

PET & MRI Compatible Syriporter



The unique design of the Syriporter helps to minimise radiation exposure to Nuclear Medicine Technologist and Radio-Pharmacist in PET more than 90%

The only portable radiation shield that is PET/MRI compatible

Recommended isotopes F-18 Tc-99m Ga-68
Lu-177 I-131 plus more 5, 10, 20, 30 cc





GLOBALSONICS

Research Pty Ltd

Globalsonics Research Pty Ltd recognized across the world for innovative research and design of radiation measurement and detection technology.

For over 40 years, Globalsonics has been specialised in finding solutions to protect personnel and patients from over exposure and contamination of radioactivity.

As a leader in the field, we constantly strive to provide competitive and reliable technology to fulfil the needs of our clients worldwide.

Our Research and Development in delicate areas of interest, ranging from Science, Industry, Defense, and Medicine and last, but not least Vets, without allowing any room for mistakes.

Inclusive some of our technology and solutions are qualified to the highest level of certification such as: MIL - spec with NATO (North Atlantic Treaty Organisation/UN) accreditation.

Globalsonics is also committed to provide a continuing technical support. This includes regular, preventative service at our Radiological Calibration Laboratory.

All equipment and solutions are designed and manufactured in Australia as per:

ISO 9001-2015

ISO 13485-2016

NATO Mil-Spec Certification

ISO ASTM 51939



Automated Infusion Systems in Nuclear Medicine PET/CT & PET/MRI

Improvements in nuclear medicine in the last 15 years have seen the widespread introduction of new techniques and imaging capabilities, and consequently manufacturers from the USA, Europe, Japan and Korea are developing and delivering more sophisticated equipment which further demands new techniques in radiation protection.

Radiation protection is driven by the ALARA principle ("As Low As Reasonably Achievable"). To satisfy the rules and regulations imposed by legislators, hospital radiation personnel have to be monitored continuously to adhere to these standards.

Automated infusion systems for PET were introduced as an attempt to minimise radiation exposure to personnel operating in PET facilities and nuclear medicine departments. We refer to these devices as a "mini hot lab on wheels" including a basic isotope dose calibrator, infusion pump, syringe pump, PC & micro processing power with a multi-dispensing capability being the basic description of an automatic system (but with some limitations).

Automatic infusion systems are normally loaded in the nuclear medicine department with a multi-dose vial of [^{18}F] FDG containing the radioisotope produced at the cyclotron facility. These systems have been designed to deliver only ^{18}F ($E_{\gamma} = 511 \text{ keV}$), introducing a limitation and inconvenience to the nuclear medicine department in regards to dispensing and administering other isotopes.

Other radioisotopes such as $^{99\text{m}}\text{Tc}$, ^{67}Ga , ^{68}Ga and ^{177}Lu still need to be injected manually by the technologist, in a way deviating from the purpose of minimising the radiation dose to the operator and totally disregarding the ALARA principle.

What is permitted today in terms of allowed radiation doses to personnel was totally overlooked 40 years ago and may well be totally different again in another 40 years from today. Therefore, we should strive to take all efforts possible to minimize the radiation exposure to the operators, and not just adhere to the contemporary guidelines.

In conclusion, an automatic injection infusion system only partially addresses the radiation exposure to personnel. It also totally fails to protect the operator after the radiopharmaceutical has been administered to the patient as it has no shielding for the operator included in the design.

- Proceeding to deliver the isotope to the patient- the technologist delivers the radioactive dose according to the program of the automated infusion system;
- They leave the room to allow this to be conducted automatically (approx. 1 min);

- They then return to the room to disconnect the infusion system from the patient. In doing so, the technologist will be exposed to the highest levels of radiation in diagnostic nuclear medicine practice (immediately after injection of a PET radiopharmaceutical) multiple times every day.
- As radiation protection is not included or provided for with the infusion system, the technologist receives a radiation dose for any procedure such as removing the cannula from the patient, check the patient's wellbeing, or responding to their call for attention;
- As the patient has typically been injected with the radioisotope [^{18}F]-FDG with an energy level of 511 keV which has a half-life of 110 mins;
- The automatic system does not offer any protection to the operator. After the injection we must consider that the patient is now a very highly radioactive and mobile source emanating radiation!

Automatic infusion systems are expensive to acquire and maintain. When they breakdown or malfunction, the medical facility is dependent on the manufacturer for service. They are also not cost-effective for smaller PET practices. However, the staff in these practices still need to be afforded the optimal solution for minimising radiation exposure. The world market for automated systems is estimated to be approx. 300 units per year, with an increase of 15-20% increase p.a.

As the systems are capable of only being loaded with a single multi-dose vial, they are limited to only one radiopharmaceutical. For some PET facilities that only use FDG this may not be a problem, but the current trend is towards offering a wider array of PET radiopharmaceuticals to answer a greater range of clinical questions. In this scenario the automated system is a "one trick pony".

