CLAIMS

1. A mobile radioisotope generator system comprising:

a movable platform carrying an infusion tubing circuit, an activity detector, a dose calibrator, a computer, and a shielding assembly containing a strontium/rubidium radioisotope generator configured to generate a radioactive eluate via elution of an eluant,

the infusion tubing circuit including a tubing line connected between the strontium/rubidium radioisotope generator and the dose calibrator and configured to supply a portion of radioactive eluate to the dose calibrator,

the activity detector being positioned downstream of the strontium/rubidium radioisotope generator and configured to measure an activity of the radioactive eluate flowing through the infusion tubing circuit, and

the computer being electronically coupled to the dose calibrator and configured to execute automated quality control testing using the dose calibrator,

wherein the computer is configured to determine an activity of strontium-82 and an activity of strontium-85 in the portion of radioactive eluate through automated quality control testing using the dose calibrator,

the computer is configured to control the mobile radioisotope generator system to deliver a dose of radioactive eluate to a patient during a patient infusion procedure, and

the computer is further configured to prevent the patient infusion procedure if a quality control test result exceeds an allowable limit.

2. The system of claim 1, wherein the automated quality control testing comprises breakthrough testing~~, and the computer is further configured to prevent a patient infusion procedure if a breakthrough test result exceeds an allowable limit~~.

3. The system of claim 1~~2~~, wherein the allowable limit includes a ratio of the~~an~~ activity of strontium-82 divided by an activity of rubidium-82 and a ratio of the~~an~~ activity of strontium-85 divided by the~~an~~ activity of rubidium-82 each being less than 0.02 microcurie / millicurie.

4. The system of claim 1, wherein the computer is configured to collect and store quality control test parameters and results.

5. The system of claim 1, wherein the computer is configured to automatically transfer quality control test information to one or more remote computers.

6. The system of claim 1, wherein

the movable platform further carries a waste reservoir and the infusion tubing circuit further includes a waste tubing line and a divergence valve, the waste tubing line being configured to provide fluid communication between the strontium/rubidium radioisotope generator and the waste reservoir via the divergence valve, and

the computer is configured to receive activity measurements from the activity detector, control the divergence valve to direct eluate to the waste reservoir until the activity detector measures a threshold amount of radioactivity in the eluate, and, upon receiving an indication from the activity detector that the eluate has the threshold amount of radioactivity, control the divergence valve to direct eluate to the dose calibrator.

7. The system of claim 6, wherein

the movable platform further carries a pump electronically coupled to the computer and connected to a supply of eluant,

the computer is configured to control the pump to supply the eluant to the strontium/rubidium radioisotope generator and generate the portion of radioactive eluate, and

the computer is configured to execute the automated quality control testing by controlling the pump, the divergence valve, the dose calibrator, and the activity detector.

8. The system of claim 1, wherein the movable platform further carries a printer configured to provide a printout of quality control test information.

9. The system of claim 1, wherein the dose calibrator is at least one of integrated into the shielding assembly or contained within a well of the shielding assembly.

10. The system of claim 1, wherein the computer is configured to execute automated quality control testing by at least receiving activity data from the dose calibrator and calculating at least one of breakthrough test results and calibration coefficient results.

11. The system of claim 1, wherein the computer is configured to execute automated quality control testing by at least receiving a first activity measurement from the dose calibrator at a first time, receiving a second activity measurement from the dose calibrator at a second time later than the first time, and calculating breakthrough test results using the first activity measurement and the second activity measurement.

12. The system of claim 1, where the computer is configured to execute automated quality control testing by receiving activity data from the dose calibrator and calculating a ratio of the~~an~~ activity of strontium-82 divided by an activity of rubidium-82 and a ratio of the~~an~~ activity of strontium-85 divided by the activity of rubidium-82.

13. The system of claim 1, wherein the movable platform further carries a touch screen display and the computer is further configured to indicate via the display if results of the quality control testing are within allowable limits.

14. The system of claim 1, wherein the dose calibrator comprises a removable sample collection reservoir configured to receive the portion of eluate.

15. The system of claim 1, wherein the computer is electronically coupled to the dose calibrator via one of a wired or wireless connection.

16. The system of claim 1, wherein the movable platform rests on wheels configured to roll and swivel.

17. The system of claim 1, further comprising an eluant reservoir containing saline as the eluant, the eluant reservoir being connected to the movable platform and positioned outside of the shielding assembly.

