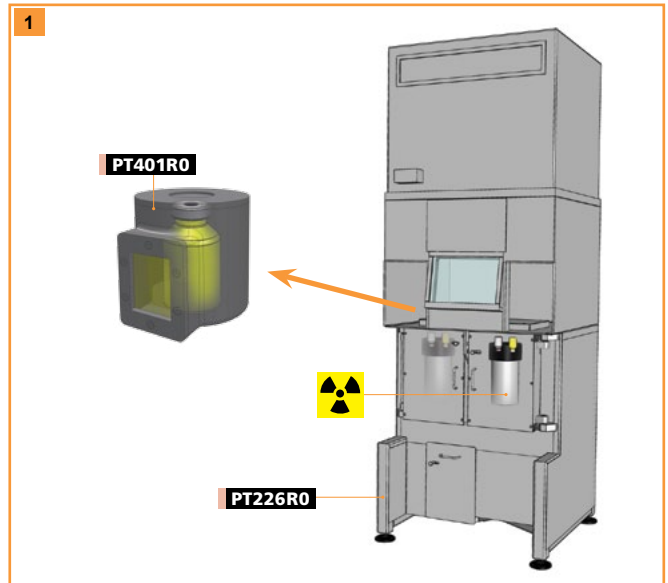


Labelling of radiopharmaceuticals by <sup>99m</sup>Tc; Single dose preparation

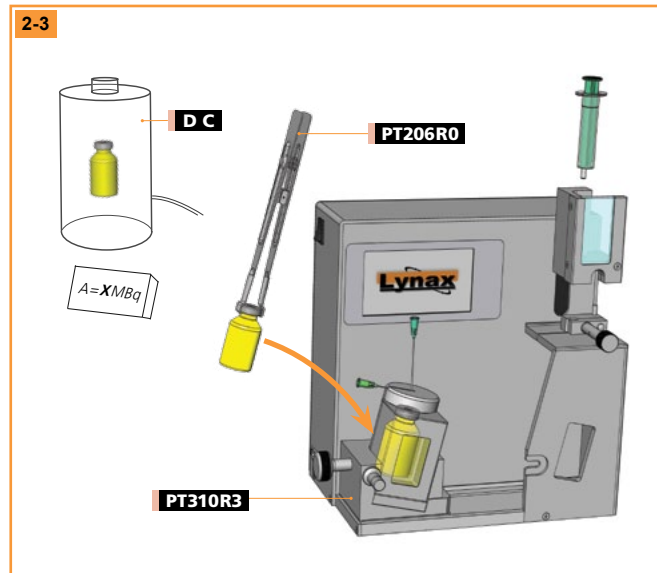
Patented system avoiding unexploited rests of expensive active solution in the vial. The very efficient system organising all steps in the chain of the handling procedure. Strict implementation of simple and easy movements results in substantial reduction of operating time (up to 50%) and obviously crucial reduction of irradiation. Your finger doses will be reduced almost to a ZERO!

1

Because the elution is carried out once a day most frequently, the two <sup>99m</sup>Tc generators are located inside the EA 68 elution cell **PT226R0**. Much better radiation protection has been achieved by locating the generators outside of the laminar flow cell. The EA 68 has shielding layers up to 70mm of Pb and is generally located in a corner of the lab. A new <sup>99m</sup>Tc generator can have 140GBq of <sup>99</sup>Mo as a mother radionuclide. Up to 4000µSv/h can be measured on its surface. The elution takes place outside of the working place of the radiopharmacist.



2-3



2

After elution has been finished, the eluate is transported into the working laminar flow cell type **PT227R0** easily by means of the Pb container. To reload the vial the Handling tweezers **PT206R0** can be used. The vial with eluate is inserted into the lead shielding jacket for the vial of the Slanted stand with dose measuring **PT310R3** after the activity of <sup>99m</sup>Tc has been measured inside a dose calibrator well. The jacket has been prepared in the outer position.

