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Editorial

Knockout Serum Replacement as a Substitute for Exosome Free Serum

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HIGHLIGHTS

- Exosomes of the fetal bovine serum can be an interfering factor in cell exosome separation.
- Knockout serum replacement, exosome free serum, can be an alternative for cell culture and subsequently isolate exosome.

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ABSTRACT

Exosomes, extracellular vesicles secreted from cells, play a major role in cellular communication and are also involved in pathological mechanisms of various diseases. Today, isolation and characterization of exosomes from various cells using in vitro cell culture are important topics in experimental studies. Fetal bovine serum (FBS) because of having a high content of exosomes has a limitation in using that for in vitro cell culture. Knockout serum replacement, exosome free serum, can be an alternative for cell culture and subsequently isolate exosome.

Keywords: Exosome; Fetal Bovine Serum; Knockout Serum Replacement; Purification

Editorial: Exosomes, extracellular vesicles secreted from cells, are carriers containing proteins, lipids, and nucleic acids. By adhering and releasing their contents to the recipient cells, exosomes play a major role in cellular communication. Based on a variety of their originated cells, cargos, and physiologic state of releasing cell, Exosomes have been attributed an extended range of roles such as signal transduction, reprogramming, epigenetic modification, and inflammation (1). Recently, it has been shown that exosomes are also involved in pathological mechanisms of diseases, such as neurodegenerative diseases, tumours, chronic inflammation, and cardiovascular diseases (2). Moreover, exosomes have

been used as diagnostic markers for different diseases since their cargos and contents can reflect physiological or pathological processes of the cells of origin. Because of having features of being the carrier, they can be considered as a vehicle to drug delivery or gene therapy (3). Due to the reasons above cited, researchers have been focused on isolation, characterization, and therapeutic application of exosomes from various cells using in vitro cell culture (4). Fetal bovine serum (FBS) because of having a lot of growth factors is widely used for in vitro cell culture but it also has high content of exosomes which interfere with the characterization and isolation procedures of the cultivated cells. Thus, for eliminating

exosomes of FBS, several protocols have been routinely applied using ultrafiltration, sonication, precipitation, and ultracentrifuge procedures which most of them are time-consuming and complex (5). In here, we suggest that knockout serum replacement (KSR) can be used instead of exosome-depleted FBS. KSR is a substitute for FBS in the culture of embryonic stem cells (ESCs) and induced pluripotent stem cells (iPSCs) and also for when animal proteins might create an immunologic reaction in cases where the cells need to be injected for clinical application (6).

Conclusions

KSR is an exosome-free serum since it has a defined formulation and stable concentration of ingredients. In summary, using an exosome-free serum is the first step for isolation and purification of exosomes from in vitro cell cultures and KSR can be a beneficial and efficient option than exosome-depleted FBS.

Authors' contributions

Not applicable.

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Conflict of interest

There is not any kind of conflict of interest.

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Ethics statement

Not applicable.

Data availability

Not applicable.

Abbreviations

ESCs	Embryonic stem cells
FBS	Fetal bovine serum
iPSCs	Induced pluripotent stem cells
KSR	knockout serum replacement

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