A landscape view

EXOSOMES IN THERAPEUTICS AND DIAGNOSTICS

Chun-An (Andy) Chen, Information Scientist

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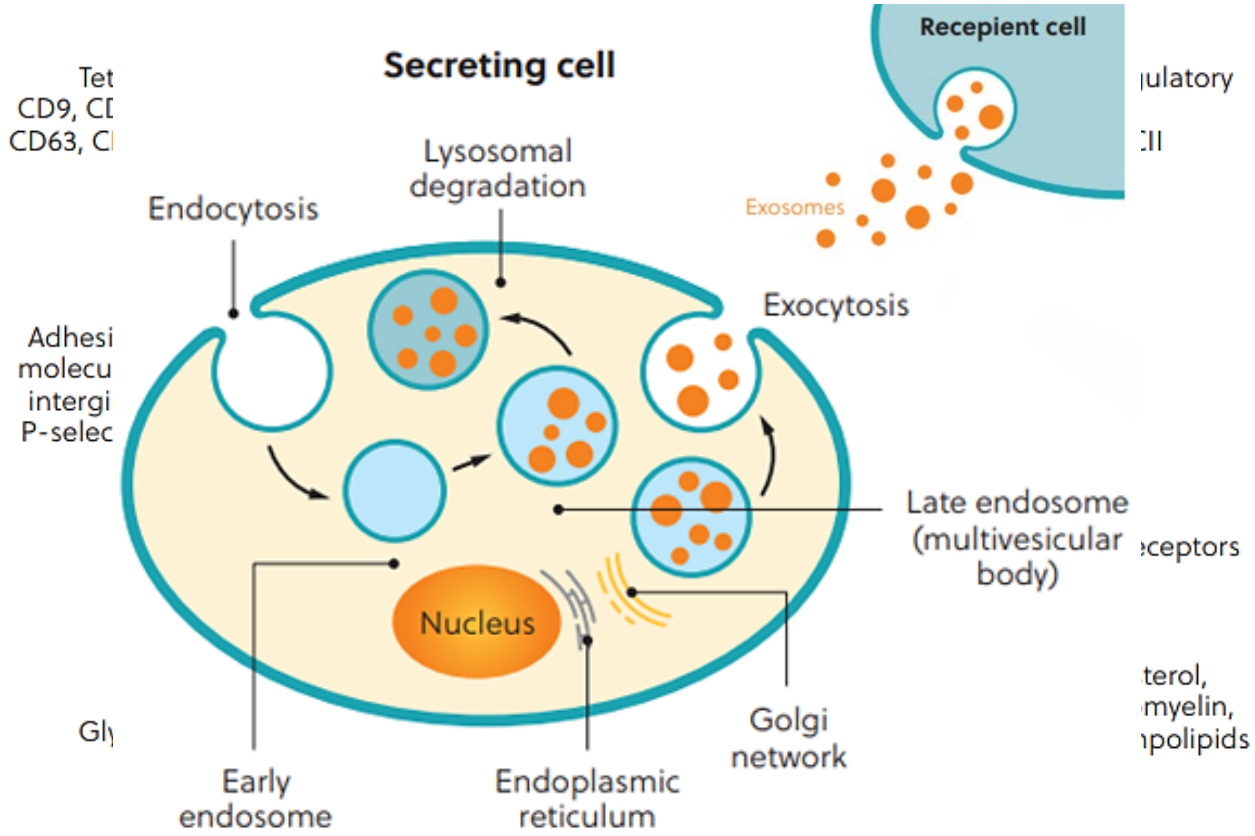
What are exosomes?

Function and Characterization



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Why exosomes?

Natural

Innate stability | Biocompatibility | Low immunogenicity | Crosses blood-brain barrier

Synthetic

Low bioavailability | Rapid bloodstream clearance | Cytotoxicity

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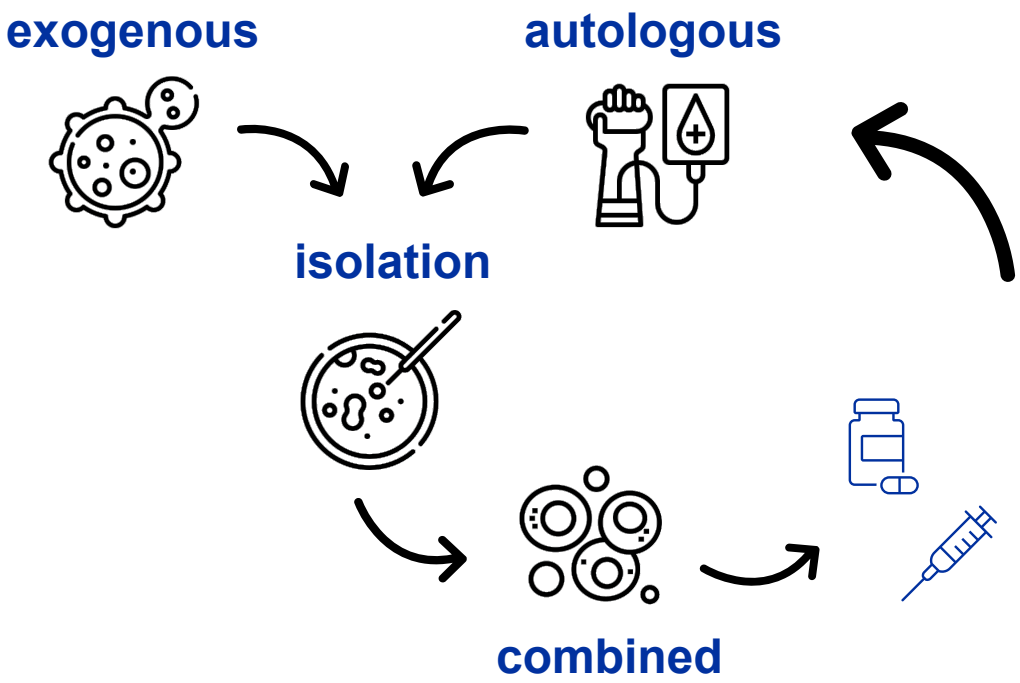
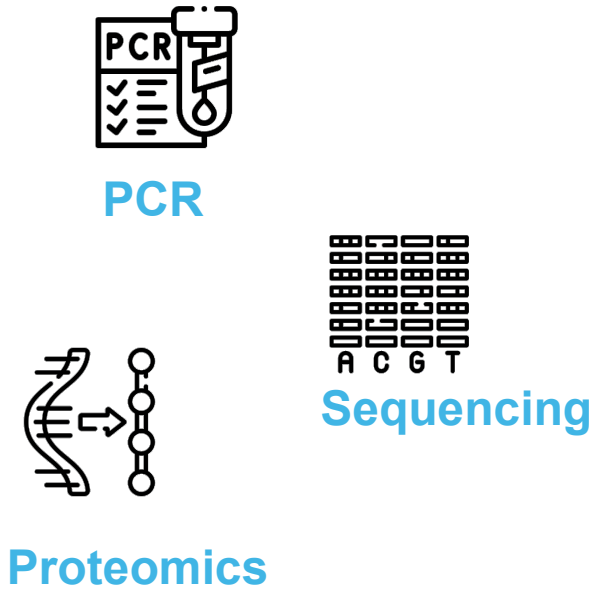
Exosomes at the human scale

