

A System For Vascular Access In Preclinical Models

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SUMMARY

Researchers at UCLA have developed an automated method to access the vasculature of murine models for intravenous injections and blood sampling. The invention provides a standardized and reliable solution to the error prone injections and blood sampling procedures during preclinical studies.

BACKGROUND

Positron Emission Tomography (PET) imaging devices for preclinical models are becoming more user friendly, but to date no technology addresses the challenging tasks of manual intravenous probe injection and blood sampling from rodent tails. Any scientist not exclusively dedicated to animal handling can leave from 10% to 80% of the injectable PET probe in the soft tissue of the animal tail. Such inconsistency has deleterious consequences on the outcome and cost of preclinical studies. Therefore, there is a demand for an accurate and automated tail vein or artery sampling device. Technology that facilitates vascular access to rodent models will reduce user-based experimental error, save time and resources spent on training, and improve overall cost efficiency of experiments. In addition, automation of PET imaging protocols will promote the widespread use of preclinical studies and accelerate the rate of therapeutic research.

INNOVATION

UCLA researchers have designed and tested a novel automated system that 1) locates the position of the rodent tail vasculature, 2) inserts a needle into the tail vein or tail artery, and 3) injects into or withdraws a specified volume from blood circulation. The system requires no manual assistance from the human operator and can be controlled from a standard PC interface. Needle insertion is programmable in two spatial dimensions, which allows the user to reliably take numerous blood samples without occlusion or damaging the tail tissue. In addition, automated blood sampling can be integrated to microfluidic chips for analysis and processing. The current platform conveniently fits on a standard laboratory bench top.

APPLICATIONS

- ▶ Radio-labeled or optical probe injection for PET, SPECT, or MRI preclinical studies.
- ▶ Drug delivery and cell transfers in preclinical studies.
- ▶ Blood sampling for pharmacology and toxicology studies.

ADVANTAGES

- ▶ Eliminates the need for manual tail vein injection
 - ▶ Reduces variability in PET studies
 - ▶ Reduces probe, animal and overall experimental costs
 - ▶ Allows untrained users access to preclinical studies
- ▶ Allows automated blood sampling for pharmacology and toxicology studies
 - ▶ Improves automation and reduces user-based experimental error
 - ▶ Can be integrated with microfluidic chips for small-volume blood analysis assays
 - ▶ Reduces specialized staff requirements
 - ▶ Permits animal survival due to minimally invasive needle insertion for blood extraction

STATE OF DEVELOPMENT

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OTHER INFORMATION

KEYWORDS

Drug delivery, Preclinical Imaging,
Microfluidic Tools, Research Tools

CATEGORIZED AS

- ▶ **Medical**
 - ▶ Imaging
 - ▶ Research Tools
- ▶ **Sensors & Instrumentation**
 - ▶ Medical
 - ▶ Scientific/Research

RELATED CASES

2011-398-0

A working prototype for the automated vascular access system has reached feasibility milestones and design and process optimization is underway. Blood sampling protocols have demonstrated no negative effects on cell viability, while integration with a microfluidic platform is under development.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	9,510,783	12/06/2016	2011-398

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- ▶ [High Resolution Depth of Interaction Gamma Radiation Detector](#)
- ▶ [Copyright: A Statistical Atlas of the Mouse Trunk Region](#)
- ▶ [New Low-Cost Method for Pre-clinical Animal Imaging](#)

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