Product Data Sheet

LAB Biotech Co., Ltd.

Research Use Only

Extracellular Vesicles derived from Cheese Whey

Cat. No. EXCW1000

November 20, 2025

[I] Background

Exosomes are membrane vesicles with a diameter of approximately 50–150 nm that are secreted by most cells. They encapsulate miRNA, mRNA, proteins, micropeptides, and other molecules, and are suggested to play a role in transmitting information from the originating cell or tissue to distant target cells or tissues. Microorganisms also secrete extracellular vesicles (EVs) similar to exosomes.

This product is a purified fraction derived from cheese whey, which is generated during the cheese-making process using raw milk. It contains both bovine-derived milk exosomes (2,254.8 µg/mL, measured using the Cosmo Bio EXBMEL Bovine Milk Exosome ELISA Kit) and lactic acid bacteria–derived EVs secreted during fermentation (1.378 × 10^7 particles/mL, measured using the Cosmo Bio EVEL01 Gram-positive bacteria EV Quantification ELISA Kit). This product is purified from cheese whey with three step purification process, ultrafiltration, and ion-exchange chromatography 1 and 2. Through removal of impurities such as lipids and protein components, a highly purified EV fraction is obtained. The product is prepared at high particle density (5 × 10^12 particles/mL) and can be used for a wide range of applications from in vitro to in vivo studies as a DDS carrier. Bulk supply is also available upon request.

