



Key Opinion Leader Call – March 26, 2020

Why Exosomes are Uniquely Suited for Vaccine Development
-Exosomes Platform Technology to Combat the Novel Coronavirus-

NASDAQ: CAPR

Forward-Looking Statements

Statements in this presentation regarding the efficacy, safety, and intended utilization of Capricor's product candidates; the initiation, conduct, size, timing and results of discovery efforts and clinical trials; the pace of enrollment of clinical trials; plans regarding regulatory filings, future research and clinical trials; regulatory developments involving products, including the ability to obtain regulatory approvals or otherwise bring products to market; plans regarding current and future collaborative activities and the ownership of commercial rights; scope, duration, validity and enforceability of intellectual property rights; future royalty streams, revenue projections; expectations with respect to the expected use of proceeds from the recently completed offerings and the anticipated effects of the offerings, and any other statements about Capricor's management team's future expectations, beliefs, goals, plans or prospects constitute forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995. Any statements that are not statements of historical fact (including statements containing the words "believes," "plans," "could," "anticipates," "expects," "estimates," "should," "target," "will," "would" and similar expressions) should also be considered to be forward-looking statements. There are a number of important factors that could cause actual results or events to differ materially from those indicated by such forward-looking statements. More information about these and other risks that may impact Capricor's business is set forth in Capricor's Annual Report on Form 10-K for the year ended December 31, 2018 as filed with the Securities and Exchange Commission on March 29, 2019, and as amended by its Amendment No. 1 to Annual Report on Form 10-K/A filed with the Securities and Exchange Commission on April 1, 2019, in its Quarterly Report on Form 10-Q for the quarterly period ended September 30, 2019, as filed with the Securities and Exchange Commission on November 8, 2019, and in its Registration Statement on Form S-1 as filed with the Securities and Exchange Commission on December 5, 2019 which was declared effective by the Securities and Exchange Commission on December 17, 2019, and the prospectus contained therein, together with any amendments and supplements thereto. All forward-looking statements in this press release are based on information available to Capricor as of the date hereof, and Capricor assumes no obligation to update these forward-looking statements.

CAP-1002 is an Investigational New Drug and is not approved for any indications. CAP-2003 has not yet been approved for clinical investigation.

Call Participants

Stephen J. Gould, Ph.D. – Professor of Biological Chemistry at Johns Hopkins University and Executive Consultant to Capricor

Linda Marban, Ph.D. – Capricor CEO

Stephen J. Gould

Affiliations, Activities, & Conflicts

Academic Affiliations & Activities:

Professor of Biological Chemistry
Johns Hopkins University

JHU Administrative Activities

- Director, Graduate Program in Biological Chemistry
- Course Director, 'Translational Intercession in Metabolism'
- Course Director, 'Exosomes & Other EVs'

External Administrative Activities

- President, American Society for Exosomes and Microvesicles
- CSO, TAVEC Pharmaceuticals

Research Activities:

- exosome biogenesis & uptake
- retrovirus budding & infectivity
- exosome engineering
- exosome-based therapeutics
- *intersection of cell biology & human disease*

Consulting:

Sanderling Ventures
ReNeuron
Capricor
Gates Ventures
Kolon Life Science
Nanoview Biosciences
ParticleMetrix
PureTech Health
System Biosciences
Bio-Trac
Round Table Group
Exosis

Equity/Royalty/License:

TAVEC*
Exosoma*
GSC Services*
Capricor*
AbbVie
AstraZeneca
Johns Hopkins University

Funding:

NIH
AbbVie
AstraZeneca
Capricor
TAVEC
Johns Hopkins University

coronavirus.jhu.edu

Coronavirus COVID-19 Global Cases by Johns Hopkins CSSE

Total Confirmed
105,559

Confirmed Cases by Country/Region

- 80,652 Mainland China
- 7,041 South Korea
- 5,883 Italy
- 5,823 Iran
- 799 Germany
- 716 France
- 696 Others
- 500 Spain
- 461 Japan
- 376 US
- 268 Switzerland
- 206 UK
- 188 Netherlands
- 169 Belgium
- 161 Sweden
- 147 Norway
- 138 Singapore

Country/Region City, St/Prov

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Cumulative Confirmed Cases Active Cases

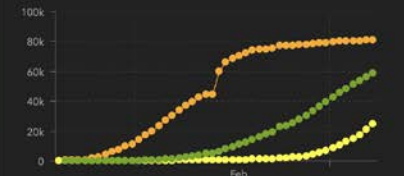
Lancet Inf Dis Article: [Here](#), Mobile Version: [Here](#), Visualization: JHU CSSE, Automation Support: [Esri Living Atlas team](#) and [JHU APL](#).
Data sources: [WHO](#), [CDC](#), [ECDC](#), [NHC](#) and [DXY](#). Read more in this [blog](#), [Contact US](#).
Downloadable database: [GitHub](#): [Here](#), [Feature layer](#): [Here](#).
Visit the [Johns Hopkins Coronavirus Resource Center](#) where our experts help to advance understanding of the virus, inform the public, and brief policymakers in order to guide a response, improve care, and save lives.

