TRASIS

NEW !

A Dispensing and Packaging solution for PET & SPECT Radiopharmaceuticals

Fast **Cost-effective** **Safe** **Ergonomic**

Benefits

At the pharmacy
- ✔ Fully automated process
- ✔ Up to 4 patient doses/min.
- ✔ No batch size limit
- ✔ Lower exposure

At the hospital
- ✔ Clean, sterile & sealed
- ✔ Reduced handling
- ✔ Lower exposure
- ✔ Easier and lighter shipping

Cartridges replace syringes

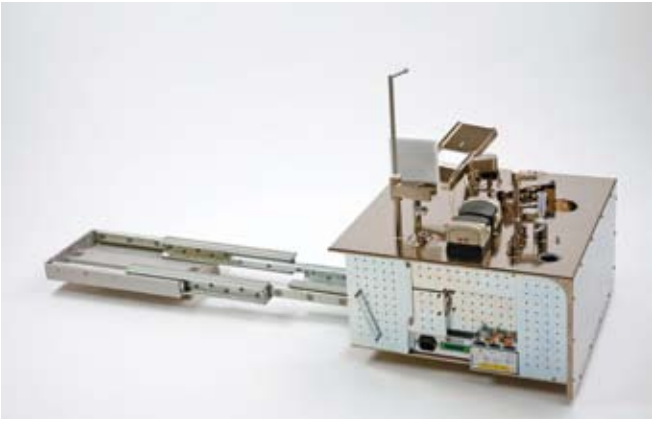
The packaging solution from Trasis allows the preparation and the injection of single patient doses of PET and SPECT radiopharmaceuticals. It addresses in a global way the needs of the radiopharmaceutical industry for a more efficient, faster and safer preparation method of unit doses, the need to reduce drastically the weight of the shipping containers and the need for all hospitals to reduce the radiation exposure of the medical staff.

The concept consists in a syringe-like unit dose Cartridge and a dedicated aseptic filling machine. Through the design of this specific container, single patient doses can now be prepared automatically, perfectly sealed, transported at half of the weight needed for syringes and delivered to hospitals in a form that reduces exposure and avoids any investment or change in medical procedures.

At the radiopharmacy, the filling machine prepares automatically an unlimited number of doses at a rate of 4 doses/minute.

At the hospital, the cartridges are delivered in Local Shields which replace syringe injection shields. The technician simply snaps an Injection Tool, assays the dose through the shield and plugs a Luer Adaptor into the Cartridge. The shielded dose is ready for injection!

The 3 mL sealed Cartridge replaces a syringe.



The compact system includes a sliding tray to pull the dispenser easily out of the hotcell.

The Injection Tool and a Sample Luer Adapter convert the shielded Cartridge into a syringe ready for injection.

A fast aseptic Filling Machine for the industry

The filling machine allows the fast aseptic filling and capping of an unlimited number of doses. A very accurate filling is achieved by the combined measurements of activity and weight. The system allows different isotopes for PET and SPECT.

The filling machine includes a ***compounding area*** where the dilution is performed in a sterilized disposable Tubing Set, a ***Cartridge handling area*** where the Cartridges are aseptically filled and capped and an ***outlet area*** including an air-lock system where the Cartridges are assayed and dropped into their shields. Labels and manufacturing documents are issued on-line, displaying the actually measured volumes and activities. The system connects to the local Ethernet network and can be operated from any computer via a graphical user interface.

Main components

The filling machine includes two peristaltic pumps, actuators operating the Tubing Set, two dose calibrators, one for measuring the in-coming activity and the other for measuring each unit dose delivered, an RFID tag reader, a scale, an actuator to locate the Cartridge piston according to the amount of solution dispensed, a capping tool, a carrousel to move the Cartridges, an air-lock system to keep the system isolated from lower grade atmosphere as the filled Cartridges are dropped out of the machine and a label printer. The system is operated by 2 PLCs, controlled from a computer via a graphical user interface.

