Bioorthogonally-Engineered Extracellular Vesicles for Applications in Detection and Therapeutic Delivery

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OTHER INFORMATION

CATEGORIZED AS

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BRIEF DESCRIPTION

Extracellular vesicles (EVs) are promising as drug delivery carriers because they are inherently biocompatible, It would be desirable to efficiently, specifically, and rapidly change the EVs surface presentation to program the interactions with its target cells. Inventors at UC Irvine have developed a strategy for functionalizing the cellular membranes of EVs with precision and ease.

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FULL DESCRIPTION

In the body, extracellular vesicles (EVs) are derived from the cellular membrane during the budding process and are vehicles used for the transport of mRNA and microRNA. Intrinsically biocompatible, EVs are promising as delivery carriers for drugs, therapeutics, or genes. However, there lacks a fast, convenient, and efficient way to synthetically functionalize EVs. Synthetic functionalization is highly desirable as a way to facilitate EVs to be purified, concentrated, and delivered properly post loading with desired cargo.

UCI researchers have developed a facile method for introducing binding sites on the surface of EVs. These binding sites serve as a platform to conjugate various molecules such as fluorescent groups or magnetic particles. The different types of molecules that can be conjugated enable the user to utilize the EVs for a variety of applications, ranging for molecular imaging to delivery of desired cargo to targeted tissues.

SUGGESTED USES

· Enable purification and/or concentration of desired EVs based on functionalized molecules

· Facilitate delivery of drugs, therapeutics, or genes for therapy

· Improve detection of EVs in combination with fluorescent molecules

· Allow for molecular imaging based on functionalized molecules (such as in conjunction with magnetic particles)

· Use magnetic particles to permit localization of EVs via magnetic forces

ADVANTAGES

· Low cost: Functionalizing technique involves inexpensive reagents

· Specific: Technology utilizes particular chemistry to generate bonding sites at specific locations

· Versatile: Approach utilizes a particular ligation technique that enables a wide variety of downstream conjugation

· Targeted: Localization of EVs in target tissues possible

· Timely/Efficient: Reduction of time and labor (relative to previous functionalization techniques)

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Published Application	20210205469	07/08/2021	2017-982

STATE OF DEVELOPMENT

There is in vitro data regarding fluorescent and magnetic particle conjugation on EVs from different mammalian cells.

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