Ultra-Technekow™ FM
Mo-99/Tc-99m generator

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Why choose Ultra-Technekow FM?

Reliable Moly Supply
Mallinckrodt is the only supplier of Tc-99m generators that operates its own Molybdenum facility. The production plant in Petten, The Netherlands has been one of the largest investments in the history of our company. Mallinckrodt is one of the most reliable suppliers of Mo-99, assuring the delivery of your generator.

Daily Manufacturing
From Monday to Friday we produce and ship our generators every day of the week in a wide range of activities from 2,15 to 43,00 GBq. Standard Activity Reference Time (ART) is 7 days after shipment at 06:00 CET. We offer you optimal flexibility in choosing the right activity for your needs, combined with an excellent distribution network.

One Step Elution
Ultra-Technekow FM is very easy to operate. Elution starts by placing an evacuated vial in its appropriate shield on to the generator. This one step elution shortens handling time and consequently helps you in reducing exposure to radiation.
Variable Elution
We offer three standard elution volumes: 5, 11 and 25 ml. In addition Ultra-Technekow FM is the only generator on the market to have a safe and dedicated system to perform a partial elution. Elution can be stopped at any time by turning the elution shield 90 degrees. Variable elution helps you to control the concentration of Tc-99m in the eluate to your own needs. Our concept of visible elution allows you to observe the process. We can provide you with a special Clear View shield for use in a cabinet and our Ultravial shield for use in our secondary lead shielding.

Consistent Yield
Analysis by our Research & Development Department demonstrates that the average Tc-99m yield efficiency is 89.5%, standard error 0.03%. This finding confirms what we hear from our customers: our generator produces a high and consistent yield of Tc-99m.

Quality of the Eluate
The generator yields a very pure eluate. It does not contain oxidizing agents and has less than 5 µg Al³⁺ per ml. The eluate is sterile, colourless and clear. pH of the carrier free, isotonic solution ranges between 4.0 and 8.0. We guarantee a radionuclildic purity > 99.9% and a radiochemical purity ≥ 99% as Pertechnetate.

Shielding
Ultra-Technekow FM contains integrated shielding around the column to provide safe handling and transport. An optimal balance between radiation protection and a minimal weight, determines the size of the shield. We can provide you with a secondary shield, for use in your department to contain one or two generators.

Environment
We feel it is our obligation to operate our production facilities with a minimum of waste. For this reason we recycle nearly all parts used in an Ultra-Technekow FM and its packaging.
How to use our Ultra-Technekow FM generator

Start

Please make sure that you have all accessories to use Ultra-Technekow FM.

1 Accessories for use in a cabinet or isolator:
   Holder for needle protector:
   DRN8262 Technestat shield
   Elution shield: DRN8275 Clear view elution shield™ 11 ml
   (for 5 and 11 ml evacuated vials)
2 Accessories for use in one of our secondary safes (DRN8230 and DRN8260):
   - Holder for needle protector: DRN8265
   - Technestat shield
   - Elution shield: DRN8271 Ultravial shield™ 11 ml (for 5 and 11 ml sterile evacuated vial) or
   - DRN8272 Ultravial shield™ 25 ml (for 25 ml sterile evacuated vial)

3 Ultra-Technekow FM is shipped in a transport box of w 40 x d 40 x h 40 cm

4 Each generator is shipped with a 5, 11 or 25 ml elution kit (DRN4345, DRN4347 or DRN4348)

5 An elution kit contains:
   - 7x sterile evacuated vials (5, 11 or 25 ml)
   - 1x 5 ml sterile needle protector
   - 1x sterile eluent vial 100 ml NaCl 0,9%
   - 7x disinfection swabs
   - 7x radioactivity labels
How to use our Ultra-Technekon FM generator

Preparation

1. Take the generator out of the transport box (and store the box and packaging materials for later use)
2. 1 Pull out the seal
    2-3 Open the closing ring and remove it
    4 Take the top cover off (and store for later use)
3. Put the Ultra-Technekon FM with the elution station facing forward in a lead castle or behind any other suitable laboratory shielding
4. 1 Remove the flip-off cover from an eluent vial
    2 Disinfect the stopper
    3 Let the disinfectant evaporate completely
1. Remove the flip-off cover from a needle protector
2. Disinfect the stopper
3. Let the disinfectant evaporate completely

