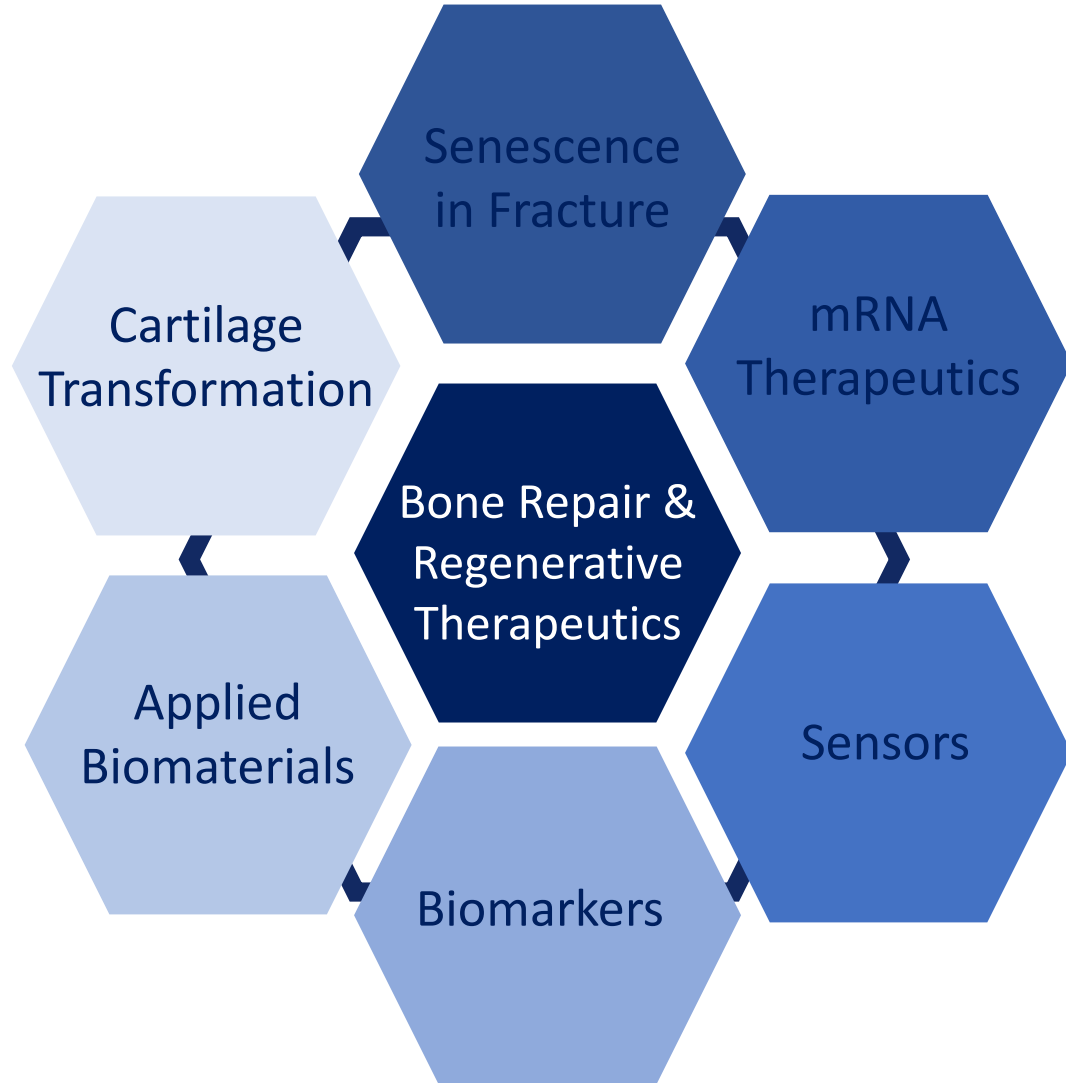
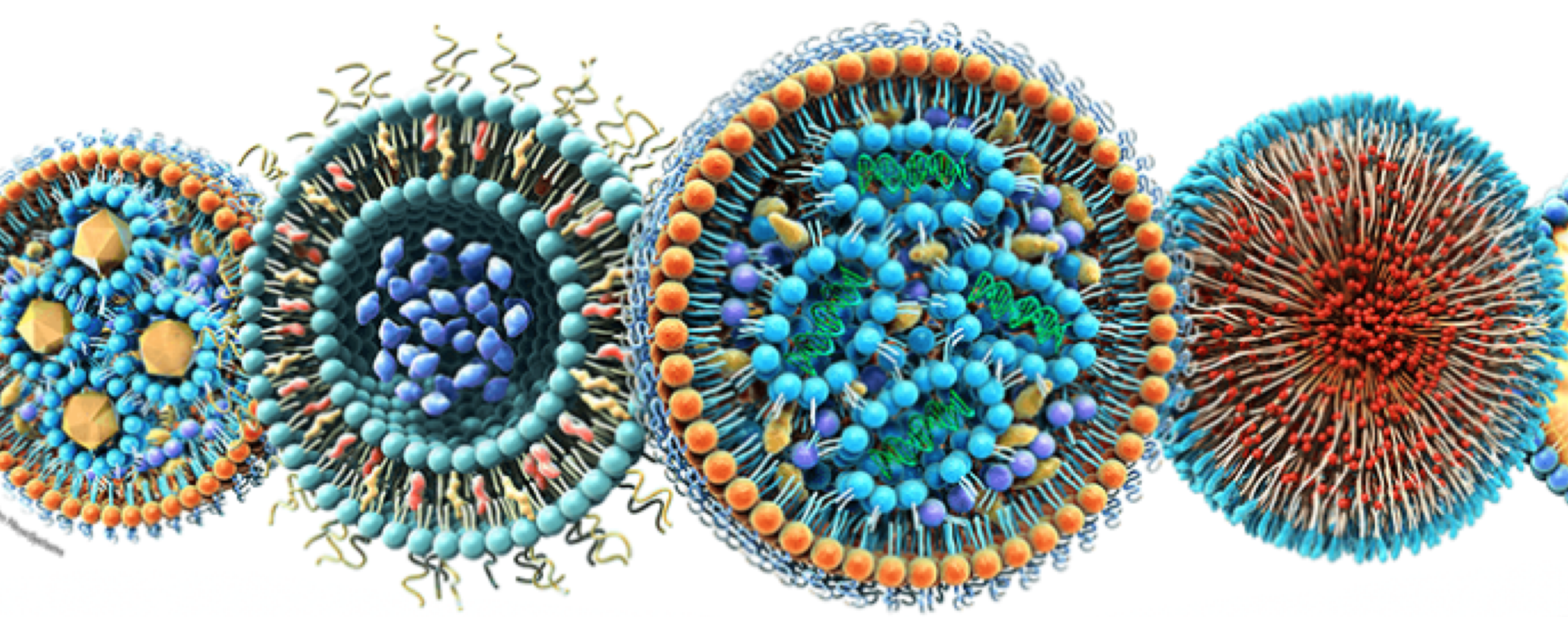