Total Deaths
3,555

- 2,959 deaths Hubei Mainland China
- 233 deaths Italy
- 145 deaths Iran
- 44 deaths South Korea
- 22 deaths Henan Mainland China
- 13 deaths Heilongjiang Mainland China
- 12 deaths King County, WA US
- 11 deaths France
- 10 deaths

Total Recovered
58,354

- 43,500 recovered Hubei Mainland China
- 1,669 recovered Iran
- 1,244 recovered Henan Mainland China
- 1,237 recovered Guangdong Mainland China
- 1,154 recovered Zhejiang Mainland China
- 979 recovered Anhui Mainland China
- 960 recovered Hunan Mainland China
- 916 recovered Jiangxi Mainland China
- 627 recovered



● Mainland China ● Other Locations ● Total Recovered

Actual Logarithmic Daily Cases

coronavirus.jhu.edu



Coronavirus COVID-19 Global Cases by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University (JHU)



Total Confirmed

441,187

Confirmed Cases by
Country/Region/Sovereignty

81,661 China
74,386 Italy
60,115 US
47,610 Spain
35,740 Germany
27,017 Iran
22,654 France
10,537 Switzerland
9,137 Korea, South
8,328 United Kingdom
6,438 Netherlands
5,588 Austria
4,937 Belgium
3,034 Norway

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countries/regions

Lancet Inf Dis Article: [Here](#), Mobile Version: [Here](#). Visualization: JHU CSSE. Automation Support: [Esri Living Atlas team](#) and [JHU APL](#). Contact US, [FAQ](#).
Data sources: WHO, CDC, ECDC, NHC, DXY, [1point3acres](#), [Worldmeters.info](#), [BNO](#), state and national government health departments, and local media reports. Read more in this [blog](#).

Total Deaths

20,499

7,503 deaths
Italy

3,434 deaths
Spain

3,163 deaths
Hubei China

2,077 deaths
Iran

1,100 deaths
France

433 deaths
United Kingdom

356 deaths
Netherlands

192 deaths

Total Recovered

112,982

60,811 recovered
Hubei China

9,625 recovered
Iran

8,326 recovered
Italy

5,367 recovered
Spain

3,730 recovered
Korea, South

3,540 recovered
Germany

3,281 recovered
France

1,336 recovered



Confirmed

Daily Increase

1. What Are Exosomes/Extracellular Vesicles (EVs): Secreted, Single Membrane Vesicles

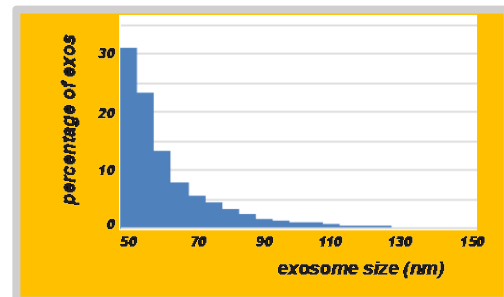
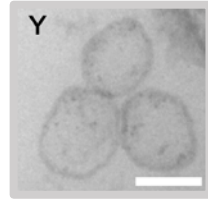
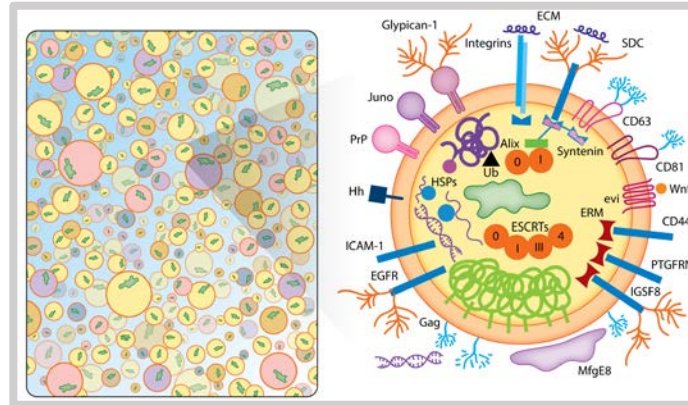
Exosomes:

- small secreted vesicles, ~30-150nm
- highly enriched in selected:
 - proteins
 - lipids
 - nucleic acids
 - glycoconjugates
- released by all cells
- abundant in biofluids (blood, urine, saliva, milk, CSF, bile, lymph, semen, vitreous, feces, etc.)

