



**UNIVERSITÉ
DE GENÈVE**



**SOCIÉTÉ
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de Genève

**Fondation
Ernst et Lucie Schmidheiny**

Extracellular Vesicle Lipid Rafts Profiling As a Blueprint For Targeted EV-mimetic Therapies



Oliwia Majchrzak, Carolina Lopes Silva, Dr. Isabel Meister, Dr. Stoyan Tankov, Dr. Julien Boccard, Dr. Olivier Jordan, Prof. Paul Walker, Prof. Serge Rudaz, Prof. Gerrit Borchard



**PHILADELPHIA, PA
JULY 13-18, 2025**



Schweizerische Eidgenossenschaft
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**NEXT-GENERATION
DELIVERY INNOVATIONS**

EXTRACELLULAR VESICLES / EVs

WHAT ARE THEY?



particles that are delimited by a lipid bilayer
and
cannot replicate on their own

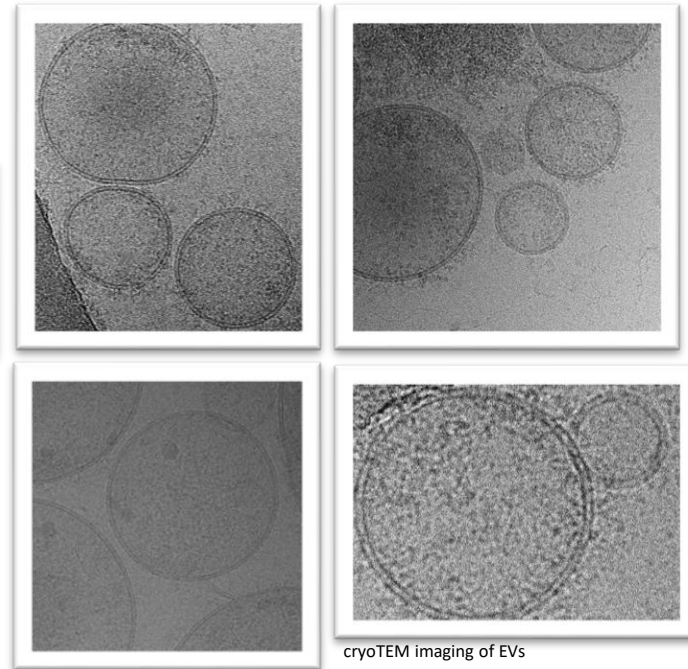
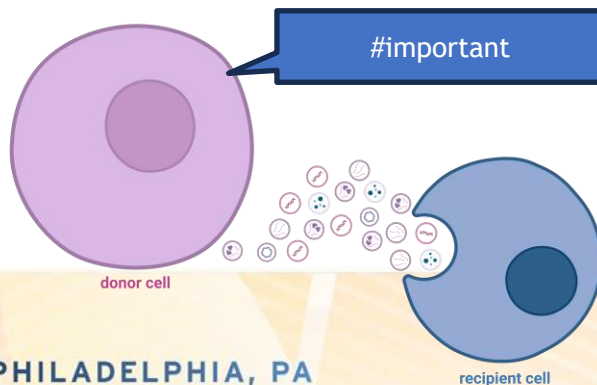
received: 15 December 2023 | Revised: 15 December 2023 | Accepted: 19 December 2023
DOI: 10.1002/jev2.12404

POSITION PAPER



Minimal information for studies of extracellular vesicles
(MISEV2023): From basic to advanced approaches

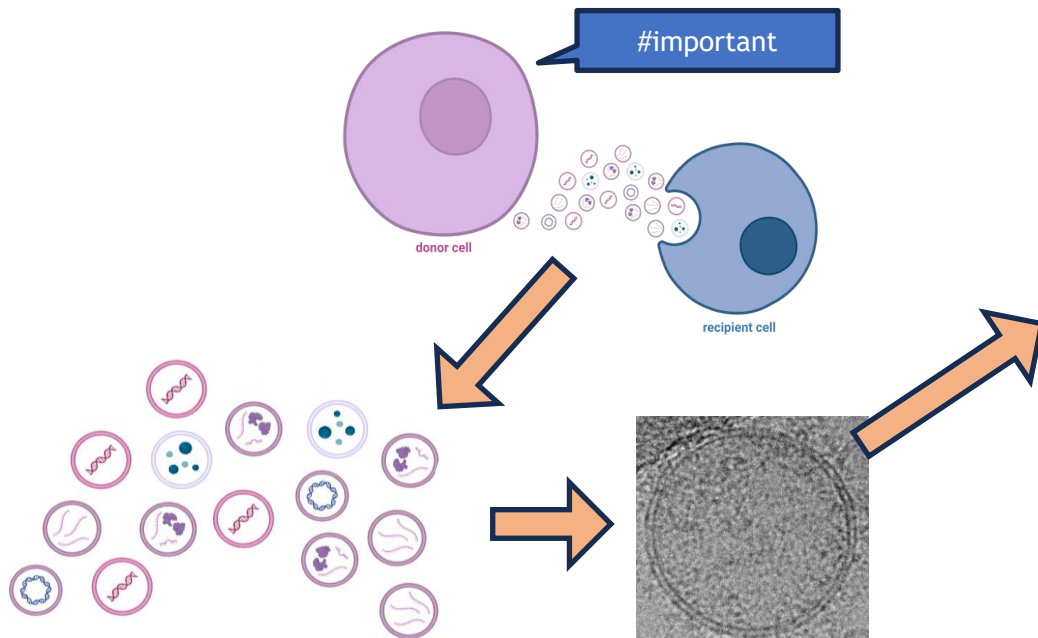
WHY ARE THEY INTERESTING? WHAT ROLE DO THEY PLAY?