Program for Bone Repair & Regenerative Therapeutics



- ❖ 6 Funded Grants
- ❖ High impact research
(18 patents, 60 papers, 10 book chapters, 2100 citations)
- ❖ Past president of the International Society for Fracture Repair (2020-2022)
- ❖ Board Service:
 - Orthopaedic Research Society
 - Tissue Engineering & Regenerative Medicine
 - Orthopaedic Trauma Association
 - AO Foundation R&D Commission



Next-Generation Therapeutics in Regenerative Medicine: Developing a “Fracture Vaccine”

The Billion Dollar Biotech

Business: The billion-dollar biotech

Elie Dolgin

Nature 522, 26–28 (2015) | [Cite this article](#)

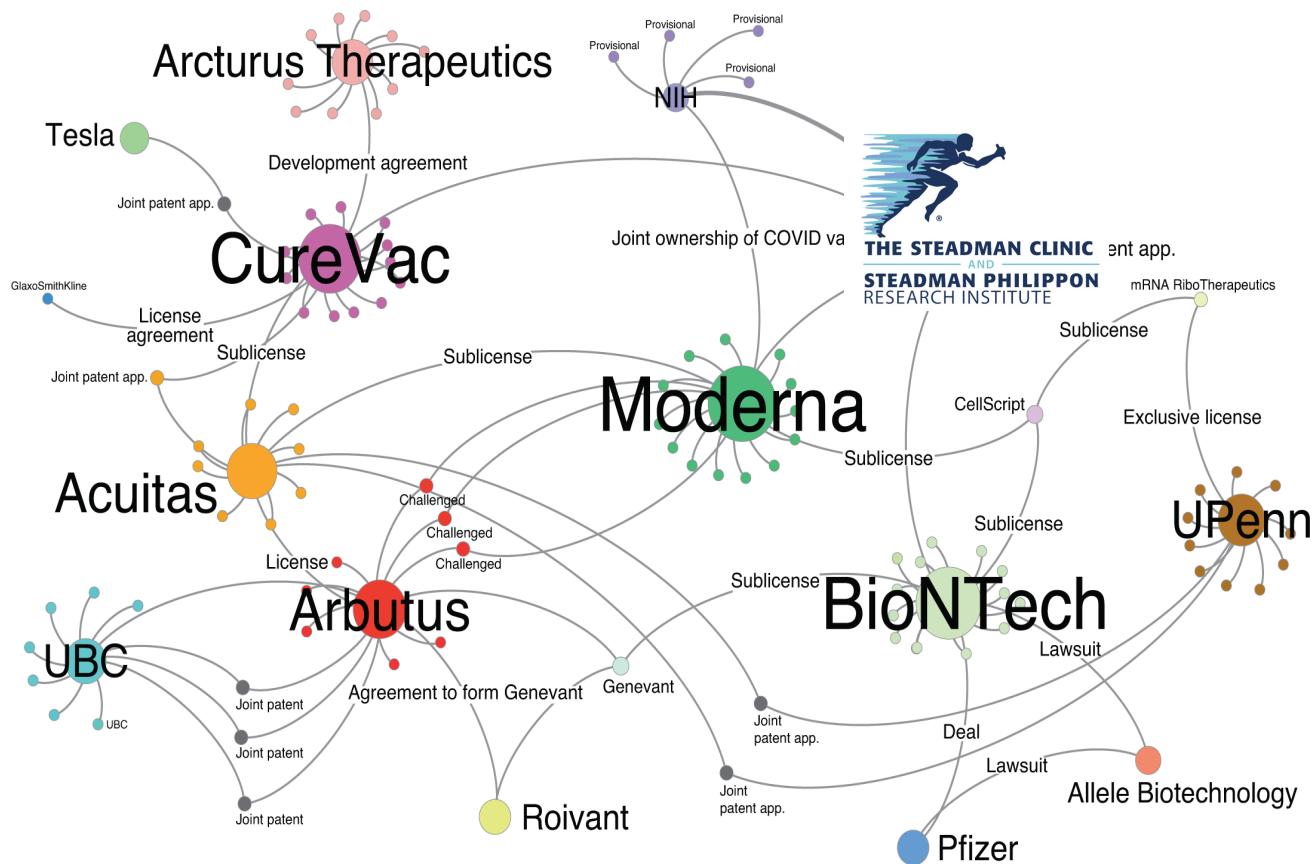
741 Accesses | 9 Citations | 272 Altmetric | [Metrics](#)

Moderna Therapeutics has big ambitions and a bankroll to match. How a fledgling start-up became one of the most highly valued private drug firms ever.