5. Remove the plastic cover from the inlet needle (and store for later use)
6. Lower the eluent vial gently and without turning on the inlet needle

7. Remove the rubber cover from the outlet needle (and store for later use)
8. Place the needle protector in its holder
9. Lower the holder with needle protector on to the elution station
How to use our Ultra-Technekow FM generator

Elution

1. Remove the flip-off cover from an evacuated vial
2. Disinfect the stopper
3. Let the disinfectant evaporate completely

2. Place the evacuated vial in an elution shield

3. Replace the holder with needle protector
4. Lower the elution shield with evacuated vial on to the generator
   a. Clear View: mark facing forward
   b. when using an Ultravial shield: lead glass facing forward
5 Elution starts

6 To stop the elution process turn the elution shield 90 degrees

7 1 Remove the flip-off cover from a needle protector  
   2 Disinfect the stopper  
   3 Let the disinfectant evaporate completely

8 Place the needle protector in its holder

9 1 Replace the elution shield  
   2 with the holder with needle protector

For instructions on return of used generators please refer to page 27 ‘Return of the Ultra-Technekow FM generator’.
Variable elution to control Tc-99m concentration
an exclusive feature
of Ultra-Technekow FM

Elution can be stopped at any time by turning the elution shield 90 degrees. A variable elution volume helps to control the concentration of Tc-99m in the eluate to your own needs.

A Lower the elution shield with evacuated vial on to the generator
   a Clear View: mark facing forward
   or
   b when using an Ultravial shield:
       lead glass facing forward

B The safety valve is now open: elution starts
C To stop the elution process turn the elution shield 90 degrees either way. The techneivial is now filled with sterile air.

D There is equilibrium in the system: the elution shield can now be replaced by the holder with needle protector.
Accessories

Vials

Needle protectors
DRN4349 Sterile elution needle protectors
25 vials in one box

5 ml evacuated vials
DRN4373 5 ml sterile evacuated vials
25 vials in one box

11 ml evacuated vials
DRN4357 11 ml sterile evacuated vials
25 vials in one box

25 ml evacuated vials
DRN4370 25 ml sterile evacuated vials
25 vials in one box
Eluent vials
DRN4346 sterile eluent vials 100 ml NaCl 0,9%
10 vials in one box
Accessories

Shields

**Clear view elution shield**

**DRN8275** Clear view elution shield™ 11 ml

Elution shield for 5 ml and 11 ml sterile evacuated vials
For use in a cabinet or isolator

With spherical lead glass possible to watch elution
Variable elution possible

14 mm lead glass (Pb equivalent 6 mm)
Stainless steel (grade 316, chromed) and lead
Surface dose rate: 0.043 μSv/hr per GBq Tc-99m

Ø d 45/58 x h 76 mm
Weight 929 g

**Elution shield 11 ml**

**DRN8271** Ultravial shield™ 11 ml

Elution shield for 5 and 11 ml sterile evacuated vials
For use in one of our secondary safes (DRN8230 and DRN8260)

Watch the elution
With lead glass window and built-in light
Variable elution possible

Minimum diameter lead wall 4,5 mm
10 mm lead glass (Pb equivalent 4,5 mm)
Surface dose rate: 1.687 μSv/hr per GBq Tc-99m

Ø d 45/62 x h 150 mm
Weight 1057 g
Needs 2x AA LR6 1,5V alkaline batteries
Elution shield 25 ml
DRN8272 Ultravial shield™ 25 ml
Elution shield for 25 ml sterile evacuated vial
For use in one of our secondary safes (DRN8230 and DRN8260)

Watch the elution
With lead glass window and built-in light
Variable elution possible

Minimum diameter lead wall 4,5 mm
10 mm lead glass (Pb equivalent 4,5 mm)
Surface dose rate: 2,214 μSv/hr per GBq Tc-99m