3

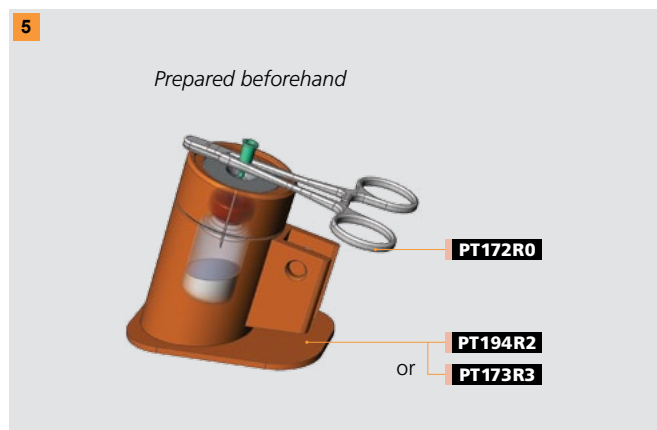
The upper part of the shielding (with tapered orifice) is located on the shielding container and two needles are introduced into the vial: **extraction needle** – 0,70x120mm (green), vertically – the point of the needle touches the very bottom of the vial (to maintain aseptical accomplishment of the manipulation a 2ml syringe is connected to the needle); **breathing needle** – 0,70x40mm (black). Afterwards the shielding container is closed by a lid with longitudinal slot. The shielding jacket is moved into the basic part of the device and the extraction needle is fixed by means of spindle driven jaws.

4

The shield of the extraction syringe is located on the jaws and the syringe is connected to the fixed part of the needle subsequently. The device is now prepared for extracting the solution into the syringe.

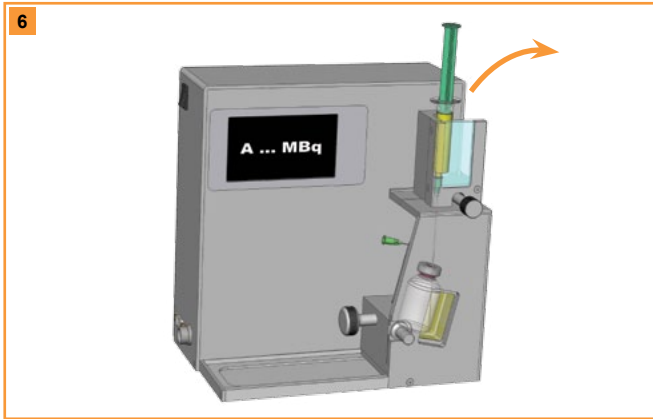


5



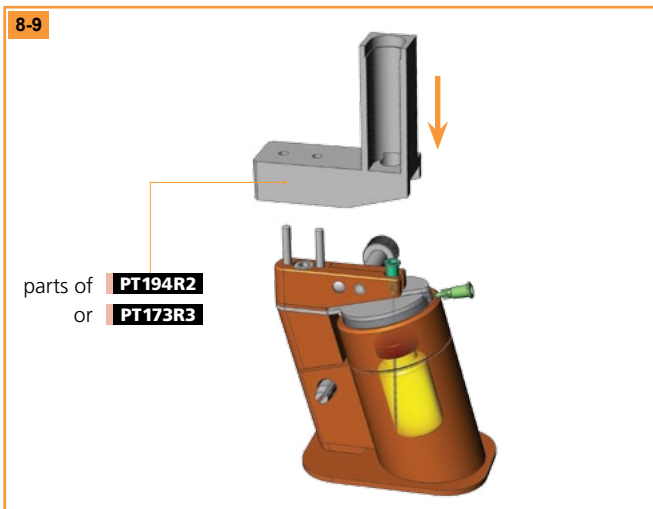
5

A vial of the KIT containing steril basic substances (generally lyophilised substance) is inserted into the basic container of the Slanted stand **PT194R2**, the upper part with tapered orifice bringing the shield to an end. A set of spacers serves to compensate different heights of vials.



**7**  
The needle 0,90x25mm (yellow) is introduced into the vial previously prepared in the Slanted stand **PT194R2**. The Modified hemostat **PT172R0** helps to handle and also to fix the needle. The syringe with <sup>99m</sup>Tc is now removed from its position in the **PT310R3** and its cone connected by mild pressure to the cone of the yellow needle. The content of the syringe can be now transported into the vial of the KIT very easily by simple pressing its piston. The air bubble under the piston provides an utter emptying of the syringe. The syringe with the needle is now to be taken out of the vial without being disconnected. The difference between the activities measured in the syringe and subsequently in the vial does not reach 3%. The content of the vial is to be stirred up.

