vitro* radiolabelling of various kits for radiopharmaceutical preparation developed and approved for radiolabelling with such eluate, to be used for positron emission tomography (PET) imaging.

4.2. Posology and method of administration

This medicinal product is for use in designated nuclear medicine facilities only and should only be handled by specialists experienced with *in vitro* radiolabelling.

Posology

The quantity of the eluate gallium (^{68}Ga) chloride solution required for radiolabelling and the quantity of ^{68}Ga-labelled radiopharmaceutical that is subsequently administered will depend on the kit that is to be radiolabelled and its intended use. Refer to the Summary of Product Characteristics/package leaflet of the particular kit for radiopharmaceutical preparation to be radiolabelled.

Paediatric population
Please refer to the Summary of Product Characteristics/package leaflet of the kit for radiopharmaceutical preparation to be radiolabelled with ^{68}Ga for more information concerning its paediatric use.

Method of administration

The gallium (^{68}Ga) chloride solution is not intended for direct use in patients but is used for *in vitro* radiolabelling of various kits for radiopharmaceutical preparation. The route of administration of the ^{68}Ga-labelled radiopharmaceutical is defined in the Summary of Product Characteristics/package leaflet of the respective kit for radiopharmaceutical preparation and should be adhered to.

For instructions on extemporary preparation of the medicinal product before administration, see section 12.

4.3. Contraindications

Gallium (^{68}Ga) chloride solution should not be administered directly to the patient.

The use of ^{68}Ga-labelled medicinal products is contraindicated in case of hypersensitivity to the active substance or to any of the excipients listed in section 6.1.

For information on contraindications to particular ^{68}Ga-labelled radiopharmaceuticals prepared by radiolabelling with gallium (^{68}Ga) chloride solution, refer to the Summary of Product Characteristics/package leaflet of the particular medicinal product to be radiolabelled.

4.4. Special warnings and precautions for use

Gallium (^{68}Ga) chloride solution for radiolabelling is not to be administered directly to the patient but is used for *in vitro* radiolabelling of various kits for radiopharmaceutical preparation.

Unintended direct administration of gallium (^{68}Ga) chloride solution may lead to increased radiation exposure to patients (see sections 4.9, 5.2, and 11). Accidental administration of gallium (^{68}Ga) chloride solution for radiolabelling containing 0.1 mol/l hydrochloric acid may also cause local venous irritation and, in case of paravenous injection, tissue necrosis. The catheter or affected area should be irrigated with sodium chloride 9 mg/ml (0.9 %) solution for injection.

Safe handling of GalenVita and its eluate in accordance with the instructions in this document should be permanently ensured to protect patients and healthcare professionals from unintentional excess radiation exposure (see sections 6 and 12).

^{68}Ge breakthrough can increase in the eluate above 0.001 % if the radionuclide generator is not eluted for several days (see section 12). All instructions provided in section 12 should be strictly followed to avoid the risk of excess exposure to ^{68}Ge.

Individual benefit/risk justification

For each patient, the radiation exposure must be justifiable by the likely benefit.
The radioactivity administered should in every case be as low as reasonably achievable to obtain the required information.

General warnings

For information concerning special warnings and special precautions for use of ^{68}Ga-labelled radiopharmaceuticals refer to the Summary of Product Characteristics/package leaflet of the kit for radiopharmaceutical preparation to be radiolabelled.

Precautions with respect to environmental hazard are included in section 6.6.

4.5. Interaction with other medicinal products and other forms of interaction

No interaction studies of the gallium (^{68}Ga) chloride solution for radiolabelling with other medicinal products have been performed, because it is used for *in vitro* radiolabelling of medicinal products.

For information concerning interactions associated with the use of ^{68}Ga-labelled radiopharmaceuticals, refer to the Summary of Product Characteristics/package leaflet of the kit for radiopharmaceutical preparation to be radiolabelled.

4.6. Fertility, pregnancy and lactation

Women of childbearing potential

When administration of radiopharmaceuticals to a woman of childbearing potential is intended, it is important to determine whether she is pregnant or not. 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 dose 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 the foetus.

Breast-feeding

Before administering a radiopharmaceutical to a mother who is breast-feeding, consideration should be given to whether the investigation could be reasonably delayed until the mother has ceased breast-feeding. If the administration is considered necessary, breast-feeding should be interrupted, and the expressed feeds discarded.

Further information concerning the use of a ^{68}Ga-labelled radiopharmaceutical in pregnancy and breast-feeding is specified in the Summary of Product Characteristics/package leaflet of the kit for radiopharmaceutical preparation to be radiolabelled.

Fertility

Further information concerning the use of a ^{68}Ga-labelled radiopharmaceutical concerning fertility is specified in the Summary of Product Characteristics/package leaflet of the medicinal product to be radiolabelled.

4.7. Effects on ability to drive and use machines

Effects on ability to drive and use machines following administration of ^{68}Ga-labelled radiopharmaceutical will be specified in the Summary of Product Characteristics/package leaflet of the kit for radiopharmaceutical preparation to be radiolabelled.

4.8. Undesirable effects

Possible adverse reactions following the use of a ^{68}Ga-labelled radiopharmaceutical will be dependent on the specific kit for radiopharmaceutical preparation being used. Such information will be supplied in the Summary of Product Characteristics/package leaflet of the kit for radiopharmaceutical preparation to be radiolabelled.

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

Reporting of suspected adverse reactions

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

4.9. Overdose

Excess radiation exposure may occur if higher than recommended activity of a ^{68}Ga-labelled radiopharmaceutical is administered to a patient. For further information refer to the Summary of Product Characteristics/package leaflet of the kit for radiopharmaceutical preparation to be radiolabelled.

No toxic effects are to be expected from the free ^{68}Ga after an inadvertent administration of the eluate.

The administered free ^{68}Ga decays almost completely to stable ^{68}Zn within a short time (97 % are decayed in 6 hours). During this time, ^{68}Ga is mainly concentrated in the blood/plasma (bound to transferrin) and in the urine. The patient should be hydrated to increase the excretion of the ^{68}Ga. Forced diuresis as well as frequent bladder voiding is recommended.

Human radiation dose in case of an inadvertent administration of the eluate should be estimated using the information given in section 11.

5. PHARMACOLOGICAL PROPERTIES

5.1. Pharmacodynamic properties

Pharmacotherapeutic group: Diagnostic radiopharmaceuticals, other diagnostic radiopharmaceuticals, ATC code: V09X.

The pharmacodynamic properties of ^{68}Ga-labelled radiopharmaceutical prepared by radiolabelling with the radionuclide generator eluate prior to administration will be dependent on the nature of the medicinal product (carrier molecule) to be labelled. Refer to the Summary of Product Characteristics/package leaflet of the kit for radiopharmaceutical preparation to be radiolabelled.

Paediatric population

The European Medicines Agency has waived the obligation to submit the results of studies with GalenVita radionuclide generator in all subsets of the paediatric population as it is a radiolabelling agent. See section 4.2 for information on paediatric use.

5.2. Pharmacokinetic properties

Gallium (^{68}Ga) chloride solution is not intended for direct use in patients but is used for *in vitro* radiolabelling of various kits for radiopharmaceutical preparation. Therefore, the pharmacokinetic properties of ^{68}Ga-labelled radiopharmaceuticals will depend on the nature of carrier molecules to be radiolabelled.

The absorption, distribution, and excretion of free ^{68}Ga following direct injection of gallium (^{68}Ga) chloride solution were investigated in rats. The rat study has shown that following direct intravenous administration of gallium (^{68}Ga) chloride, ^{68}Ga is slowly cleared from the blood with a biological half-life of 188 h in male and 254 h in female rats. This is because free Ga^{3+} likely behaves in a similar way as Fe^{3+}. However, as the biological half-life of ^{68}Ga is much longer than its physical half-life (67.71 min), at 188 h or 254 h almost all ^{68}Ga anyway decays to inactive ^{68}Zn. Already in 6 h approx. 97 % of the initial ^{68}Ga disappear via decay to ^{68}Zn.

In rats, ^{68}Ga was excreted predominantly into the urine, with some retention in the liver and kidneys. The organs with the highest ^{68}Ga activity, other than blood, plasma, and urine, were liver, lungs, spleen, and bones. In female rats, the ^{68}Ga activity in female genital organs, i.e., uterus and ovaries, was comparable to that seen in the lungs. ^{68}Ga activity in the testes was very low.

According to the dose estimates based on rat data, the sex-averaged effective dose for adults is 0.035 mSv/MBq. This is equal to the effective dose of 8.75 mSv from an accidental injection of a typical radiopharmaceutical activity of 250 MBq (see section 11 for more details).

The activity resulting from ^{68}Ge breakthrough in the rat study was extremely low and is not of clinical importance.

5.3. Preclinical safety data

The toxicological properties of ^{68}Ga-labelled radiopharmaceuticals prepared by *in vitro* radiolabelling with gallium (^{68}Ga) chloride solution will depend on the nature of the kit for radiopharmaceutical preparation to be radiolabelled.

