CONTAINER-CONTENT INTERACTIONS TESTS FOR AUTOMATED DISPENSING OF RADIOPHARMACEUTICALS : Who's gonna stick to it?

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INTRODUCTION

In nuclear medicine, when **dispensing ready-to-use radiopharmaceuticals** (RPs), **automatic dispensing systems offer technical and radiation protection advantages**. These systems operate with captive consumables and are mainly used for [^{18}F]FDG, [^{18}F]Fcholine, and [^{18}F]Fdopa dispensing. However, their use for less common RPs is still poorly documented.

Aim : Evaluate the **container-content interactions** between the **Karl100** dispensing system (Tema Sinergie) and **3 fluorinated RPs**

- [^{18}F]piflufolastat (Pylclari®) **PFF**
- [^{18}F]florbétabène (Neuraceq®) **FBB**
- [^{18}F]Fluoroestradiol (Estrotep®) **FES**

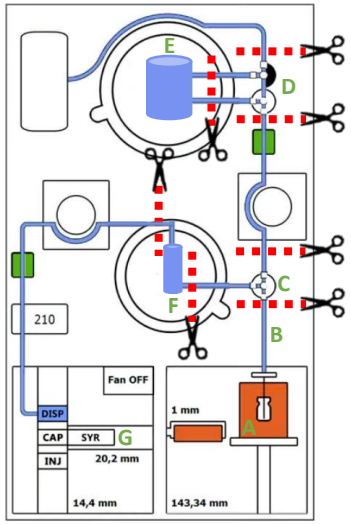
MATERIAL & METHOD

Material :

- Daily kit Karl100 Tema Sinergie
- Perfuser with 0,22 µm PES filter *(PolyEtherSuflone)*

Composition du kit :

A : RP vial
B : Needle + 0,22µm PES filter
C : Simple 3-way valves
D : Double 3-way valves
E : Collecting vial
F : Activimeter vial
G : Syringe



Daily kit layout view

Method :

- Loading of RPs in Karl100 dispenser
- Automatic dispensing in syringes
- Administation to patients simulated in a vial through a 0.22 µm filter perfuser
- Daily kit and infusion line were cut into several parts (cutting plan opposite)
- Measurement of residual activity in segments and the 'patient' vial using a calibrated activimeter

RESULTS - DISCUSSION

MRP	PFF	FBB*					FES
		1st test	*2nd test*	*3rd test*	*4th test*		
Karl100 filter	0,2%	100%	21,5%	-	-	-	40,5%
Kit	0,5%	-	41,5%	-	38,5%		23,4%
Perfuser filter	0,1%	-	-	63,7%	-	67,4%	-
Dose accuracy	4,8%	-	-87,3%	-	-27,3%		-71,4%
Administrated activity	96,7%	-	-	2,1%	82,0%	5,5%	-

FBB : 1st test : loading RP through filter kit
2nd test : loading through filter kit then rinsing filter + RP vial with ethanol
3rd test : manual dispensing + administration through 0.22µm filter perfuser
4th test : loading without filter kit then administration without and with perfuser filter

- **PFF** : **No container - content interaction** during loading into the automated system, syringe dispensing and administration with a filter perfuser. **Automatic dispensing possible** on Karl100.
- **FBB** : **Total adsorption on the Karl100 PES filter**. **Automatic dispensing not possible** on Karl100.
  - **Better if the filter and vial are rinsed with ethanol**, but adsorption on the kit is too high to allow syringe dispensing.
  - If loading without a filter, dispensing is possible but **poor dose accuracy**.
  - **Administration incompatible with perfuser with filter.**
- **FES** : **High adsorption** on the Karl100 PES filter and on the kit. **Automatic dispensing not possible** on Karl100.

CONCLUSION

Material adsorption, whether it comes from filters, kits tubing or perfusion line, greatly depend on RPs physical and chemical properties. **Preliminary tests are therefore essential before any clinical use**, as some RPs are not currently compatible with automatic dispensing on Karl100, particulary lipophilic ones.