

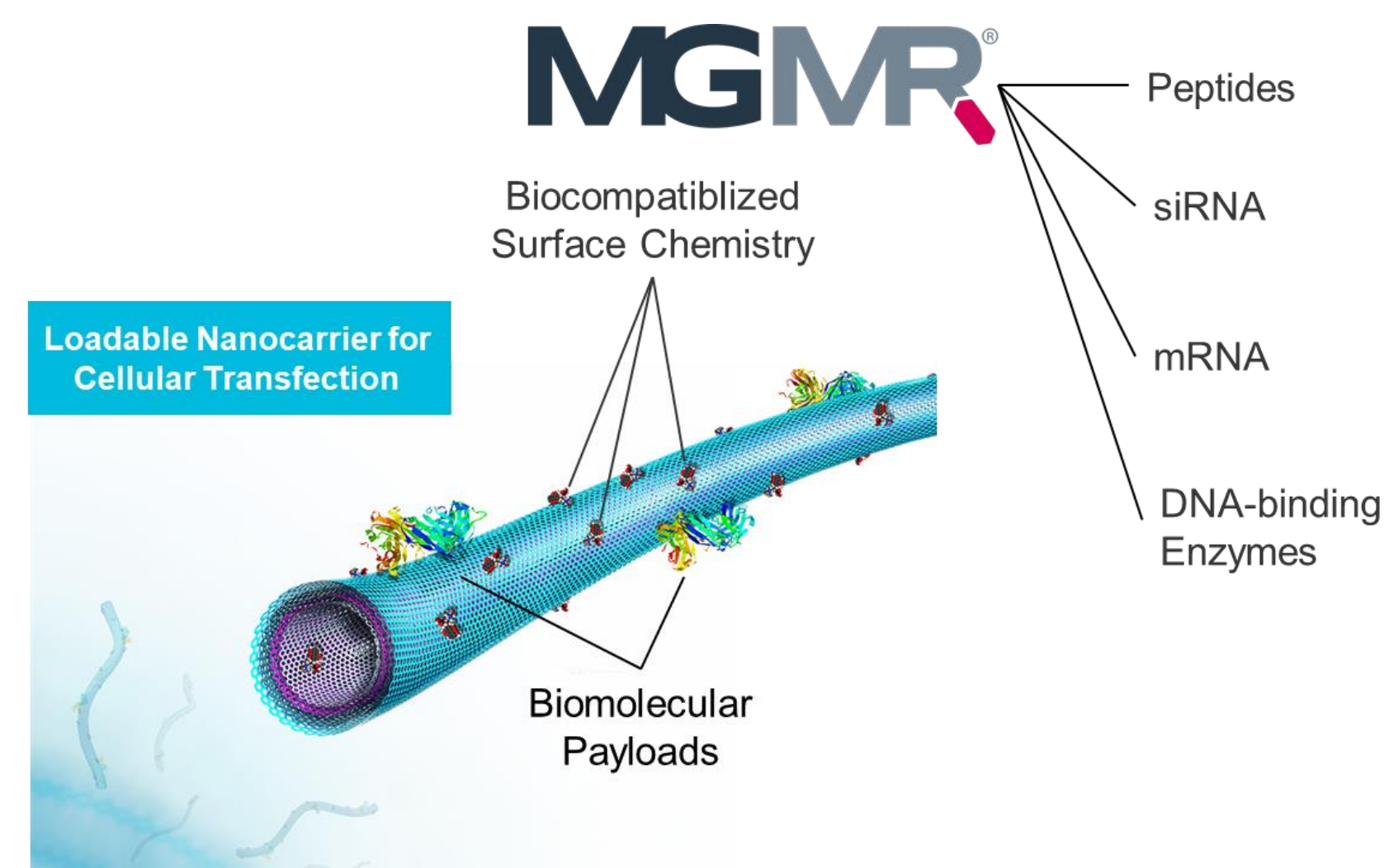
MGMR® Versatile Nano-vehicle for Non-viral Cellular Transfection