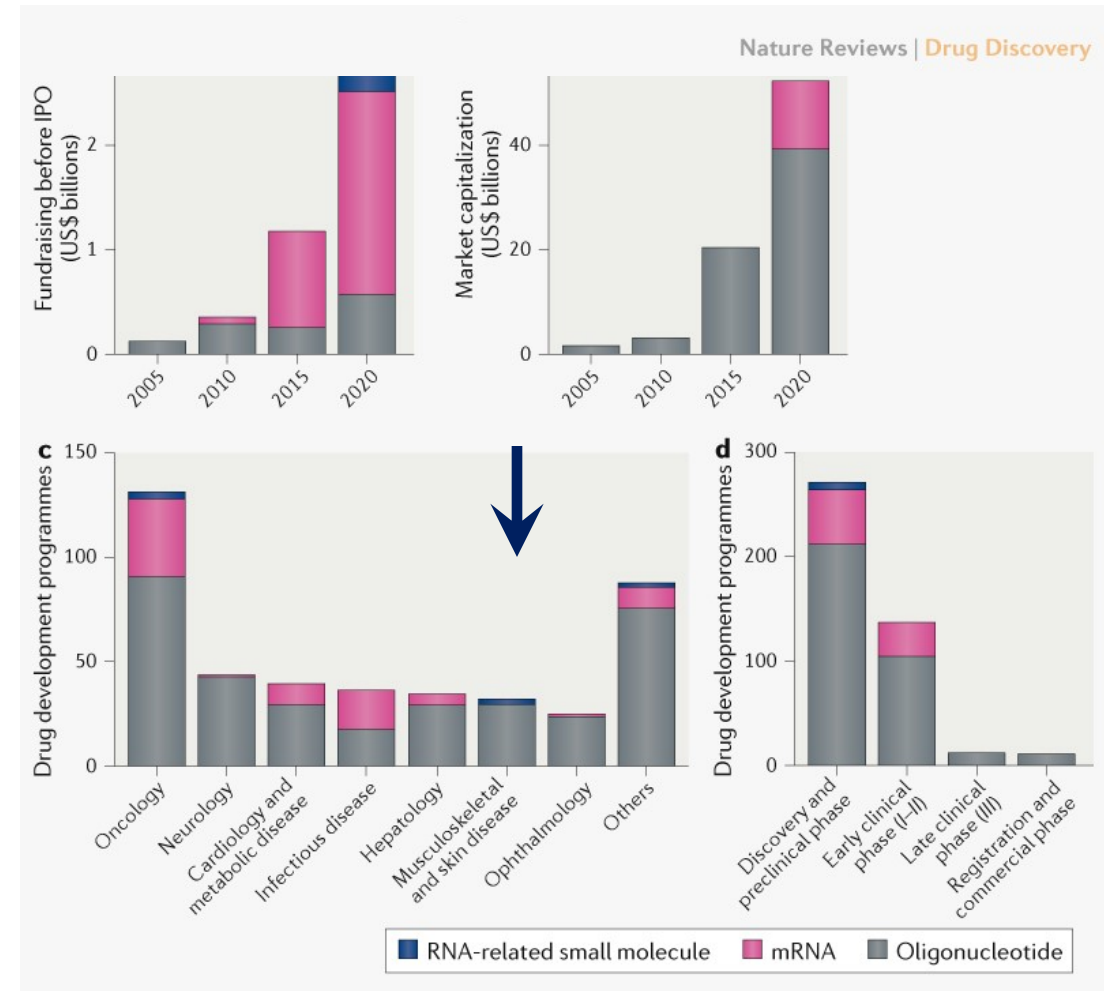


www. Bloomberg.com; July 2021

\$81 Billion in revenue since COVID-19 Vaccine
Net worth estimated at \$100 Billion