6. PHARMACEUTICAL PARTICULARS

6.1 List of excipients

Column matrix

Titanium dioxide

Solution for elution

0.1 mol/l hydrochloric acid

6.2 Incompatibilities

Radiolabelling of carrier molecules with gallium (^{68}Ga) chloride is very sensitive to the presence of trace metal impurities.

It is important that all glassware, syringe needles etc., used for the preparation of the radiolabelled medicinal product are thoroughly cleaned to ensure freedom from such trace metal impurities. Only syringe needles (for example, non-metallic) with proven resistance to dilute acids should be used to minimise trace metal impurity levels.

It is recommended not to use uncoated chlorobutyl stoppers for the elution vial as they may contain considerable amounts of zinc that is extracted by the acidic eluate.

6.3 Shelf life

Radionuclide generator

12 months
Radionuclide generator with 3.70 GBq strength: 18 months
The calibration date and the expiry date are stated on the label.

Gallium (^{68}Ga) chloride eluate

After elution, immediately use the eluate.

Sterile hydrochloric acid solution for elution

12 months

6.4 Special precautions for storage

Warm temperatures substantially exceeding 25 °C can reversibly reduce the yield of ^{68}Ga in the eluate to below 55 %. Therefore, to obtain optimal elution yield (≥ 55 %), the radionuclide generator should be operated at temperatures not exceeding 25 °C. If the radionuclide generator is routinely stored at higher temperatures, make sure to equilibrate it at < 25 °C for several hours before elution. Elutions at temperatures above 25 °C are nevertheless possible and will not harm the radionuclide generator or have an impact on the quality of the eluate except for the possibly reduced yield of ^{68}Ga.

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

6.5 Nature and contents of container and special equipment for use

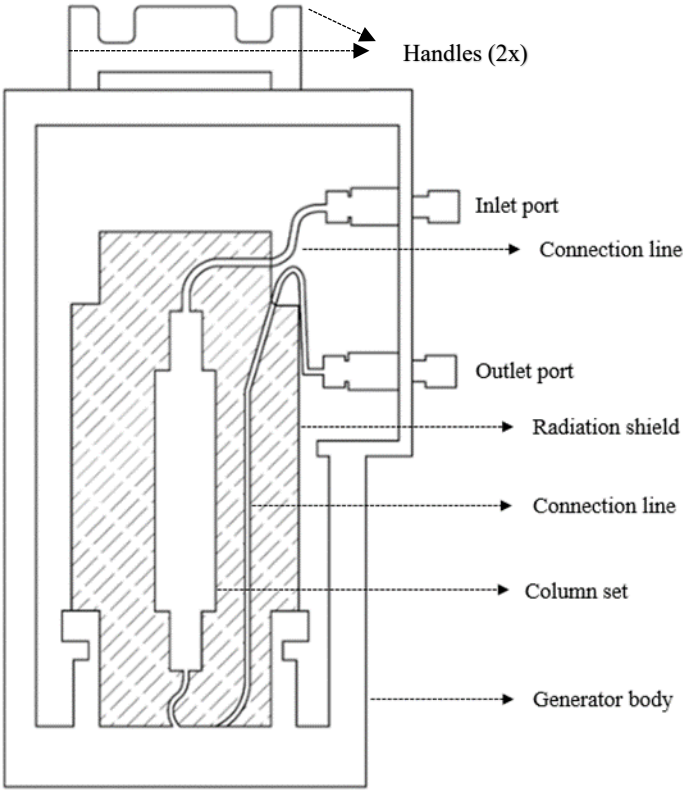
The generator consists of a PEEK (Polyetheretherketone) column and PEEK upper and bottom caps which are attached to PEEK inlet and outlet lines via HPLC-style finger tight fittings. These lines are connected to two unions that pass through the outer case of the GalenVita generator. The column is contained within the radiation shield assembly.

Accessories supplied with the radionuclide generator (minimum amounts):
1. 1 x 220 ml sterile 0.1 mol/l hydrochloric acid in polypropylene bag
2. 1 x B-safe spike
3. 2 x Adapter male LUER
4. 1 x Stopcock manifold
5. 1 x Inlet extension line
6. 1 x Outlet Extension line

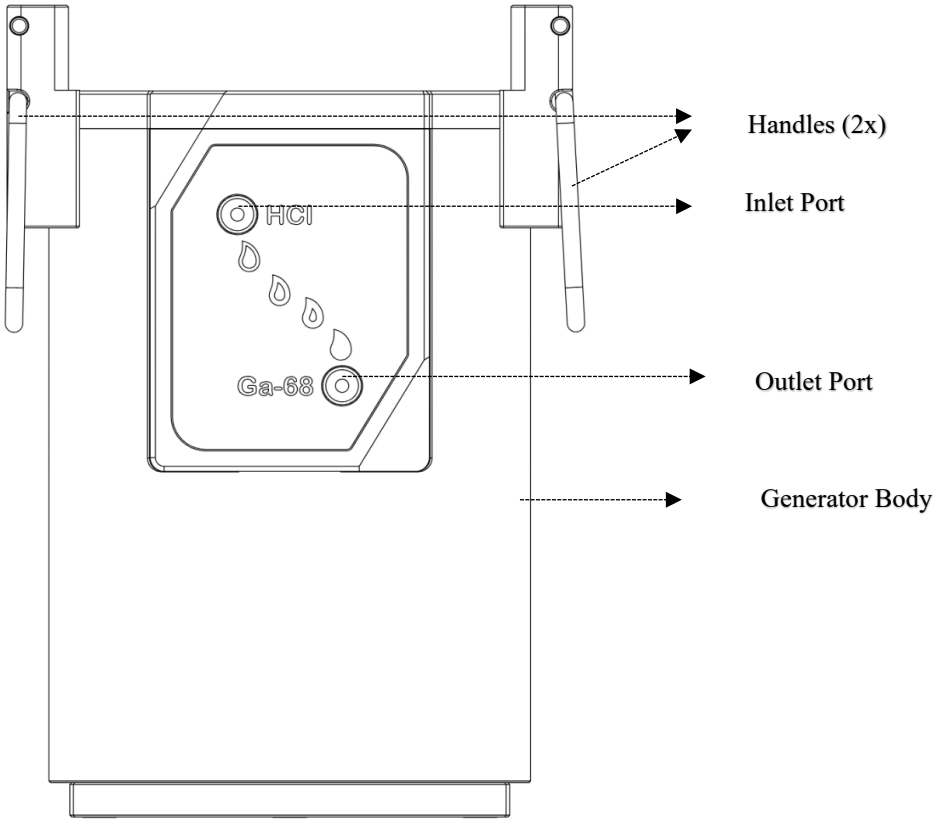
Available strengths

The radionuclide generators are supplied with the following ^{68}Ge activity amounts at calibration date in accordance with the customer orders:
0.74 GBq, 1.11 GBq, 1.48 GBq, 1.85 GBq, 2.22 GBq, 2.59 GBq, 2.96 GBq, 3.33 GBq, 3.70 GBq.

Sectional view of the GalenVita radionuclide generator



Front view of the GalenVita radionuclide generator



6.6 Special precautions for disposal and other handling

General warnings

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 licenses 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.

The radionuclide generator must not be disassembled for any reason as this may damage the internal components and possibly lead to a leak of radioactive material. Also, disassembly of the outer case will expose the radiation shielding to the operator.

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

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

The residual activity of the radionuclide generator must be estimated before disposal.

Any unused gallium (^{68}Ga) chloride solution for radiolabelling or radiolabelled medicinal product or waste material should be disposed of in accordance with local requirements.

7. MARKETING AUTHORISATION HOLDER

Curium Romania SRL
Pantelimon, Str. Gradinarilor, nr.1
Ilfov
Romania

8. MARKETING AUTHORISATION NUMBER

EU/1/25/2004/001 - GalenVita 0.74 GBq radionuclide generator
EU/1/25/2004/002 - GalenVita 1.11 GBq radionuclide generator
EU/1/25/2004/003 - GalenVita 1.48 GBq radionuclide generator
EU/1/25/2004/004 - GalenVita 1.85 GBq radionuclide generator
EU/1/25/2004/005 - GalenVita 2.22 GBq radionuclide generator
EU/1/25/2004/006 - GalenVita 2.59 GBq radionuclide generator
EU/1/25/2004/007 - GalenVita 2.96 GBq radionuclide generator
EU/1/25/2004/008 - GalenVita 3.33 GBq radionuclide generator
EU/1/25/2004/009 - GalenVita 3.70 GBq radionuclide generator

9. DATE OF FIRST AUTHORISATION/RENEWAL OF THE AUTHORISATION

Date of first authorisation:

10. DATE OF REVISION OF THE TEXT

11. DOSIMETRY

The radiation dose received by the various organs following intravenous administration of a ^{68}Ga-radiolabelled medicinal product is dependent on the specific kit for radiopharmaceutical preparation being radiolabelled. Information on radiation dosimetry of each different ^{68}Ga-labelled radiopharmaceutical following its administration will be available in the Summary of Product Characteristics of the particular kit for radiopharmaceutical preparation.

