

S. JOURNO¹, M. SACREZ¹, A. LOMBARD¹, M. DEBARGE¹, Q. CITERNE¹, N. VERAN¹, B. DEMORE²
¹CHRU OF NANCY, RADIOPHARMACY, VANDOEUVRE-LÈS-NANCY, FRANCE. ²UNIVERSITY OF LORRAINE / CHRU OF NANCY, APEMAC / HOSPITAL PHARMACY, VANDOEUVRE-LÈS-NANCY, FRANCE.

Background and Importance

Radiopharmaceuticals (RPs) prepared in plastic syringes
 → adsorption may compromise dose accuracy

Homemade RPs sterilised with 0,22µm filter
 → activity may be retained, affecting yield synthesis

Aim and objectives

Screening of RPs for adsorption on plastic syringes (scintigraphy and PET)

Evaluating the **activity retention** of two experimental RPs on sterilization filters

Objective: Minimize loss of activity due to adsorption

Tested RPs and medical devices for adsorption

Material and methods

Retention tests on 0.22 µm sterilization filters

Scintigraphy		PET	
^{99m} Tc	Sestamibi	¹⁸ F	FluoroEthylTyrosine
	Mertiatide		FluoroDopa
	MAA		FluoroEstradiol
	DMSA		FluoroCholine
	Nanocolloidal albumin		Flutemetamol
	Oxidronate		PSMA-1007
	Human serum albumin		FluoroDeoxyGlucose
¹²³ I	Ioflupane	⁶⁸ Ga	Dotatoc
			PSMA-11

Tested medical devices

Type	Lubricated 3-part syringes				2-part syringes	Cartridges	Catheters	Tubing
Model	BD	Bbraun	Terumo	Medicina	Bbraun Injekt	Trasis	BD Saf-T-Intima	CareFusion
	plastipak	Omnifix						

Residual activity (in vitro and in vivo) : Measured after filling, emptying, rinsing (n≥3)

2 experimental RPs tested :

- ⁶⁸Ga-NODAGA-Exendin-4 (Exendin)
- ⁶⁸Ga-EMP100 (EMP100)

Six filters with four different membranes tested

- PolyVinylidene Fluoride (PVDF)
- PolyTetraFluoroEthylene (PTFE)
- PolyEther Sulfone (PES)
- Cellulose Esters (CE)

• Injection into the filter

• Collection in a vial

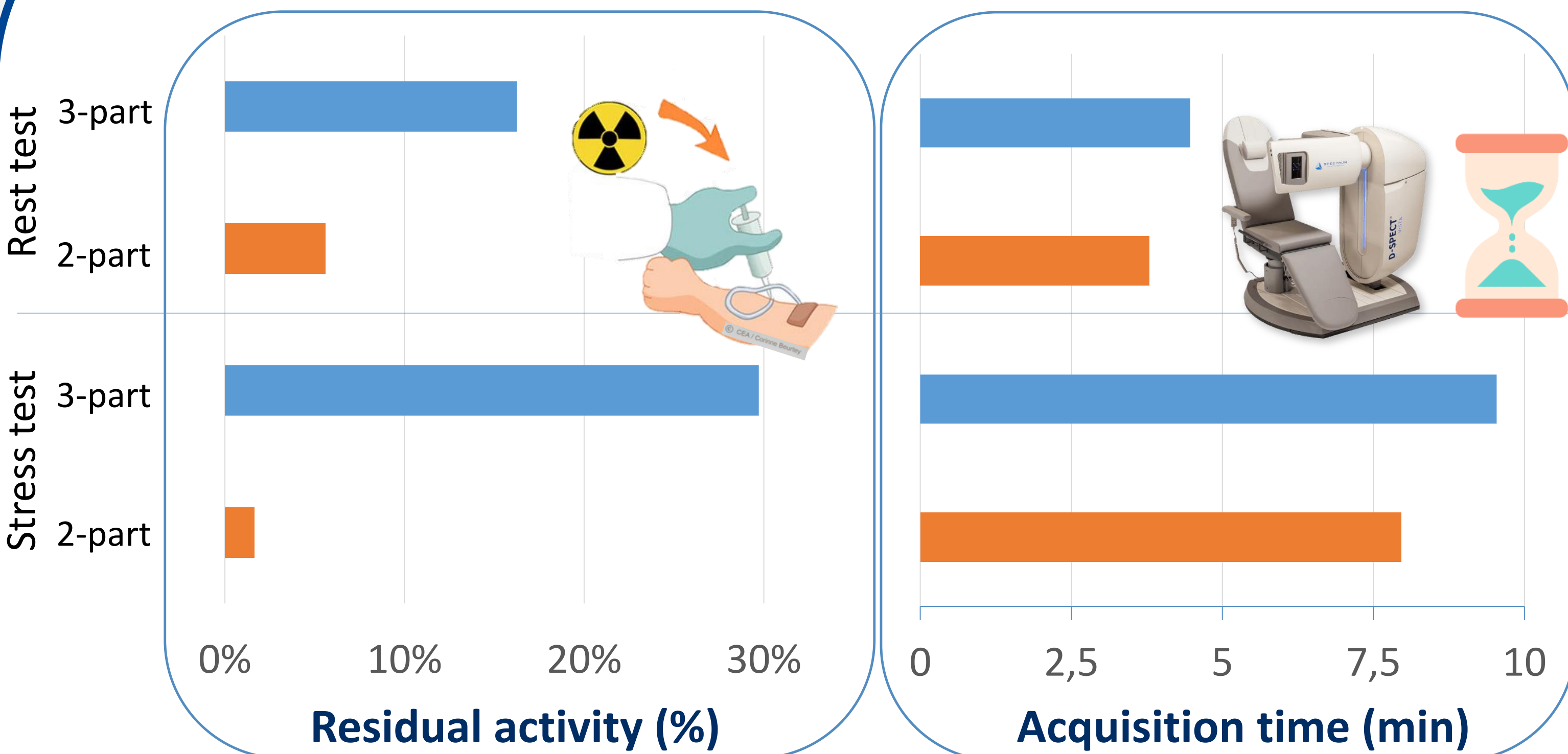
• Rinsing filter and syringe with 5 mL of saline