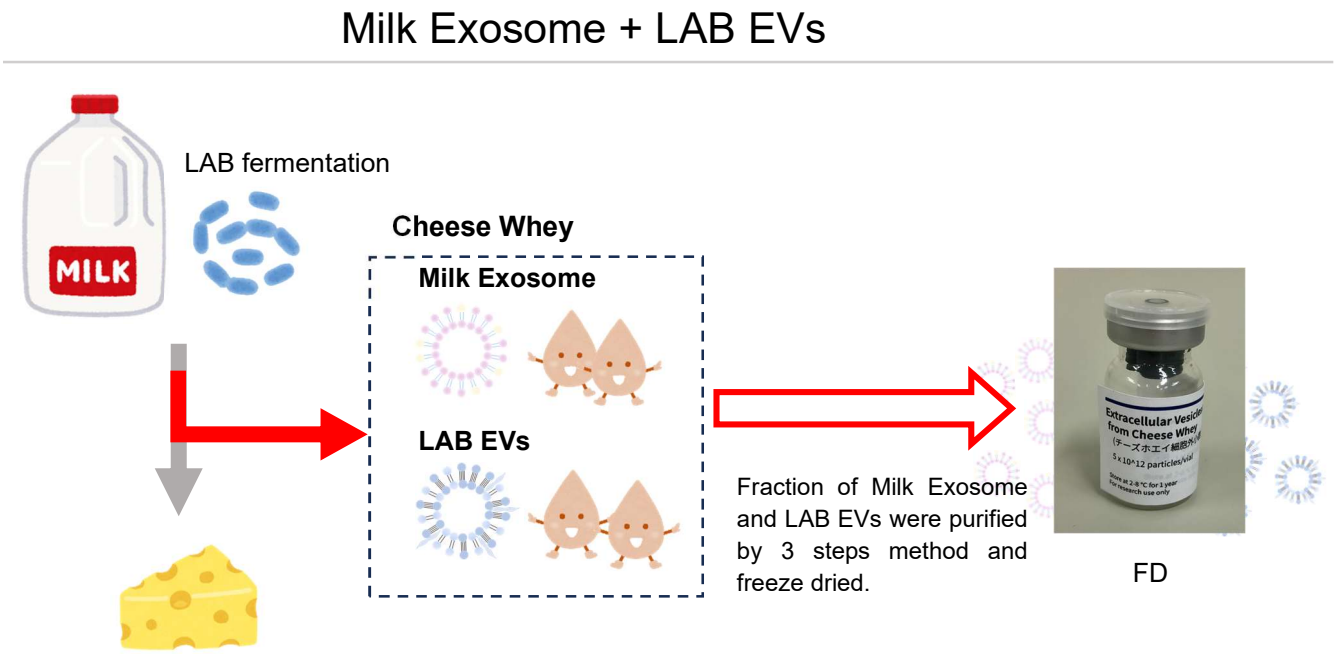


Fig. 1. Overview of Cheese Whey–Derived EVs Production Diagram

[**II**] Instructions for Use

1. Return it to room temperature before use.
2. Add 1 mL of sterile distilled water and mix gently until dissolved. After reconstitution, store at 4°C and use within 3 months.
3. Dilute the reconstituted solution 1:1000 to 1:10,000 in culture medium before use.