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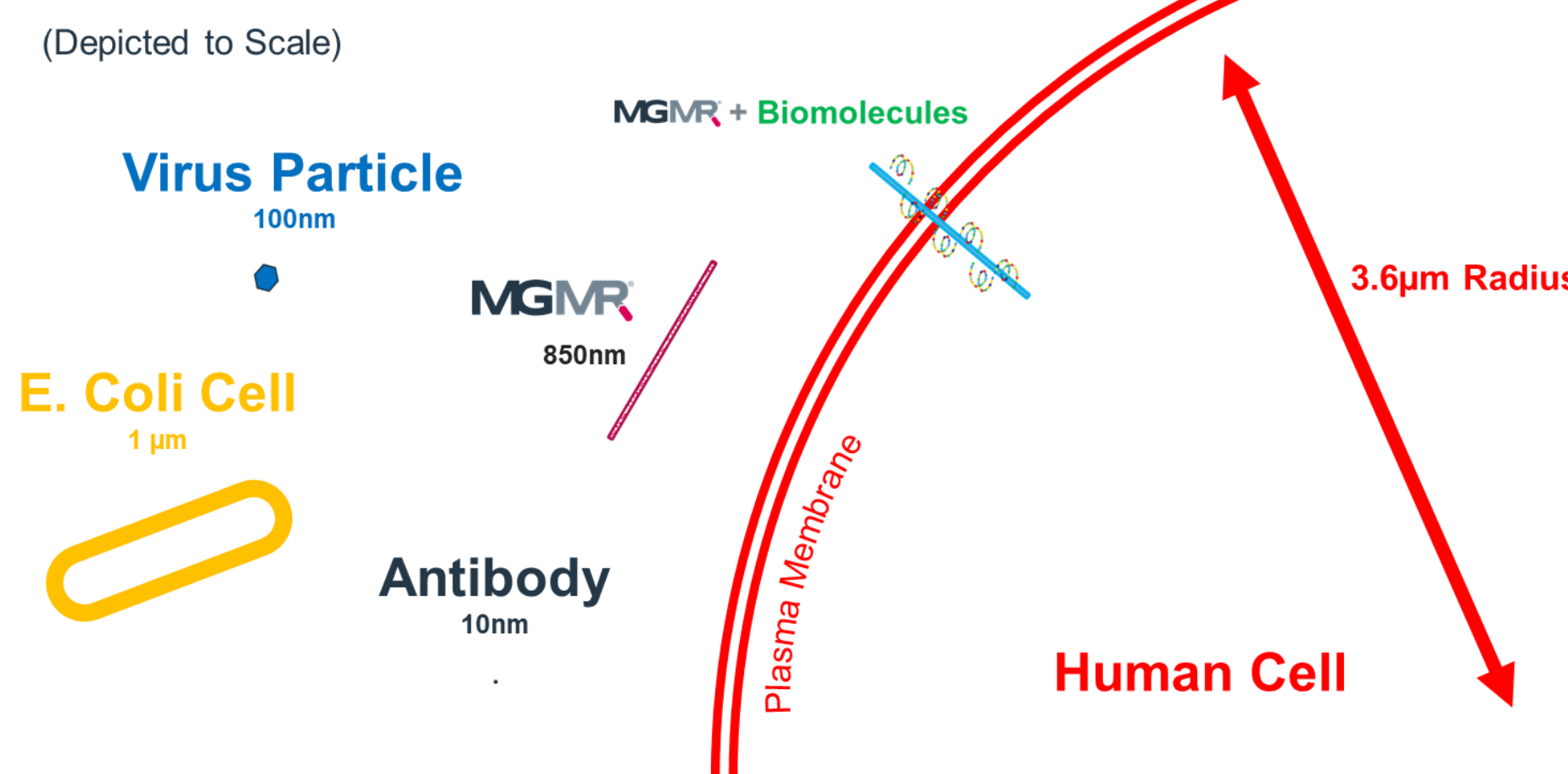
Biopact, LLC