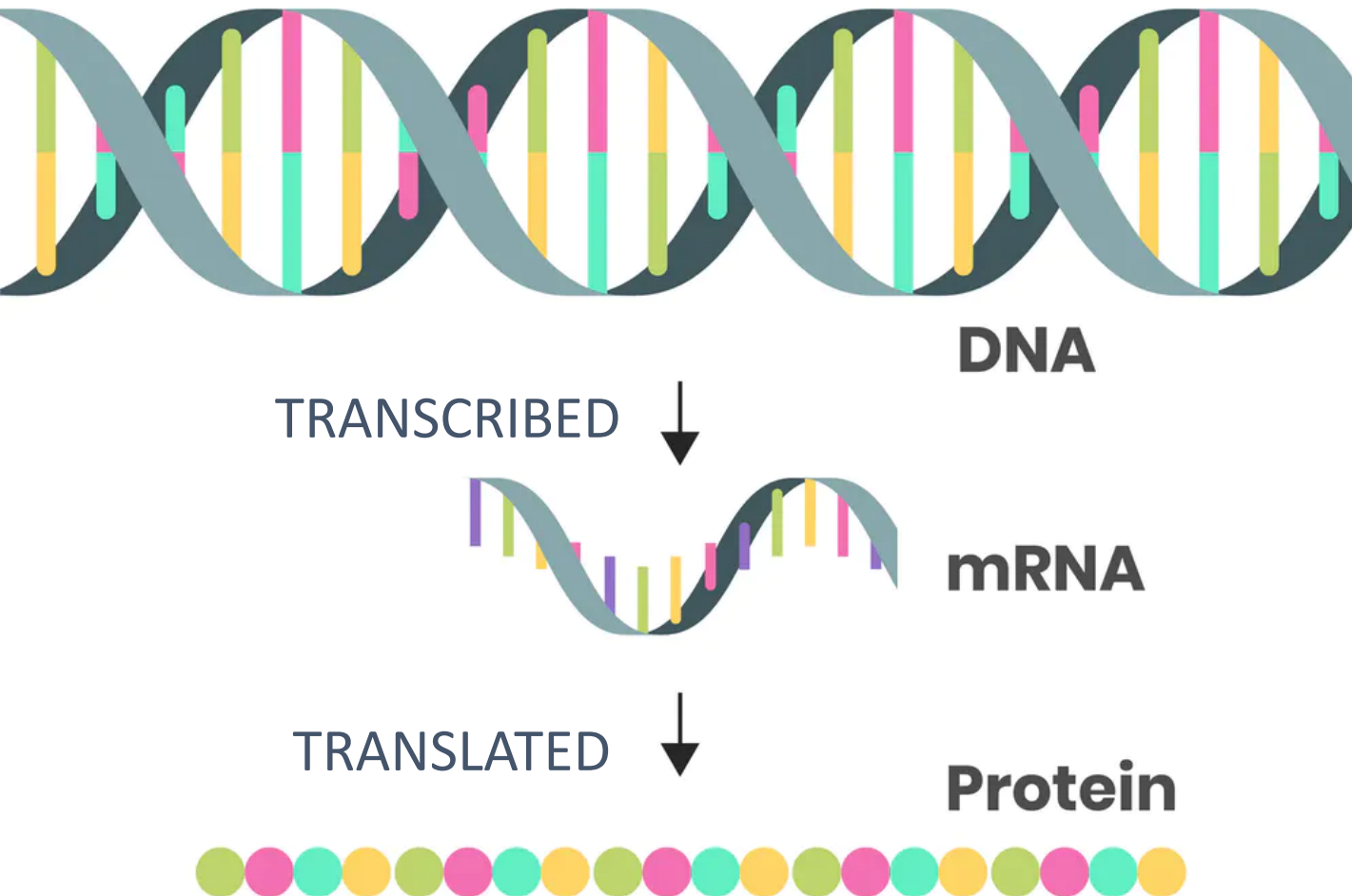


Gavirina and Kilic, Nature Biotechnology 2021.



Wang F, *et al.* Nature Reviews Drug Discovery 2020.