[**III**] Reference materials

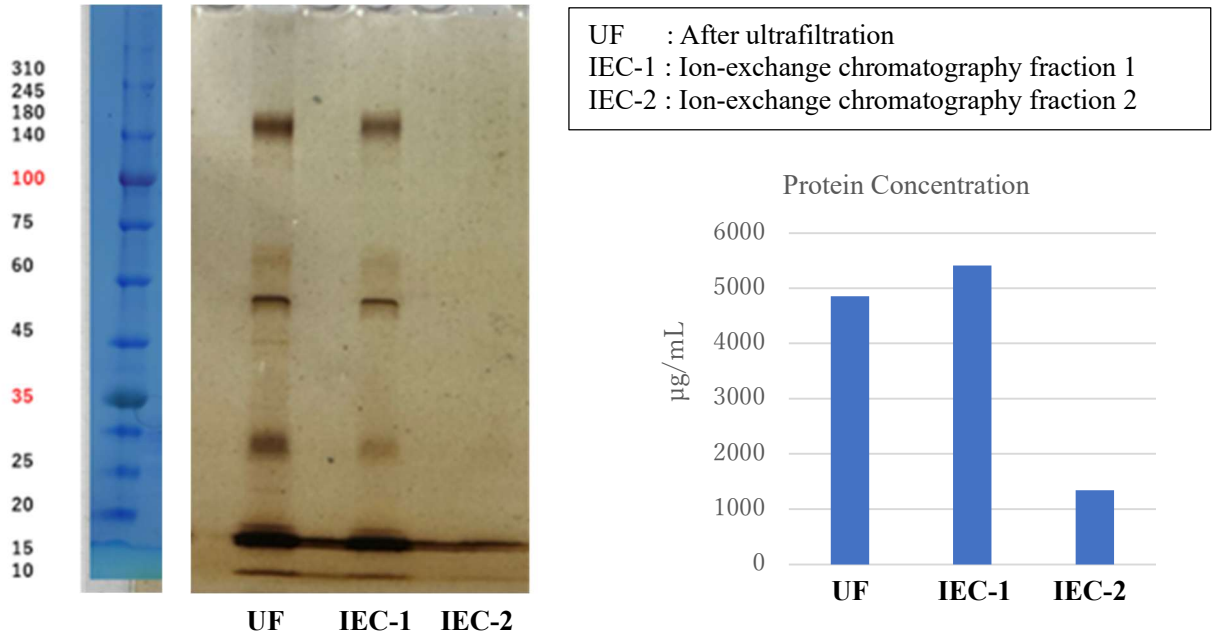


Fig. 2. SDS-PAGE analysis and protein quantification

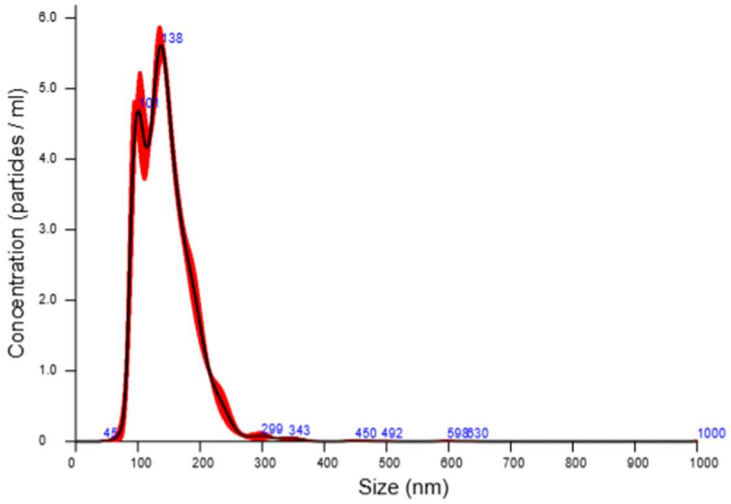


Fig. 3. Particle size distribution（Nano Sight）

Item No.	Product Name	Package	Particle Count	Example Applications	Storage
EXCW1000	Extracellular Vesicles from Cheese Whey	Freeze-dried (1 mL)	5×10^{12} particles/mL	Promotion of epidermal cell proliferation; enhancement of collagen synthesis in fibroblasts, etc.	Refrigerated

[**III**] Reference Data

Human epidermal HaCaT cells were seeded at low density (3 × 10^3 cells/well) in a 96-well plate. EVs samples were added at a 1:1000 dilution. After 48 hours, cells were fixed with 4% paraformaldehyde and stained with Giemsa. Colony area was quantified using ImageJ.

Compared with the control (no addition), the colony area increased in the group treated with cheese whey–derived EVs. Furthermore, the activity approached that of the positive control group treated with exosomes derived from human dental pulp mesenchymal stem cells. Example shown: 1:1000 dilution.

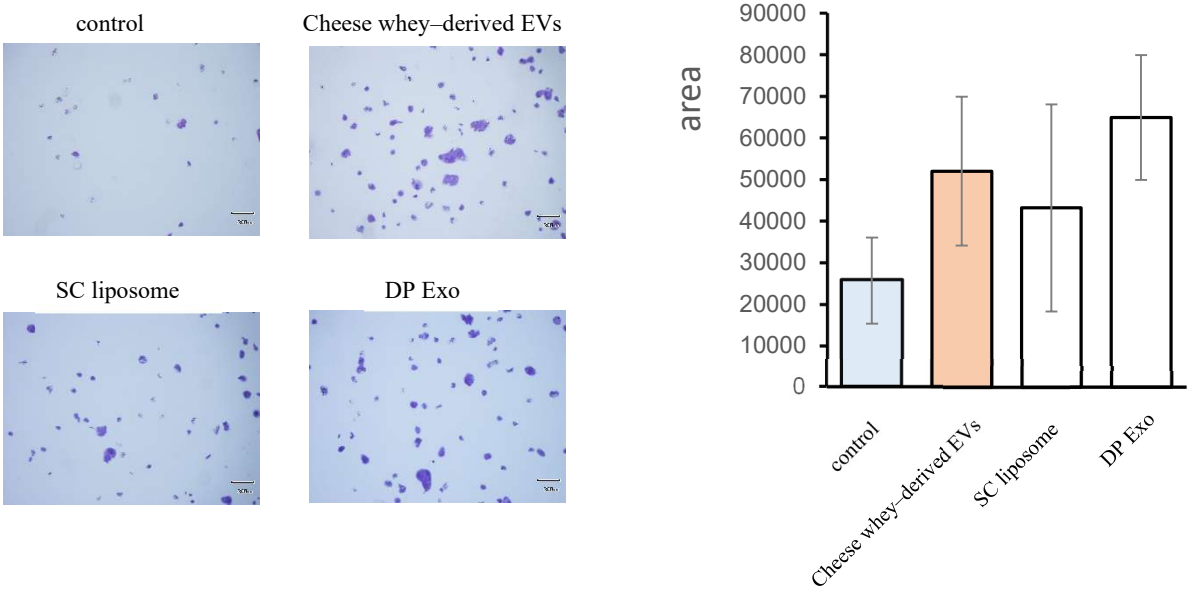


Fig.4. Epidermal Cell Proliferation Assay

[**IV**] References

[1] Maghraby MK, *et al*., Extracellular vesicles isolated from milk can improve gut barrier dysfunction induced by malnutrition, *Scientific Reports*., 2021, **11**:7635.