For both therapeutics and diagnostic applications

Therapeutics



Diagnostics



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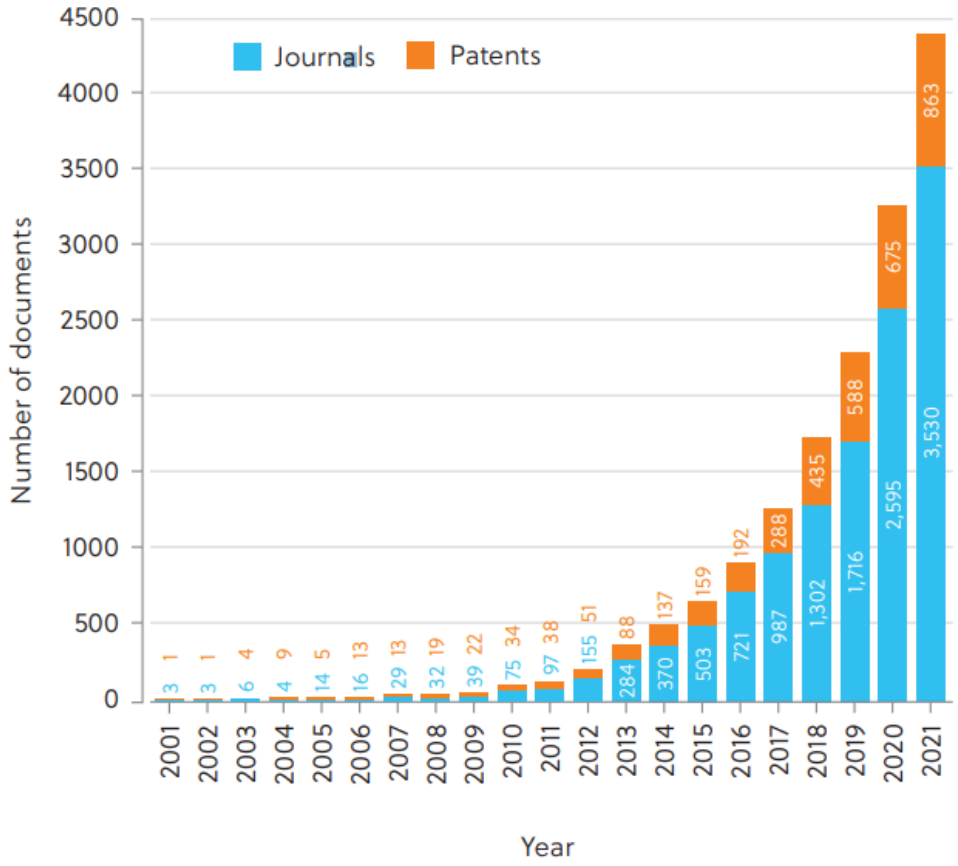
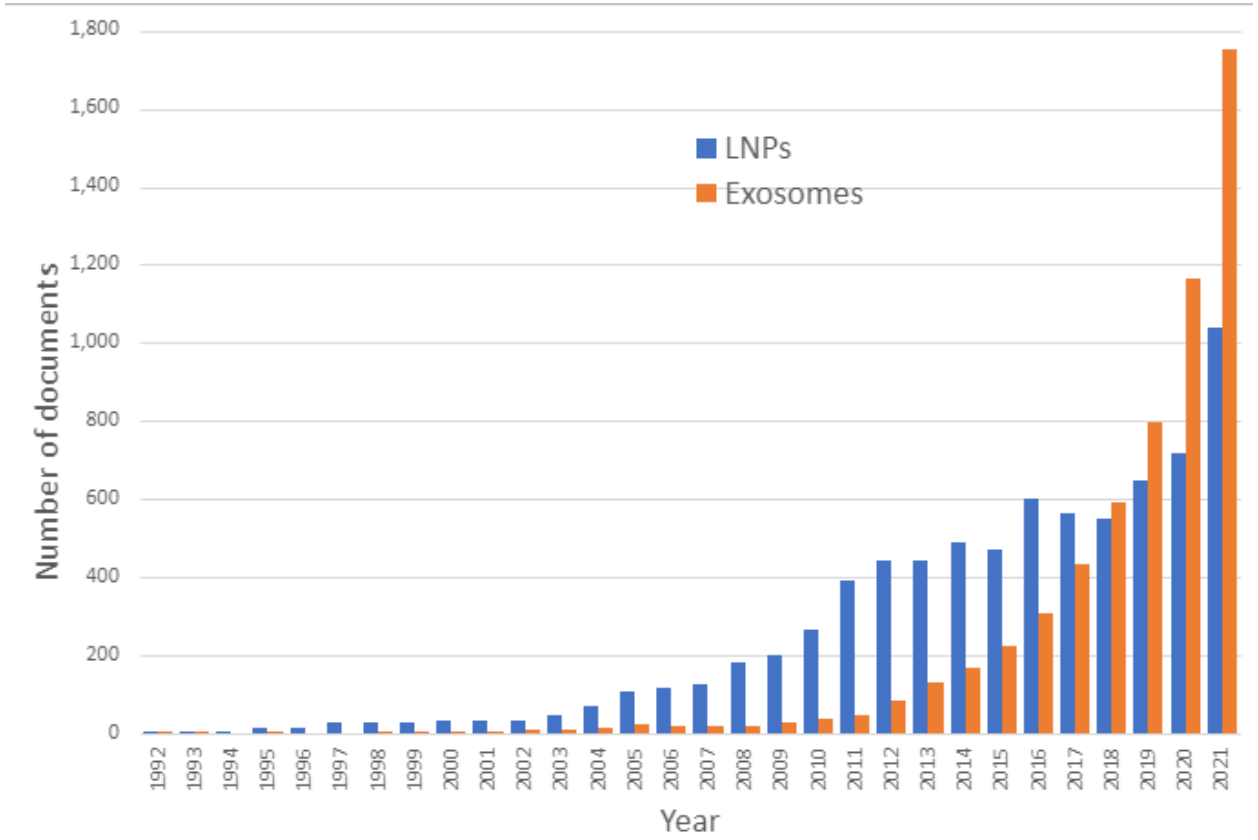
Exosome publications has increased over time