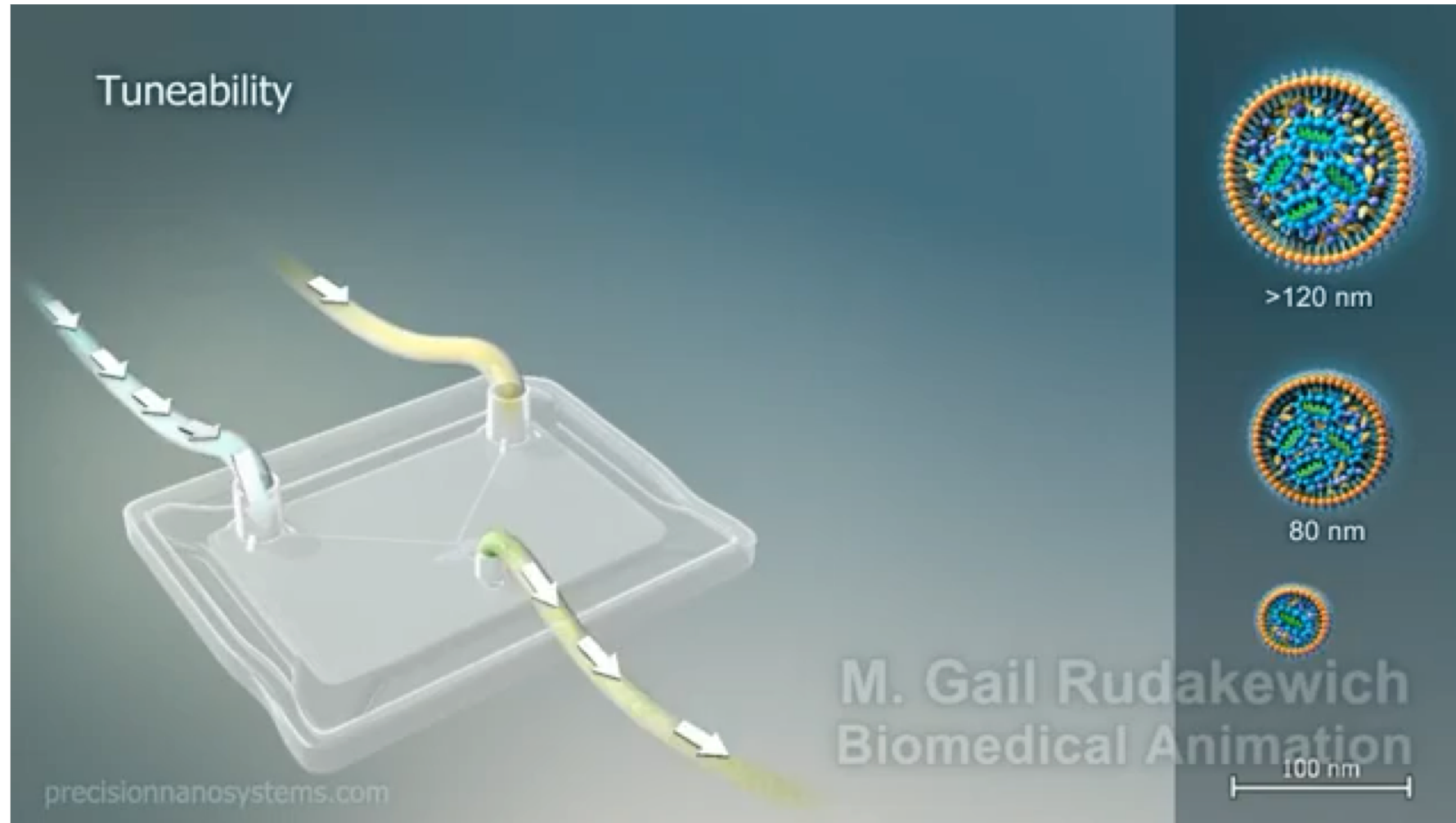
Therapeutic Advantages of mRNA



- Safety concerns (genomic integration)
- Difficult in non-dividing cells

- Short half life
- Limited activity → high doses
- Expensive to manufacture

1st Injectable mRNA Therapy Under Development at SPRI



No Pharmacologic Treatments for Delayed and Non-Healing Fractures



AN AGING POPULATION

BY 2034 THERE WILL BE
MORE ADULTS 65+ THAN
CHILDREN UNDER 18.



**AGED 50+ WILL SUFFER FROM AN
OSTEOPOROTIC FRACTURE.**

1 FRACTURE EVERY 3 SECONDS

IN 2019, FRACTURES COST THE GLOBAL
HEALTHCARE SYSTEM **\$620 BILLION**



Fracture injuries/year worldwide

10-20%

Fractures result in delayed or nonunion



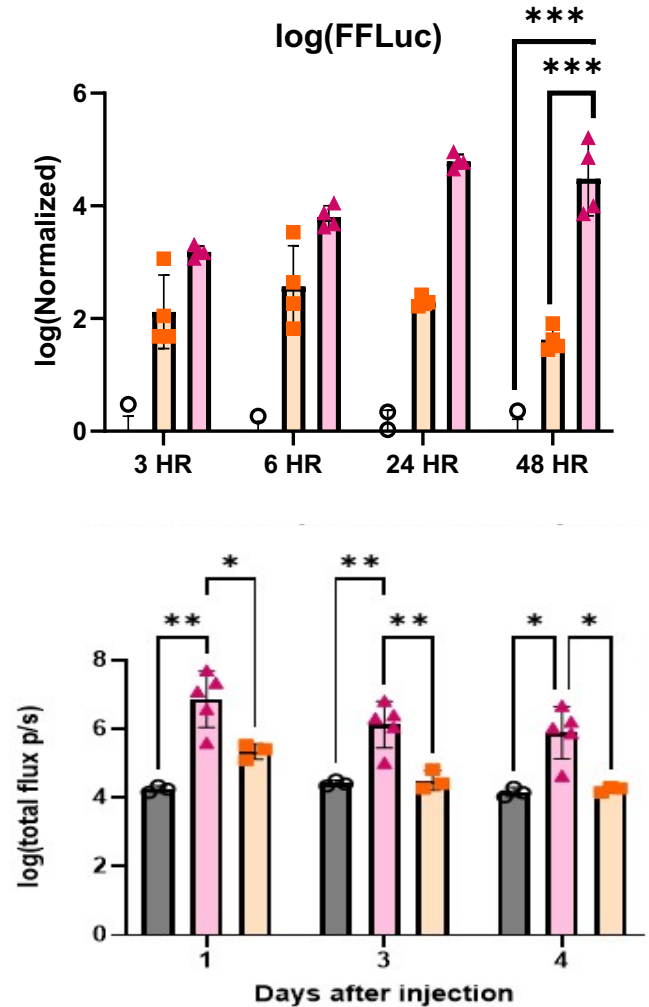
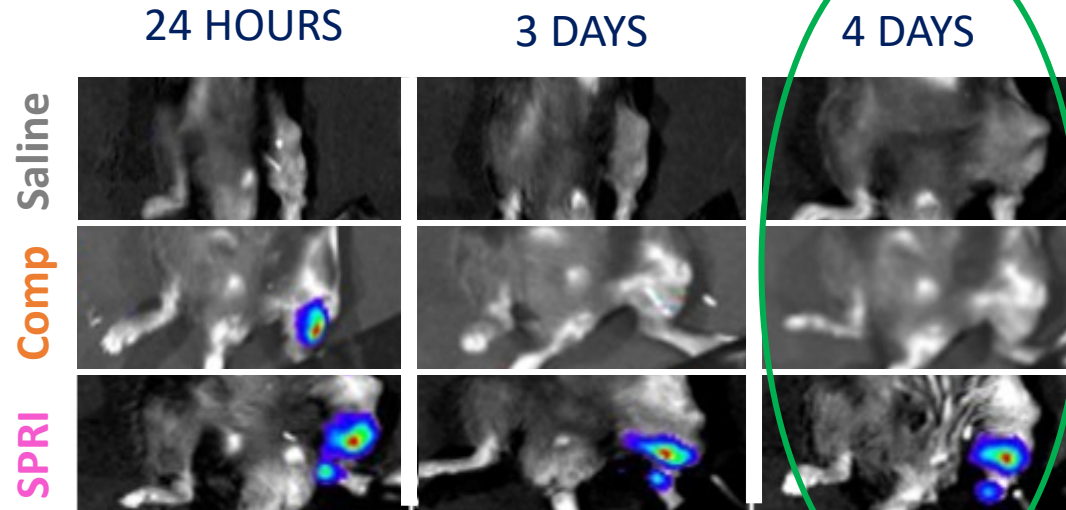
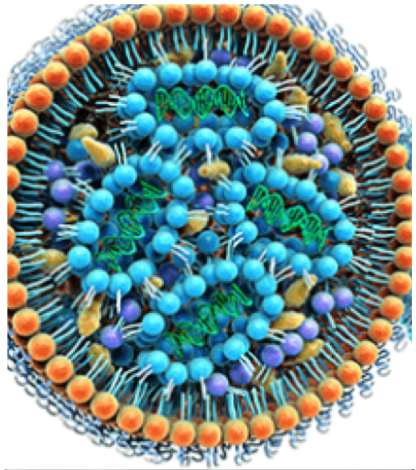
50% in elderly, diabetic, smoking, military