The dosimetry table 3 is presented in order to support the assessment of the contribution by unbound ^{68}Ga to the radiation dose following the administration of ^{68}Ga-labelled radiopharmaceutical or of the radiation dose resulting from an inadvertent intravenous injection of gallium (^{68}Ga) chloride solution.

The dosimetry estimates were based on a rat distribution study. Time points for measurements were 5 minutes, 30 minutes, 60 minutes, 120 minutes and 180 minutes.

Sex-averaged effective dose resulting from an inadvertently intravenously injected gallium (^{68}Ga) chloride, calculated according to the 103 ICRP publication, is 0.035 mSv/MBq.

Table 3: Sex-averaged organ doses (mSv/MBq) for adults and individual paediatric phantoms*

	Adult (sex-averaged mean; 66.5 kg)	**Newborn (sex-averaged mean; 3.5 kg)**	**1 year (sex-averaged mean; 10 kg)**	**5 years (sex-averaged mean; 19 kg)**	**10 years (sex-averaged mean; 32 kg)**	**15 years (sex-averaged mean; 54.5 kg)**
Target Organ						
Adipose tissue	0.00287	0.03231	0.0224	0.01245	0.00775	0.00574
Adrenals	0.1017	0.1915	0.298	0.212	0.154	0.104
Bone - endosteal cells	0.00255	0.015385	0.0138	0.00788	0.00448	0.00223
Bone marrow - red (active)	0.00666	0.01736	0.014	0.008045	0.00606	0.00382
Brain	0.001775	0.00546	0.00367	0.002625	0.0023	0.00176
Breast tissue	0.0066	0.023425	0.0192	0.0134	0.0074	0.00617
Bronchial basal cells	0.1795	0.558	0.566	0.279	0.161	0.0996
Bronchial secretory cells	0.178	0.558	0.566	0.279	0.161	0.0996
Bronchiolar secretory cells	0.128	0.951	0.749	0.3395	0.213	0.118
Colon - ICRP133	0.00406	0.02103	0.0145	0.00767	0.00481	0.00315
Colon - left	0.003085	0.015445	0.01475	0.00717	0.005	0.00331
Colon - rectosigmoid	0.000445	0.0094435	0.00519	0.00264	0.00145	0.000801

Colon - right	0.007055	0.032735	0.0198	0.0111	0.00652	0.00436
Esophagus	0.0176	0.11515	0.0529	0.0331	0.0252	0.0123
ET1 airway basal cells**	0.000678	0.004958	0.00292	0.001555	0.00103	0.00066
ET2 airway basal cells**	0.00186	0.00597	0.003765	0.00227	0.00158	0.001
Extrathoracic region - ICRP133	0.00181	0.00591	0.003735	0.00224	0.00156	0.00099
Eye lens	0.000549	0.0034865	0.001995	0.001185	0.000849	0.000525
Gallbladder wall	0.0678	0.1046	0.11	0.0589	0.046	0.0312
Heart wall	0.07835	0.56285	0.406	0.224	0.144	0.0855
Kidneys	0.1345	0.9025	0.603	0.343	0.213	0.146
Liver	0.159	0.943	0.762	0.423	0.291	0.187
Lung - ICRP133	0.1195	0.9365	0.746	0.3375	0.212	0.118
Lungs (AI)***	0.1195	0.9365	0.7465	0.3375	0.213	0.118
Lymph nodes - extrathoracic	0.00285	0.01346	0.00707	0.00816	0.00546	0.00297
Lymph nodes - systemic	0.00977	0.020955	0.0159	0.00769	0.00458	0.00407
Lymph nodes - thoracic	0.03845	0.07775	0.0881	0.0439	0.0218	0.014
Lymphatic nodes - ICRP133	0.01159	0.02367	0.0212	0.0108	0.00611	0.00481
Muscle	0.002255	0.017715	0.0104	0.005835	0.00377	0.00208
Oral mucosa	0.001435	0.010455	0.00499	0.002915	0.0019	0.00261
Ovaries	0.0002015	0.0004445	0.0031	0.001405	0.00128	0
Pancreas	0.04975	0.3539	0.237	0.137	0.0843	0.0463
Pituitary gland	0.0011265	0.005065	0.00318	0.00206	0.00155	0.00111
Prostate	0.000107	0.00393	0.001605	0.00061	0	0.000336
Salivary glands	0.04985	0.2879	0.154	0.107	0.0838	0.0548
Skin	0.00143	0.008715	0.006615	0.003555	0.00217	0.00138
Small intestine	0.005345	0.02588	0.0183	0.009135	0.00631	0.0048
Spleen	0.01675	0.0862	0.0656	0.0355	0.0222	0.0131
Stomach	0.0172	0.0567	0.06025	0.0222	0.0172	0.0102
Testes	0.00002715	0.0025	0.001105	0.0004425	0	0.000321
Thymus	0.01097	0.09225	0.0609	0.023	0.0223	0.0113
Thyroid	0.00475	0.019675	0.03605	0.01	0.00582	0.00437
Tongue	0.001655	0.01293	0.00845	0.00445	0.00322	0.00227
Tonsils	0.0012425	0.010885	0.006625	0.005035	0.0037	0.00234
Ureters	0.005975	0.051525	0.0399	0.0218	0.00821	0.00551
Urinary bladder wall	0.0003935	0.0063605	0.0048	0.00204	0.000927	0.000667
Uterus	0.0002055	0.000391	0.002715	0.00138	0.00117	0
Whole body target	0.0123	0.1041	0.0731	0.039	0.0239	0.014

Effective whole-body dose (mSv/MBq)	0.0335	0.3295	0.149	0.07435	0.04815	0.0312
ICRP 103 effective dose (mSv/MBq)	0.035	0.329	0.149	0.0743	0.0482	0.0312

*The calculation was performed using the software MIRDCalc
** ET1 extrathoracic region 1 (anterior nasal passage); ET2 extrathoracic region 2 (posterior nasal passage, oral cavity, pharynx and larynx)
*** AI alveolar region

The sex-averaged effective dose for adults is 0.035 mSv/MBq. Following accidental administration of 250 MBq of $^{68}GaCl_3$, the effective dose is 8.75 mSv in adults.

Effective doses from an accidental injection of a typical radiopharmaceutical activity of 3.76 MBq/kg BW in paediatric patients are as follows: 4.336 mSv in newborn, 5.602 mSv in 1 year, 5.312 mSv in 5 years, 5.793 mSv in 10 years, 6.394 mSv in 15 years.

External radiation exposure

The average surface or contact radiation for the radionuclide generator is less than 0.09 µSv/h per MBq of ^{68}Ge, but local hot spots of higher radiation can occur. Nevertheless, a 3.70 GBq radionuclide generator will reach an overall average surface dose rate of approx. 337 µSv/h. It is generally recommended that the radionuclide generator is stored within auxiliary shielding to minimise dose to operating personnel.

12. INSTRUCTIONS FOR PREPARATION OF RADIOPHARMACEUTICALS

Elution of the radionuclide generator must be performed in premises complying with the national regulations concerning the safety of use of radioactive products.

Maximum cumulative number of elutions over the shelf-life: 1000

The general handling, the attachment of tubing, the exchange of the sterile 0.1 mol/l hydrochloric acid container, the elution of the generator and other activities potentially exposing the generator to the environment should be undertaken using aseptic techniques in an appropriate clean environment according to current national legislation.

Preparation

Unpacking of the radionuclide generator:

1. Check outer shipping package for shipping damage. If damaged, perform radiation wipe survey of the damaged area. If counts exceed 40 counts per second per 100 cm^2, notify your Radiation Safety Officer.

2. Cut security seal on the lock of the shipping package and open the lid.

3. Carefully remove radionuclide generator using the handles.
   CAUTION: Drop hazard: The radionuclide generator weighs approx. 14 kg. Handle with care to avoid potential injuries. If radionuclide generator is dropped or if shipping damage extends into the shipping package, check for leaks and perform a wipe survey of the radionuclide generator. Also check for internal damage by slowly tilting the radionuclide generator 90°. Listen for broken/loose parts.

4. Perform wipe survey of shipping package foam inserts and radionuclide generator outer surface. If wipes exceed 40 counts per second per 100 cm^2, notify your Radiation Safety Officer.

5. Check sealed inlet and outlet ports for damage. Do not remove the port plugs before the elution lines are prepared and ready for installation.

Optimal positioning

1. When installing the radionuclide generator in its final position, i.e., with a synthesis device or for manual elutions, it is recommended to keep the outlet line as short as possible as the length of this tubing may influence the yield in the receiving/reaction vial.

2. Local auxiliary shielding is recommended when positioning the radionuclide generator.
   Please note: Moving the radionuclide generator after installation in its final position should be avoided.

Assembly of the radionuclide generator

Accessories supplied with the radionuclide generator (minimum amounts):

1. 1 x 220 ml sterile 0.1 mol/l hydrochloric acid in polypropylene bag
2. 1 x B-safe spike
3. 2 x Adapter male LUER
4. 1 x Stopcock manifold
5. 1 x Inlet extension line
6. 1 x Outlet extension line

Image of the assembled elution accessories prior to connecting them to the radionuclide generator. The identification numbers of the accessories, as listed above, are used consistently in the pictures and assembly instructions that follow.