Research in exosomes is outpacing LNP





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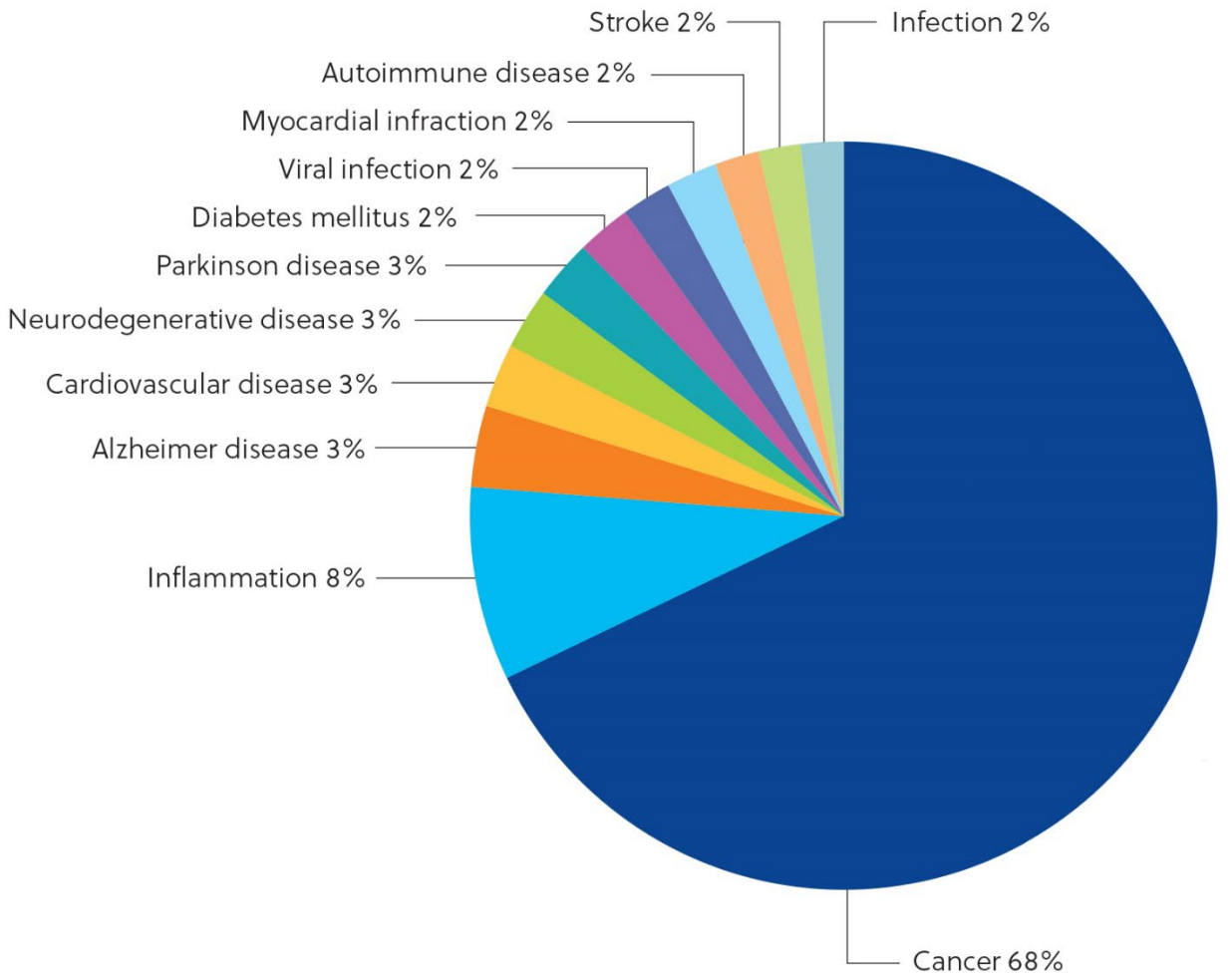
Cancer leads the way