30% mortality and 80% permanent disability @ 1yr

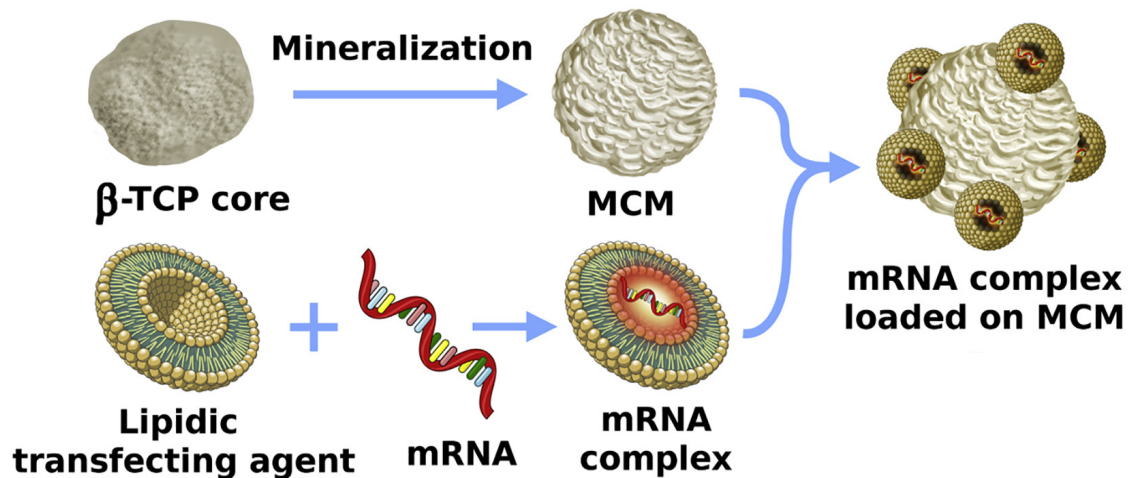
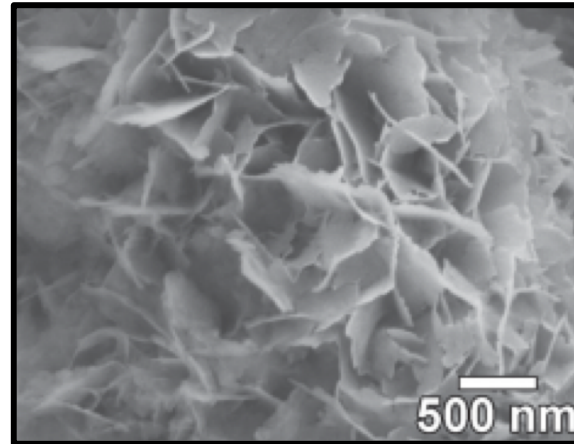
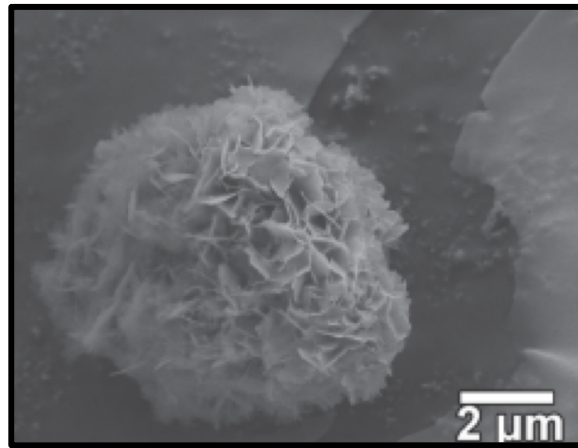


Declares Osteoporosis in Crisis → Funding Special Interest

Developing a Fracture Vaccine: Can Lipid Nanoparticles Get a Drug to the Injury?