Automation from filling to final packing

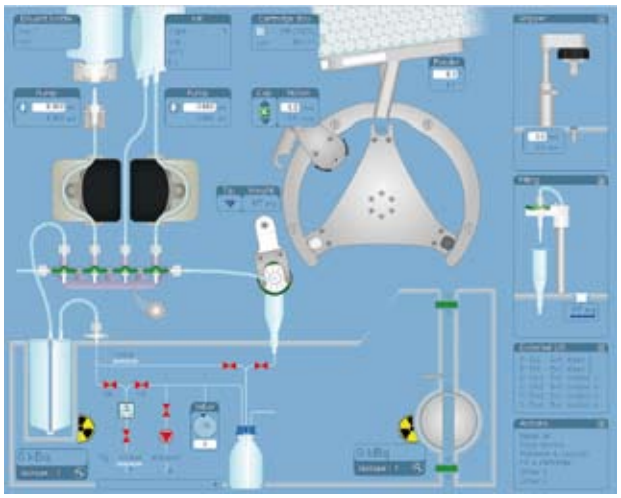
A Shuttle located beneath the hotcell can automatically transfer the shielded cartridges from below the hotcell to the packing room. This option connects to the Ethernet network and is operated by the filling machine.

Control system

The software system allows the importing and creation of orders. It helps the operator to plan optimally the batches, taking into account the amount of activity available, the time of use of each dose, the transportation constrains and whatever new priorities may suddenly occur. It controls the filling machine and allows in-process follow up. It features operator logon, calibration traceability as well as remote control. Production reports are also issued and saved in a data base. The system allows the exchange of data with other applications.

The bulk is prepared on the left side and dispensed to Cartridges on the right side. The dispenser is waterproof and fully sanitizable.

Delivery end of the Shuttle: the shielded Cartridge visible in the black carriage is about to be dropped in a shipping container.



The intuitive and user friendly interface.

Ancillaries

Tubing Set
All fluid handling operations such as diluting, mixing and dispensing are performed in a compact sterilized Tubing Set. It includes a reservoir for the in-coming activity, a stopcock valve manifold, a connection to a pouch of saline, a dilution bag and a dispensing tip with a 0.22 µm hydrophilic filter. It is a matter of a few seconds to install the Tubing Set.

Cartridge Box
Each Cartridge is made of a 3 mL barrel with a plunger less piston at one end and a cap at the other. The piston has a feature to connect to an Injection Tool allowing injection and drawing of the rinsing solution into the Cartridge. The cap adapts aseptically with a "Sample Luer adapter" (SLA), a low cost consumable universally used for collecting blood samples, providing a standard male luer outlet to the Cartridge. Cartridges are packed by 295 in boxes that fit onto the "Cartridge feeder" of the machine. Larger capacity boxes can be provided on request.

The disposables above are assembled in clean rooms, provided in double wrapping and sterilized. The traceability is automatically achieved by the use of RFID tags.

Calibrated Local Shield
Once filled, the Cartridges are inserted into shields that are used both for transportation and as local shielding for injection. Models are available for PET and Tc99 SPECT. All shields of a given model are calibrated to have the same attenuation factor, allowing the direct measurement of the dose through the material. The shields have an individual identifier for inventory purposes and can be supplied engraved with the radiopharmacy's name.

Shipping container
In many cases, existing shipping containers can be easily customized to the calibrated Local Shields.
For PET, Trasis offers a specific container for 2 doses. The compact dimensions of the Cartridges combined to the use of Tungsten for the Local Shields allow a drastic reduction of the amount of lead required for the shipping container. Weight : 13 Kg (29 lbs) for 2 doses instead of 25 Kg (54 lbs) for 2 syringes.

Injection Tool
This accessory acts as a plunger that snaps on the Local Shield. It transforms the shielded Cartridge into a ready for use syringe, allowing injection and drawing of the rinsing solution into the Cartridge.

The Injection Tool never enters in contact with the fluids, and can therefore be used to administer different patients. Made out of tungsten, the Injection Tool also provides some protection to the user. One or two Injection Tools are enough in a nuclear medicine department.

Disposable sterilized Tubing Set for dilution and dispensing.

Box of sterilized cartridges.

The three sterile consumables.

Local Shields for PET and SPECT.

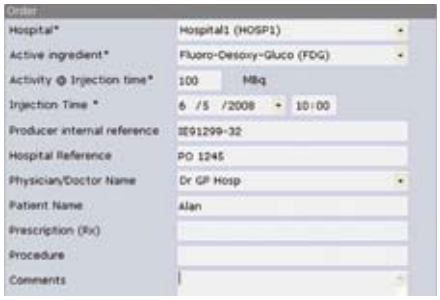
Injection tool.

Shipping container for 2 PET doses.

Operation in the Pharmacy

Collecting the orders from the hospitals

The standing orders waiting to be produced are listed within the Trasis software. They can be imported from an existing ordering system or edited directly into the Trasis database.



Entering orders into the Trasis software.