amongst a wide range of diseases



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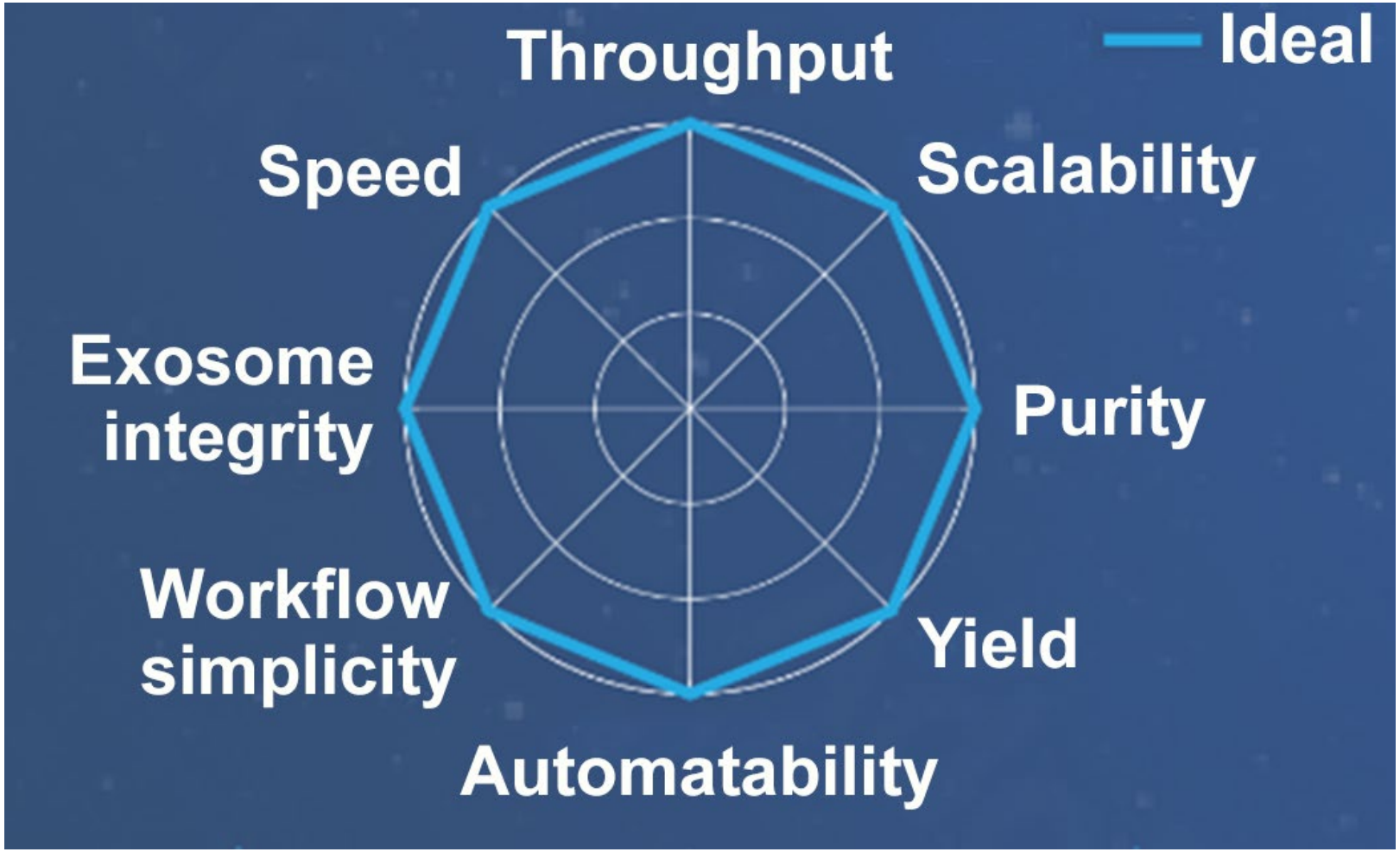
There’s a challenge: isolating and purifying exosomes



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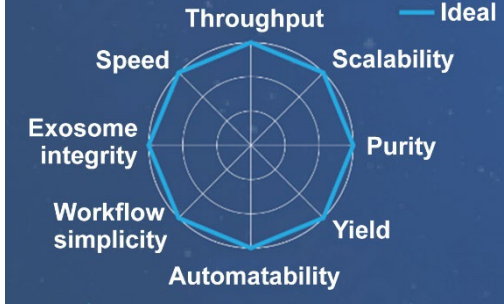
With a wide range of approaches…