*Fig. 1**(1)** 220 ml sterile 0.1 mol/l hydrochloric acid in polypropylene bag [PP Bag]*

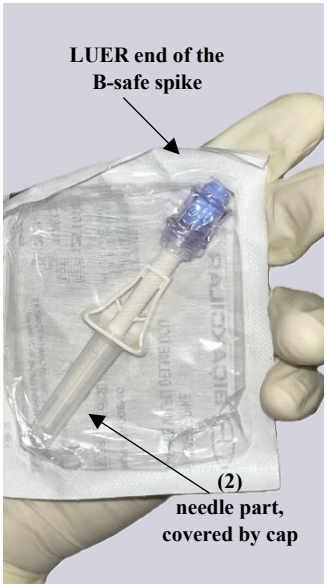


*Fig. 2 **(2)** B-safe spike*

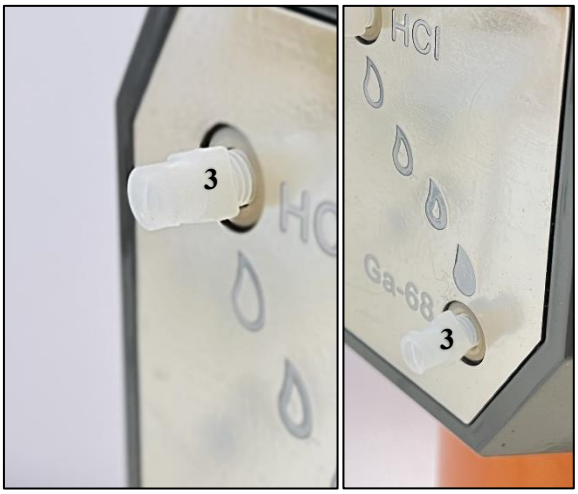


*Fig 3. **(3)** Adapter male LUER*

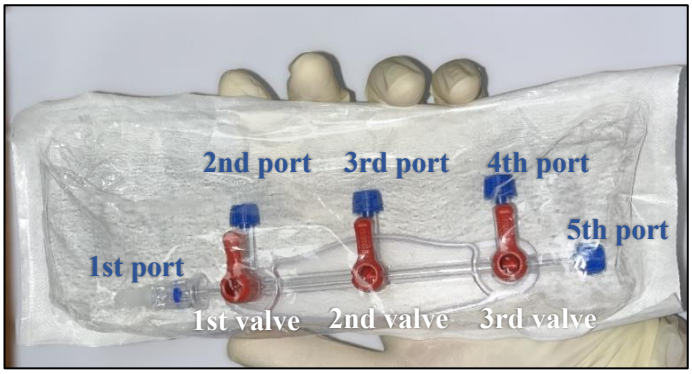


*Fig 4. **(4)** Stopcock manifold*

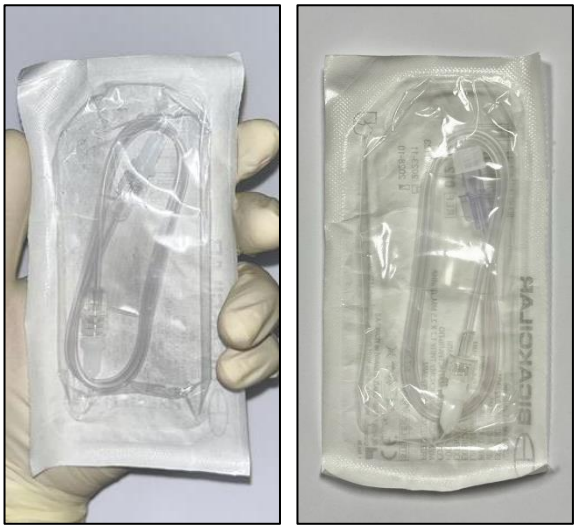


*Fig. 5 **(5) / (6)** Inlet extension line / Outlet Extension line with connection blind plugs*

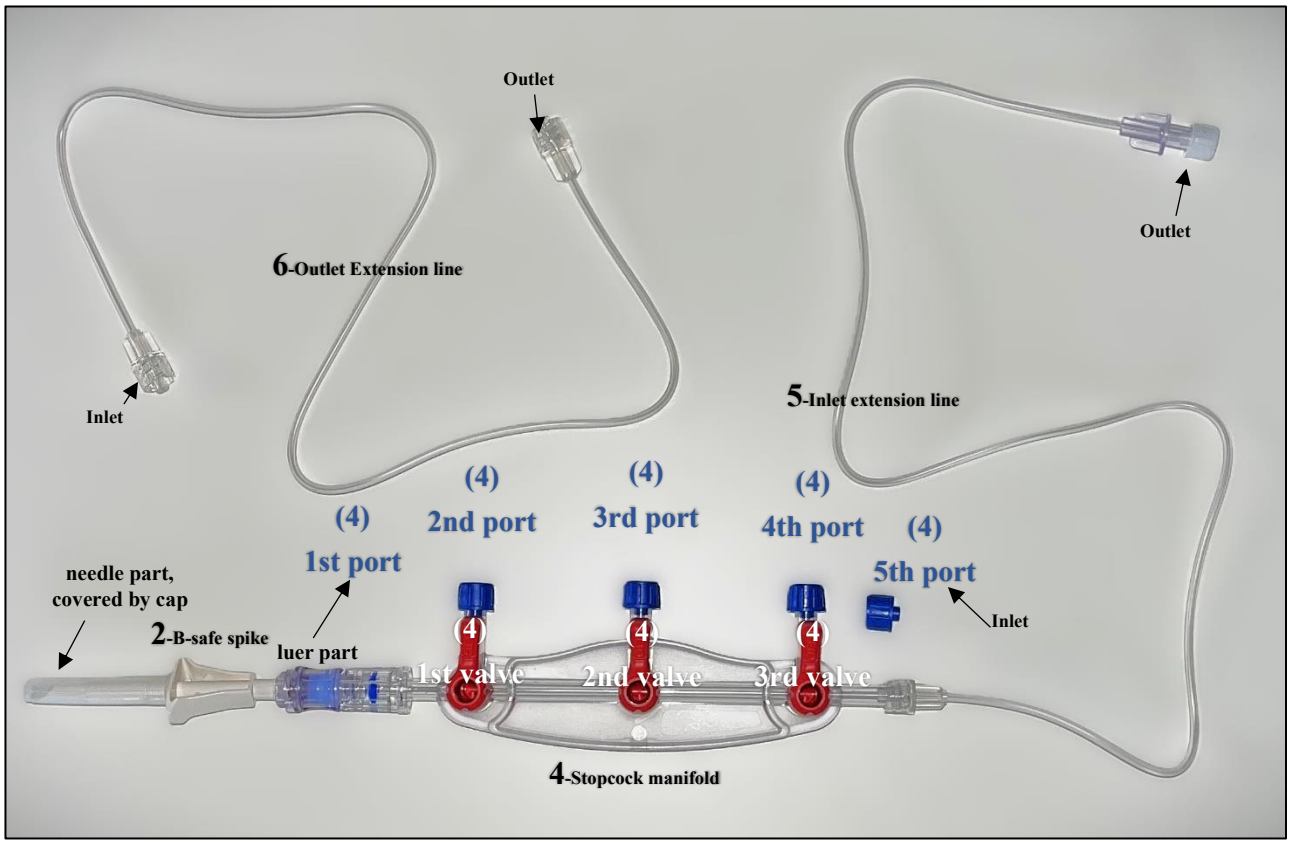


Fig 6 Completed assembly of the radionuclide-generator accessories. For a successful setup, follow the instructions below step-by-step.

Wear gloves to assemble the lines and to connect the eluent solution to the generator using aseptic technique in an appropriately clean environment.

1. Assembling the Inlet Line:

1-a) Remove the plug from the *inlet extension line (5*).
(See Fig. 7.)

1-b) Remove the protective cap from the fifth port of the *stopcock manifold (4)* before connecting the *inlet extension line (5).*
(See Fig. 8.)
(Note: In Fig. 6, the cap has already been removed for illustrative purposes.)

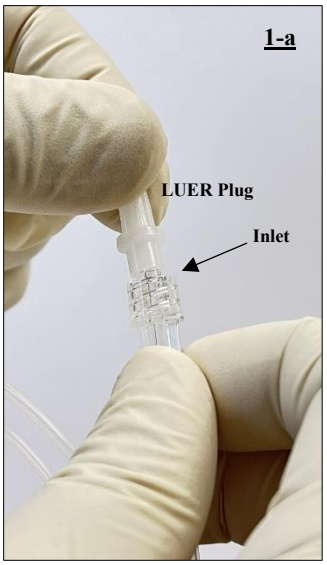


Fig. 7 Removing the plug from the inlet extension line (5) prior to connection.