Allocating the orders to a production

The Trasis software helps the operator to optimally allocate the orders within production runs. The knowledge of the activity required at time of use, the capacity of the cyclotron (or generators), the labeling yield, and the transportation time to the hospitals allows determining whether the orders are feasible in one production run or not. In the later case, the software helps choosing how to split the orders among several runs and at what time each of these runs must start and end. The organization of the delivery routes may also impact the global optimization. Modifications such as editing, adding or removing orders within a production run remain possible until the dilution step begins.

The software then determines the optimal activity concentration for the bulk product, taking into account that the largest doses need to fit into a 3 mL Cartridge and that the smallest volumes dispensed with an accuracy of more than 5% must be larger than 0.3mL. The minimal and maximal limits of activity concentrations of a given lot are defined by the range of activity concentration ensuring product stability.

Setting-up the dispenser

The dispensing process requires a Tubing Set, a box with enough Cartridges and saline to be installed. The software ensures automatically the traceability while minimizing the setup mistakes by the user, thanks to the RF tags on the components. It detects which consumables are in place, how many Cartridges remain in the box and prompts the operator if items for the planned batch are missing or if the expiration date is passed. When all the components are placed, which takes less than one minute, preliminary tests check if the machine is functional. It can detect if a connection of the Tubing Set is loose. Upon successful completion of the tests, the Tubing Set is filled with saline and the peristaltic pumps perform a self-calibration procedure. On request, saline can be transferred to the "inlet reservoir" in order to pre-dilute the activity as soon as it will arrive in the dispenser. The system is now ready to receive activity.

Preparing the bulk solution

The activity is then automatically transferred from a synthesizer or from a vial to the Inlet Reservoir of the Tubing Set, located in the inlet dose calibrator of the dispenser. After measurement of the starting activity, one or more doses can still be edited, added or removed from the production run in order to use all the activity in the most efficient way.

The appropriate fraction of activity is transferred by a peristaltic pump from the Inlet Reservoir to an intermediate bag where it will be diluted with saline transferred by the second peristaltic pump. Homogenization of the bulk solution is achieved by pumping in a closed loop and takes ~2 min. The bulk solution is now ready for dispensing.

Filling, capping and assaying the doses

The Cartridges are filled one by one. A Cartridge is taken from the Cartridge Box and dropped into the carrousel. It is first transferred to a capping position where it is uncapped and then onto the scale where the calculated amount of bulk solution is dispensed, through the 0.22 µm filter. If required, the dose can be completed with saline in order to obtain a more comfortable volume to inject. The Cartridge returns to the capping station where a moving rod adjusts the location of the piston according to the amount dispensed, to minimize the size of the air bubble below 50 µL. The cap is then sealed onto the Cartridge. Finally, the Cartridge is transferred to the air lock. The filling of the next Cartridge starts. In the airlock, the second ionization chamber measures the actual activity of the Cartridge which is then turned upside down and released though the floor of the hot cell to a waiting position.

Automated paper work reduces the workload.

Labeling and packaging of doses

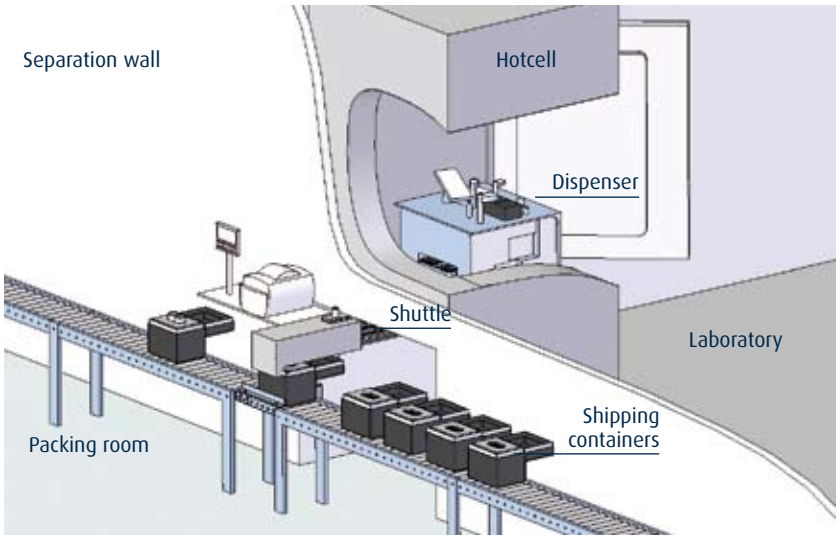
In the room where the shipping containers are handled, a label with all the information relevant to the Cartridge is printed. The operator sticks the label on an empty shield and loads it in a Shuttle. The labeled shield is then automatically moved beneath the hot cell and loaded with the waiting Cartridge. During this time, the complementary documents are placed in a shipping container that is pushed beneath the outlet of the Shuttle. Finally, the Shuttle drops the loaded shield into the shipping container. The operator only needs to close the container. The doses are now ready for shipment to the hospital.