Ultracentrifugation

Density and size based sequential separations

☑ purity

Polymer precipitation

Polymer adhering and precipitating exosomes

☒ purity, speed

Ultrafiltration

Filter membrane with defined size-exclusion limit

☒ purity, integrity

Size exclusion chromatography

Hydrodynamic radii exosome separation

☒ throughput, automation

Immunoaffinity

Antigen–antibody specific recognition and binding

☒ yield, speed

Microfluidics

Immunoaffinity, size, density

☒ scale, speed

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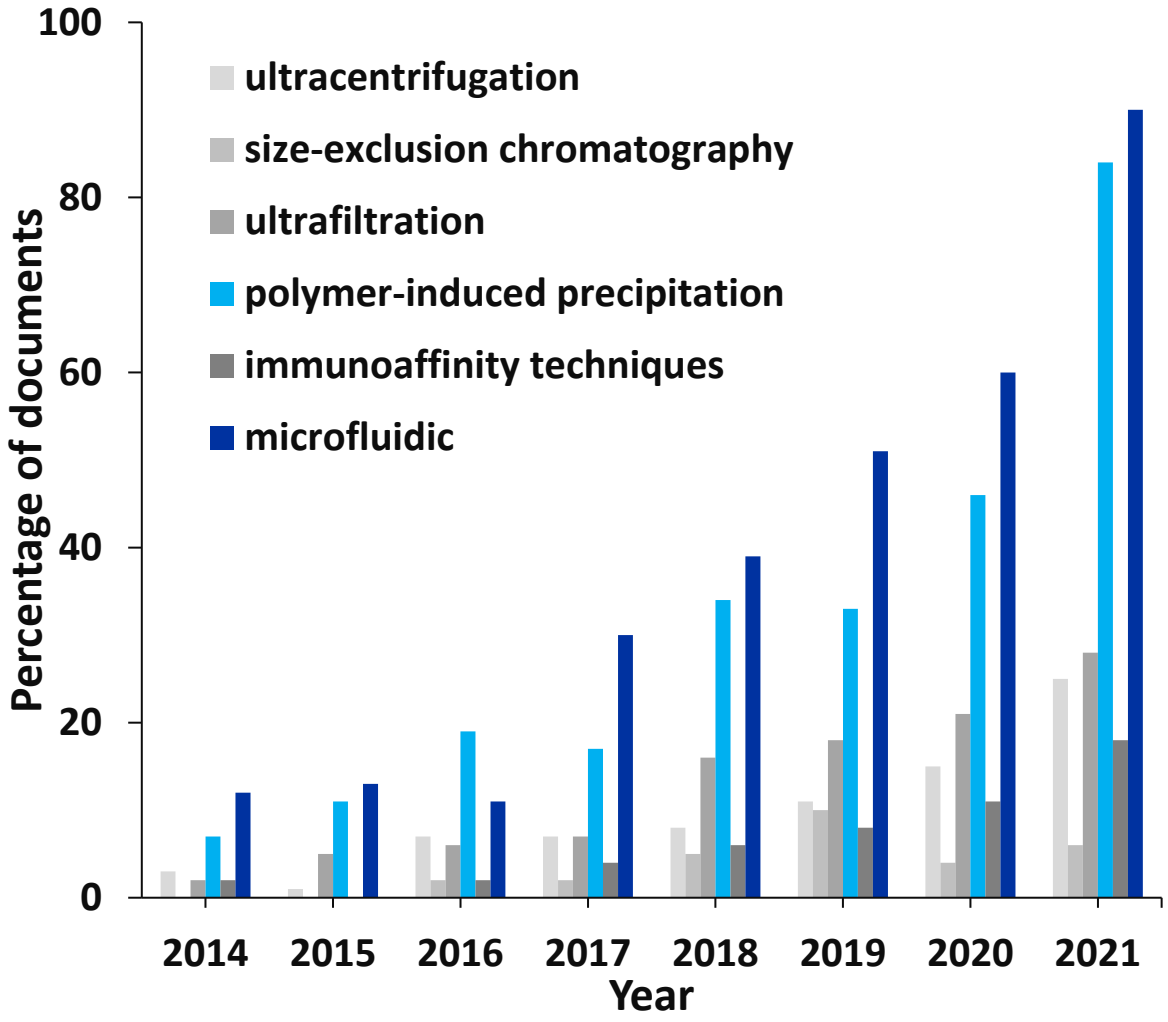
Advanced microfluidics are leading

Due to efficiency, speed, and high grade of purity



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Exosome donor cells and disease correlation

Therapy and diagnostics

	dendritic cells	leucocytes	endothelial cells	antigen-presenting cells	stem cells	erythrocytes	platelets	lymphocytes	immune cells	T-cells	natular killer cells	macrophages	adipocytes
cancer	50	41	39	56	37	35	37	46	49	46	57	39	33
inflammation	18	26	24	14	28	20	25	24	25	21	14	31	26
infection	15	15	9	18	9	14	11	15	13	17	12	13	7
cardiovascular disease	4	6	13	3	9	9	11	4	4	4	5	6	10
neurodegeneration	2	2	2	2	4	4	3	2	2	2	4	2	1
Alzheimer's disease	5	3	3	2	4	6	5	3	2	3	3	3	3
Parkinson's disease	2	2	2	2	3	5	3	2	1	2	3	2	2
diabetes	3	4	8	4	6	8	6	4	3	4	2	5	17

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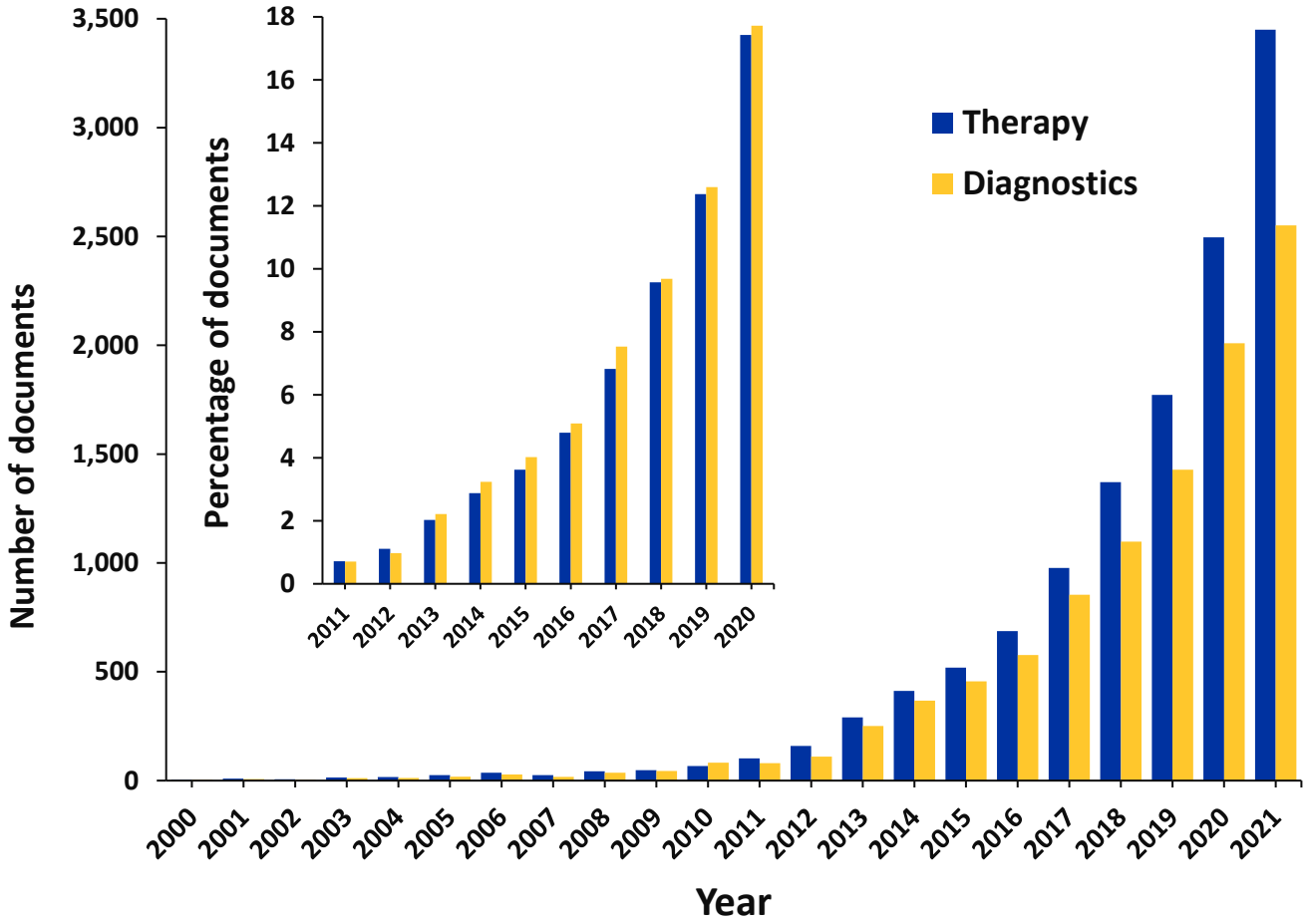
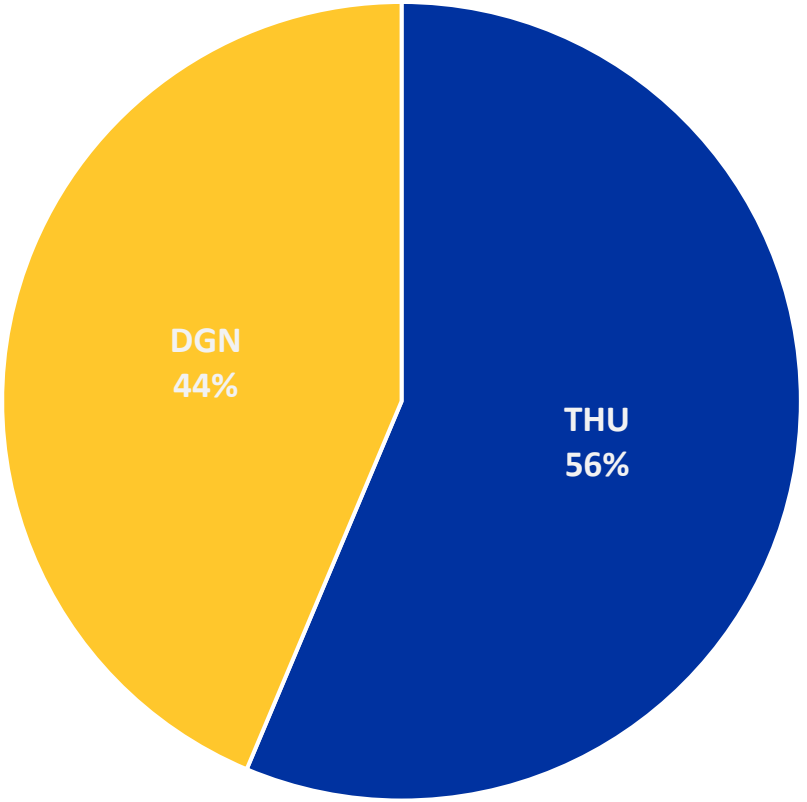
Therapeutic and diagnostic growing in equal shares over time