Ø d 45/62 x h 150 mm
Weight 1047 g
Needs 2x AA LR6 1,5V alkaline batteries

Adaptor ring
N311346 11 ml adaptor ring
For use in DRN8272 Ultravial shield 25 ml
To allow use of 5 and 11 ml sterile evacuated vials
**Accessories**

**Shields**

**Holder for needle protector**
DRN8262 Technstat shield without lead
Holds the sterile elution needle protector
For use in a cabinet or isolator

**Shield for needle protector**
DRN8265 Technstat shield with lead
Holds the sterile elution needle protector
For use in one of our secondary safes (DRN8230 and DRN8260)
Integrated lead shield
Vial shield 11 ml

**DRN8263** Technevial 11 ml shield

Shield used to store 5 and 11 ml sterile evacuated vial

Suitable for elution
No variable elution possible

Diameter lead wall 7 mm
Surface dose rate: 0.006 μSv/hr per GBq Tc-99m

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Vial shield 25 ml

**DRN8264** Technevial 25 ml shield

Shield used to store 25 ml sterile evacuated vial

Suitable for elution
No variable elution possible

Diameter lead wall 3 mm
Surface dose rate: 0.215 μSv/hr per GBq Tc-99m
Accessories
Secondary safes

Mono safe
DRN8230 Lead castle FM™
Can store one generator

Lead castle remains closed during elution
Technestat shield with lead holds sterile elution needle protector in place (DRN8265)
Elution visible through lead glass by use of illuminated elution shield (DRN8271 or DRN8272)
Variable elution possible

Leadshielding
   Top 42 mm
   Around 50 mm
Ø d 344 x h 485 mm
Weight 250 kg

Surface dose

<table>
<thead>
<tr>
<th>Dose rates</th>
<th>DRN8230 Lead castle FM™</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead wall mono safe</td>
<td>50</td>
</tr>
<tr>
<td>Internal UTK lead shield</td>
<td></td>
</tr>
</tbody>
</table>
|   42                      | 56                      | mm
|   92                      | 106                     | mm
| Total lead shielding      |                         |
|   0,0665                  | 0,0159                  | µSv/hr per GBq Mo-99
| Surface dose rate         |                         |
|   0,0020                  | 0,0005                  | µSv/hr per GBq Mo-99
| Dose rate at 1 meter      |
**Duo safe**

**DRN8260 Ultra-Technekow safe™**
Compact shield can store two generators

Lead castle remains closed during elution
Technestat shield with lead holds sterile elution needle protector in place (DRN8265)
Elution visible through lead glass by use of illuminated elution shield (DRN8271 or DRN8272)
Variable elution possible

**Leadshielding**
- Top 50 mm
- Around maximum 57 mm
- w 455 x d 525 x h 522 mm
- Weight 325 kg

**Surface dose**

<table>
<thead>
<tr>
<th>Dose rates</th>
<th>DRN8260 Ultra-Technekow safe™</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead wall duo safe</td>
<td>57</td>
</tr>
<tr>
<td>Internal UTK lead shield</td>
<td>42 / 56 mm</td>
</tr>
<tr>
<td>Total lead shielding</td>
<td>99 / 113 mm</td>
</tr>
<tr>
<td>Surface dose rate</td>
<td>0.0616 / 0.0148 µSv/hr per GBq Mo-99</td>
</tr>
<tr>
<td>Dose rate at 1 meter</td>
<td>0.0010 / 0.0002 µSv/hr per GBq Mo-99</td>
</tr>
</tbody>
</table>
Accessories
Elution kits

Elution kit 5 ml
DRN4345 Accessories kit 5 ml

Elution kit 11 ml
DRN4347 Accessories kit 11 ml

Elution kit 25 ml
DRN4348 Accessories kit 25 ml

An elution kit shipped with each generator contains:

- 7x sterile evacuated vials (5, 11 or 25 ml)
- 1x 5 ml sterile needle protector
- 1x sterile eluent vial 100 ml NaCl 0,9%
- 7x disinfection swabs
- 7x radioactivity labels
Technetium-99m (activities for one elution per day)