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Austin, Texas, USA



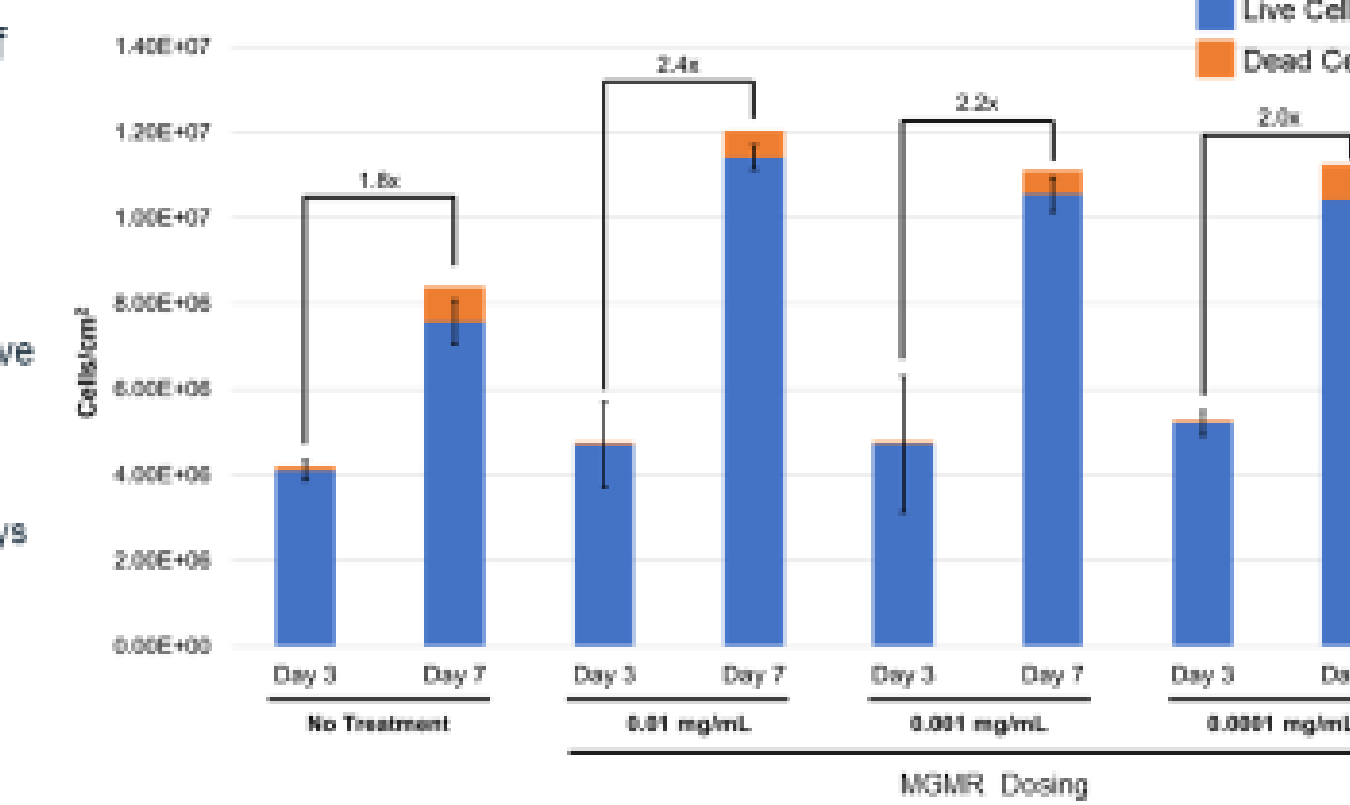
Intracellular Transport Mechanism



MGMR® Supports T-cell Proliferation

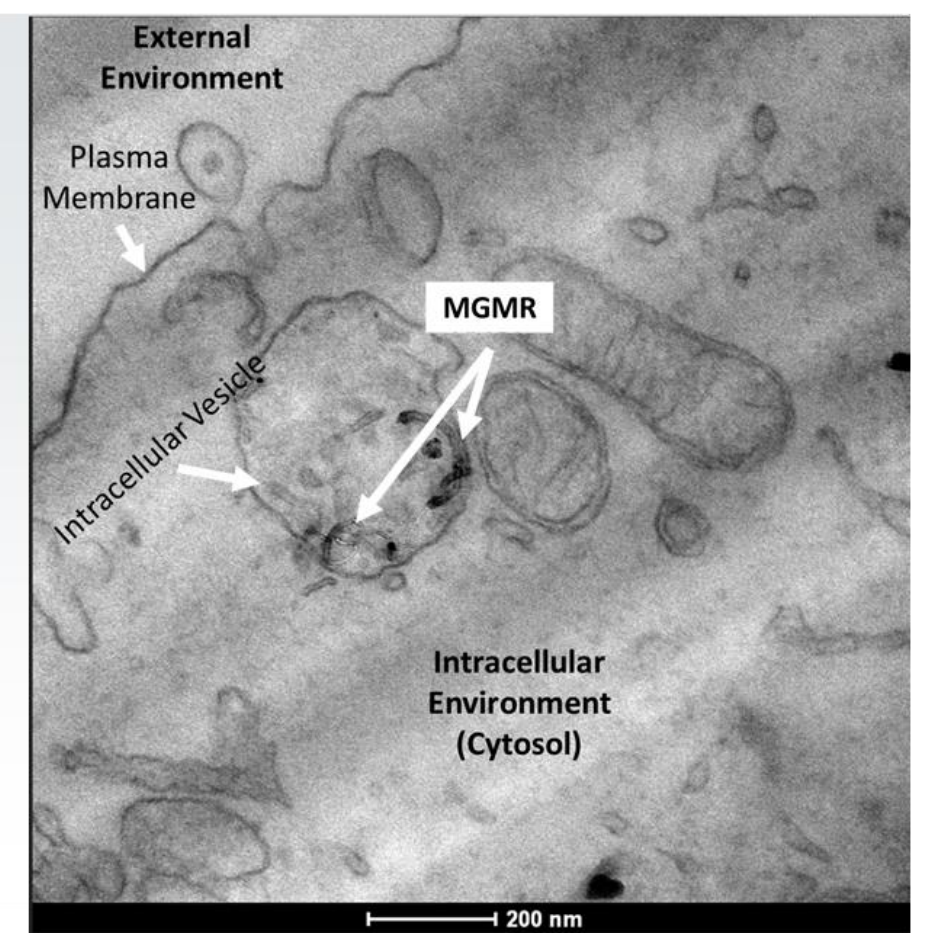
Dose-response Testing for Proliferation of Human T Lymphocyte-like cells (Jurkat)

- MGMR does not reduce cell proliferation relative to control
- (Growth Media, No Treatment)
- All groups indicated high viability
- Certain dosing-ranges of MGMR may improve cell proliferation and increase yield
- Protocol
 - Groups incubated with various concentrations of MGMR for 3 and 7 Days
 - Control = Standard Growth Media (RPMI 1640 + 15% FBS)
 - Cellular viability and quantification assessed by trypan exclusion assay
 - Stats: 95% CI