Syriporter: PET/CT & PET/MRI

The Syriporter multi isotope Plus:

The original Syriporter was developed nearly 30 years ago using real-life radiation exposure data received by technologists in a routine day's work. It has evolved in response to user feedback and by understanding the changing requirements of the local EPAs, Radiation Protection authorities and the requirements in nuclear medicine departments. The first hospital groups participating in this clinical trial at the time were: The Austin Hospital in Melbourne, the Royal Adelaide Hospital in South Australia and Liverpool Hospital in Sydney.

The units were provided with a lead shielding pot to minimize the dose to personnel in transport in NM facilities across Australia. Soon the device proved to be reliable and helped facilities maintain compliance with the appropriate legislative requirements at the time. As the first Syriporter was seen to be an economical and simple solution to satisfying the ALARA principle it didn't take long for other facilities and hospitals to take advantage of the "Syriporter Lite".

Some of these devices were supplied not only for general nuclear medicine environments but also for PET facilities. During the 30 years of use of the Syriporter Lite in nuclear medicine the units have evolved to incorporate a lead shield "whole body barrier" with lead glass viewing window, sufficient to protect and reduce the total exposure of staff by up to 80%.

The Syriporter is the ideal, cost effective "work horse" for the nuclear medicine departments. The latest developments help to address some of the problems left unsolved by automatic infusion systems.

The Syriporter can be a back-up system when the automatic system fails or simply to take over the role of the automatic system by offering capabilities that are not offered by automatic infusion systems.

Uniquely, the new Syriporter multi isotope plus has been made MRI-compatible in response to requests from high-end PET/MRI users. Complemented with whole body barrier shielding which protects the technologist at all times during injection and during visit to the patient, it is truly unique and the "best friend" of a busy technologist.

The Syriporter is light and moves effortlessly across corridors and hospital surfaces. It has a minimum number of moving components giving less possibility of a break down. The unit can be fitted with a lead single shielded pot when it is to be utilised with PET/MRI but the unit can normally operate with a syringe pump that can be programmed behind the specially designed lead barrier.

The design and cost are minimised by not incorporating a dose calibrator in the system as, in reality, every nuclear medicine department would already have a dose calibrator, plus the syringe shields and lead carrier vial to protect

personnel from exposure. As the Syriporter has the ability to incorporate an infusion pump surrounded with shielding in a user-friendly design, a single dose can be loaded within the pump with minimum effort at the hot lab and even delivered safely to the ward for administration if required (e.g., bone scan with imaging 2-4 hours after injection).

- The Syriporter multi isotope plus permits the delivery of other isotopes without limitations unlike the automatic system.
- The Syriporter multi isotope plus is also delivered with a radiation detector to be programmed to minimise dose to the operator covering the time of the complete procedure.
- The Syriporter multi isotope plus also offers the ability to have a saline solution "flush" after dispensing the radiopharmaceutical to minimise any residue left in the unit, similar to an automated infusion system.
- The Syriporter multi isotope plus includes a motorised whole-body barrier shield adjustable to individual operator's height.
- The Syriporter multi isotope plus includes a 15mm lead equivalent radiation barrier to protect operators from exposure.
- The Syriporter multi isotope plus is compatible with MRI as it is manufactured from completely non-magnetic material.
- The Syriporter multi isotope plus is a fraction of the cost of an automated system but is more flexible and provides better radiation protection for staff.
- The Syriporter multi isotope plus includes bar coding to enter a library of isotopes that can be attached to the syringe and confirmed before introducing it into the pump to ensure that the correct isotope has been loaded for the right patient.
- The Syriporter multi isotope plus includes a video camera to view the unit during operation by the technologist.
- The Syriporter multi isotope plus is fitted with a tablet PC to enter patient's data and isotope configuration.
- The Syriporter multi isotope plus is supplied with a program or tablet PC replacing the viewing window. Guided by a video camera fitted with in the unit. Permitting to enter all radioactive doses and records of the patient in the tablet PC which will, in future, be able to be linked to the hospital information system (HIS) and gamma camera or PET camera.

Clinical trials of the Syriporter are being conducted at Monash University Hospital in Melbourne, the new Royal Adelaide Hospital in South Australia & Royal North Shore Hospital in Sydney.

Syriporter PET & MRI compatible



Infusion Pump



FDG transport box



Dispensing pot

The First Portable Injection System suitable for PET/CT • PET/MRI • 18F • 99mTc • 68Ga • 177Lu • 131I & more

The measurement of radiation indicated that can minimise exposure by approximately 50-80% to PET, Nuclear Medicine technologist and Radio Pharmacist. It does so, by allowing for a fast transfer of the syringe shield into the syringe holder. It is then easily moved from the dose preparation area to the delivery suite due to its superiorly good weight distribution and center of gravity. The two previous designs of Syriporter have been successfully utilized in numerous centres in Australia and overseas.

