

Method for Concentration and Formulation of Radiopharmaceuticals

Tech ID: 30269 / UC Case 2017-185-0

SUMMARY

Researchers at the UCLA Department of Medical and Molecular Pharmacology have developed a compact microfluidic device that is able to achieve rapid concentration and/or reformulation of PET tracers after HPLC purification.

BACKGROUND

Positron emission tomography (PET) uses small amounts of short-lived radiolabeled tracers to image specific molecular processes in living subjects for clinical applications including disease diagnosis and disease progression monitoring. Synthesis of most PET tracers requires purification via semi-preparative high performance liquid chromatography (HPLC), and downstream solid-phase extraction (SPE) and/or evaporation to remove solvents while concentrating PET tracers for final formulation. Commercially available evaporation systems (i.e. rotary evaporators) used for solvent evaporation are extremely bulky and require manual intervention to assess the vacuum level, introduce saline, monitor the evaporation process, and collect the formulated final product. Compact vortex evaporator systems and microfluidic chip architectures have been reported for solvent evaporation but are not suitable for PET tracer formulation since their evaporation rates are too low for time-sensitive concentration of short-lived radioactive tracers.

INNOVATION

Researchers at UCLA have developed a compact microfluidic device architecture that is able to achieve complete evaporation of solvent during the PET tracer concentration process at a fast speed to minimize radioactive decay of the PET tracer. This microfluidic system has been designed to minimize dead volume, facilitate heat flow throughout the system to improve evaporation rate, and completely automate the evaporation process. An additional solvent exchange step is also enabled in this system to thoroughly remove organic solvents and ensure that the final concentrated formulation is safe for injection.

APPLICATIONS

- ▶ Solvent evaporation
- ▶ Radiopharmaceutical formulation
- ▶ PET tracer formulation

ADVANTAGES

- ▶ Compact microfluidic design
- ▶ Rapid solvent evaporation
- ▶ Complete solvent removal
- ▶ Maximum tracer recovery and minimum radioactive decay
- ▶ Buffer exchange to injection safe saline solution
- ▶ Easily integrated to upstream and downstream processes
- ▶ Completely automated to minimize unnecessary radiation exposure

STATE OF DEVELOPMENT

Prototype has been developed.

RELATED MATERIALS

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INVENTORS

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OTHER INFORMATION

KEYWORDS

Positron emission tomography, PET,
PET tracer, microfluidic, solvent
removal, evaporation, formulation,
reformulation

CATEGORIZED AS

- ▶ **Imaging**
 - ▶ Other
- ▶ **Medical**
 - ▶ Devices
 - ▶ Imaging
 - ▶ Research Tools
- ▶ **Sensors & Instrumentation**
 - ▶ Medical

RELATED CASES

2017-185-0

► Chao, P.H., Collins, J., Argus, J.P., Tseng, W.Y., Lee, J.T. and van Dam, R.M., 2017. Automatic concentration and reformulation of PET tracers via microfluidic membrane distillation. Lab on a Chip, 17(10), pp.1802-1816

PATENT STATUS

Country	Type	Number	Dated	Case
Germany	Issued Patent	3510393	11/04/2020	2017-185
France	Issued Patent	3510393	11/04/2020	2017-185
United Kingdom	Issued Patent	3510393	11/04/2020	2017-185
United States Of America	Published Application	20190201560	07/04/2019	2017-185

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- [Device and Method for Microscale Chemical Reactions](#)
- [Microscale Device and Method for Purification of Radiopharmaceuticals](#)
- [Novel Method of Radiofluorination](#)
- [Digital Microfluidic Platform for Radiochemistry](#)
- [Disposable World-to-Chip Interface for Digital Microfluidics](#)

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