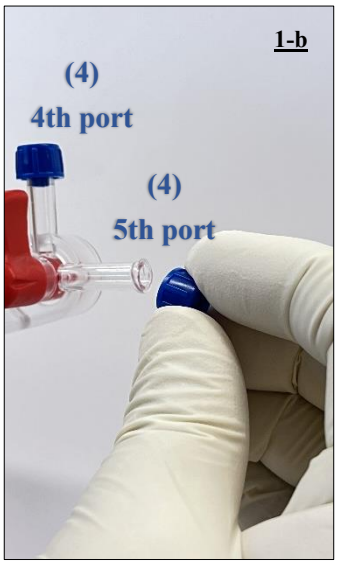


Fig. 8 Removing the protective cap from the fifth port of the stopcock manifold (4).

1-c1&c2) Connect the male LUER end of the *inlet extension line (5)* to the fifth port of the *stopcock manifold (4)*.
(See Fig. 9. & 10.)

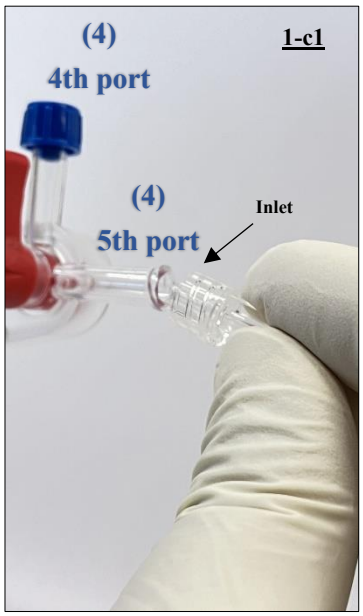


Fig. 9 Positioning the male LUER end of the inlet extension line (5) before connection to the fifth port.

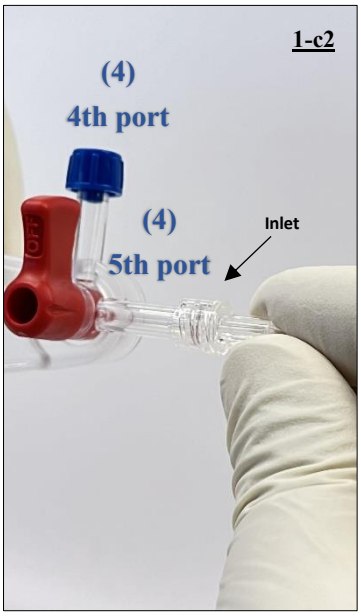


Fig. 10 Completing the LUER connection between the inlet extension line (5) and the fifth port of the stopcock manifold (4).

1-d) Remove the plug from the LUER adapter at the first port of the *stopcock manifold (4)*. Then connect the LUER end of the *B-safe spike (2)* to the first port of the *stopcock manifold (4)*.
(See Fig. 11.)

Fig. 11 Connecting the LUER end of the B-safe spike (2) to the first port of the stopcock manifold (4) after removing the plug.

1-e1 & 1-e2)
Close the first valve
Start (e1 – ON): handle in line with manifold; *Spike (2) → Manifold (4)* open.
Turn: rotate handle 90 ° counterclockwise until "OFF" faces *Spike (2).*
End (e2 – OFF): *Spike (2) → Manifold (4)* closed.
(See Fig. 12. & 13.)

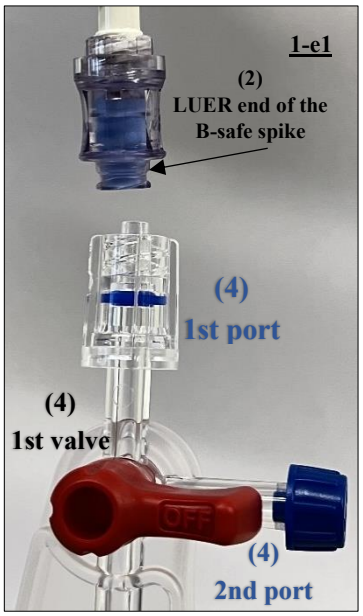


Fig. 12 First valve in the ON position: handle aligned inline between B-safe spike (2) and stopcock manifold (4), allowing fluid passage.

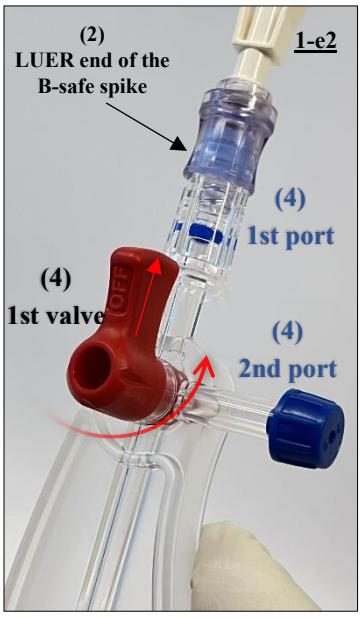


Fig. 13 Rotating the valve 90° counterclockwise to reach the OFF position: handle perpendicular, closing the connection between spike (2) and manifold (4).

2. Connecting the Hydrochloric Acid Container to the Inlet Line:

2-f) Remove the cap from the PP bag containing the *220 ml sterile 0.1 mol/l hydrochloric acid solution (1).*

(See Fig. 14.)

2-g) Remove the cap from the *B-safe spike (2).*
(See Fig. 15.)

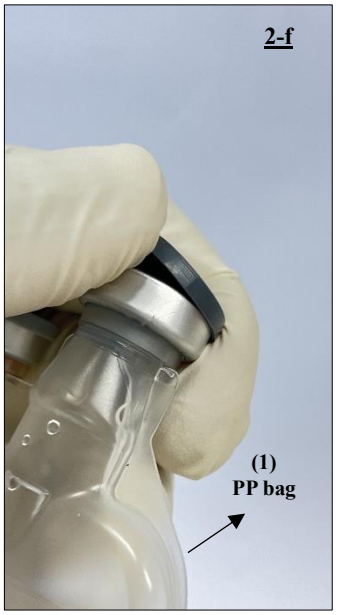


Fig. 14 Removing the cap from the PP bag containing the 220 ml sterile 0.1 mol/L hydrochloric acid solution (1).

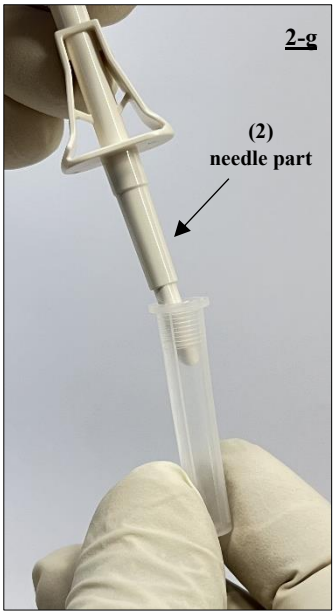


Fig. 15 Removing the protective cap from the B-safe spike (2) prior to insertion.

2-h1 & 2-h2) Insert the needle part of the *B-safe spike (2)* into the *PP bag (1*). Ensure the spike is fully inserted to secure the connection.

(See Fig. 16. & 17.)

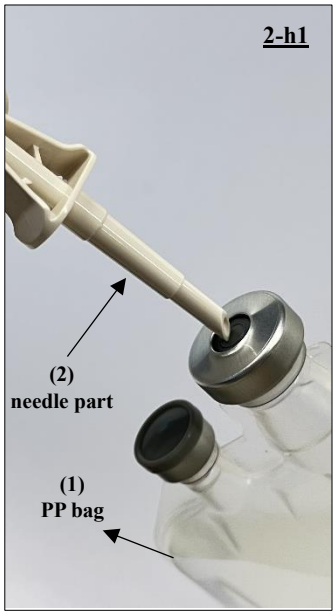


Fig. 16 Aligning the needle part of the B-safe spike (2) with the port of the PP bag (1) before insertion.

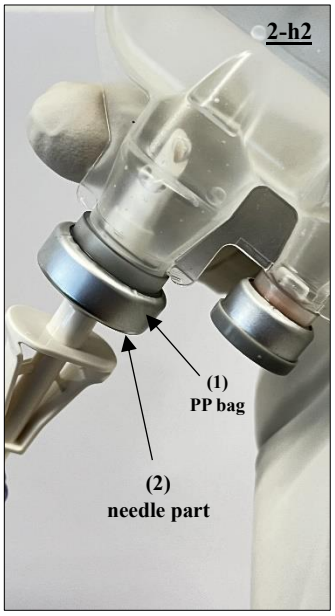


Fig 17 Fully inserting the B-safe spike (2) into the PP bag (1) to ensure a secure connection.

3. Connecting the Inlet Line to the Radionuclide Generator:

i) Remove the end plug from the HCl port of the radionuclide generator.

(See Fig. 18.)

j) Attach a male LUER adapter (3) to the HCl port of the radionuclide generator.

(See Fig. 19.)

Fig. 18 End plug covering the HCl port of the radionuclide generator, prior to removal.

Fig. 19 Attaching the male LUER adapter (3) to the HCl port of the radionuclide generator.

k) Connect the female LUER end of the inlet extension line (5) to the HCl port via the attached adapter.

(See Fig. 20.)