Elution at 07:00 CET (in GBq)

<table>
<thead>
<tr>
<th>Nominal activity in GBq</th>
<th>2.15</th>
<th>4.30</th>
<th>6.45</th>
<th>8.60</th>
<th>10.75</th>
<th>12.90</th>
<th>17.20</th>
<th>21.50</th>
<th>25.80</th>
<th>30.10</th>
<th>34.40</th>
<th>39.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>ART -6 days</td>
<td>7.07</td>
<td>14.14</td>
<td>21.22</td>
<td>28.29</td>
<td>35.36</td>
<td>42.43</td>
<td>56.58</td>
<td>70.72</td>
<td>84.86</td>
<td>99.01</td>
<td>113.15</td>
<td>141.44</td>
</tr>
<tr>
<td>ART -5 days</td>
<td>5.95</td>
<td>11.91</td>
<td>17.86</td>
<td>23.81</td>
<td>29.77</td>
<td>35.72</td>
<td>47.62</td>
<td>59.53</td>
<td>71.44</td>
<td>83.34</td>
<td>95.25</td>
<td>119.06</td>
</tr>
<tr>
<td>ART -4 days</td>
<td>4.63</td>
<td>9.25</td>
<td>13.88</td>
<td>18.50</td>
<td>23.13</td>
<td>27.75</td>
<td>37.01</td>
<td>46.26</td>
<td>55.51</td>
<td>64.76</td>
<td>74.01</td>
<td>92.51</td>
</tr>
<tr>
<td>ART -3 days</td>
<td>3.59</td>
<td>7.19</td>
<td>10.78</td>
<td>14.38</td>
<td>17.97</td>
<td>21.57</td>
<td>28.75</td>
<td>35.94</td>
<td>43.13</td>
<td>50.32</td>
<td>57.51</td>
<td>71.89</td>
</tr>
<tr>
<td>ART -2 days</td>
<td>2.79</td>
<td>5.59</td>
<td>8.38</td>
<td>11.17</td>
<td>13.96</td>
<td>16.76</td>
<td>22.34</td>
<td>27.93</td>
<td>33.52</td>
<td>39.10</td>
<td>44.69</td>
<td>55.86</td>
</tr>
<tr>
<td>ART -1 day</td>
<td>2.17</td>
<td>4.34</td>
<td>6.51</td>
<td>8.68</td>
<td>10.85</td>
<td>13.02</td>
<td>17.36</td>
<td>21.70</td>
<td>26.04</td>
<td>30.38</td>
<td>34.72</td>
<td>43.40</td>
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<tr>
<td>ART</td>
<td>1.69</td>
<td>3.37</td>
<td>5.06</td>
<td>6.75</td>
<td>8.43</td>
<td>10.12</td>
<td>13.49</td>
<td>16.86</td>
<td>20.24</td>
<td>23.61</td>
<td>26.98</td>
<td>33.73</td>
</tr>
<tr>
<td>ART +1 day</td>
<td>1.31</td>
<td>2.62</td>
<td>3.93</td>
<td>5.24</td>
<td>6.55</td>
<td>7.86</td>
<td>10.48</td>
<td>13.10</td>
<td>15.72</td>
<td>18.34</td>
<td>20.97</td>
<td>26.21</td>
</tr>
<tr>
<td>ART +2 days</td>
<td>1.02</td>
<td>2.04</td>
<td>3.05</td>
<td>4.07</td>
<td>5.09</td>
<td>6.11</td>
<td>8.15</td>
<td>10.18</td>
<td>12.22</td>
<td>14.25</td>
<td>16.29</td>
<td>20.36</td>
</tr>
<tr>
<td>ART +3 days</td>
<td>0.79</td>
<td>1.58</td>
<td>2.37</td>
<td>3.16</td>
<td>3.96</td>
<td>4.75</td>
<td>6.33</td>
<td>7.91</td>
<td>9.49</td>
<td>11.08</td>
<td>12.66</td>
<td>15.82</td>
</tr>
<tr>
<td>ART +4 days</td>
<td>0.61</td>
<td>1.23</td>
<td>1.84</td>
<td>2.46</td>
<td>3.07</td>
<td>3.69</td>
<td>4.92</td>
<td>6.35</td>
<td>7.38</td>
<td>8.61</td>
<td>9.84</td>
<td>12.29</td>
</tr>
<tr>
<td>ART +5 days</td>
<td>0.48</td>
<td>0.96</td>
<td>1.43</td>
<td>1.91</td>
<td>2.39</td>
<td>2.87</td>
<td>3.82</td>
<td>4.78</td>
<td>5.73</td>
<td>6.69</td>
<td>7.64</td>
<td>9.55</td>
</tr>
<tr>
<td>ART +6 days</td>
<td>0.37</td>
<td>0.74</td>
<td>1.11</td>
<td>1.48</td>
<td>1.86</td>
<td>2.23</td>
<td>2.97</td>
<td>3.71</td>
<td>4.45</td>
<td>5.20</td>
<td>5.94</td>
<td>7.42</td>
</tr>
<tr>
<td>ART +7 days</td>
<td>0.29</td>
<td>0.58</td>
<td>0.87</td>
<td>1.15</td>
<td>1.44</td>
<td>1.73</td>
<td>2.31</td>
<td>2.88</td>
<td>3.46</td>
<td>4.04</td>
<td>4.61</td>
<td>5.77</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hours after previous elution</th>
<th>% Tc-99m*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>11%</td>
</tr>
<tr>
<td>2</td>
<td>20%</td>
</tr>
<tr>
<td>3</td>
<td>28%</td>
</tr>
<tr>
<td>4</td>
<td>36%</td>
</tr>
<tr>
<td>5</td>
<td>42%</td>
</tr>
<tr>
<td>6</td>
<td>48%</td>
</tr>
<tr>
<td>7</td>
<td>53%</td>
</tr>
<tr>
<td>8</td>
<td>57%</td>
</tr>
<tr>
<td>9</td>
<td>60%</td>
</tr>
<tr>
<td>10</td>
<td>64%</td>
</tr>
<tr>
<td>11</td>
<td>66%</td>
</tr>
<tr>
<td>12</td>
<td>69%</td>
</tr>
</tbody>
</table>