[2] Cui Z, *et al*., Potential therapeutic effects of milk-derived exosomes on intestinal diseases, *J. Nanobiotechnology*., 2023, **21**:496.

[3] Lu L, *et al*., Novel roles of bovine milk-derived exosomes in skin antiaging, *J. Cosmet. Dermatol*. 2024, **23**:1374–1385.

[**V**] Not for Human Use.

製品添付用データシート

株式会社 LAB バイオテック
LAB Biotech Co., Ltd.

一般研究用試薬

Extracellular Vesicles derived from Cheese Whey

チーズホエイ細胞外小胞

Cat. No. EXCW

2025 年 10 月 27 日作成

[I] 背景

Exosome（エクソソーム）は、ほとんどの細胞で分泌される直径 50 nm ～ 150 nm 程度の膜小胞で、miRNA や mRNA、タンパク質、マイクロペプチドなどを内包し、由来する細胞や組織から離れた別の標的細胞や組織へと情報を伝達する役割を担うことが示唆されている。一方で、微生物からもエクソソームと同様の Extracellular Vesicles（EVs、細胞外小胞）を分泌しています。

本商品は、生乳からチーズを製造する過程で生じるチーズホエイを原材料とし、牛由来の Milk Exosome および乳酸菌発酵時に分泌される乳酸菌由来 EVs を共に含む精製画分です（図 1 、図 2 参照）。チーズホエイを高速遠心分離、0.22 μ m メンブランで除菌、限外濾過、イオン交換クロマトグラフィー法を順次行い、不純物である油分とタンパク成分を取り除くことにより EVs を高純度化しています（図 3、図 4 参照）。*in vitro* から *in vivo* まで幅広い実験にご利用ください。

バルク供給（受注生産）も可能ですのでご相談ください。

図 1　チーズホエイ細胞外小胞の概略

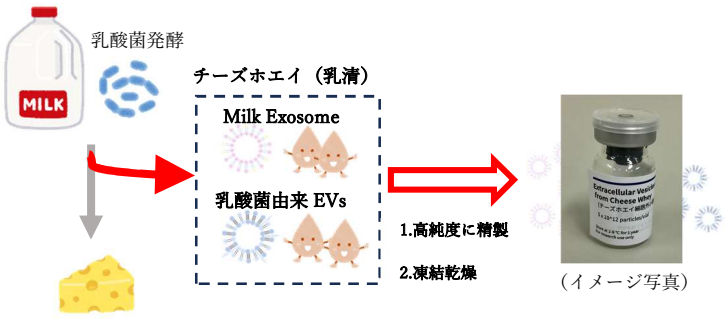
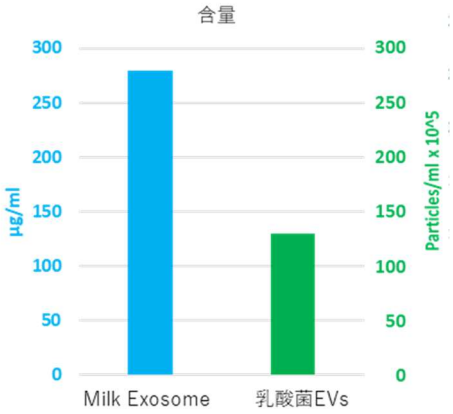