18. The system of claim 17, further comprising an encoded information reader configured to read encoded information from at least one of the eluant reservoir, the infusion tubing circuit, and the strontium/rubidium radioisotope generator, and wherein the computer is further configured to receive information read from a label attached to the at least one of the eluant reservoir, the infusion tubing circuit, and the strontium/rubidium radioisotope generator.

19. The system of claim 1, further comprising a pressure sensor in communication with the computer and configured to measure pressure of the eluate within the infusion tubing circuit.

20. The system of claim 1, wherein the computer is configured to connect to a removable computer readable storage device and transfer quality control information to the removable computer readable storage device.

21. A mobile radioisotope generator system comprising:

a shielding assembly configured to contain a strontium/rubidium radioisotope generator that generates radioactive eluate via elution of an eluant and an infusion tubing circuit comprising an eluate tubing line configured to convey eluate from the strontium/rubidium radioisotope generator;

means for measuring an activity of the eluate flowing through the eluate tubing line;

means for receiving eluate from the eluate tubing line and measuring~~calculating~~ breakthrough activity of~~within~~ the eluate; and

means for receiving activity data from the means for measuring the activity of the eluate ~~and also receiving breakthrough activity data from the means for receiving eluate and calculating breakthrough activity~~ and controlling the mobile radioisotope

generator system based on the received activity data to deliver a dose of eluate to a patient during a patient infusion procedure,~~and breakthrough activity data.~~

~~22. The system of claim 21,~~ wherein the means for receiving activity data~~, receiving breakthrough activity data,~~ and controlling the mobile radioisotope generator system is further configured to receive breakthrough activity data from the means for receiving eluate and measuring breakthrough activity, determine at least an activity of strontium-82 and an activity of strontium-85 in the eluate from the breakthrough activity data, and prevent the~~a~~ patient infusion procedure if the~~breakthrough~~ activity of strontinum-82 or the activity of strontium-85~~data~~ exceeds an allowable limit.

~~23~~22. The system of claim 21, wherein the means for receiving activity data, receiving breakthrough activity data, and controlling the mobile radioisotope generator system is configured to electronically transfer quality control test information and infusion information to one or more remote computers.

~~24~~23. The system of claim 21, wherein

the shielding assembly is configured to further contain a waste reservoir and the infusion tubing circuit further includes a waste tubing line and a divergence valve, the waste tubing line being configured to provide fluid communication between the strontium/rubidium radioisotope generator and the waste reservoir via the divergence valve, and

the means for receiving activity data, receiving breakthrough activity data, and controlling the mobile radioisotope generator system is configured to control the divergence valve to direct eluate to the waste reservoir until the activity data indicates a threshold amount of radioactivity in the eluate, and, upon receiving an indication that the eluate has the threshold amount of radioactivity, control the divergence valve to direct eluate to the means for receiving eluate from the eluate tubing line and calculating breakthrough activity within the eluate.

~~25~~24. A method comprising:

delivering eluant to a strontium/rubidium radioisotope generator carried by a movable cart and thereby generating radioactive eluate via elution;

measuring, with an activity detector carried by the movable cart, an activity of the eluate within a tubing line of an infusing tubing circuit;

delivering a portion of eluate via the tubing line to a dose calibrator carried by the movable cart, ~~and~~

performing quality control testing on the eluate delivered to the dose calibrator, quality control testing including determining an activity of strontium-82 and an activity of strontium-85 in the eluate, and

preventing, via a computer carried by the movable cart, a patient injection procedure if a quality control test result exceeds an allowable limit.

~~26. The method of claim 25, wherein performing quality control testing on the eluate comprises conducting breakthrough testing, and further comprising preventing, via a computer carried by the movable cart, a patient injection procedure if a breakthrough test result exceeds an allowable limit.~~

~~27~~25. The method of claim ~~25~~24, further comprising storing, on the~~a~~ computer carried by the movable cart, quality control testing information.

~~28~~26. The method of claim ~~27~~25, further comprising transmitting, via the computer carried by the movable cart, quality control information to one or more remote computers.

~~29~~27. The method of claim ~~27~~25, further comprising transferring, via the computer carried by the movable cart, quality control information to a removable computer readable storage device.

~~30~~28. The method of claim ~~25~~24, wherein delivering the portion of eluate via the tubing line to the dose calibrator comprises delivering the portion of eluate to a removable sample collection reservoir.