* Based on the values in the above table ‘Technetium-99m (activities for one elution per day)’
# Technical Information

## Internal lead shields

<table>
<thead>
<tr>
<th>Internal lead shield (mm)</th>
<th>Weight generator (kg)</th>
<th>Weight including box (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>42</td>
<td>12,0</td>
<td>15,6</td>
</tr>
<tr>
<td>56</td>
<td>18,0</td>
<td>21,6</td>
</tr>
</tbody>
</table>

## Dimensions

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Size (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diameter Ultra-Technekow FM</td>
<td>135</td>
</tr>
<tr>
<td>Height Ultra-Technekow FM</td>
<td>284</td>
</tr>
<tr>
<td>Height Ultra-Technekow FM with Saline vial</td>
<td>325</td>
</tr>
<tr>
<td>Height Ultra-Technekow FM with holder for needle protector DRN8262</td>
<td>344</td>
</tr>
</tbody>
</table>

## Elution speed

<table>
<thead>
<tr>
<th>Evacuated vial</th>
<th>Time to complete elution (s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>60</td>
</tr>
<tr>
<td>11</td>
<td>38</td>
</tr>
<tr>
<td>25</td>
<td>82</td>
</tr>
</tbody>
</table>

## Elution curve

<table>
<thead>
<tr>
<th>Eluted volume (ml)</th>
<th>% Tc-99m eluted</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0,0 %</td>
</tr>
<tr>
<td>1</td>
<td>4,9 %</td>
</tr>
<tr>
<td>2</td>
<td>52,8 %</td>
</tr>
<tr>
<td>3</td>
<td>87,1 %</td>
</tr>
<tr>
<td>4</td>
<td>96,3 %</td>
</tr>
<tr>
<td>5</td>
<td>98,8 %</td>
</tr>
<tr>
<td>6</td>
<td>99,7 %</td>
</tr>
<tr>
<td>7</td>
<td>100,0 %</td>
</tr>
</tbody>
</table>
Molybdenum-99
Mo-99 activity at 06:00 CET (in GBq)