Site layout

The compact system of Trasis fits in a small class 100 (ISO 5) hotcell. All the pass-throughs are leak tight. The working area is waterproof and fully sanitizable. The system will allow a smooth transition from the pharmacy practice to drug manufacturing.

The system can easily adapt to nearly any laboratory configuration. The Shuttle that ensures the transit of the shields between the final packing location and the hotcell can be tailored in length and orientation. A dedicated hotcell is also available on request.

Engineers, software and automation professionals working at Trasis will be at your side for any related custom engineering, technical advice and services.



An example of laboratory layout that will allow transitioning smoothly from the pharmacy practice to drug manufacturing.

Specifications and Performances

Size (w × d × h)	566 × 516 × 630 mm (22.3”×20.3”×24.8”)
Recommended enclosure (w × d × h)	600 × 575 × 670 mm (23,6’’ x 22,7’’ x 26,4’’)
Weight	~60 kg
Production rate	a dose every 15 sec
Standard box content	295 Cartridges
Cartridge filling range	0,5 to 3 mL
Filling accuracy	±20 µL
Set-up time	< 1 minute
Labels & documents	printed online
Activity measuring device	2 ionization chambers
Environmental specification	Designed for class 100 (ISO-5) operation for aseptic dispensing
Software	Windows based control software including SQL Database.

By courtesy, Biodesx Inc.

Simplify the administration of SPECT and PET radiopharmaceuticals

In the new packaging solution from Trasis, the doses are delivered in sealed Cartridges, themselves being packed in Local Shields for injection.

Operation at the hospital: at time of injection, the technician opens the light-weight shipping container and snaps the Injection Tool on the Local Shield. He assays the dose through the shield and then screws a Luer Adpater on the sterile tip of the Cartridge.

The shielded dose can be connected to the injection set, as usual !

- ✔ Reduce the Staff 's exposure
- ✔ Don't handle too heavy containers
- ✔ Avoid investment costs...
- ... While keeping your usual practice!

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Company profile

Trasis S.A., created in 2004 by professionals experienced in the development of innovative solutions for the radiopharmaceutical industry, gathers scientists and engineers that developed isotope production and handling systems for nuclear medicine in previous positions since 20 years. Among these systems, the "TracerLab Mx", the most widely used FDG synthesizer in the world (~500 units in operation in the end of 2007), now commercialized by General Electric.

Trasis aims at becoming a reference supplier in its field by addressing the key issues of the radiopharmaceutical industry and anticipating the future needs in the area of diagnostic imaging with:
- Products that help radiopharmacies reducing their costs and improving quality and safety,
- Products that will allow the production of tomorrow's molecular imaging probes.

Product strategy
The products of Trasis are all the instruments and consumables that are in direct contact with the radioactive materials from the output of the accelerator down to the patient. On the short term, Trasis envisions to answer the urgent need for cost effective solutions for dose dispensing and packaging. On the long term, Trasis develops the technology that will be required for the production of tomorrow's molecular imaging agents.

To implement this strategy, Trasis focuses on 2 main developments:
• a Cartridge-based patient dose packaging, with the associated patient administration set and the automated dispenser for the dose preparation.
• a miniaturized chemistry platform relying on a set of micro fluidic functionalities. This technology is expected to strongly impact the way specific radiopharmaceuticals will be produced in the future. Trasis partners with several research centers and companies in this project.

The Team
Jean-Luc Morelle, co-founder, 49y., physicist. Founder of Coincidence Technologies SA in 1996 that was acquired by GE Medical Systems in 2001. He has an earlier experience in accelerator based isotope production and is a member of the advisory committee of the WTTC Targetry group. 7 patents.

Gauthier Philippart, co-founder, 30y., Automation engineer with an extensive experience in radio-pharmaceutical laboratory system design and in industrial automation. He has been responsible of an R&D dept. of GE. 5 patents.

The core of the dynamic and skillful team also includes three design engineers, two software engineers and one PhD Chemist

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