Technical Specifications

- MRI-Compatible
- 100 % Non-Magnetic Material (Aluminium/ SS)
- Electrical adjustable Height (max 1500 mm/min 1350mm)
- Low level gravity center
- Rechargeable 12V DC battery operated
- Complying with International Protocol
- Weight: 120kg
- Height: 1500mm (maximum) & 1350mm (minimum)
- Dispensing Pot made of Stainless Steel 316
- Syringe Shield made of Tungsten material
- Shielding around Infusion Pump

Barrier

- Lead Barrier 550mm (H) x 300mm (W)
- Lead Shielding Barrier: 15mm Pb
- Viewing Window: 280mm x 280mm x 35mm
Lead Equivalence: 15mm Pb
- Shielding built around infusion pump

Syriporter + Dose

Patient Delivery System for PET/MRI+I-131

The Syriporter has been designed for specific application where radiation protection needs to be followed correctly in areas of high energy and activity. However, the Syriporter can be easily used to minimize exposure dose to those operating in Nuclear Medicine and I-131 therapy facilities by adding optional modifications.

The new PET/MRI Syriporter has emerged as a result of studies on personnel operating in PET departments, who receive a higher radiation dose than those in nuclear medicine. Understanding the staff at PET facilities and how they accumulate their doses throughout the day during routine procedures is important.

The Syriporter + Dose shielding design is based on time versus activities, which bring us again to the ALARA concept. Achieving reduction of dose to operators and supporting personnel within the facility.



Infusion Pump



Syringe Shield

The New PET/MRI+I-131 Syriporter Features and Functions

- The Syriporter has been designed with a 35mm thick glass which is 15mm lead equivalent glass window and with a barrier of 15 mm lead shielding material for better protection. The lead glass can also be replaced by tablet PC and video camera.
- An optional unique feature of the Syriporter + Dose is inclusion of a dose product meter that can be programmed to calculate the required time and dose being received by the operator during the procedure. The alarm will warn the operator of the time left before the ALARA principal has been followed.
- An important feature is the inclusion of the saline bag stick connected to a 3 way valve (permitting the operator removing any residuals of radio-isotopes left between the patient tubing and the syringe shield helping reduce the dose even further)
- The Syriporter can be acquired as a stand alone device, but belongs to The Concept System.

Syriporter Radiation Test

Syriporter Lead Glass Viewing Window Attenuation

Test Performed: 26.05.2017
Reference Unit Used: AustralRad Mini Fukushima 3 S/N: 2358

Isotope: Cs-137 Activity: 940 kBq {253.7μCi} S/N: 1461-29-12
Date: 1 Mar 2011 Source 10 cm from detector in front of barrier: 200.0μSv Source 10 cm from detector behind barrier: 11.0μSv

Isotope: Co-57 Activity: 410 MBq {11.0mCi} S/N: 1946-28-7
Date: 1 Jun 2017 Source 10 cm from detector in front of barrier: 600.0 μSv Source 10 cm from detector behind barrier: 6.0μSv

Syriporter Lead Shield Barrier Attenuation

Test Performed: 15.06.2017
Reference Unit Used: AustralRad Mini Fukushima 3 S/N: 2358

Isotope: Cs-137 Activity: 940 kBq (253.7μCi) S/N: 1461-29-12
Date: 1 Mar 2011 Source 10 cm from detector in front of barrier: 200.0μSv Source 10 cm from detector behind barrier: 17.9μSv

Isotope: Co-57 Activity: 410 MBq (11.0mCi) S/N: 1946-28-7
Date: Jun 2017 Source 10 cm from detector in front of barrier: 537.5μSv Source 10 cm from detector behind barrier: 5.4μSv

THE CONCEPT Complete Patient Delivery System

The Concept delivers the isotope to the patients with maximum safety. It begins with the transportation of the FDG from a central facility or remote area.

The Concept Procedure Overview

Transport, dispensing, preparation and delivery of the isotope to the patient's bed is as simple as 1, 2, 3... 4. All steps condensed into one, the concept system makes your PET Nuclear Medicine Department an efficient and safe work environment for all personnel.

Optional features:

- DOSE meter programmable to time or DOSE (optional)

The Steps: The system consists of the below devices



1 Transport Case. For Safe transportation of Transport/Dispensing Lead Pot

2 Transport dispensing LEAD pot. (Part No. G-431)

3 Pot Handle (Part. G-431). For quick and easy movement of Dispensing Lead Pot.

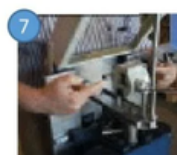
4 Base (Part No. G-431)

5 Syringe Shield

6 PET Preparation Workstation (Part No. G-430). Mobile / Rigid dose preparation and dispensing area used 'Vial Base'. Comes with provision for under bench dose calibrator and safety housing waste storages lead safe.

7 New Syriporter Delivery System. Patient delivery System designed for fast, accurate injections while adhering to the ALARA principle

8 Lead Safe. Built in shielded lead safe for waste decay process.





Other Services

- Service, repair and calibration facility for radiation equipment with source traceable to the Australian National Standard.
- Compliance testing with traceability.

Request your proposal

Our specialised team can help you.

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