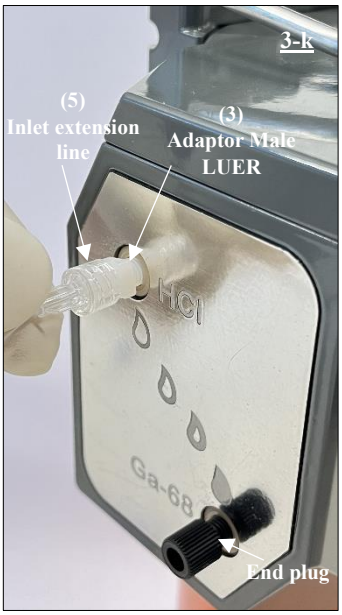


Fig. 20 Connecting the female LUER end of the inlet extension line (5) to the adapter-attached HCl port

4. Connecting the Outlet Line to the Radionuclide Generator:

4-l) Remove the end plug from the Ga-68 port of the radionuclide generator.

(See Fig. 21.)

4-m) Attach the second male LUER adapter (3) to the Ga-68 port of the radionuclide generator.

(See Fig. 22.)

Fig. 21 Removing the end plug from the Ga-68 port of the radionuclide generator.

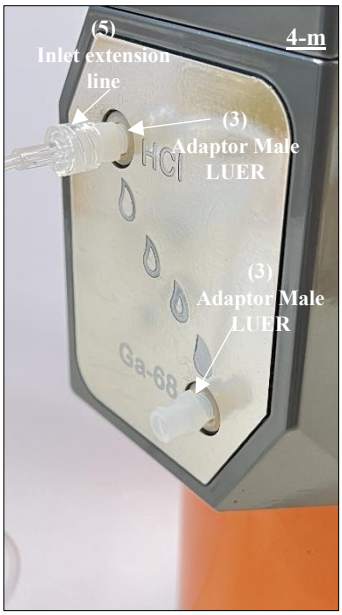


Fig. 22 Attaching the second male LUER adapter (3) to the Ga-68 port.

4-n) Connect the female LUER end of the outlet extension line (6) to the Ga-68 port via the attached adapter. *(See Fig. 23.)*	 *Fig. 23 Connecting the Inlet end (female LUER end) of the outlet extension line (6) to the Ga-68 port via the adapter.*

5. Finalizing the Assembly:

5-o) The radionuclide generator is now ready for elution. Double-check all connections to ensure they are secure. Avoid hard bending or pinching of the lines to maintain proper flow during elution.

(See Fig. 24.)

Fig. 24 Final assembled configuration of the radionuclide generator with all accessories connected.

First Manual Elution Procedure
Before first elution be sure the assembly steps completed.

1. **Required Materials and Equipment:**
    - **Personal Protective Equipment (PPE):** Elutions must be performed wearing appropriate eye protection, hand protection, and laboratory attire.
    - **Syringe:** A minimum 10 ml sterile syringe is required. Two-piece syringes are preferred; syringes with rubber plungers should be avoided.
    - **Receiving Vial:** A shielded receiving vial or vessel with a minimum volume of 10 ml. Uncoated stoppers must be avoided due to the potential for zinc extraction by the acidic eluate.

2. **Eluent Preparation and Syringe Filling:** The syringe shall be attached to the upper side port of the stopcock manifold (2nd port). The valve is to be turned to the position indicated in *Fig 25*. Subsequently, 10 ml of sterile, ultrapure 0.1 mol/l hydrochloric acid shall be drawn from the PP-container into the syringe. Introduction of air into the syringe must be strictly avoided.

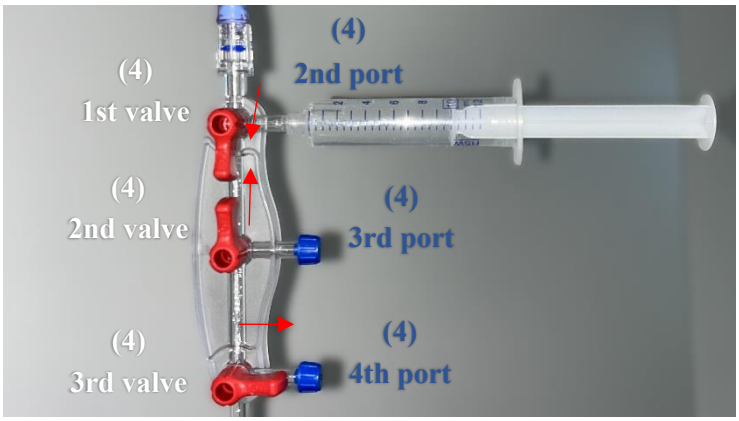


Fig. 25 This figure is referenced in step 2, "Eluent Preparation and Syringe Filling," and shows the valve position for drawing eluent into the syringe"

3. **Connection of Receiving Vessel:** The shielded receiving vessel shall be connected to the outlet line using the appropriate connector. The vessel must possess sufficient capacity to accommodate the volume. Metal syringe needles are not to be used for this connection.

4. **Elution Procedure:** 2nd and 3rd valves of the stopcock manifold shall be turned towards the inlet port of the radionuclide generator. Turn the 1st valve 180° counterclockwise to the closed position. The 10 ml of sterile, ultrapure 0.1 mol/l hydrochloric acid shall then be passed through the generator at a flow rate **not exceeding 2 ml/minute** (refer to *Fig 26*).
    - **Flow Rate Adherence:** Exceeding the specified flow rate may reduce the operational lifespan of the radionuclide generator.
    - **Elution Volume:** While 4 ml of eluent is generally sufficient for complete elution of the radionuclide generator, for the initial elution, a volume of 10 ml is recommended.

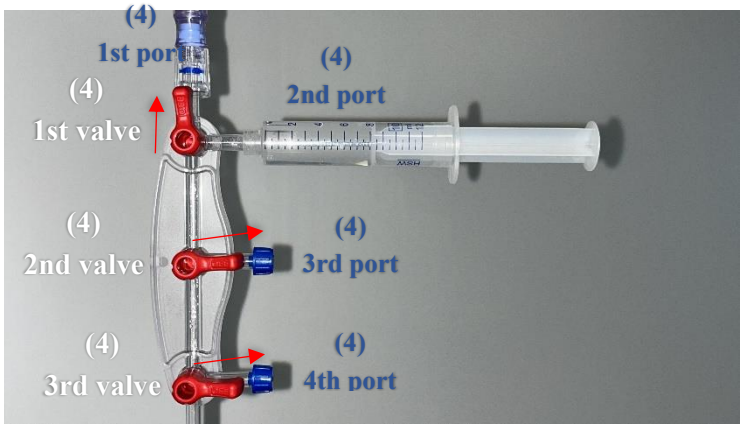


Fig. 26 This figure is referenced in step 4, "Elution Procedure," and likely illustrates the setup or process for passing the hydrochloric acid through the generator.

- **Resistance Monitoring:** Should high resistance be encountered during elution, the solution must not be forced into the radionuclide generator. If a peristaltic pump is employed for elution, it must be set to a flow rate not exceeding 2 ml/minute. The operator must verify that the eluent is flowing without unusual resistance; elution must be discontinued if high resistance is observed.

Critical Operational Considerations:

- The eluent must be introduced exclusively through the designated **inlet port**. Elution of the radionuclide generator in the reverse direction is prohibited.
- Introduction of air into the radionuclide generator column may result in reduced elution efficiency (^{68}Ga yield).

5. **Eluate Collection and Activity Measurement:** The eluate shall be collected in the shielded receiving vessel. The activity of the collected solution must be measured using a calibrated dose calibrator to determine the ^{68}Ga yield.
   - If the collected eluate volume is less than 4 ml, the activity measurement may not accurately represent the total potential yield of the radionuclide generator.
   - The measured activity must be decay-corrected to the start time of the elution.
   - To optimize the yield from the radionuclide generator in its final configuration, determination of the elution peak by collecting small fractions (e.g., 0.5 ml) is recommended.

6. **Management of the First Eluate:** The first eluate obtained from the generator **must be discarded**. This is mandated due to the potential for ^{68}Ge (Germanium-68) breakthrough in this initial fraction. It is recommended that subsequent eluates be tested for ^{68}Ge breakthrough by comparing the activity levels of ^{68}Ga and ^{68}Ge.

Routine Elution

a) Remove the cap from the second port of the stopcock manifold (4).
(See Fig. 27.)

Fig. 27 Removing the cap from the second port of the stopcock manifold (4) to prepare for syringe connection.

b) Connect a sterile syringe with a LUER connection to the second port of the stopcock manifold (4).

- Securely attach the syringe to ensure a leak-free connection for fluid transfer.

(See Fig. 28.)