Endocytotic Trafficking

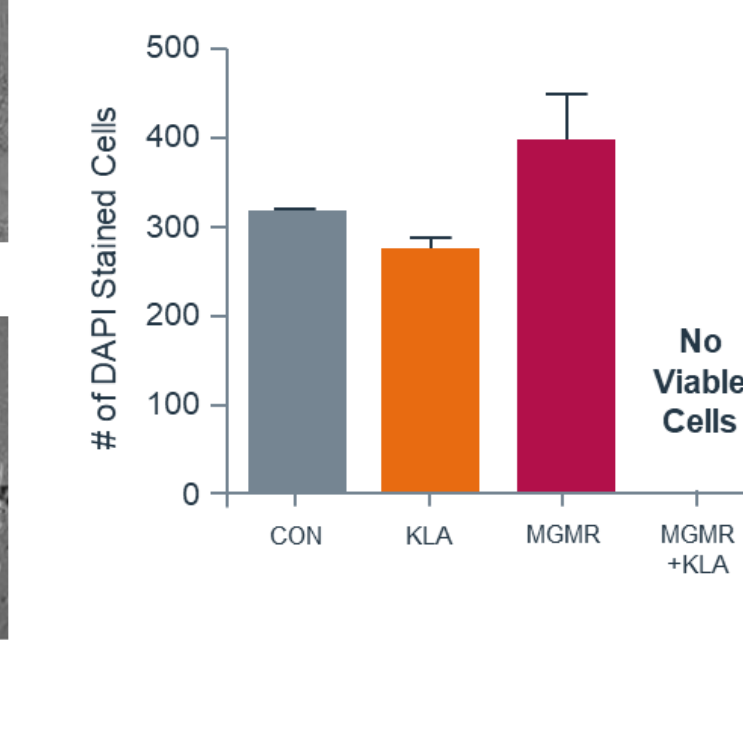
- MGMR is transported into the cell by active transport
 - Unlike other transport systems, MGMR does not damage the cell's external casing (plasma membrane) in order to enter inside
- MGMR is initially encapsulated into larger compartments called vesicles - that traffic into the interior of the cell
 - MGMR is cargo agnostic - it is not prevented from getting inside cells by the size of its molecular cargo
- Once internalized, MGMR is released from vesicles into the intracellular environment
 - MGMR can deliver cargo to many different locations inside the cell



MGMR® Peptide Delivery

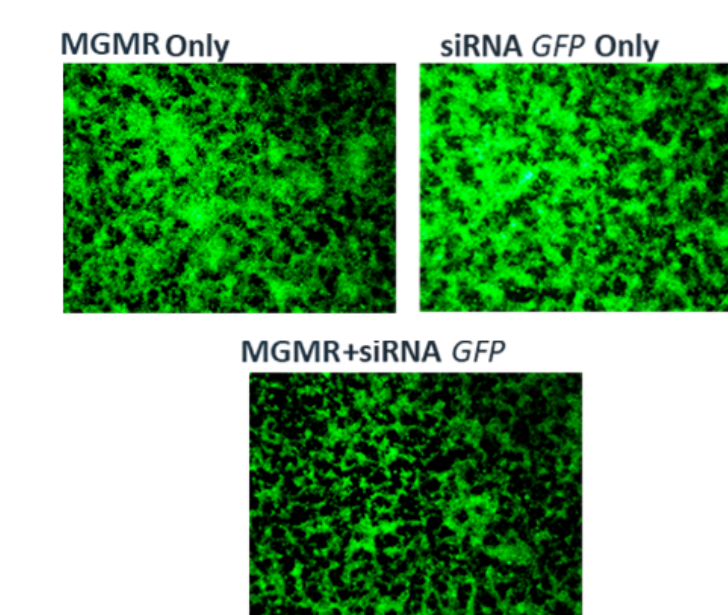
MGMR demonstrated to enhance cell penetration of KLA—a cell “impermeable” 1.5kD protein^{1,2}

- Proteins are powerful cell-regulators but very challenging for intracellular delivery
 - Do not efficiently cross the cell's membrane
 - Protein activity is very sensitive and easily diminished
- In this case study, MGMR binds to KLA with high affinity, transports it across the plasma membrane, and releases it—triggering apoptosis
 - MGMR+KLA peptide produced absolute apoptosis
 - MGMR alone has no effect (high tolerability)
 - KLA alone has no effect (benign externally)