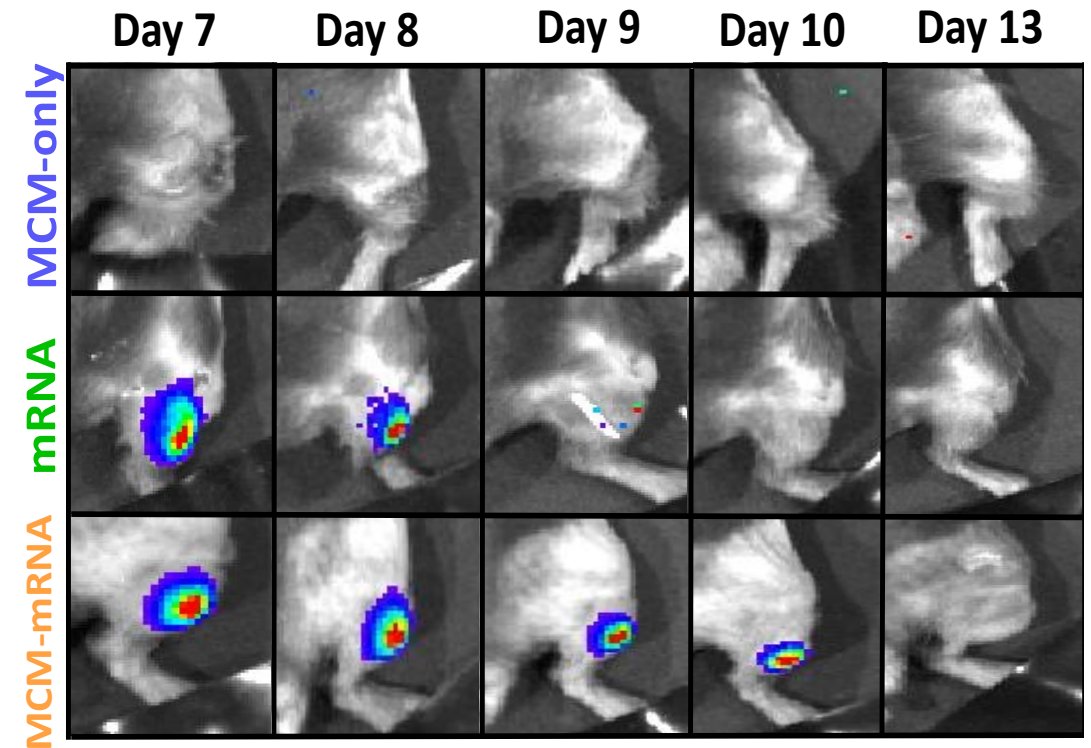


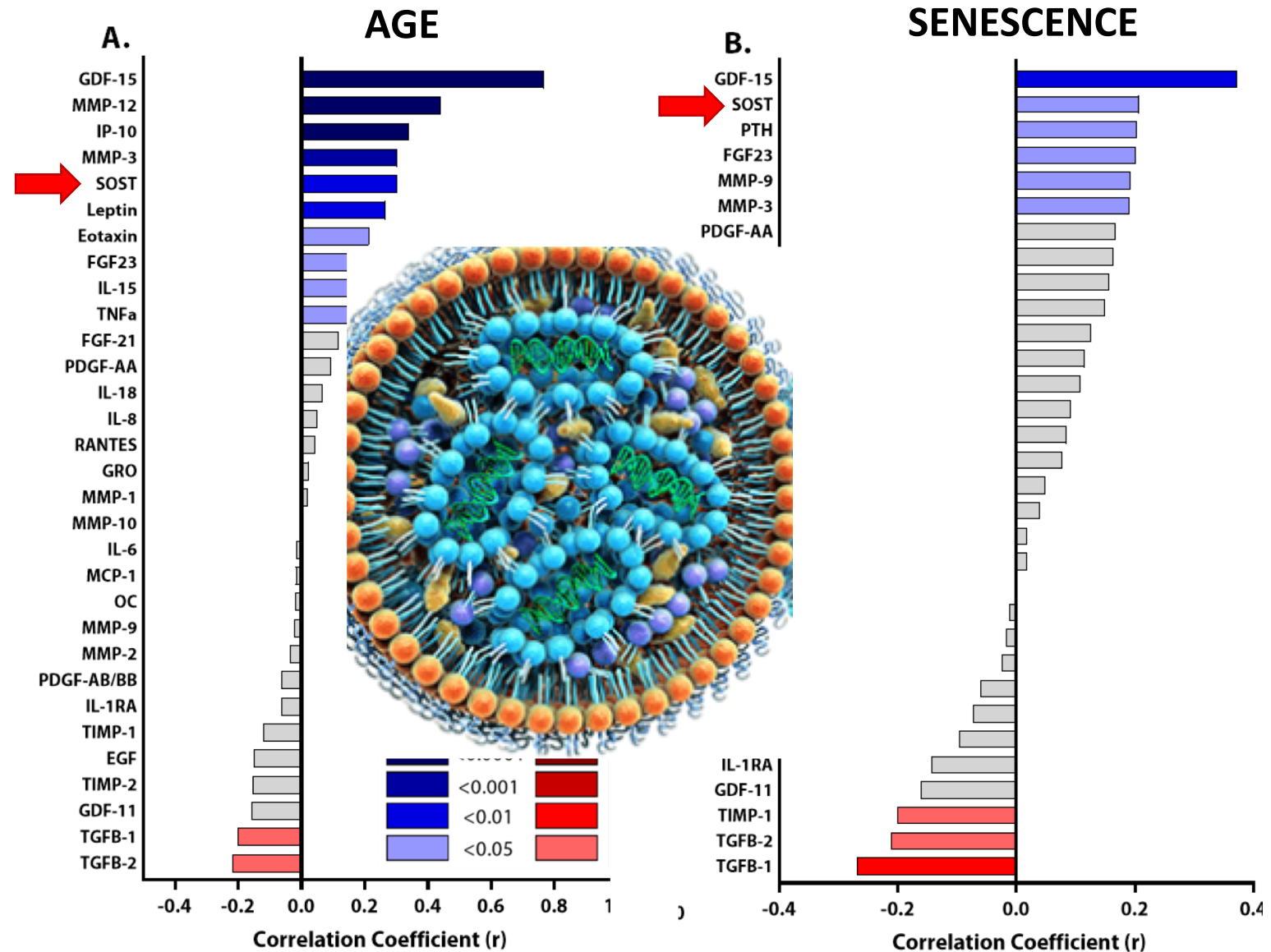
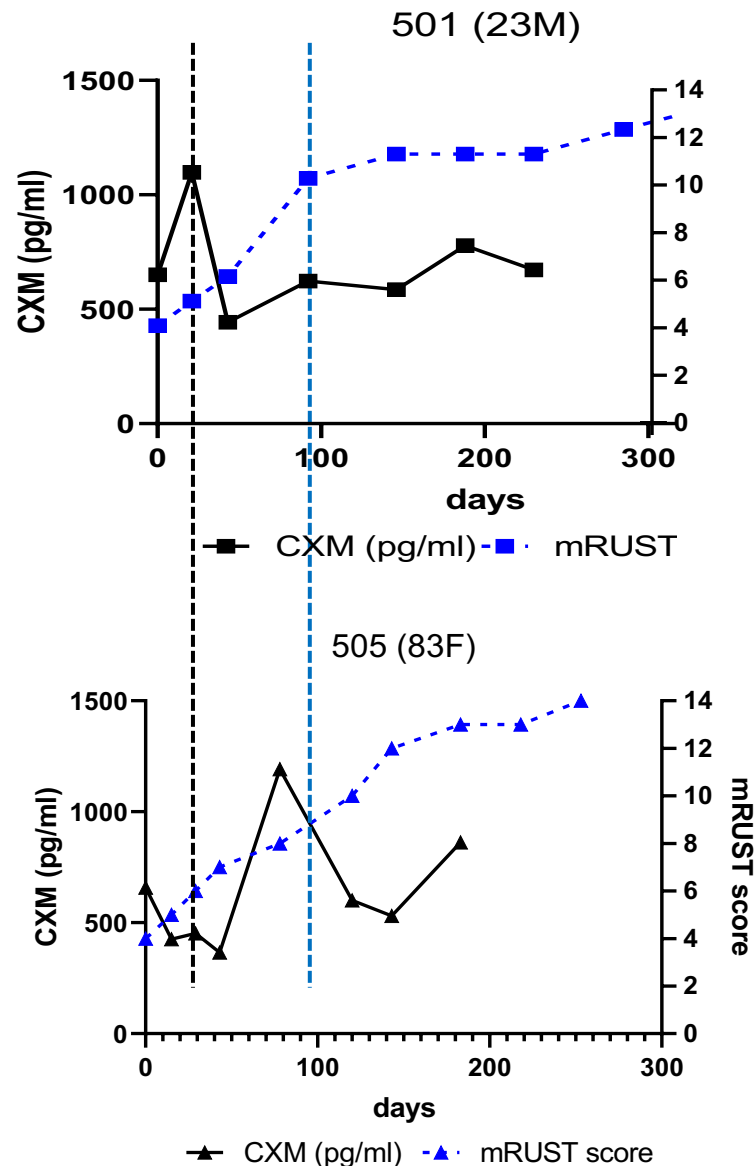
Mineral Coated Microparticle Mimic Bone To Further Improve Delivery/Storage