Dose rates Ultra-Technekow™ FM generator

<table>
<thead>
<tr>
<th>Internal lead shield</th>
<th>42</th>
<th>56</th>
<th>mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface dose rate generator</td>
<td>85,1</td>
<td>20,6</td>
<td>μSv/hr per GBq Mo-99</td>
</tr>
<tr>
<td>Dose rate at 1 meter from generator</td>
<td>0,383</td>
<td>0,093</td>
<td>μSv/hr per GBq Mo-99</td>
</tr>
</tbody>
</table>

Ultra-Technekow™ FM Product information brochure - 25
Delivery Information

Transport box
Type A package
Complies with international transport regulation of IAEA and related regulating organisations (ADR, IATA, ICAO, ICRP, IMO and CFR)
Dimensions of the box: w 40 x d 40 x h 40 cm
Includes elution kit
Box will be used for return shipment

Accessories
Each generator is shipped standard with the elution kit DRN4347 Accessories kit 11 ml
On request we can send a different elution kit than the standard one:
DRN4345 Accessories kit 5 ml, or
DRN4348 Accessories kit 25 ml (shipped with one extra eluent vial)

First time delivery
The first time an Ultra-Technekow FM is supplied, we will also supply:
Elution shield (DRN8271, DRN8272 or DRN8275)
Holder for needle protector (DRN8262 or DRN8265)

Return of used Ultra-Technekow FM generators
For return please use the same box in which the generator has been delivered. We will provide all necessary shipment documentation for return shipment. Before packing the generator for return shipment make sure to elute the remaining fluid from the generator. For instructions please refer to the following page ‘Return of the Ultra-Technekow FM generator’. Depending on distribution planning we will exchange a used generator at the moment of a new delivery or regularly collect decayed generators.

Our local Mallinckrodt representative is able to give you more information on deliveries. Please consult the competent authority in your country on handling of radioactive material.
Return of the Ultra-Technekow FM generator

1. Remove the eluent vial
2. Place the original needle cover on the inlet needle

3. Replace the holder with needle protector
4. Place the elution shield with evacuated vial

6. Close the generator with top cover,
5. Replace the elution shield with original needle cover on the outlet needle
       2-3 closing ring and
       4 seal

7. Place the used elution kit in the transport box
8. Place the used generator in its original shipping box and close off

Please store the generator in a suitable place for decay to a level acceptable for disposal. Make sure to follow the relevant procedures for return of the generator in its transport box.
Physical Characteristics

Decay schedule Mo-99

Mo-99 (T½ : 66h) → Tc-99m (T½ : 6h) → Tc-99 (T½ : 2.100.000 years) → Ru-99 (stable)

181 keV (16%) 740 keV (12%) 778 keV (4%) (12,4%)

Decay factors

<table>
<thead>
<tr>
<th></th>
<th>Mo-99</th>
<th>Tc-99m</th>
</tr>
</thead>
<tbody>
<tr>
<td>1h</td>
<td>0,7772</td>
<td>0,8910</td>
</tr>
<tr>
<td>2h</td>
<td>0,6040</td>
<td>0,7939</td>
</tr>
<tr>
<td>3h</td>
<td>0,4695</td>
<td>0,7074</td>
</tr>
<tr>
<td>4h</td>
<td>0,3649</td>
<td>0,6303</td>
</tr>
<tr>
<td>5h</td>
<td>0,2836</td>
<td>0,5616</td>
</tr>
<tr>
<td>6h</td>
<td>0,2204</td>
<td>0,5004</td>
</tr>
<tr>
<td>7h</td>
<td>0,1713</td>
<td>0,4459</td>
</tr>
<tr>
<td>8h</td>
<td>0,1331</td>
<td>0,3973</td>
</tr>
<tr>
<td>9h</td>
<td>0,1035</td>
<td>0,3540</td>
</tr>
<tr>
<td>10h</td>
<td>0,0804</td>
<td>0,3154</td>
</tr>
<tr>
<td>11h</td>
<td>0,0625</td>
<td>0,2810</td>
</tr>
<tr>
<td>12h</td>
<td>0,0486</td>
<td>0,2504</td>
</tr>
<tr>
<td>13h</td>
<td>0,0378</td>
<td>0,2231</td>
</tr>
<tr>
<td>14h</td>
<td>0,0293</td>
<td>0,1988</td>
</tr>
</tbody>
</table>