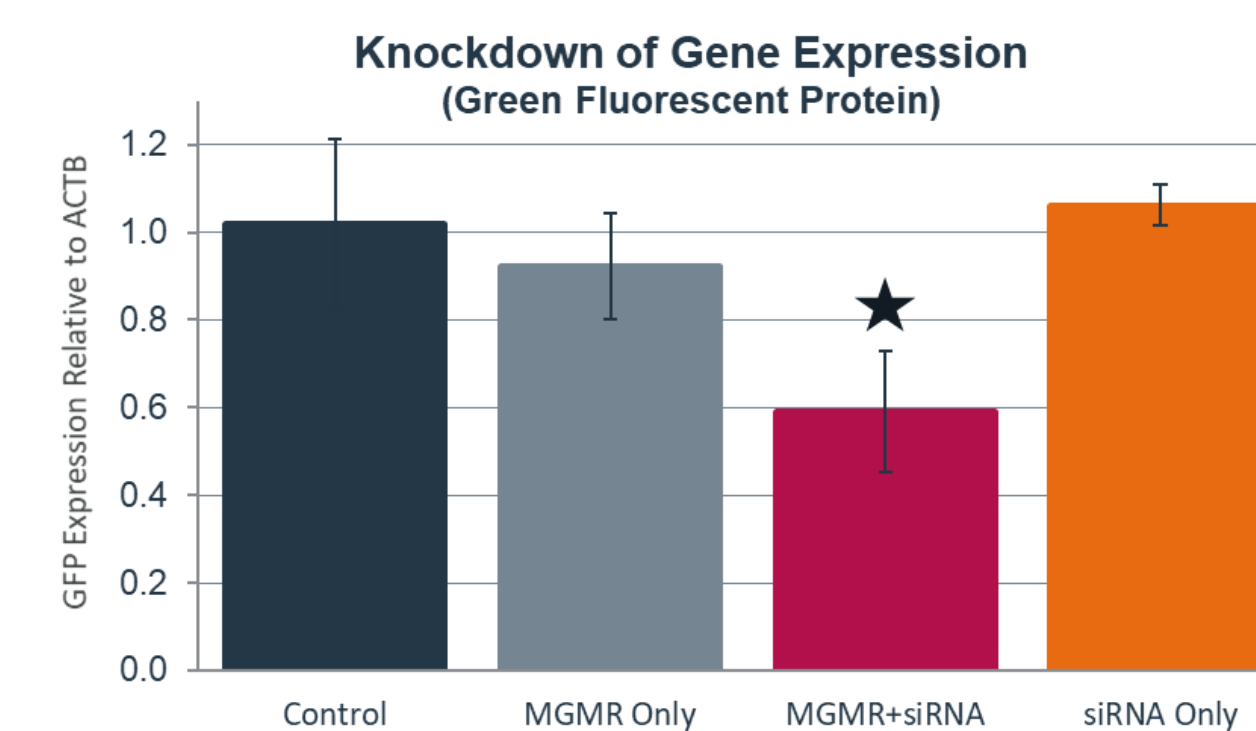


¹Zurita et al. Cancer Research 64, 435-439, 2004 ²Yang et al. Methods Mol. Biol. 1206, 29-53, 2015

MGMR® siRNA Delivery



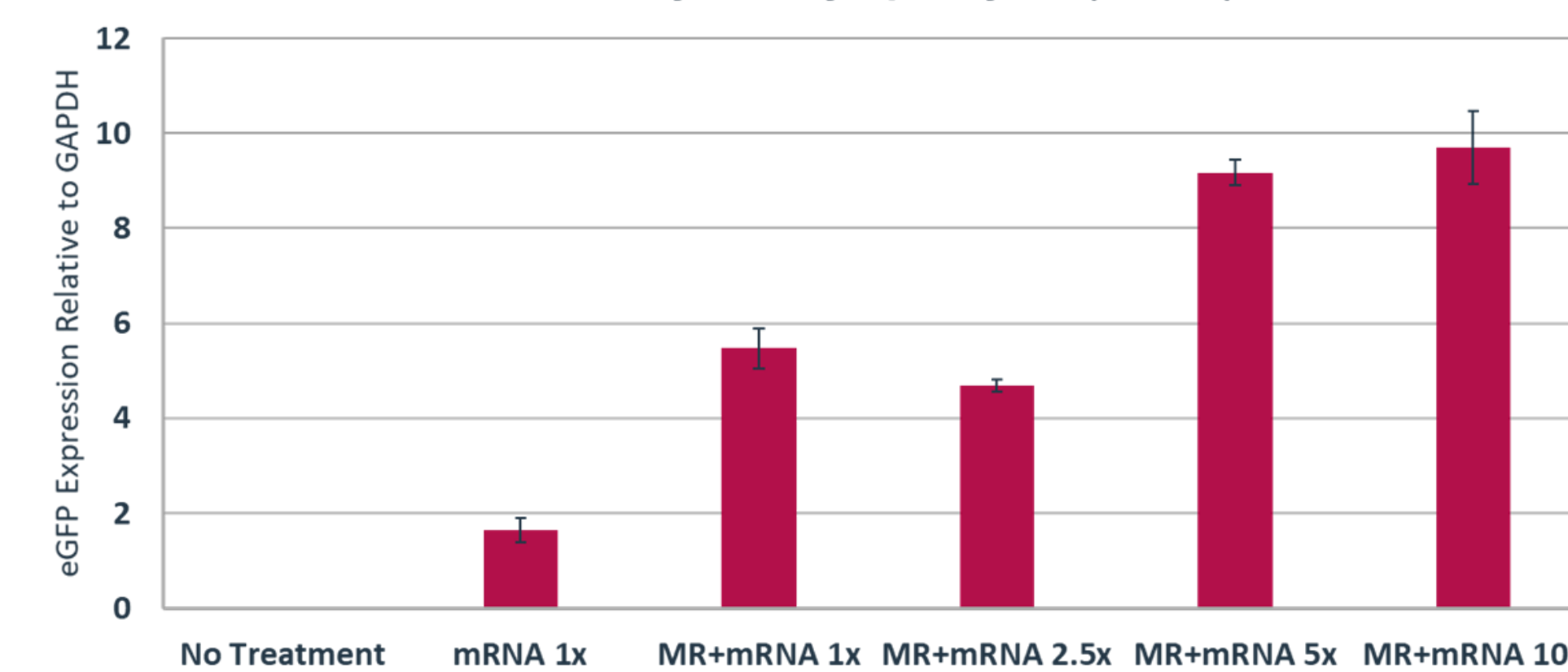
More Dark Space = More Knockdown of Green Fluorescent Protein