Therapeutics lead in publication numbers





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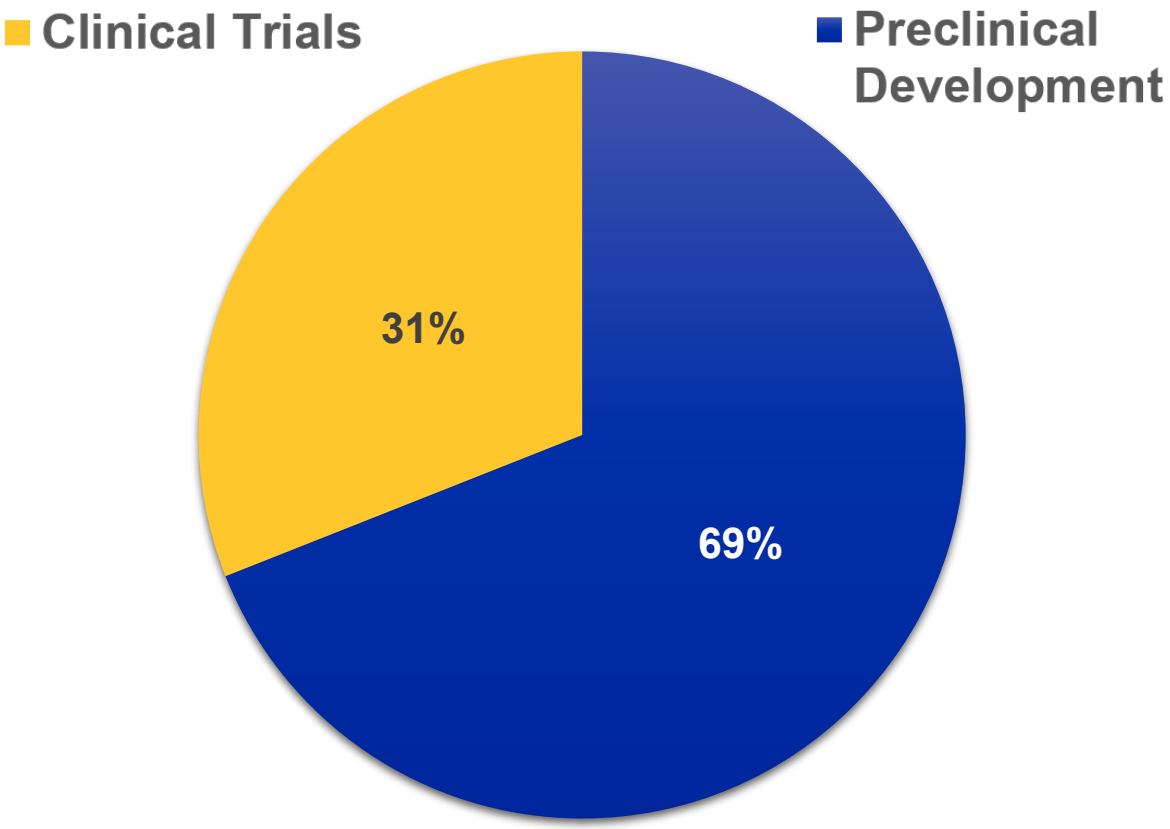
Twice as many pre-clinical studies