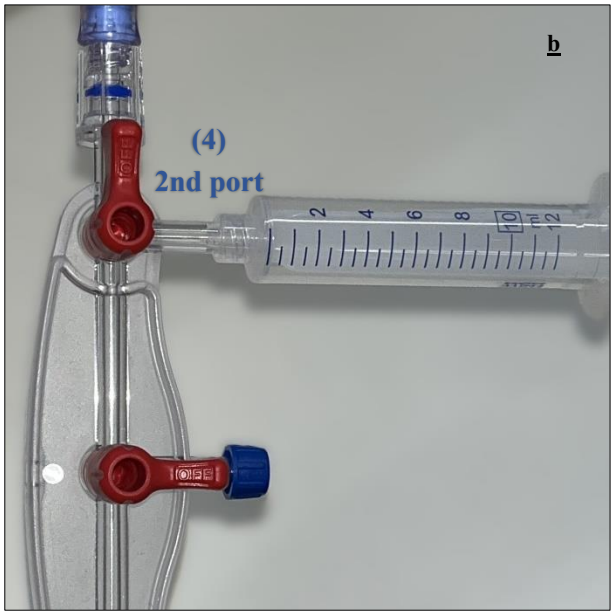


Fig. 28 Connecting a sterile syringe to the second port of the stopcock manifold (4) via LUER connection for elution.

c) Rotate the 'Off' position of the first valve of the manifold (4) to align with the inlet extension line (5), allowing flow from the HCl bag to the syringe.

- This valve adjustment opens the pathway for the hydrochloric acid solution to fill the syringe.

(See Fig. 29.)

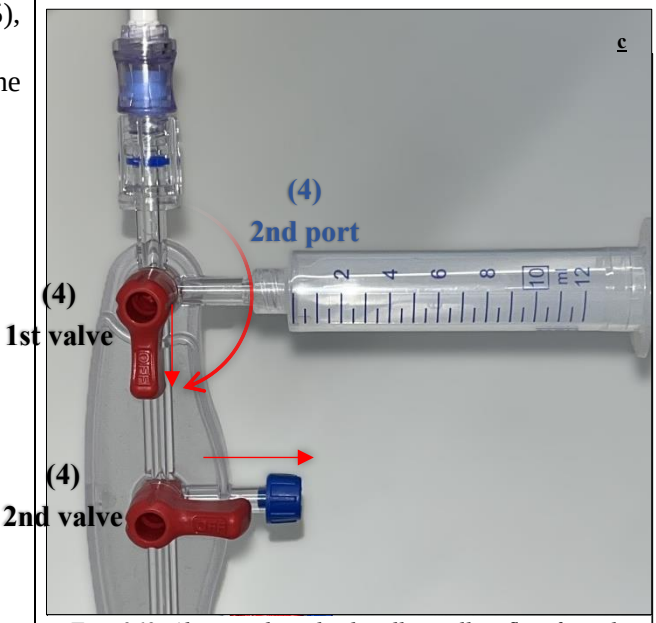


Fig. 269 Aligning the valve handle to allow flow from the hydrochloric acid bag through the inlet extension line (5) into the syringe.

d) Fill the syringe with 4 ml of sterile hydrochloric acid by pulling back the plunger, ensuring no air is drawn into the syringe.

- Slowly draw the solution to avoid air bubbles, filling the syringe to the required volume.

(See Fig. 30.)

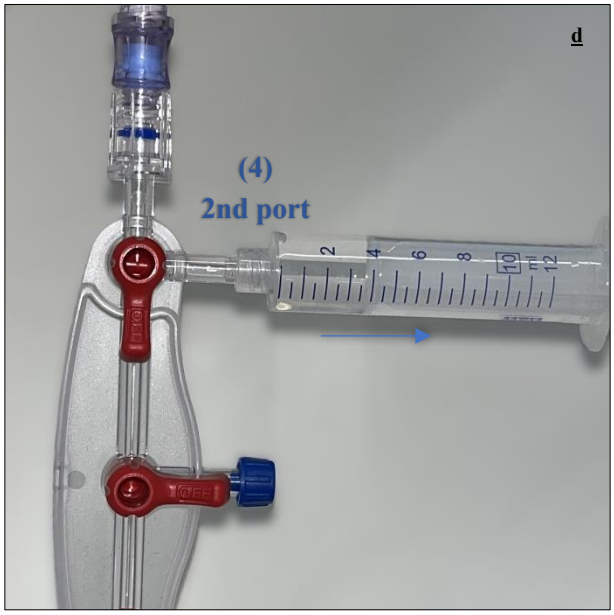


Fig 30 Drawing 4 ml of sterile hydrochloric acid solution into the syringe while avoiding air bubbles.

e) Ensure the 'Off' positions of the second and third valves are aligned with the third and fourth ports of the manifold, then rotate the 'Off' position of the first valve to align with the B-safe spike (2).

- This reconfiguration directs the flow from the syringe to the generator for elution.

(See Fig. 31.)

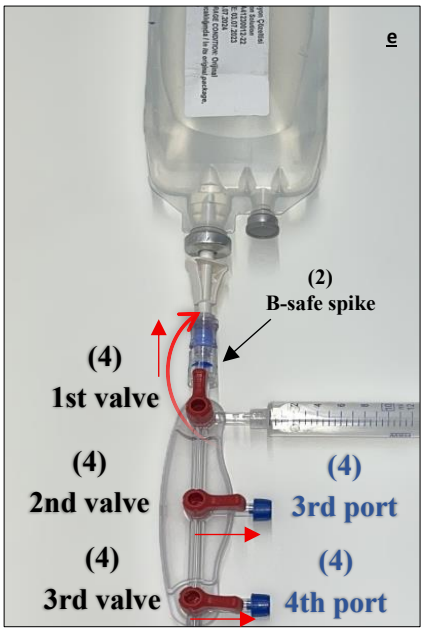


Fig 3128 Setting all valve positions to OFF except the first valve, which is turned to allow flow from the syringe to the generator for elution.

f) Push the plunger to start the elution, controlling the flow rate to not exceed 2 ml per minute.

- Gently depress the plunger to elute the generator, maintaining the recommended flow rate for optimal performance.
  (See Fig. 32.)
- The eluate shall be collected in the shielded receiving vessel. The activity of the collected solution must be measured using a calibrated dose calibrator.

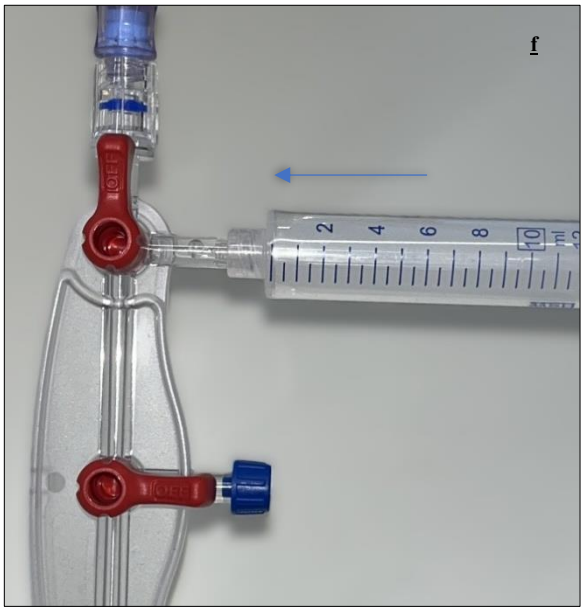


Fig 32 Initiating elution by gently pressing the syringe plunger, maintaining a controlled flow rate not exceeding 2 ml/min.

Replacing the Hydrochloric Acid Bag

CAUTION:

Aseptic technique is critical for maintenance of sterility and must be used during the exchange procedure. Always wear appropriate personal protective equipment (PPE), including gloves, eye protection, and a laboratory coat.

1. When the sterile 0.1 mol/l hydrochloric acid bag is almost empty, it can be replaced with a new sterile 0.1 mol/l hydrochloric acid bag.

   CAUTION:

   No air should enter the radionuclide generator. Introducing air can compromise sterility and affect generator performance. Before disconnecting the empty bag:

   a) Rotate the 'Off' position of the first valve of the stopcock manifold (4) to align with the B-safe spike (2). This closes the flow path from the hydrochloric acid bag, preventing any solution or air from entering or exiting during the replacement process.
   (See Fig. 33.)

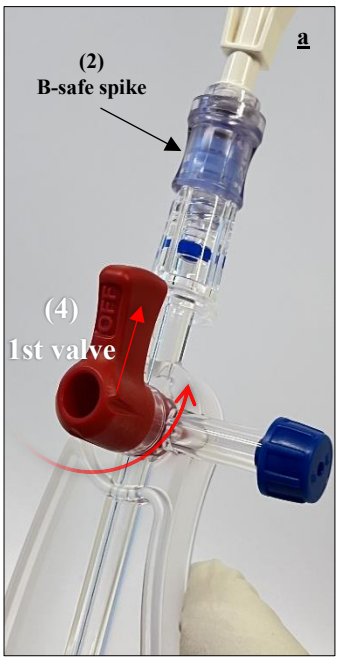


Fig 33 Rotating the first valve to the OFF position to isolate the acid bag.

   b) Disassemble the B-safe spike (2) from the empty hydrochloric acid bag (1). *(See Fig. 34.)*

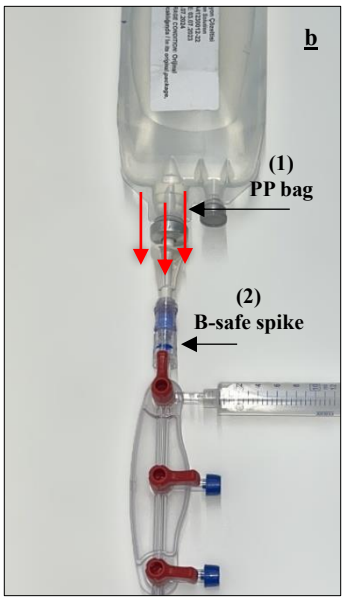


Fig 34 Removing the B-safe spike (2) from the empty acid bag (1).