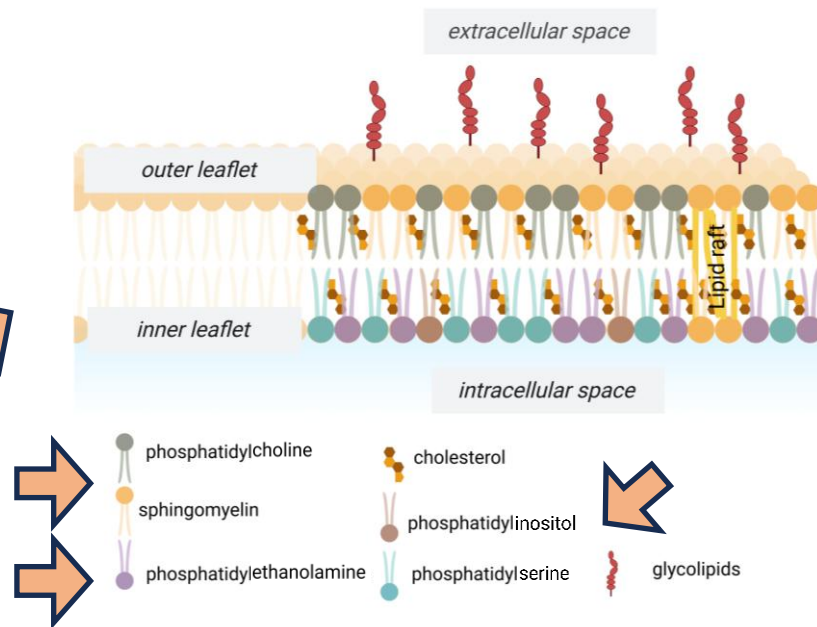
cryoTEM imaging of EVs

EXTRACELLULAR VESICLES / EVs

Intercellular communication



Lipid Bilayer Composition



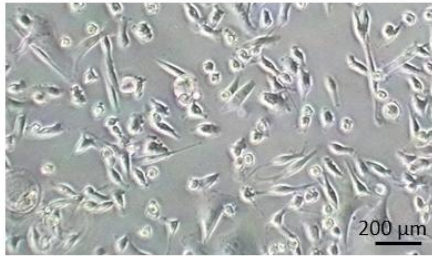
EXTRACELLULAR VESICLES: HOW-TO

CELL MODEL:

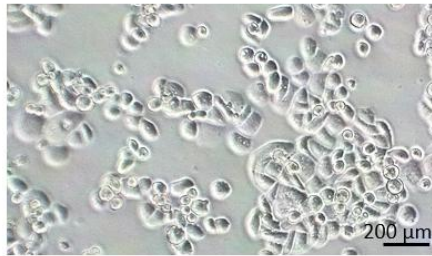
for
EVs production

MDA-MB-231/453/468
as
triple-negative breast cancer model

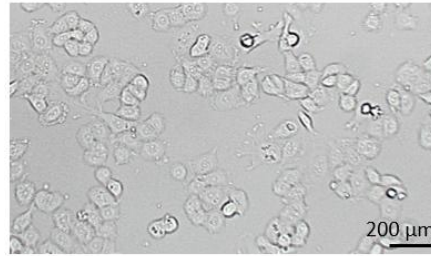
MCF10A
as
non-cancerous breast epithelium



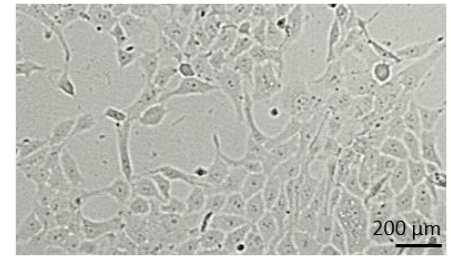
MDA-MB-231



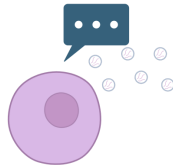
MDA-MB-453



MDA-MB-468



MCF-10A



EXTRACELLULAR VESICLES: HOW-TO

CELL MODEL:

for
EVs production

MDA-MB-231/453/468
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EXPERIMENTAL SET-UP:



EXTRACELLULAR VESICLES: HOW-TO

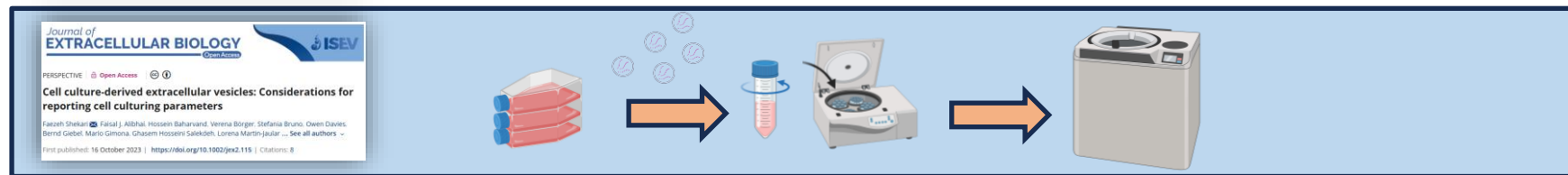
CELL MODEL:

for
EVs production

MDA-MB-231/453/468
as
triple-negative breast cancer model

MCF10A
as
non-cancerous breast epithelium

EXPERIMENTAL SET-UP:



ANALYSIS:

FORMAL REQUIREMENTS

NanoTracking Analysis

Bicinchoninic Acid Assay

Western Blot

Transmission Electron Microscopy

Minimal information for studies of extracellular vesicles (ISEV2023): From basic to advanced approaches

EXPLORATORY PART

Liquid Chromatography - Mass Spectroscopy

Statistical Analysis

LIPID PROFILING

1107

lipid species detected



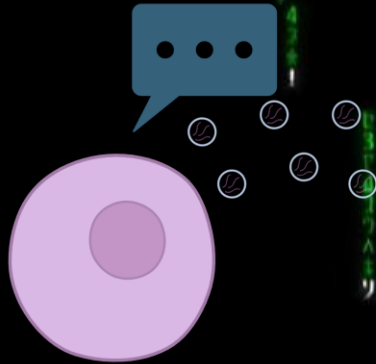
data curation

567

lipids identified

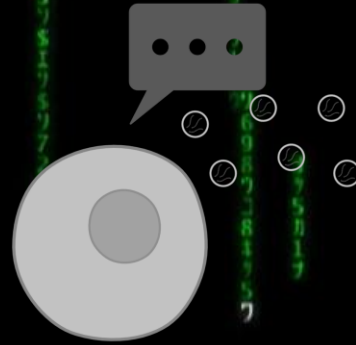
Question 1:

Are there any significant **differences in the lipid composition** between EVs secreted from cancerous and non-cancerous cells?