Suggests a wave of new drugs across a wide range of diseases



Exosomes in clinical studies	Therapeutic Focus
bmMSC-derived exosomes	ARDS, IBD
bmMSC-derived exosomes	Wound healing
amniotic fluid derived exosomes	ARDS
Purified exosome product	Wound healing/ Myocardial infarction
exosome with ASO-STAT6	Hepatocellular Carcinoma
umbilical cord derived exosomes	ARDS
ginger exosomes	IBD
MSCs-derived exosome with KrasG12D siRNA	Pancreatic cancer

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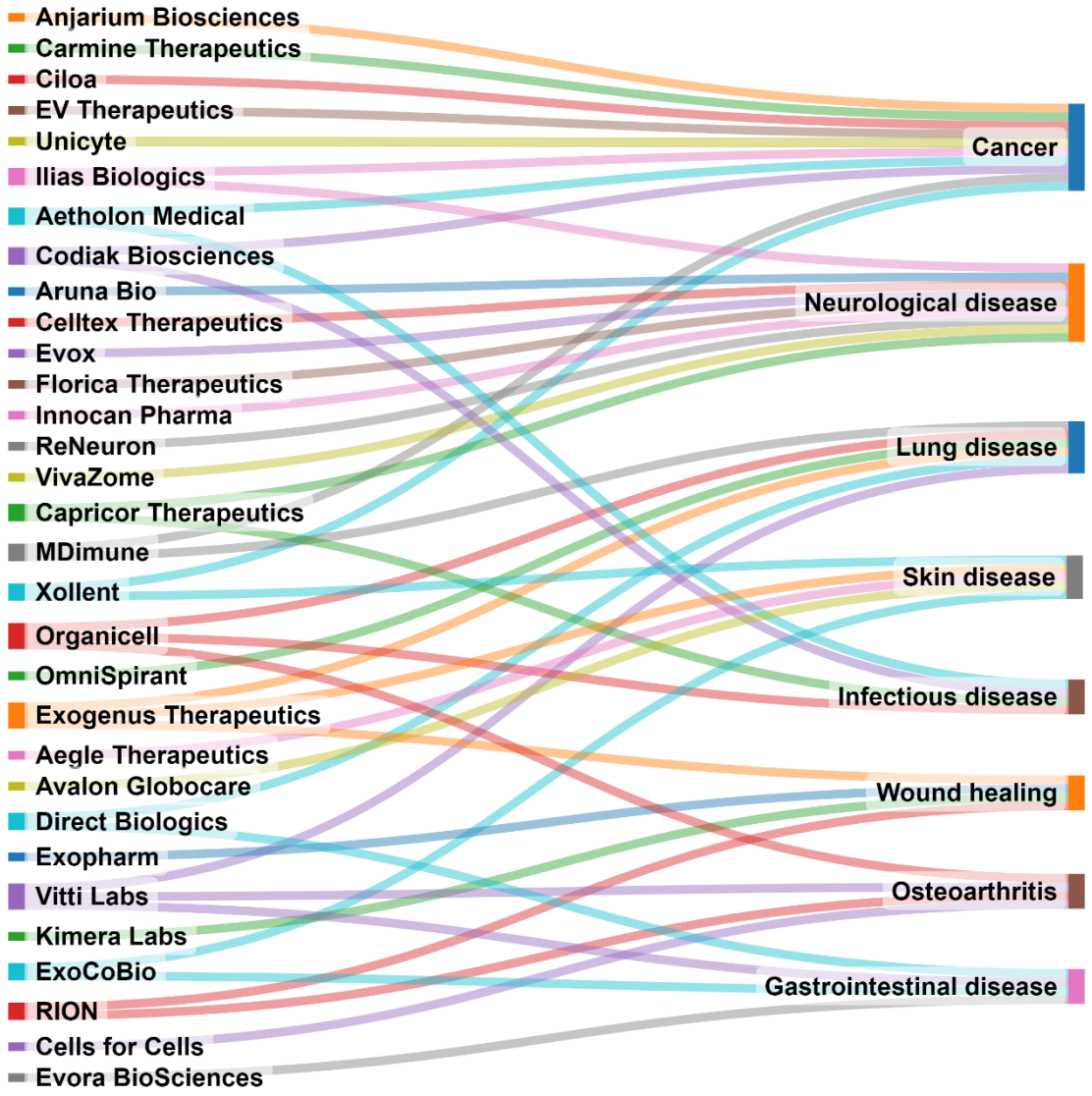
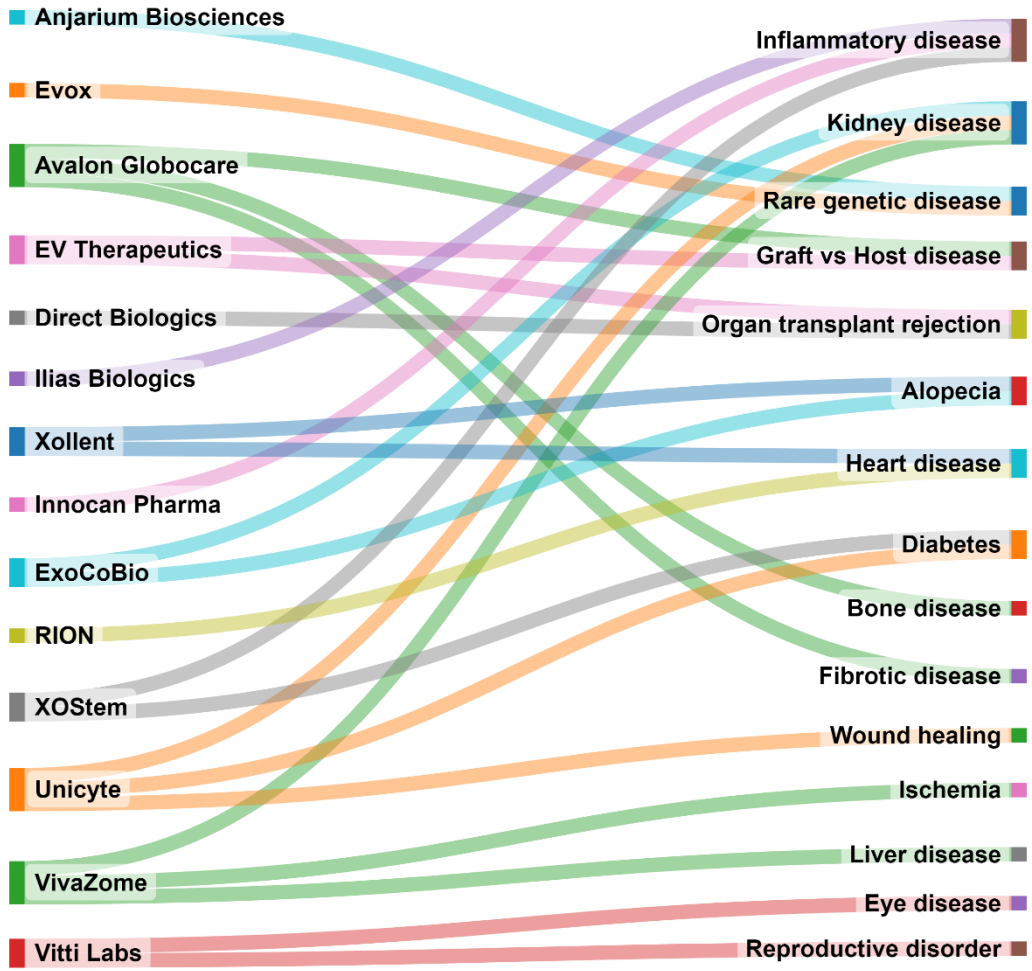
Exosome commercialization, from bench to bedside