~~31~~29. A system comprising:

a shielding assembly configured to contain a radioisotope generator that generates radioactive eluate via elution;

a computer carried by the shielding assembly, wherein the computer is configured to receive a user input and, responsive to receiving the user input, control the radioisotope generator to generate a sample of eluate via elution during breakthrough testing; and

a dose calibrator electronically coupled to the computer and configured to measure an activity of the sample of eluate generated during breakthrough testing,

wherein the computer carried by the shielding assembly is configured to receive the activity data from the dose calibrator and calculate breakthrough test results, and

the computer is further configured to prevent a patient infusion procedure if a breakthrough test result exceeds an allowable limit.

~~32~~30. The system of claim ~~31~~29, wherein the radioisotope generator comprises a strontium-rubidium generator configured to generate rubidium-82 by decay of strontium-82.

~~33~~31. The system of claim ~~31~~29, wherein the computer is configured to calculate the breakthrough test results by at least calculating a ratio of an activity of strontium-82 divided by an activity of rubidium-82 and a ratio of an activity of strontium-85 divided by the activity of rubidium-82.

~~34~~32. The system of claim ~~33~~31, wherein the computer is further configured to indicate if the breakthrough test results are within allowable limits.

~~35~~33. The system of claim ~~34~~32, wherein the allowable limits include the ratio of the activity of strontium-82 divided by the activity of rubidium-82 and the ratio of the activity of strontium-85 divided by the activity of rubidium-82 each being less than 0.02 microcurie / millicurie.

~~36. The system of claim 31, wherein the computer is further configured to prevent a patient infusion procedure if a breakthrough test result exceeds an allowable limit.~~

~~37~~34. The system of claim ~~31~~29, further comprising an activity detector.

~~38~~35. The system of claim ~~37~~34, wherein the computer is configured to divert eluate generated via elution to a waste bottle until the activity detector detects a given level of activity.

~~39~~36. The system of claim ~~38~~35, wherein the given level of activity is 1.0 millicurie.

~~40~~37. The system of claim ~~31~~29, further comprising a display configured to display the breakthrough test results.

~~41~~38. The system of claim ~~40~~37, wherein the computer is configured to control the display to provide an indication of progress of the breakthrough testing.

~~42~~39. The system of claim ~~31~~29, further comprising a cabinet structure, wherein the shielding assembly is positioned inside the cabinet structure and the computer is carried by the cabinet structure.

~~43~~40. The system of claim ~~31~~29, wherein the dose calibrator is configured to physically receive the sample of eluate generated during breakthrough testing.

~~44~~41. A method comprising:

generating, with a radioisotope generator contained within a shielding assembly, a radioactive eluate via elution of an eluant;

measuring, with a dose calibrator electronically coupled to a computer carried by the shielding assembly, an activity of the radioactive eluate;~~ and~~

determining, with the computer, an activity of rubidium-82 within the radioactive eluate, and

preventing, with the computer, a patient infusion procedure if a breakthrough test result exceeds an allowable limit.

4542. The method of claim 4441, further comprising determining, with the computer, an activity of strontium-82 and an activity of strontium-85 in the radioactive eluate.

4643. The method of claim 4542, further comprising determining, with the computer, a ratio of the activity of strontium-82 divided by the activity of rubidium-82 and a ratio of the activity of strontium-85 divided by the activity of rubidium-82.

4744. The method of claim 4643, further comprising determining, with the computer, if the ratio of activity of strontium-82 divided by the activity of rubidium-82 and the ratio of the activity of strontium-85 divided by the activity of rubidium-82 are within allowable limits.

4845. The method of claim 4744, wherein the allowable limits include the ratio of the activity of strontium-82 divided by the activity of rubidium-82 and the ratio of the activity of strontium-85 divided by the activity of rubidium-82 each being less than 0.02 microcurie / millicurie.

4946. The method of claim 4441, further comprising displaying breakthrough test results determined by the computer.

~~50. The method of claim 44, further comprising preventing, with the computer, a patient infusion procedure if a breakthrough test result exceeds an allowable limit.~~

5147. The method of claim 4441, further comprising measuring, with an activity detector electronically coupled to the computer, an activity of the radioactive eluate.

5248. The method of claim 5147, further comprising controlling, with the computer, a diverter valve to divert the radioactive eluate to a waste bottle until the activity detector detects a given level of activity.

~~53~~49. The method of claim ~~52~~48, wherein the given level of activity is 1.0 millicurie.

~~54~~50. The method of claim 44~~41~~, wherein the shielding assembly is positioned inside a cabinet structure and the computer is carried by the cabinet structure.