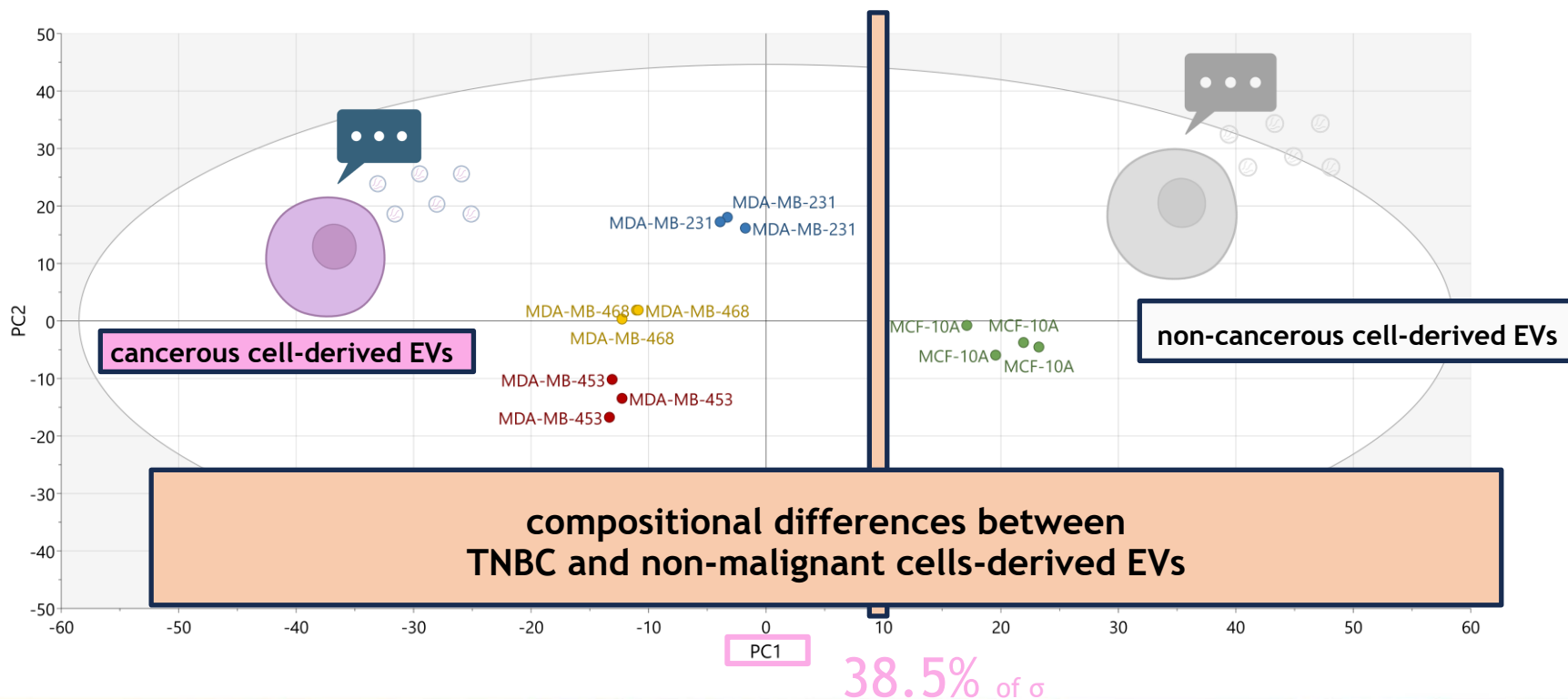
cancerous cell-derived
EVs

VS

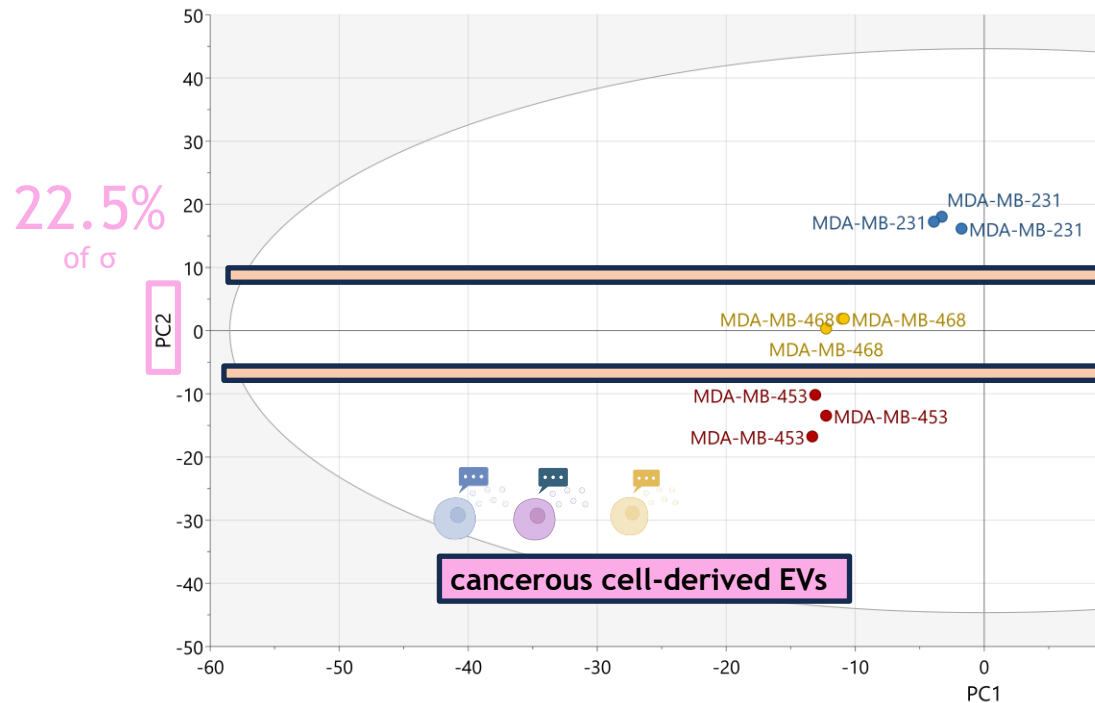


non-cancerous cell-derived
EVs

EXTRACELLULAR VESICLES / EVs - Principal Component Analysis (PCA)



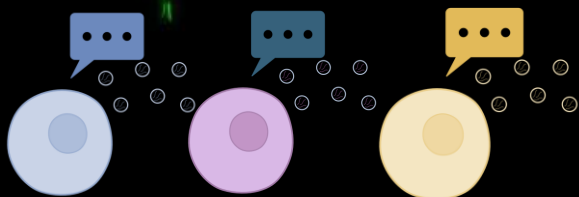
EXTRACELLULAR VESICLES / EVs - Principal Component Analysis (PCA)