図 2　ELISA 法を用いた Milk Exosome および乳酸菌 EVs の測定

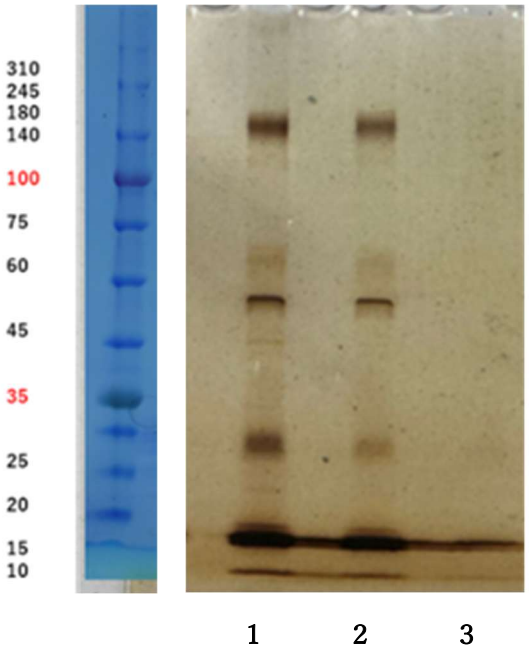


［Ⅱ］使用方法

1．冷蔵庫から本商品を取り出し、室温に戻してください。
2．1 mL の無菌蒸留水を添加して、ゆっくり攪拌して溶解してください。
　溶解後は 4℃で保管し、3 ヶ月以内で使用してください。
3．上記溶液を 1000 倍から 10000 倍希釈して、培養液に添加してください。

［Ⅲ］参考資料

図 3　チーズホエイの精製（SDS-PAGE）
（1：限外濾過精製後、2：イオン交換クロマト溶出画分 F 1、3：イオン交換クロマト溶出画分 F 2）



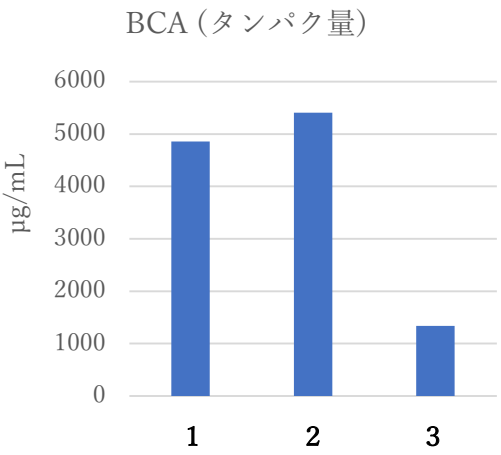
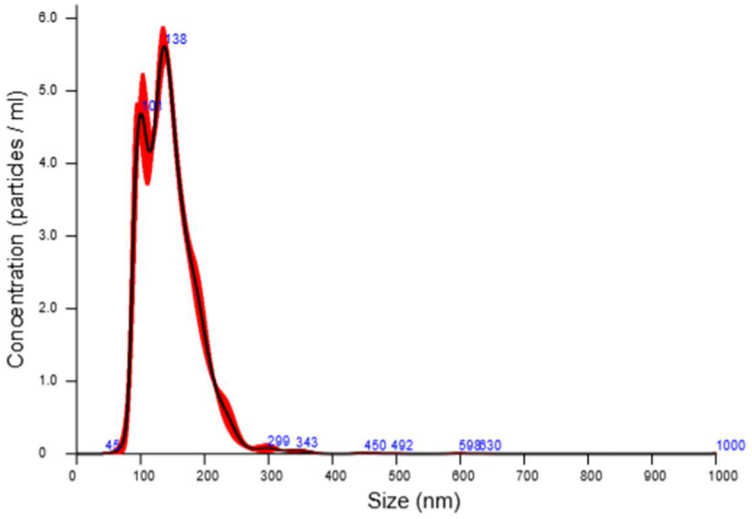