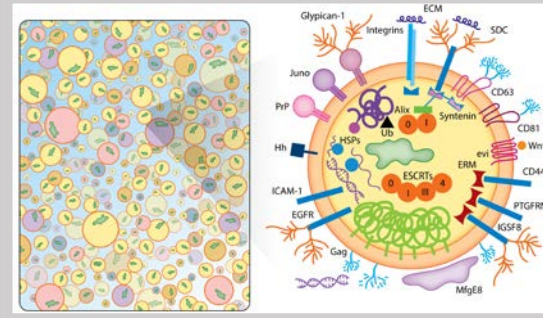
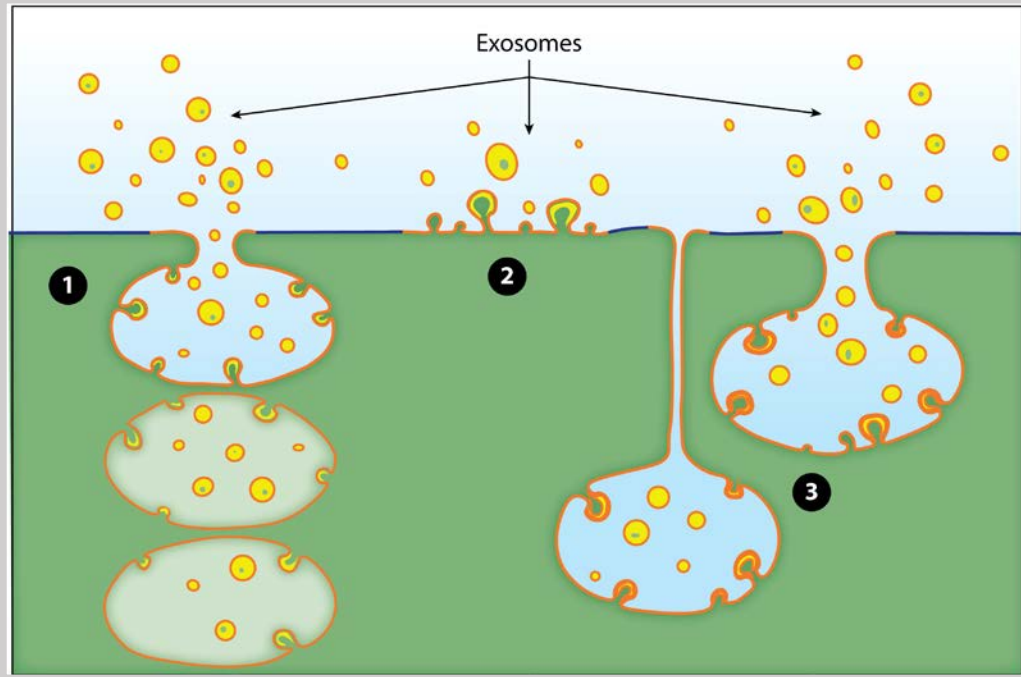
Microvesicles:

- larger secreted vesicles
- ~300-2000 nm dia.
- No selective enrichment of cargoes