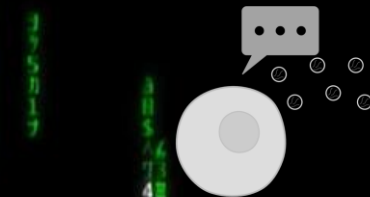
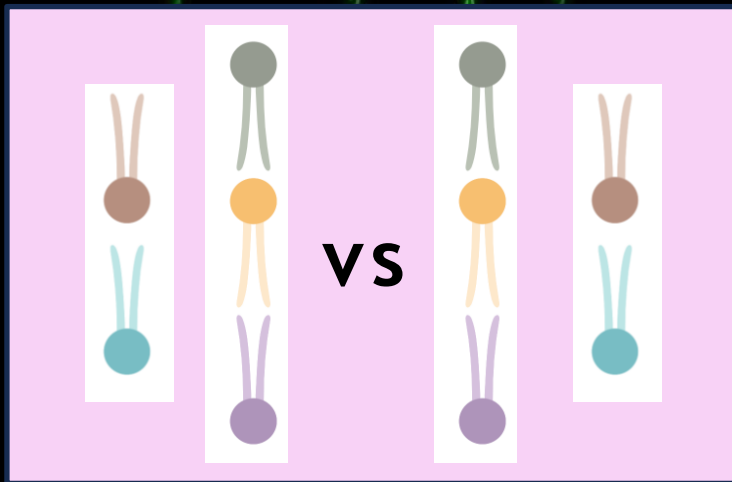
compositional differences
between distinct subtypes
of TNBC-derived EVs

Question 2:

What are the **differences in the expression levels** of the **identified lipids** between extracellular vesicles derived from different sources?



cancerous cell-derived EVs



non-cancerous cell-derived EVs

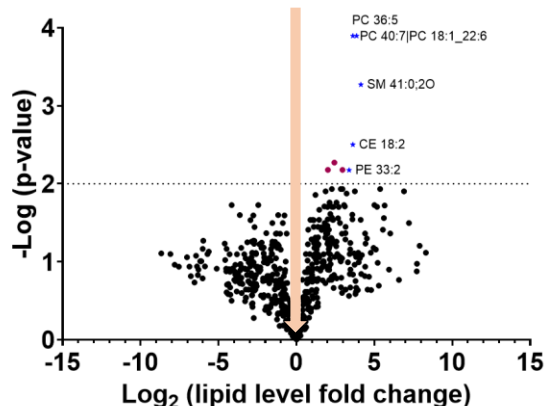
EXTRACELLULAR VESICLES / EVs - Lipid profiling (fold change)

Question:

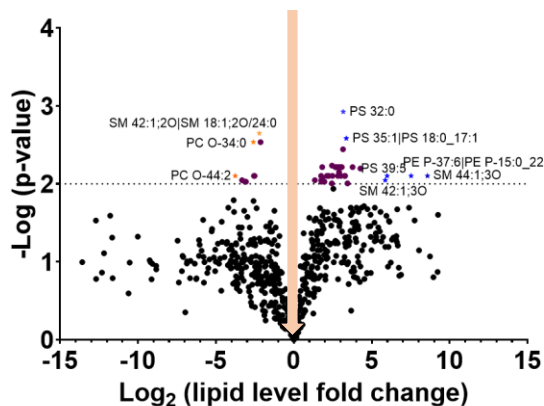
What are the differences in the expression levels of the identified lipids?



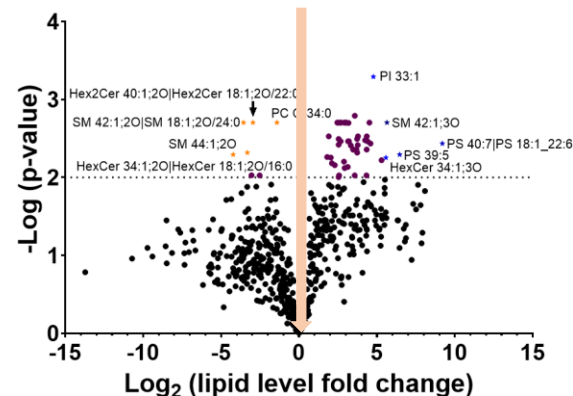
Volcano plot: MDA-MB-231 vs MCF10A



Volcano plot: MDA-MB-453 vs MCF10A



Volcano plot: MDA-MB-468 vs MCF10A



cancerous cell-derived EVs

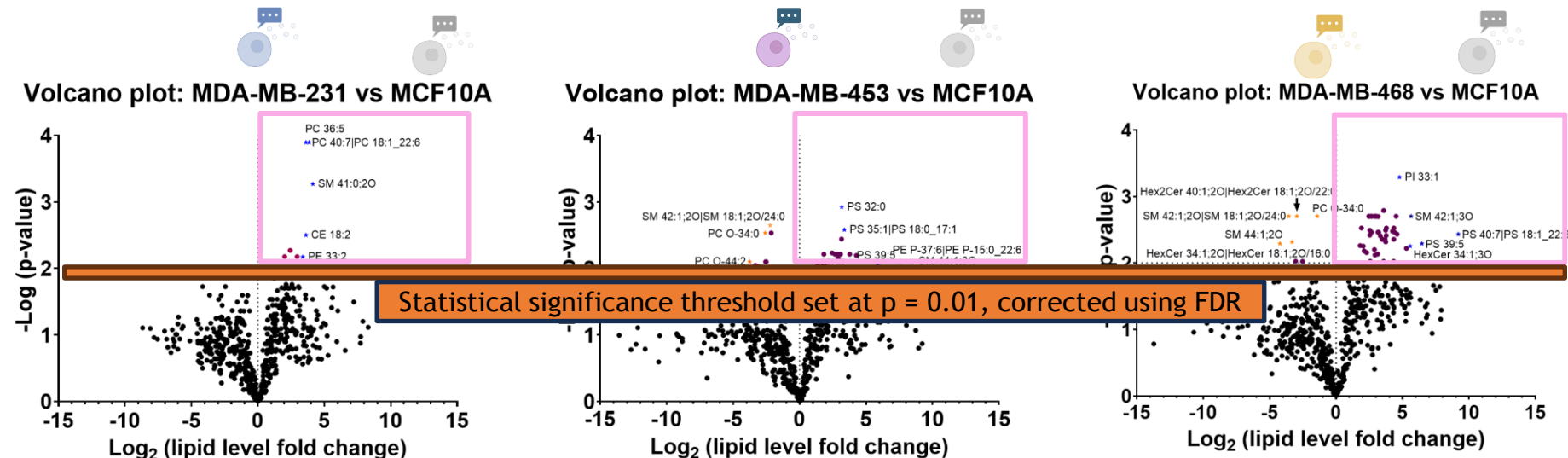
VS

non-cancerous cell-derived EVs

lipid by lipid

EXTRACELLULAR VESICLES / EVs - Lipid profiling (fold change)