**6**  
The volume of the eluate containing the required activity of <sup>99m</sup>Tc in order to prepare the given radiopharmaceutical is to be calculated. A certain volume of saline solution is taken in the 5ml syringe in order to obtain the required volume after extracting the eluate into it. The syringe with added saline solution is now located in the extraction syringe shield of **PT310R3** being concurrently connected to the cone of the extraction needle and fixed by jaws. The required volume (calculated before) is extracted into the syringe the activity of the solution being simultaneously measured and displayed. In case of the difference between required and displayed activity higher than 10% the correction is to be done by either adding or returning the eluate. The drawing in of solution into the syringe is carried out with an air gap underneath the piston (about 0,5ml) so that the position of solution level (instead of the piston position) is exactly observed.

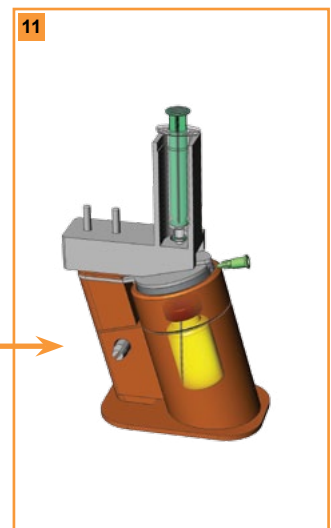
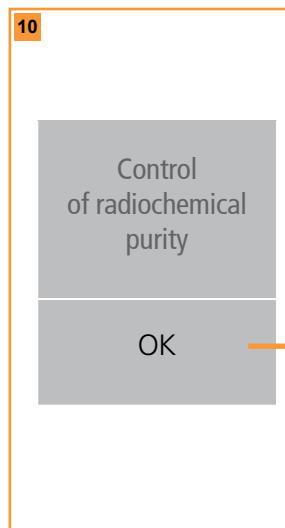


**8**  
The extraction needle 0,90x70mm (yellow) is introduced into the vial vertically - the point of the needle touches the very bottom of the vial (to maintain aseptic accomplishment of the manipulation a 2ml syringe is connected to the needle) and the breathing needle 0,70x40mm (black) the body of which has been bent in the right angle previously is introduced into the vial as well.

**9**  
The Slanted stand **PT194R2** containing now the vial with radiopharmaceutical and two needles is now completed with a shoulder holding a shielding lid and clamping jaws. The shoulder is to be located in its socket and locked by a plug. The cone of the extracting needle is now to be fixed by jaws.

**10**  
The control of radiochemical purity (described separately)

**11**  
The Slanted stand **PT194R2** is now completed with the shield of the extraction syringe and the whole assembly is located into the groove of the Measuring stand-Tc **PT342R3**. Doses for patients can now be prepared easily by extracting the radiopharmaceutical from the vial manually into subsequently used new syringes.

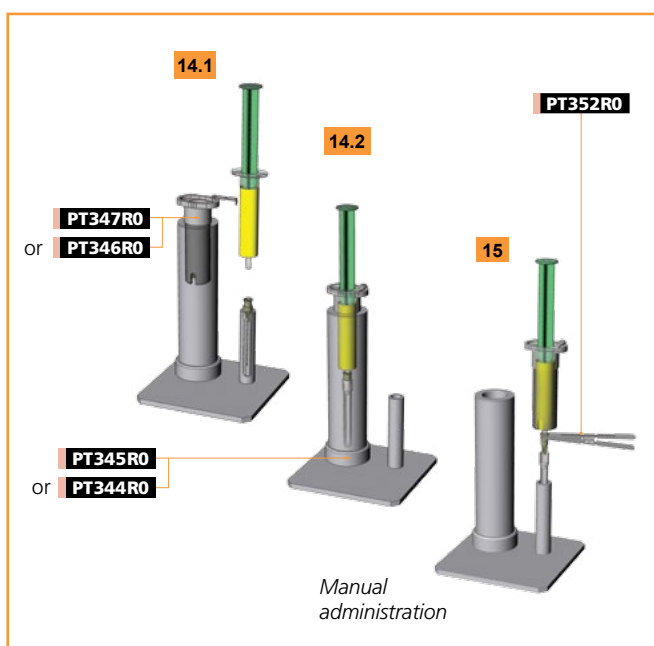
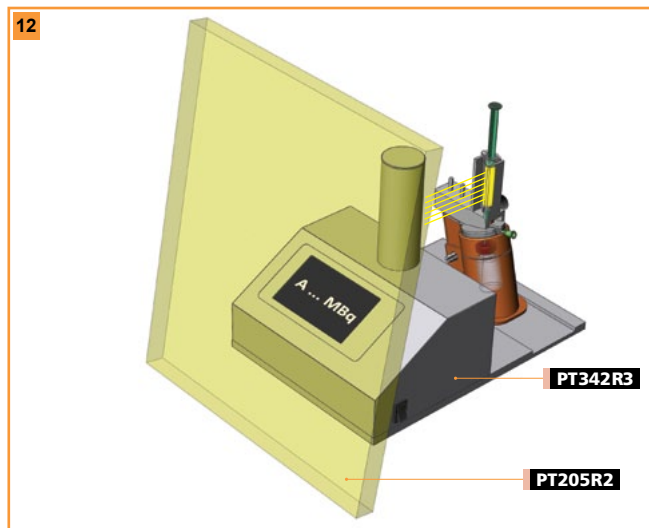