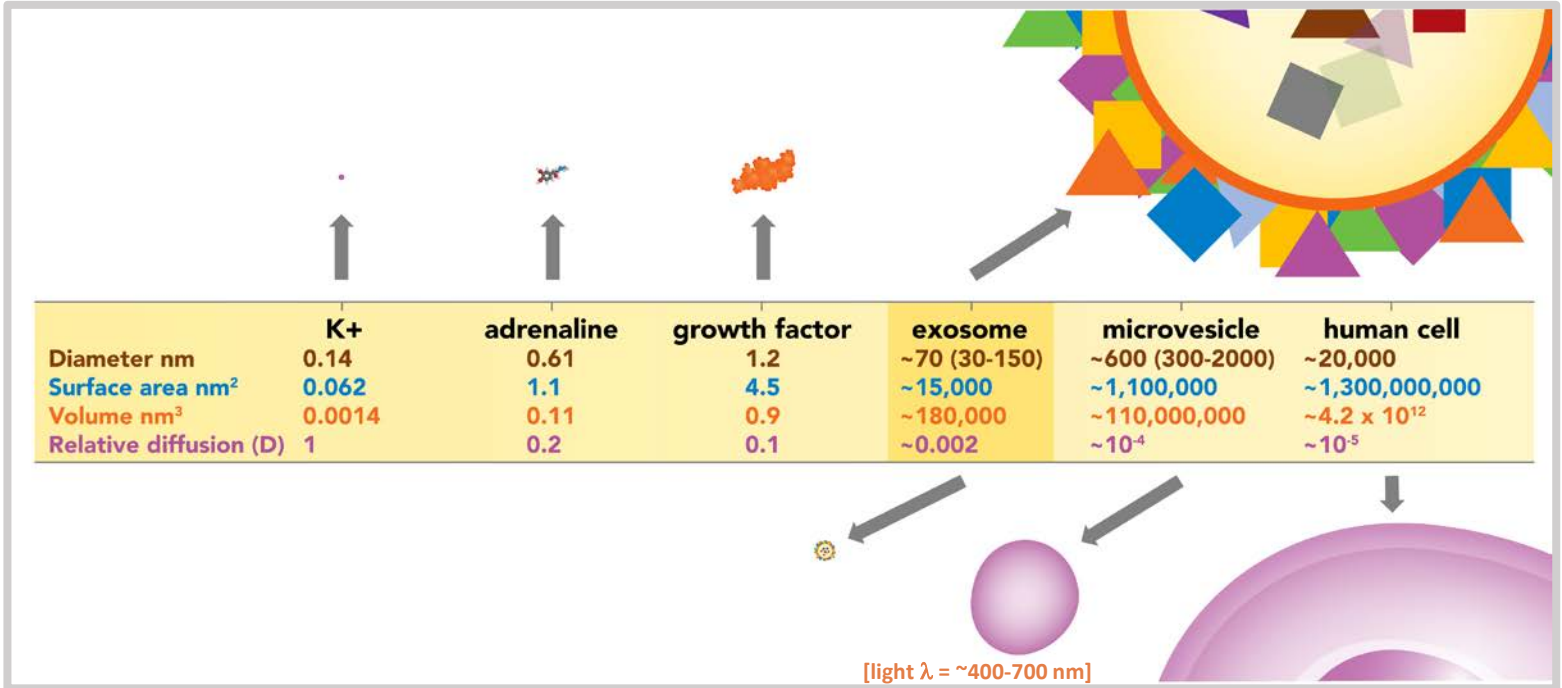
(Extracellular Vesicles = ALL secreted vesicles)