- Unlike detergent-based delivery systems, MGMR is non-cytotoxic and compatible across many types of molecular cargo

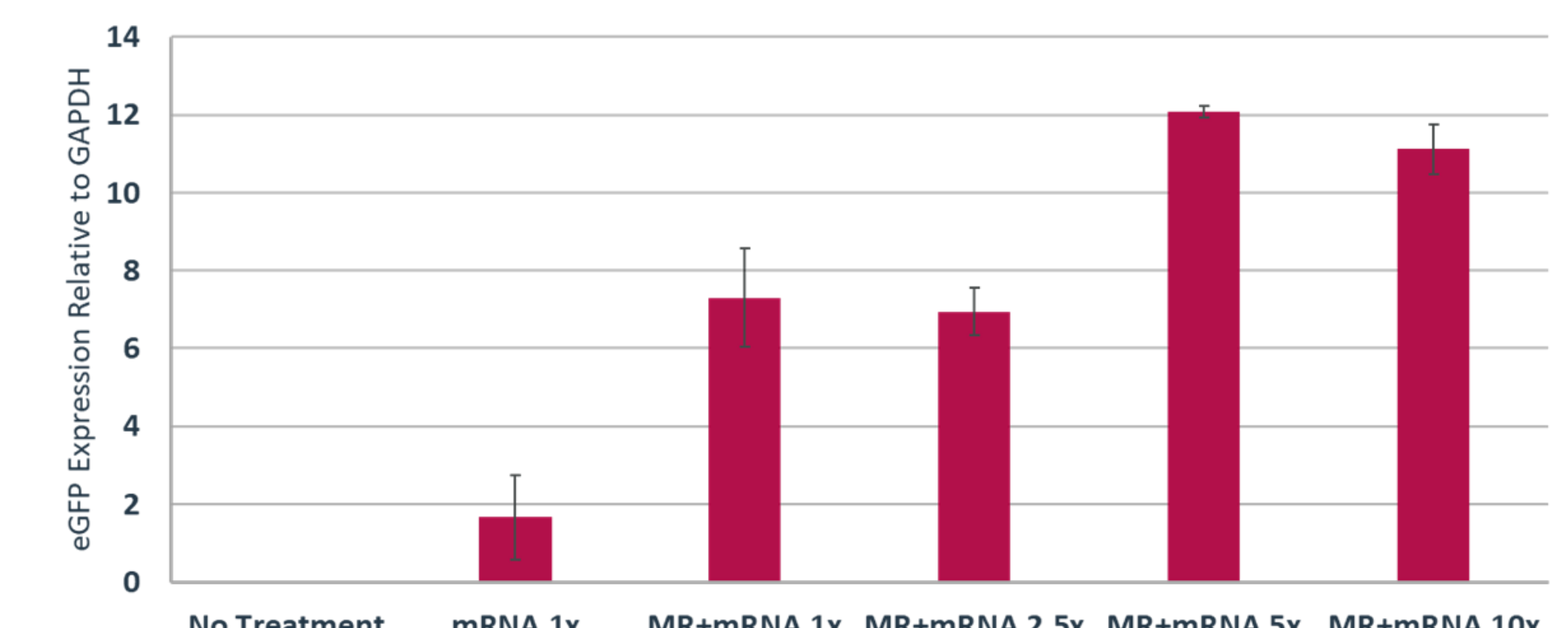
MGMR® mRNA Delivery

mRNA Delivery to T Lymphocytes (Jurkat)