図 4　NanoSight を用いた粒度分布測定



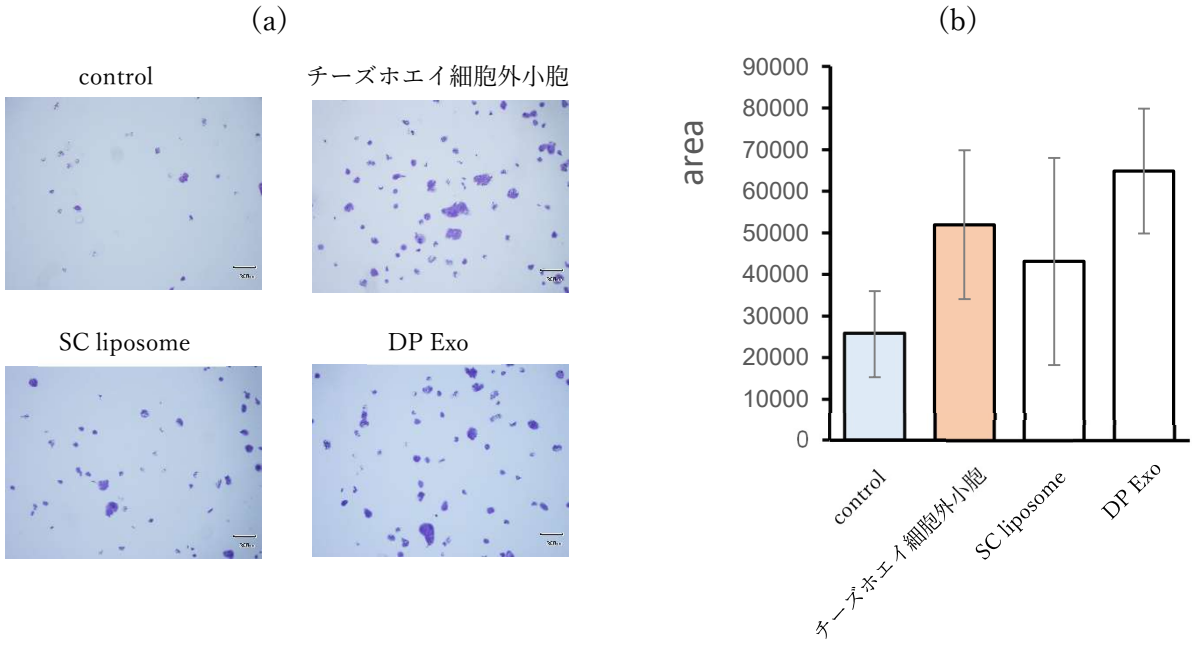
品番	品名	包装	粒子数	使用例	貯蔵
EXCW1000	チーズホエイ細胞外小胞	凍結乾燥	5 x 10^12 Particles/vial	表皮細胞の増殖、線維芽細胞のコラーゲン合成促進等	冷蔵

[IV] 参考データ

ヒト表皮細胞（HaCat 細胞）を低密度（3 x 10^3 cells/well）で 96well Plate にて培養し、チーズホエイ細胞外小胞（1000 倍希釈溶液)、ヒト脂肪由来幹細胞由来 Exosome 10%溶液（SC liposome)、ヒト歯髄間葉系幹細胞由来 Exosome（DP Exo）をそれぞれ添加して、48 時間培養後、4%パラホルムアルデヒドで固定し、ギムザ染色した（図 5a)。ギムザで染色されたコロニーの面積を、image J を用いて定量化した（図 5b)。

Control（無添加）と比較して、チーズホエイ細胞外小胞添加群のコロニーの面積が増えていることがわかる。さらに positive コントロールのヒト歯髄間葉系幹細胞由来 Exosome 添加群にも迫る活性があることが分かった。

図 5　表皮細胞の増殖試験



[IV] 参考文献

[1] Maghraby MK, *et al.*, Extracellular vesicles isolated from milk can improve gut barrier dysfunction induced by malnutrition, *Scientific Reports.*, 2021, **11**:7635.

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[VI] 注意　Not for Human Use.