Question:
Which of these lipid species could be of interest?



cancerous cell-derived EVs

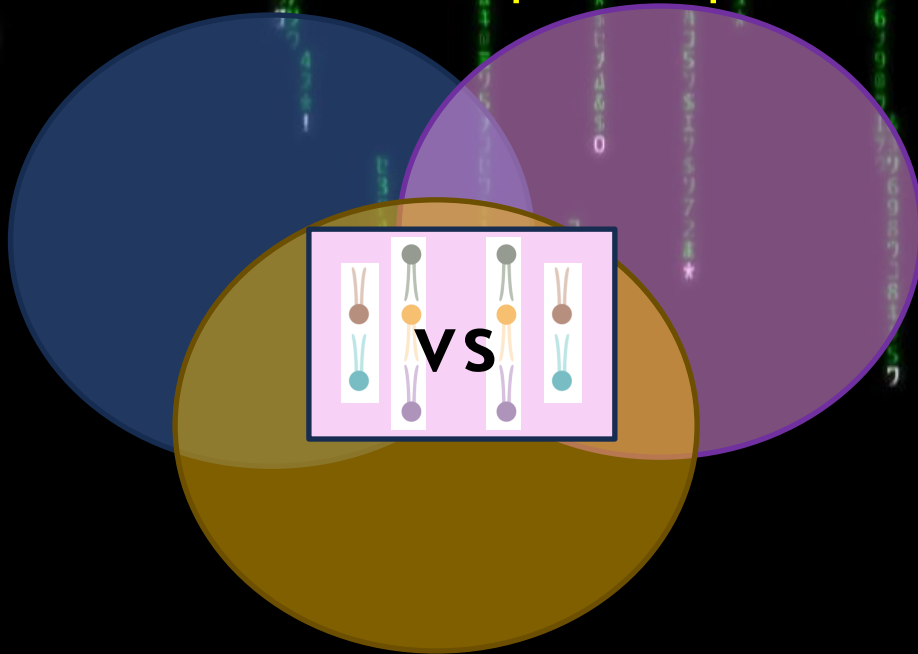
VS

non-cancerous cell-derived EVs

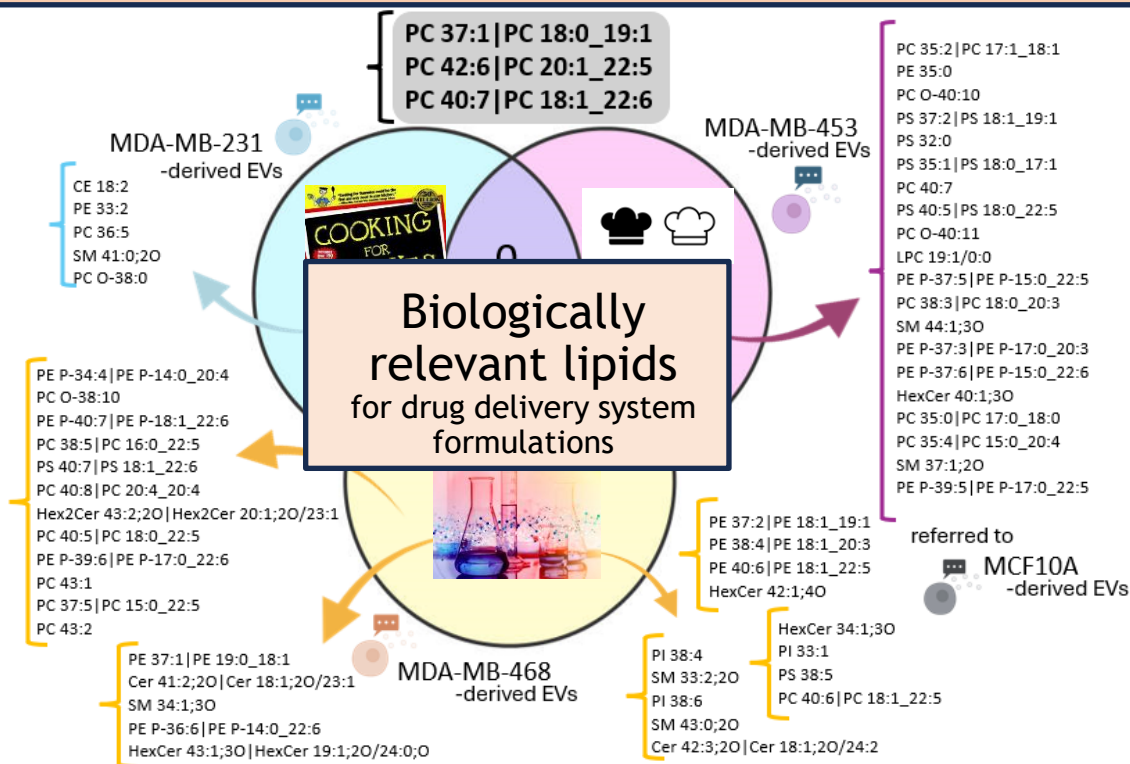
lipid by lipid

Question 3:

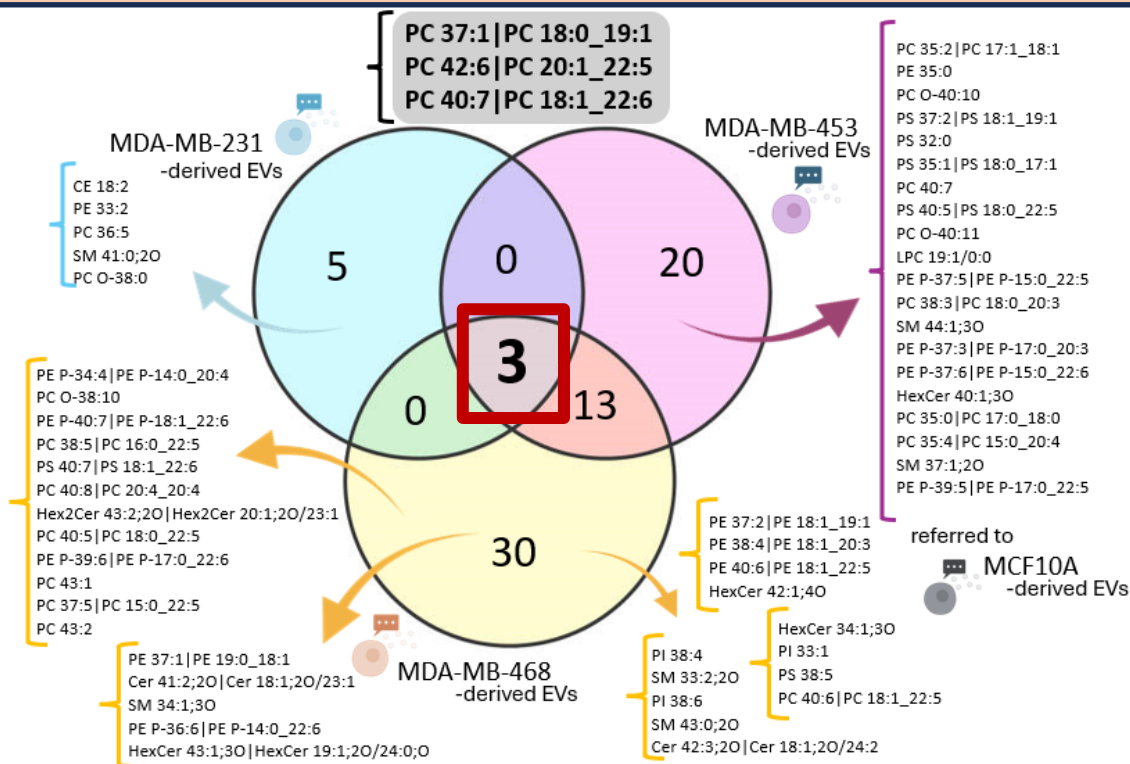
Which lipid species are **shared** across EVs from different cell sources, and which are **unique** to specific sources?



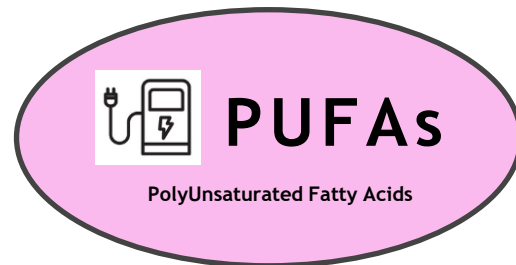
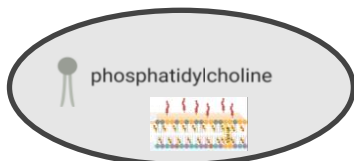
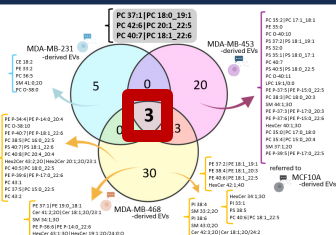
EXTRACELLULAR VESICLES / EVs - Lipidomic profiling



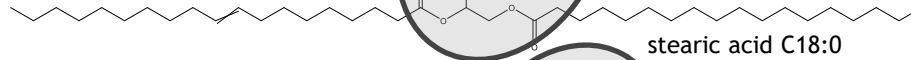
EXTRACELLULAR VESICLES / EVs - Lipidomic profiling



EXTRACELLULAR VESICLES / EVs - Lipid profiling (potential biomarkers)