2. How Do Cells Make Exosomes?

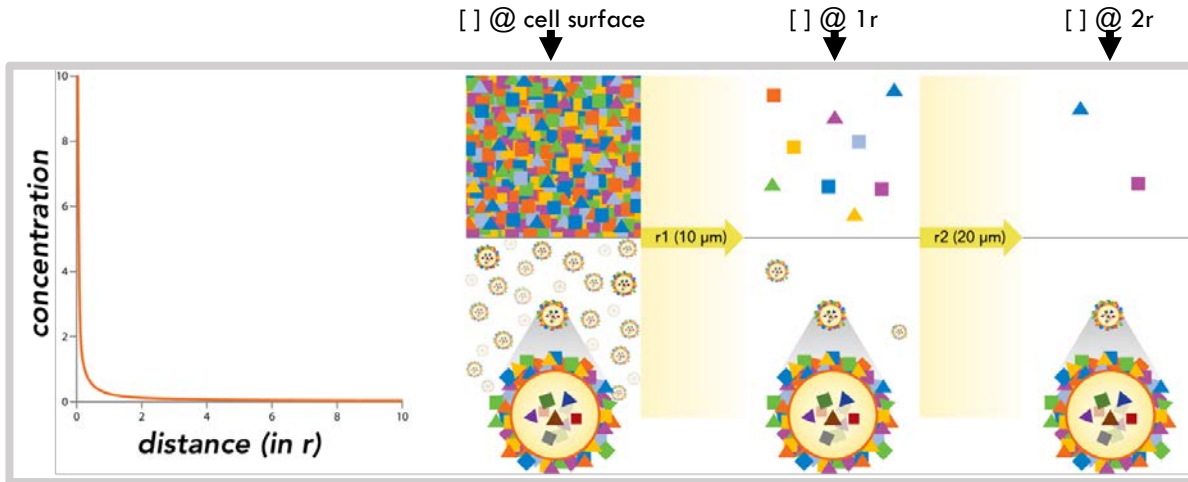


3. Exosomes Are Very Large, Yet Really Small



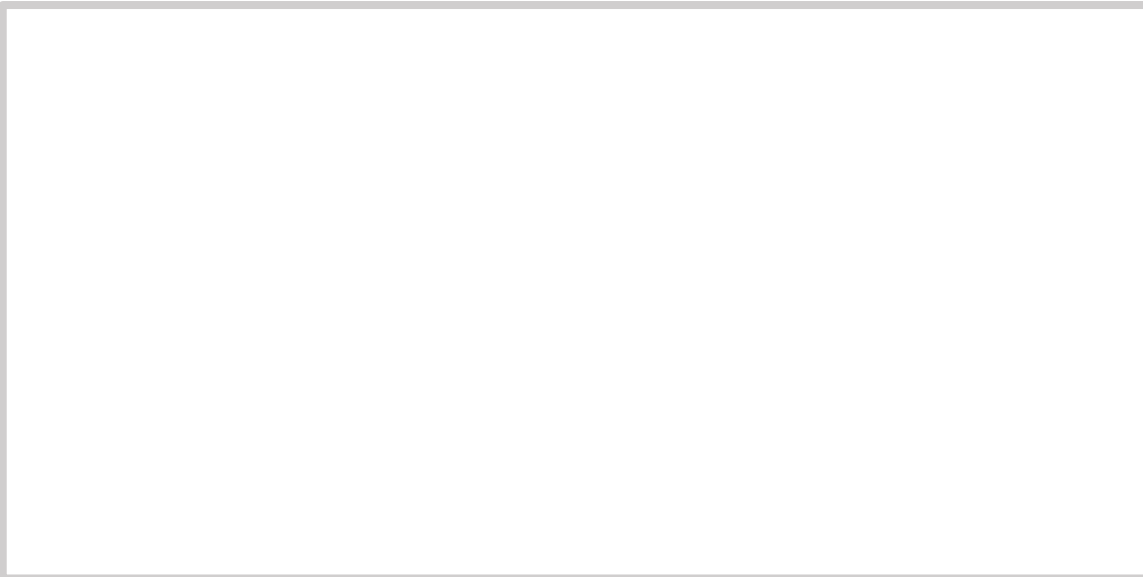
4. Exosomes A Drug Delivery Vehicle

- Normally, concentration falls dramatically over distance (inverse cube law)
- However, concentrations on/in exosomes remain constant, allowing:



1. **Enhanced signaling from a single molecule** (concentration, avidity, interfacial kinetics, localization effects)
2. **Multidimensional signaling** (2, 3, 4, & more molecules/signals)
3. **Biochemical pathways** (osteogenesis, clotting, etc.)

5. Exosomes Accumulate at Sites of Vascular Leakiness = Sites of Inflammation, Tumors, & Infection



- vascular permeability limit in most tissues is 6-15 nm, ~1 nm @ the BBB
- vascular permeability is much higher in the liver, allowing entry of exosomes (~100-200 nm limit)
- vascular permeability is very high at
 - **sites of infection!**
 - wounds
 - sites of inflammation
 - tumors

6. How Can Exosomes Be Used To Make Vaccines?

6a. Exosome Display Vaccines

recombinant product with clear pipeline:

- **genetically engineered cells**
 - cell platform approved for biologics production
 - engineered to express exosome-anchored antigens of interest
- **genetically engineered exosomes**
 - cells release exosomes displaying antigens of interest
 - engineered to express antigens of interest on/in exosomes
 - purified by scalable filtration and chromatography

delivered by i.m. injection & boost

6. How Can Exosomes Be Used To Make Vaccines?

6b. Exosome-mRNA Vaccines

simple formulation comprised of:

- **exosomes**
 - released by cells approved for biologics production
 - purified by scalable filtration and chromatography
- **mRNAs encoding target antigens**
 - synthesized for stability & high antigen expression
 - encode antigens that elicit strong cellular and humoral responses
- **exosome-mRNA loading reagent**
 - maximizes exosome-mRNA complexes
 - supports exosome-mediated mRNA protection
 - maintains host tolerance

delivered by i.m. injection & boost

7. Exosome-Based SAR2-CoV-2 Vaccines

7a. Exosome-SARS-CoV-2 Display Vaccine:

- **formulation: exosomes displaying SARS-CoV-2 proteins in their native context**
- human cell exosomes, recombinant production platform
- **4-part antigen design for balanced antigen presentation and immunity**
- **no infection risk – virus-free platform**

7b. Exosome-SARS-CoV-2 mRNA Vaccine

- **formulation: exosomes + mRNAs + loading reagent**
- human cell exosomes, chemical loading
- **tripartite mRNA design for balanced antigen presentation and immunity**
- **no infection risk – virus-free platform**

Thank you

Question and Answers

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