**12**

The estimated volume is extracted into the syringe with the activity of the solution being simultaneously measured and displayed. In case of the difference between required and displayed activity higher than 10% the correction is to be done by either adding or returning the radioactive solution.

**13**

The Administering stand **PT344R0** (2ml syringe) or **PT345R0** (5ml syringe) provided with both the syringe shield and the needle in its socket has been prepared previously. The base of the stand has also been equipped with a bonding label for the patient's data to be filled in. Tungsten Syringe shield **PT346R0** for 2ml syringe and **PT347R0** for 5ml syringe are to be used.


**12**

**14**

The syringe is taken out of the slanted stand and following steps are to be done subsequently:

- 14.1** Connect the cone of the syringe to the needle by a slight pressure.
- 14.2** Insert the syringe, now with a needle, into the prepared syringe shielding and lock it. The dose for the particular patient has been prepared and being shielded properly can now be transported to the patient just by hand. NOTE: Do not touch the unshielded syringe. All manipulation steps are to be done while touching only the piston and so called wings of the syringe! The tungsten Syringe shielding **PT346R0** for a 2ml syringe or **PT347R0** for a 5ml syringe is to be used.

**13 Administration**

Radiopharmaceuticals labelled by <sup>99m</sup>Tc are usually administered directly – by hand. All necessary materials are prepared by the patient's bed on a Movable table with a waste container **PT149R1**. The Administering stand **PT344R0** (2ml syringe) or **PT345R0** (5ml syringe) now containing the syringe with the activity is located on the desktop of the table **PT149R1**. The syringe inside the shielding (and with the needle connected) is to be taken out of its transport position and located into the needle socket where the cover of the needle is removed by means of simple Pincers **PT352R0** without touching the needle by hand. The cover itself stays in its socket. Now the administration may be performed manually.

**16**

After the administration, the cover of the needle is to be put on again by simple inserting the needle into it. This simple manipulation excludes completely the danger of the bacteriological contamination. The syringe with the covered needle will be located back into the syringe socket, the syringe shielding unlocked and the assembly containing the syringe and the needle inside its cover taken out of the shielding and thrown out to the waste container of the table.

**Typical Equipment for SPECT**

- |  |            |
|--|------------|
| 1. EA 68 Elution cell <b>PT226R0</b> for two Tc generators   | 1 piece    |
| 2. Elution container <b>PT401R0</b>  | 1 piece    |
| 3. Laminar flow cell <b>MB120NM</b> with 2 waste containers shielded with 20mm Pb and with a dose calibrator | 1 piece    |
| 4. Slanted stand with dose measuring <b>PT310R3</b>  | 1 piece    |
| 5. Handling tweezers <b>PT206R0</b>  | 1 piece    |
| 6. Modified hemostat <b>PT172R0</b>  | 1 piece    |
| 7. Slanted stand for activity distribution <b>PT194R2</b> or <b>PT173R3</b>                                  | 2-5 pieces |
| 8. Measuring stand-Tc <b>PT342R3</b>   | 1 piece    |
| 9. Administering stand <b>PT344R0</b> (2ml syringe)  | 2-5 pieces |
| 10. Administering stand <b>PT345R0</b> (5ml syringe)   | 2-5 pieces |
| 11. Syringe shielding <b>PT346R0</b> (2ml) and <b>PT347R0</b> (5 ml)   | 2-5 pieces |
| 12. Pincers <b>PT352R0</b>   | 2 pieces   |
| 13. Movable table with a wastes container <b>PT149R1</b>   | 2 pieces   |

**16**