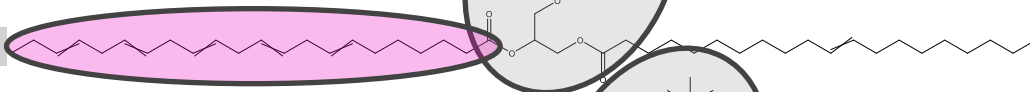


PC 37:1|PC 19:1_18:0



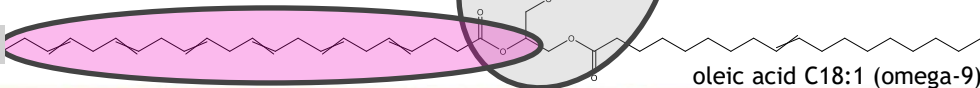
C22:5

PC 42:6|PC 22:5_20:1



C22:6

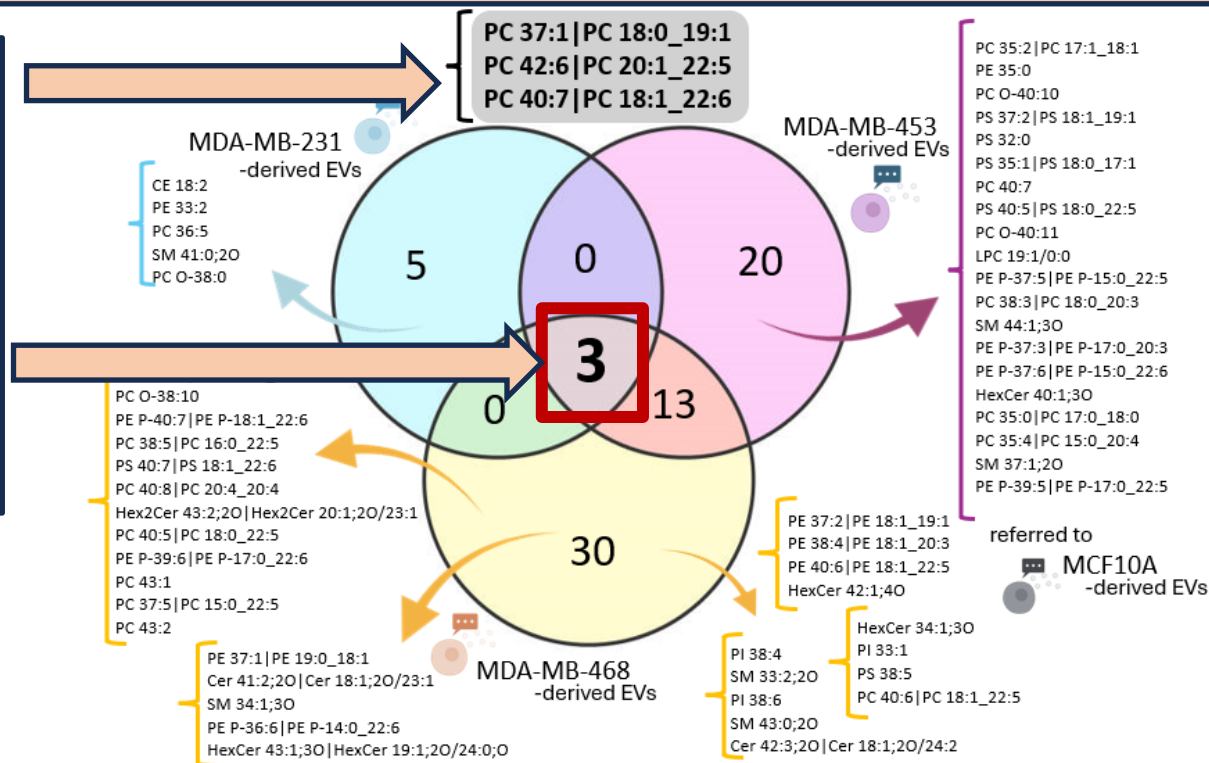
PC 40:7|PC 22:6_18:1



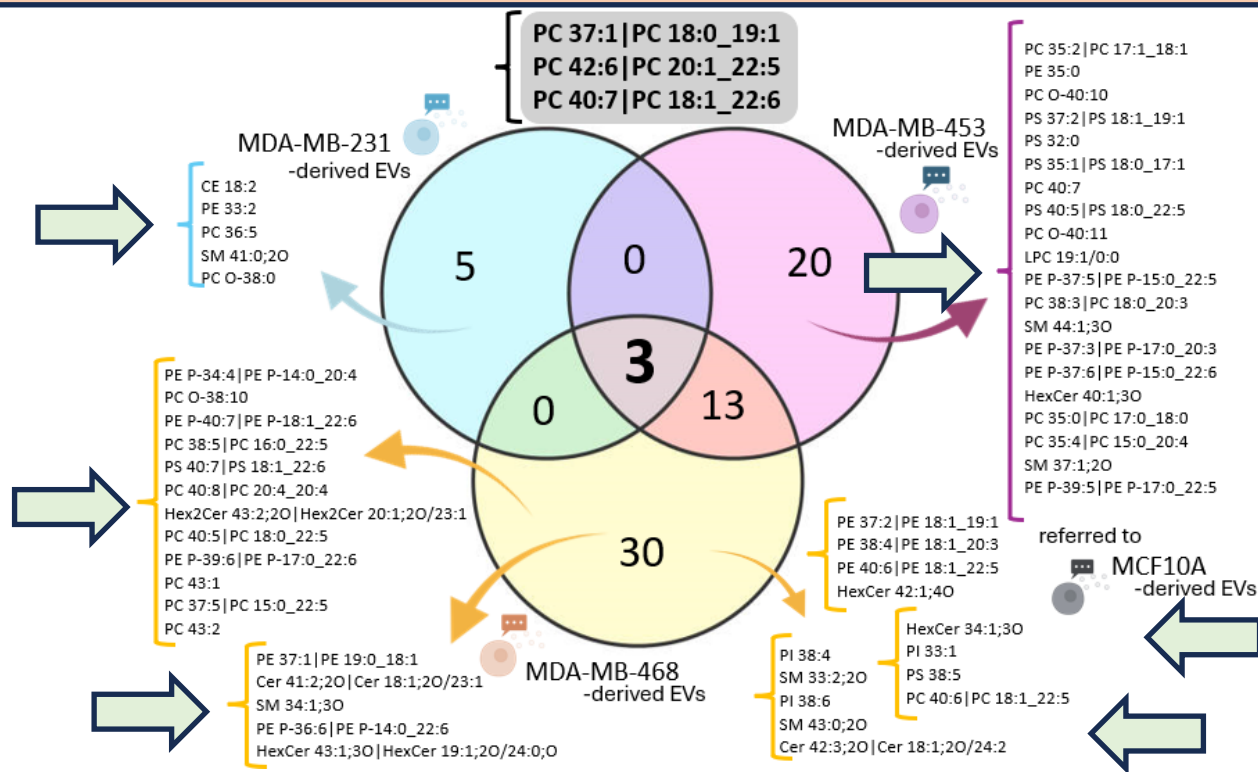
**NEXT-GENERATION
DELIVERY INNOVATIONS**

EXTRACELLULAR VESICLES / EVs - Lipidomic profiling

presence
or
absence
of TNBC
as biomarkers



EXTRACELLULAR VESICLES / EVs - Lipidomic profiling



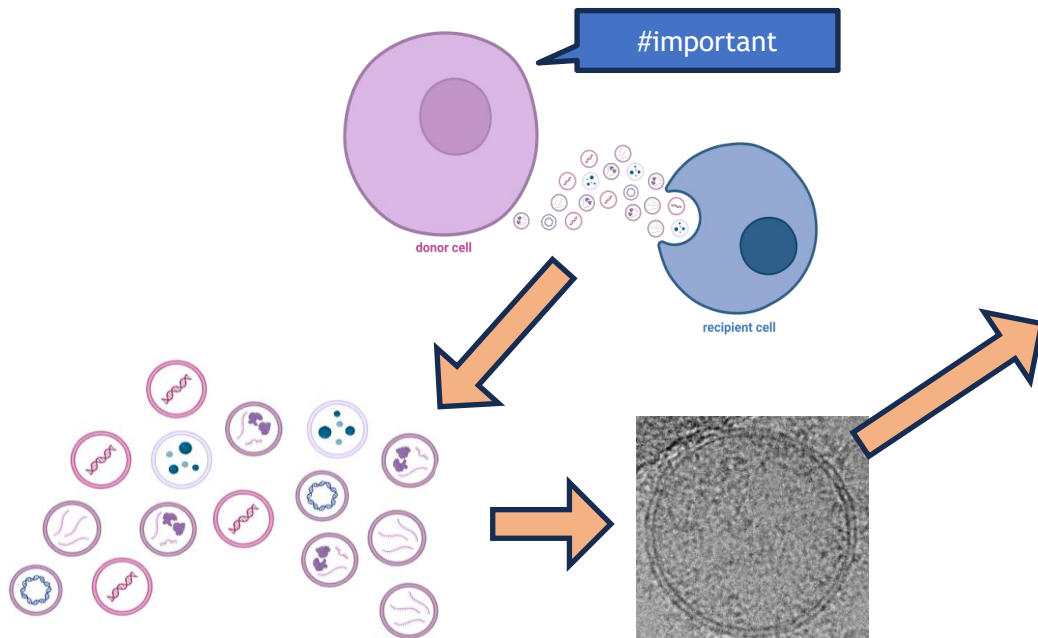
in-depth
cancer
subtyping

as biomarkers

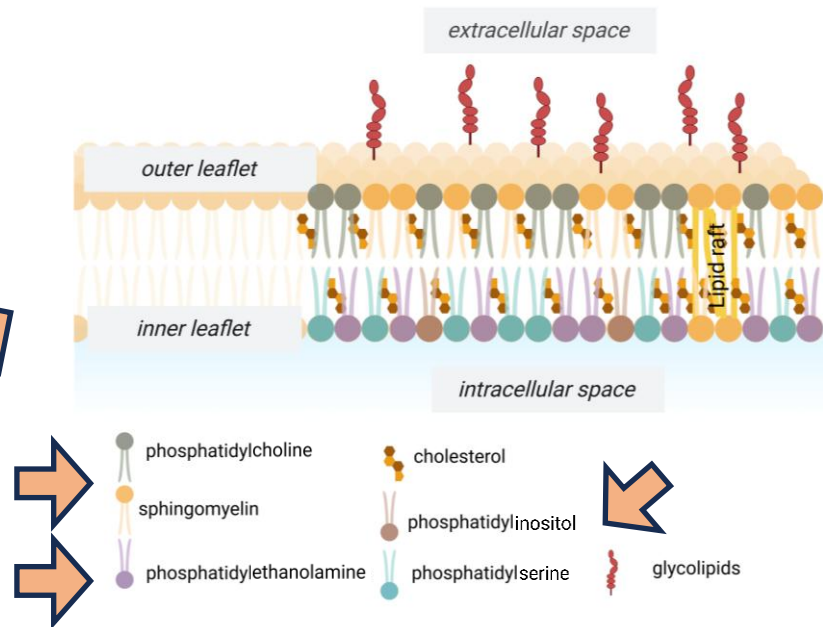
Take-home message

EXTRACELLULAR VESICLES / EVs -TAKE-HOME MESSAGE

Intercellular communication



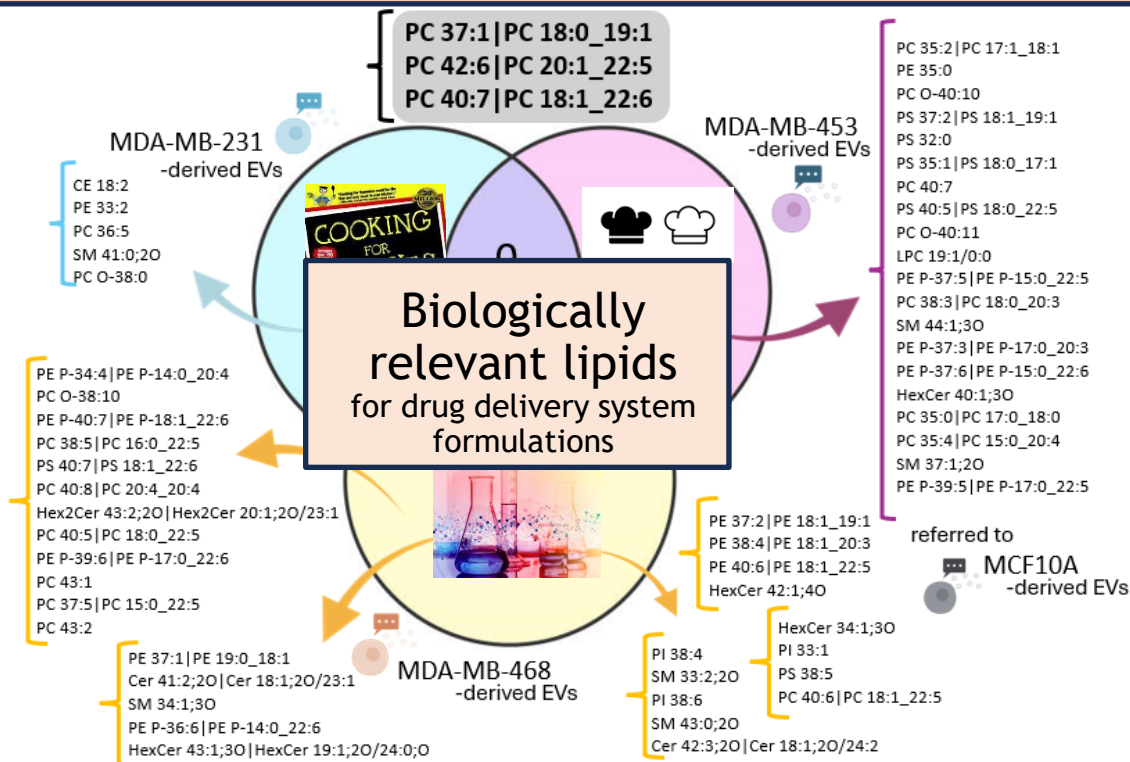
Lipid Bilayer Composition



EXTRACELLULAR VESICLES / EVs - TAKE-HOME MESSAGE

presence
or
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in-depth
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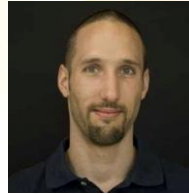


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Ernst et Lucie Schmidheiny

Thank you for your attention!

a round of applause to:



Oliwia Majchrzak, Carolina Lopes Silva, Dr. Isabel Meister, Dr. Stoyan Tankov, Dr. Julien Boccard, Dr. Olivier Jordan, Prof. Paul Walker, Prof. Serge Rudaz, Prof. Gerrit Borchard



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Dr. Jean-Baptiste Marq and Marco Perdigao for their support with ultracentrifugation
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CRS 2025
ANNUAL MEETING
& EXPOSITION

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DELIVERY INNOVATIONS**