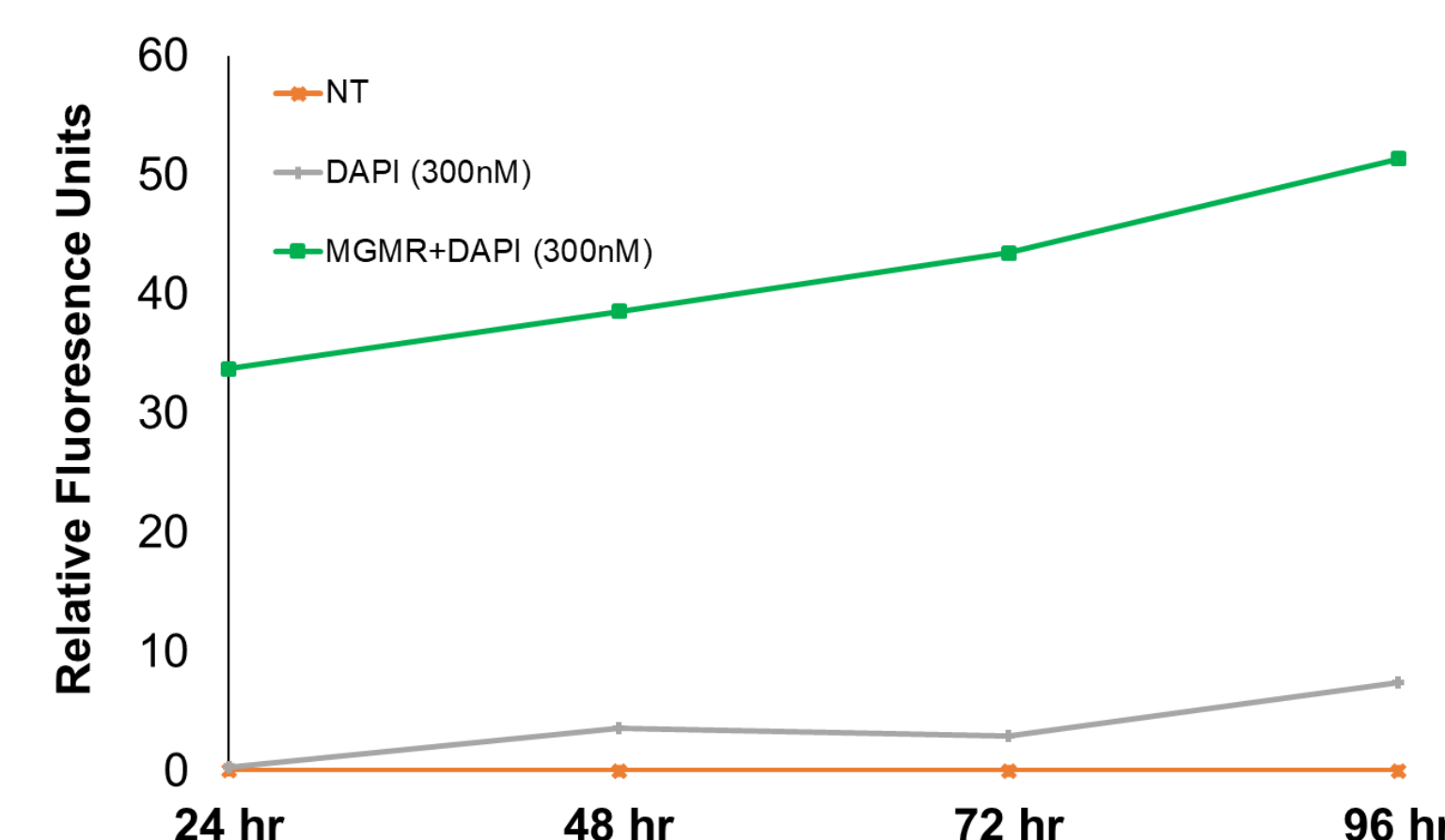
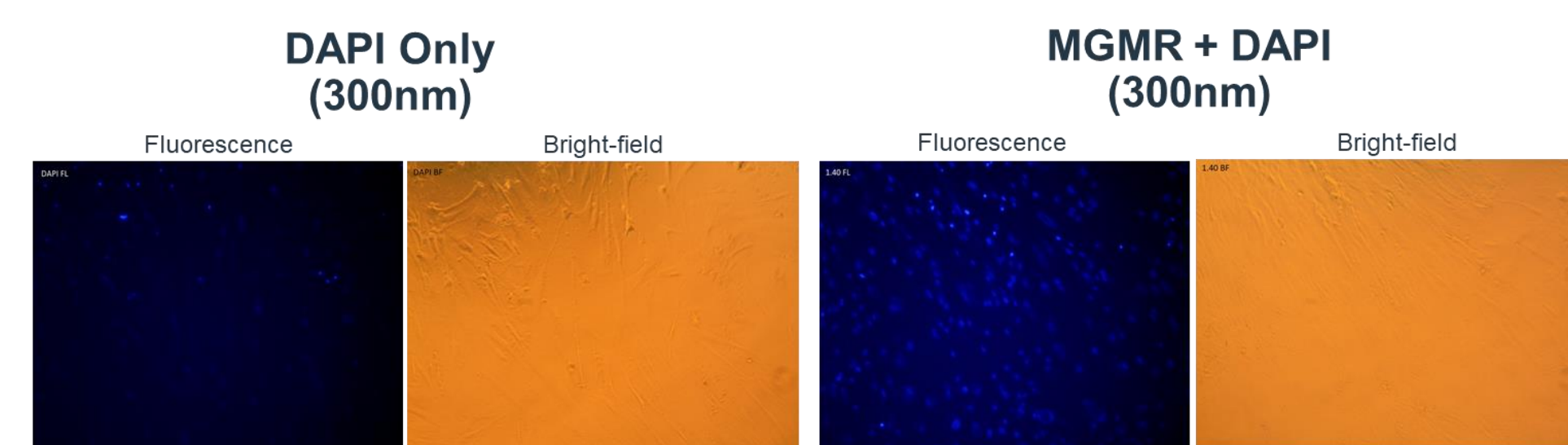
- 72-hour incubation
- 1x = 500ng/mL
- n = 3

mRNA Delivery to Monocyte-like Cells (U937)