2. It is recommended to replace the B-safe spike with a new sterile B-safe spike supplied with each new hydrochloric acid bag to maintain sterility.

   c) Attach the new B-Safe spike (2) to the new 220 ml sterile 0.1 mol/l hydrochloric acid bag (1).

3. Reconnect the system:

   d) Assemble the B-safe spike (2) to the first port of the stopcock manifold (4).

   e) Hang the new hydrochloric acid bag close to the inlet port above the radionuclide generator.

4. Prepare the system for elution:

   Carefully check for air bubbles in the stopcock manifold and attached lines.
   Slowly remove all air from the stopcock manifold using the valves. It is not necessary to detach the inlet extension line (5) from the radionuclide generator or from the stopcock manifold.

CAUTION:

Entering air into the radionuclide generator should be avoided to maintain its proper function and sterility.

5. When the stopcock manifold is filled and free of air, close the valves to stop the flow.

The radionuclide generator is now ready for elution again. Proceed with your standard elution protocol, ensuring all safety measures and procedural guidelines are followed

Continuous routine elution:

1. Repeat the steps of the first elution but use only 4 ml for the continuous routine elution. The GalenVita generator is designed to elute all of the available ^{68}Ga activity in a volume of 4 ml.

2. Elute the GalenVita radionuclide generator at every working day with 4 ml sterile 0.1 mol/l hydrochloric acid.

3. The solution eluted is a clear, sterile and colourless gallium (^{68}Ga) chloride solution, with a pH between 0.5 and 2.0 and a radiochemical purity greater than 95 %. Check the clarity of the eluate before use and discard it if the solution is not clear.

4. If the generator has not been used for a period of 3 days or more, free ^{68}Ge ions accumulate within the column over time. Therefore, it is recommended that the column is eluted once at least 7 - 24 hours prior to eluting for labelling. This elution should be done using 10 ml of sterile 0.1 mol/l hydrochloric acid to fully wash the impurities from the column.

5. The eluate should be tested for ^{68}Ge breakthrough before the radionuclide generator comes into routine use and then at least once in a month during routine elutions by comparing the activity level of the ^{68}Ga and the ^{68}Ge. For further details please refer to Ph. Eur. Monograph 2464.

CAUTION:
If fluid leaks are observed at any time, immediately stop eluting and attempt to contain the leaking fluid.

The ^{68}Ge/^{68}Ga-generator is supplied with 220 ml of sterile 0.1 mol/l hydrochloric acid. This amount is usually sufficient for at least 50 elutions. The ^{68}Ge/^{68}Ga-generator should only be eluted with sterile 0.1 mol/l hydrochloric acid supplied by the marketing authorization holder.

Additional containers may be purchased as consumables from the marketing authorisation holder.

Radionuclide generator elution yield:

The activity stated on the label of the radionuclide generator is expressed in ^{68}Ge available at the calibration date (hh:00). The available ^{68}Ga activity depends on the ^{68}Ge activity at the time of elution and the elapsed time since the previous elution.

A radionuclide generator in full equilibrium yields more than 55 % of ^{68}Ga using an elution volume of 4 ml sterile 0.1 mol/l hydrochloric acid. Since the elution yield may vary, the activity of 68Ga in the eluate should always be measured before subsequent use.

The output will decrease with decay of the parent nuclide ^{68}Ge over time. For example, after 9 months' decay (39 weeks), the ^{68}Ge will be reduced by 50 % (see Table 4). To calculate the current ^{68}Ge activity, multiply the ^{68}Ge activity at calibration date with the respective decay factor of the corresponding elapsed time in weeks.

Table 4: Decay Chart for ^{68}Ge

Elapsed Time in weeks	**Decay Factor**	**Elapsed Time in weeks**	**Decay Factor**
1	0.98	27	0.62
2	0.96	28	0.61
3	0.95	29	0.59
4	0.93	30	0.58
5	0.91	31	0.57
6	0.90	32	0.56
7	0.88	33	0.55
8	0.87	34	0.54
9	0.85	35	0.53
10	0.84	36	0.52
11	0.82	37	0.52
12	0.81	38	0.51
13	0.79	39	0.50
14	0.78	40	0.49
15	0.76	41	0.48
16	0.75	42	0.47
17	0.74	43	0.46
18	0.72	44	0.45
19	0.71	45	0.45
20	0.70	46	0.44
21	0.69	47	0.43
22	0.67	48	0.42
23	0.66	49	0.42
24	0.65	50	0.41
25	0.64	51	0.40
26	0.63	52	0.39

After elution, the ^{68}Ga will be built up by the continuous decay of the parent ^{68}Ge. The radionuclide generator requires at least 7 hours to achieve almost full yield after being eluted, but in practice it is also possible to elute the radionuclide generator earlier, depending on its strength and the activity required for

radiolabelling. Table 5 shows the build-up factor of ^{68}Ga activity over time, up to 410 minutes after an elution.

Table 5: Build-up factors of ^{68}Ga

Elapsed Time in minutes	Build-Up Factor	Elapsed Time in minutes	Build-Up Factor
0	0.00	210	0.88
10	0.10	220	0.89
20	0.19	230	0.91
30	0.26	240	0.91
40	0.34	250	0.92
50	0.40	260	0.93
60	0.46	270	0.94
70	0.51	280	0.94
80	0.56	290	0.95
90	0.60	300	0.95
100	0.64	310	0.96
110	0.68	320	0.96
120	0.71	330	0.97
130	0.74	340	0.97
140	0.76	350	0.97
150	0.78	360	0.97
160	0.81	370	0.98
170	0.82	380	0.98
180	0.84	390	0.98
190	0.86	400	0.98
200	0.87	410	0.98

For information purposes additionally the decay chart of ^{68}Ga is provided below.

Table 6: Decay chart of ^{68}Ga

Elapsed Time in minutes	Decay Factor	Elapsed Time in minutes	Decay Factor
1	0.99	35	0.70
2	0.98	36	0.69
3	0.97	37	0.69
4	0.96	38	0.68
5	0.95	39	0.67
6	0.94	40	0.67
7	0.93	41	0.66
8	0.92	42	0.65
9	0.91	43	0.65
10	0.90	44	0.64
11	0.89	45	0.63
12	0.89	46	0.63
13	0.88	47	0.62
14	0.87	48	0.61
15	0.87	49	0.61
16	0.85	50	0.60
17	0.84	51	0.60
18	0.83	52	0.59

19	0.82	53	0.58
20	0.82	54	0.58
21	0.82	55	0.57
22	0.80	56	0.57
23	0.79	57	0.56
24	0.78	58	0.55
25	0.78	59	0.55
26	0.77	60	0.54
27	0.76	61	0.54
28	0.75	62	0.53
29	0.74	63	0.53
30	0.74	64	0.52
31	0.73	65	0.52
32	0.72	66	0.51
33	0.71	67	0.51
34	0.71	68	0.50

Quality control

If possible, clarity of the solution, pH and the radioactivity should be checked before radiolabelling.

^{68}Ge breakthrough

A small amount of ^{68}Ge is washed from the radionuclide generator column with each elution. ^{68}Ge breakthrough is expressed as a percentage of total ^{68}Ga activity eluted from the column, corrected for decay, and does not exceed 0.001 % of the eluted ^{68}Ga activity. ^{68}Ge breakthrough can, however, increase above 0.001 % if the radionuclide generator is not eluted for several days. Therefore, if the radionuclide generator has not been eluted for 72 hours or more, it should be pre-eluted with 10 ml of sterile 0.1 mol/l hydrochloric acid at least 7 hours prior to the intended use (the time between the pre-elution and the elution for radiolabelling can be reduced if the intended radiolabelling procedure does not require maximum achievable eluate activity). When this instruction is followed, the ^{68}Ge breakthrough should constantly stay below 0.001 % in eluates obtained for radiolabelling. To keep the breakthrough low, the generator should be eluted at least once per working day. When used according to these instructions, the breakthrough should stay below 0.001 % for 12 months. For testing the ^{68}Ge breakthrough, the activity levels of the ^{68}Ga and ^{68}Ge in the eluate should be compared. For further details please refer to Ph. Eur. monograph 2464.

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

Detailed information on this medicinal product is available on the website of the European Medicines Agency https://www.ema.europa.eu.

ANNEX II

A. MANUFACTURER RESPONSIBLE FOR BATCH RELEASE

B. CONDITIONS OR RESTRICTIONS REGARDING SUPPLY AND USE

C. OTHER CONDITIONS AND REQUIREMENTS OF THE MARKETING AUTHORISATION

D. CONDITIONS OR RESTRICTIONS WITH REGARD TO THE SAFE AND EFFECTIVE USE OF THE MEDICINAL PRODUCT