Transmission of Mo-99 and Tc-99m through lead
### Units

<table>
<thead>
<tr>
<th>Name</th>
<th>Symbol</th>
<th>Description</th>
<th>Conversion (often used)</th>
<th>SI / Traditional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Becquerel</td>
<td>Bq</td>
<td>1 Bq = 1 disintegration per second (dps)</td>
<td>1 Bq = 27 pCi</td>
<td>SI</td>
</tr>
<tr>
<td>Curie</td>
<td>Ci</td>
<td>1 Ci = roughly the activity of 1 gramme of the radium isotope Ra-226</td>
<td>1 Ci = 37 GBq</td>
<td>Traditional</td>
</tr>
<tr>
<td>Gray</td>
<td>Gy</td>
<td>unit of absorbed dose, physical effect of radiation</td>
<td>1 Gy = 1 J/kg = 100 rad</td>
<td>SI derived</td>
</tr>
<tr>
<td>Rad</td>
<td>Rd</td>
<td>absorbed dose</td>
<td>1 rad = 1 x 10^{-2} J/kg</td>
<td>Traditional</td>
</tr>
<tr>
<td>Sievert</td>
<td>Sv</td>
<td>unit of dose equivalent, biological effect of radiation</td>
<td>1 Sv = 1 J/kg x Wr = 100 rem</td>
<td>SI derived</td>
</tr>
<tr>
<td>Rem</td>
<td>rem</td>
<td>röntgen equivalent man, dose equivalent</td>
<td>1 rem = 1 x 10^{-2} Sv</td>
<td>Traditional</td>
</tr>
</tbody>
</table>

Wr = radiation weighting factor

### Pre-fixes for SI units

<table>
<thead>
<tr>
<th>Factor</th>
<th>Name</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>10^{12}</td>
<td>tera</td>
<td>T</td>
</tr>
<tr>
<td>10^{-3}</td>
<td>kilo</td>
<td>k</td>
</tr>
<tr>
<td>10^{-6}</td>
<td>milli</td>
<td>m</td>
</tr>
<tr>
<td>10^{-9}</td>
<td>nano</td>
<td>n</td>
</tr>
<tr>
<td>10^{-12}</td>
<td>pico</td>
<td>p</td>
</tr>
</tbody>
</table>

### Conversion table Bq <-> Ci

<table>
<thead>
<tr>
<th>Conversion table Bq &lt;-&gt; Ci</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Bq = 27 pCi</td>
</tr>
<tr>
<td>1 kBq = 27 nCi</td>
</tr>
<tr>
<td>1 MBq = 27 μCi</td>
</tr>
<tr>
<td>1 GBq = 27 mCi</td>
</tr>
</tbody>
</table>
Availability

- Production and shipment every working day
- Range (activity in Mo-99): 2.15 / 4.30 / 6.45 / 8.60 / 10.75 / 12.90 / 17.20 / 21.50 / 25.80 / 30.10 / 34.40 / 43.00 GBq
- Activity Reference Time (ART): 7 days after production, 06:00 CET
- Expiry: 9 days after ART

Please consult your local Mallinckrodt representative to discuss our extensive distribution network.