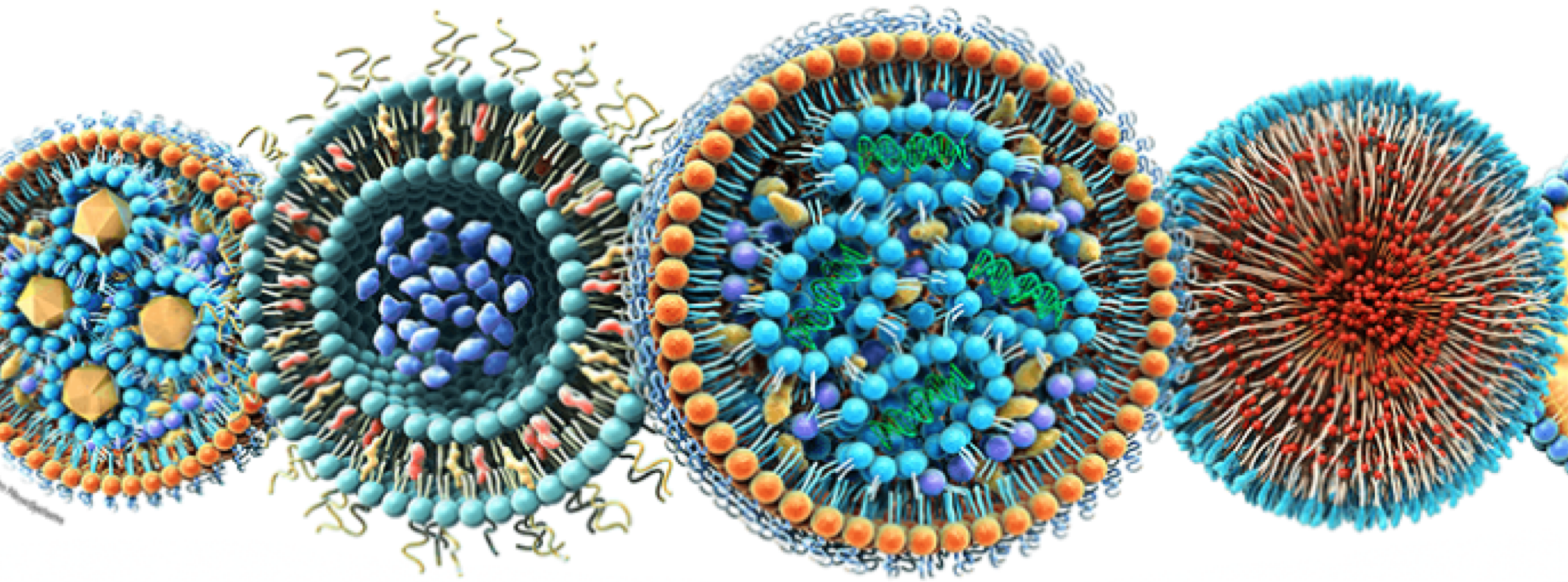


Fontana et al Molecular Therapy Nucleic Acids 2019.

Platform Enables Sustained Delivery







The Limitless Future of RNA Therapeutics

 Tulsi Ram Damase¹,  Roman Sukhovshin¹,  Christian Boada²,  Francesca Taraballi^{3,4}, 
Roderic I. Pettigrew² and  John P. Cooke^{1*}

¹RNA Therapeutics Program, Department of Cardiovascular Sciences, Houston Methodist Research Institute, Houston, TX, United States





Thank You!