• Measurement of activities using a dose calibrator :
 Syringe (before/after injection), vial, filter.

Tests were performed 3 times for each filter

Syringe Impact on Adsorption and Examination Time

No significant adsorption (<5%) is observed for most RPs. Except for ^{99m}Tc-Sestamibi (n>30) for cardiac scintigraphy :



Injected activity at rest is 3 times higher than stress test.

Stress test :

3-part syringes retained **29.7%**,
 2-part syringes retained **2.7%**

Rest test :

3-part syringes retained **16.3%**
 2-part syringes retained **5.6%**



Switching from 3-part to 2-part syringes :
 Acquisition time **reduced by 17% at stress and 15% at rest.**

Results

Retention Comparison of Filters

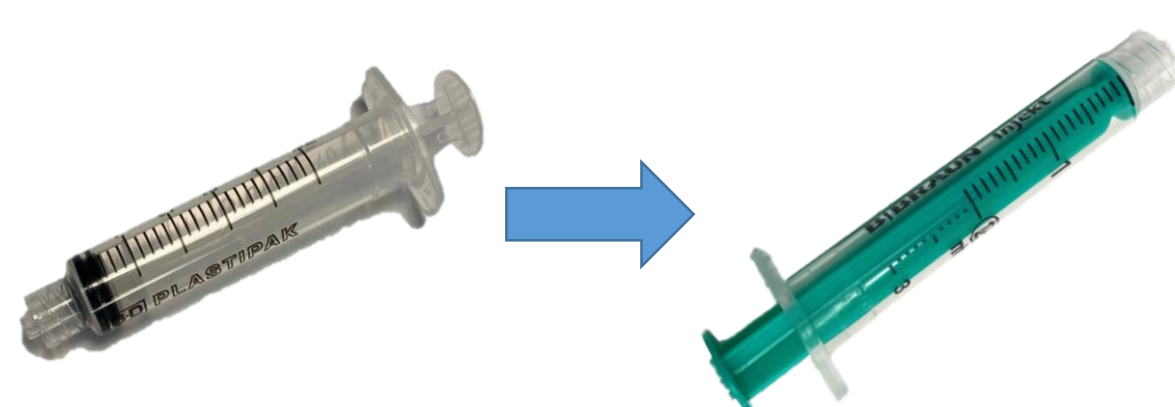
Filters	Membrane Composition	% Retention (Exendin)	% Retention (EMP100)
1 MILLEX-GV SLGV013SL	PVDF	10.4	7.5
2 MILLEX-LG SLLG013SL	PTFE	20.4	9.2
3 MILLEX-GV SLGV033RB	PVDF	43.5	N/A
4 PALL HP1002	PES	82.8	46.6
5 PALL 6764192	PES	84.0	N/A
6 MILLEX-GS SLGSV255F	CE	97.7	93.1

PVDF filter (1) : Lowest retention (Exendin: 10.4%, EMP100: 7.5%).
 CE filter (6) : Highest retention (Exendin: 97.7%, EMP100: 93.1%).

Conclusion and relevance

➤ **Drug adsorption** on syringes is negligible, except for ^{99m}Tc-Sestamibi, with up to 30% on 3-part syringes.

In practice : **switching to 2-part syringes** for cardiac scintigraphy



↑ - **Increased** administered activities



↓ - **Reduced** acquisition times

This allows for a **reduction in dosage** according to the optimization principle **ALARA** ("As Low As Reasonably Achievable").

➤ **PVDF filters** showed the **lowest activity retention** for both experimental RPs, guiding their selection for their synthesis.

These results highlight the importance of material selection in the use of medical devices for radiopharmaceuticals.