Companies and their targeted diseases





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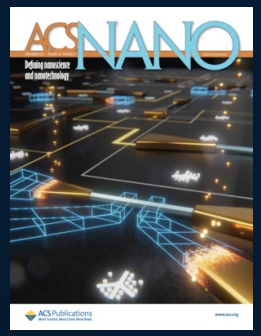
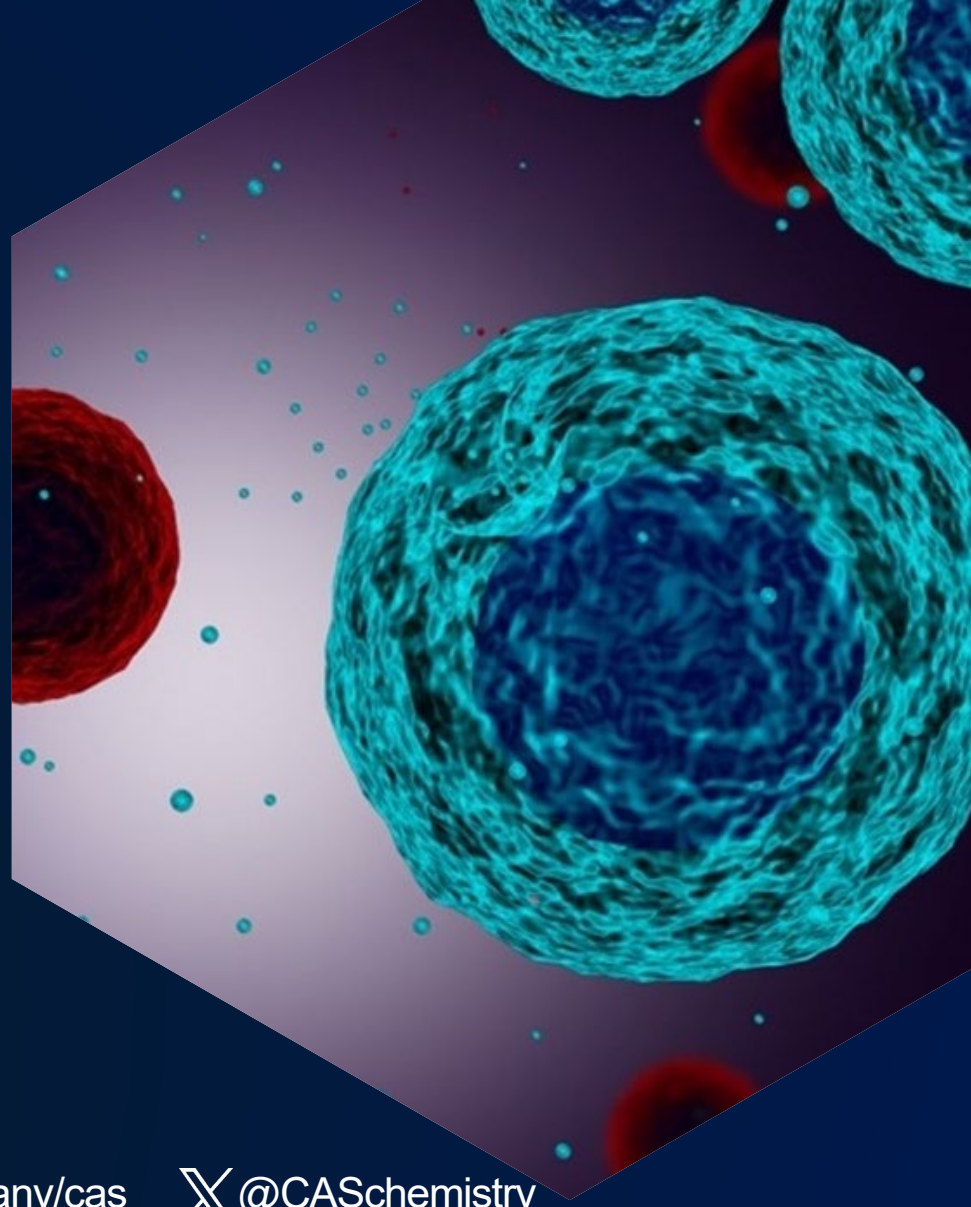
Gain insights on the emerging landscape of exosomes and more

Peer reviewed journal article
cas.org/exosomes





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