Prescribing Information

Ultra-Technekow™ FM Mo-99/Tc-99m generator

**Composition:** A sterile generator containing the parent isotope ⁹⁹Mo, adsorbed to an aluminium oxide column. The ⁹⁹Mo on the column is in equilibrium with the formed daughter isotope ⁹⁹mTc. **Pharmaceutical Form:** Radionuclide generator. **Therapeutic Indications:** The eluate from the generator (Sodium Pertechnetate (⁹⁹mTc) Injection Ph. Eur.) may be used as a reagent for labelling of various carrier compounds supplied as kits or administered directly in-vivo. Indications include: Thyroid scintigraphy; Salivary gland scintigraphy; Location of Meckel’s diverticulum; Cerebral scintigraphy; Lacrimal duct scintigraphy: to assess patency of tear ducts. ⁹⁹mTc-labelling of red blood cells: Cardiac and vascular scintigraphy; Diagnosis and localisation of occult gastrointestinal bleeding.

**Posology and Method of Administration:** Sodium pertechnetate (⁹⁹mTc) is normally administered intravenously at activities which vary widely according to the clinical information required and the equipment employed. Pre-treatment of patients with thyroid blocking agents or reducing agents may be necessary for certain indications. Children. The activity for administration to children may be calculated from the recommended range of adult activity and adjusted according to body weight or surface area. **Contra-Indications:** Hypersensitivity to the active substance or any of the excipients. Special Warnings and Special Precautions for Use: Radiopharmaceutical agents should be used only by qualified personnel with the appropriate government authorizations for the use and manipulations of radionuclides. **Interaction with Other Medicinal Products and Other Forms of Interaction:** Drug interactions have been reported in brain scintigraphy where there can be increased uptake of (⁹⁹mTc) pertechnetate in the walls of cerebral ventricles as a result of methotrexate-induced ventriculitis. In abdominal imaging drugs, such as atropine, isoprenaline and analgesics, can result in a delay in gastric emptying and redistribution of pertechnetate. **Pregnancy and Lactation:** ⁹⁹mTc (as free pertechnetate) has been shown to cross the placental barrier. When it is necessary to administer radioactive medicinal products to a woman of childbearing potential, information should always be sought about pregnancy. Radionuclide procedures carried out on pregnant women also involve radiation doses to the foetus. Only imperative investigations should be carried out during pregnancy, when the likely benefit exceeds the risk incurred by the mother and the foetus. Before administering a radioactive medicinal product to a woman who is breast-feeding, consideration should be given as to whether the administration could be reasonably delayed until the mother has ceased breast-feeding and as to whether the most appropriate choice of radiopharmaceutical has been made. If the administration is considered necessary, breast-feeding should be interrupted for at least 12 hours and the expressed feeds discarded. Breast-feeding can be restarted when the activity level in the milk will not result in a radiation dose to the child greater than 1 mSv. **Undesirable Effects:** Information on adverse reactions is available from spontaneous reporting. The reported reaction types are anaphylactoid reactions, vegetative reactions, as well as different kinds of injection site reactions. ⁹⁹mTc-pertechnetate from the Ultra-Technekow FM generator is used for radioactive labelling of a variety of compounds. These pharmaceuticals generally have a higher potential for side effects than ⁹⁹mTc, and therefore the reported side effects are rather related to the labelled compounds than to ⁹⁹mTc. The possible types of side effects following intravenous administration of a ⁹⁹mTc-labelled pharmaceutical preparation will be dependent on the specific compound being used. Such information should be available from the manufacturer of the pharmaceutical which is to be radiolabelled. Exposure to ionising radiation is linked with cancer induction and a potential for development of hereditary defects. For diagnostic nuclear medicine investigations, the current evidence suggests that these adverse effects will occur with low frequency because of the low radiation doses incurred. For most diagnostic investigations using a nuclear medicine procedure, the radiation dose delivered is less than 20 mSv EDE. Higher doses may be justified in some clinical circumstances. This product contains no excipients that have a recognised action or effect, or knowledge of which is important for safe and effective use of the product.

Manufactured and released by: Mallinckrodt Medical B.V., Westerduinweg 3, 1755 LE, Petten, The Netherlands. **Date of Preparation of this Information:** 18 Sept 2013.

Product availability and Summary of Product Characteristics may differ from one country to another.

For your country’s specific information, please contact your local Mallinckrodt Office or Representative.