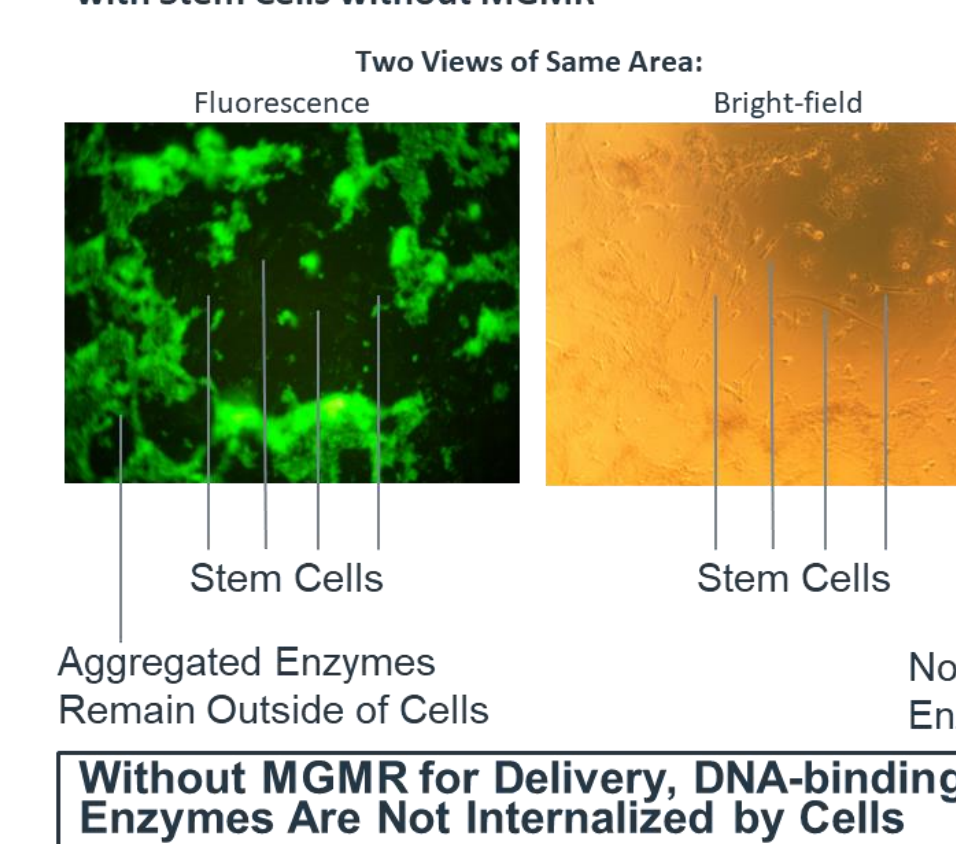
- 72-hour incubation
- 1x = 500ng/mL
- n = 3

MGMR® Nuclear Staining in Mesenchymal Stem Cells

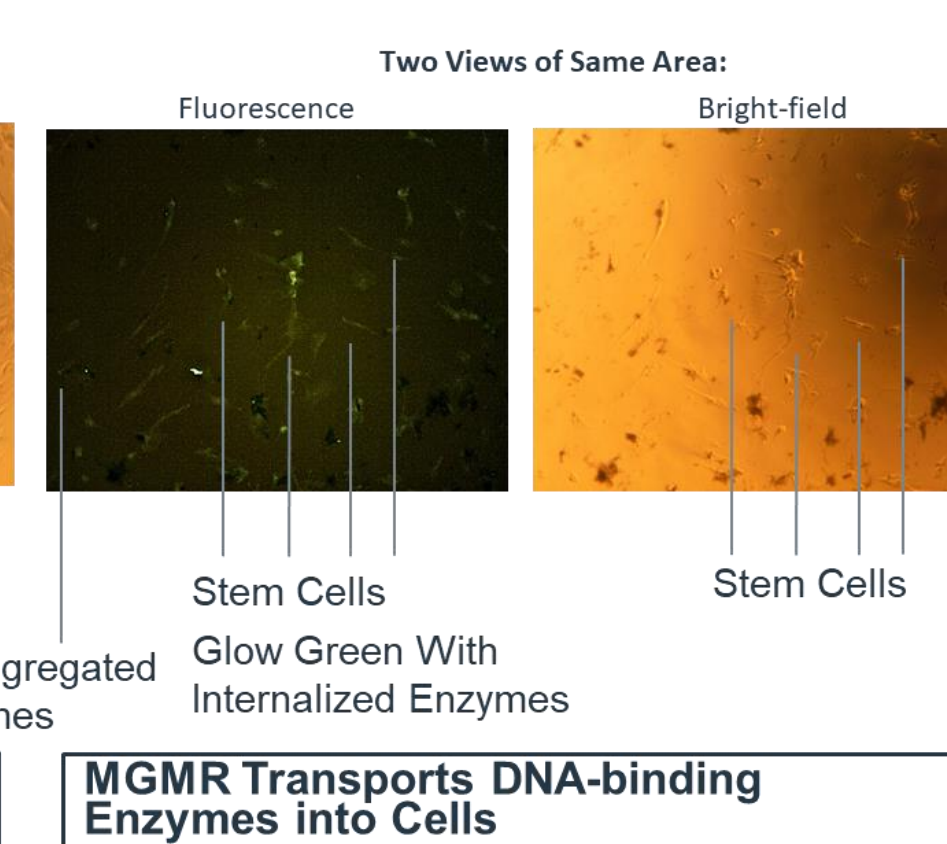


MGMR® Delivery DNA-binding Enzymes in Stem Cells

DNA-Binding Enzyme (Fluorescent-tagged) Incubated with Stem Cells without MGMR

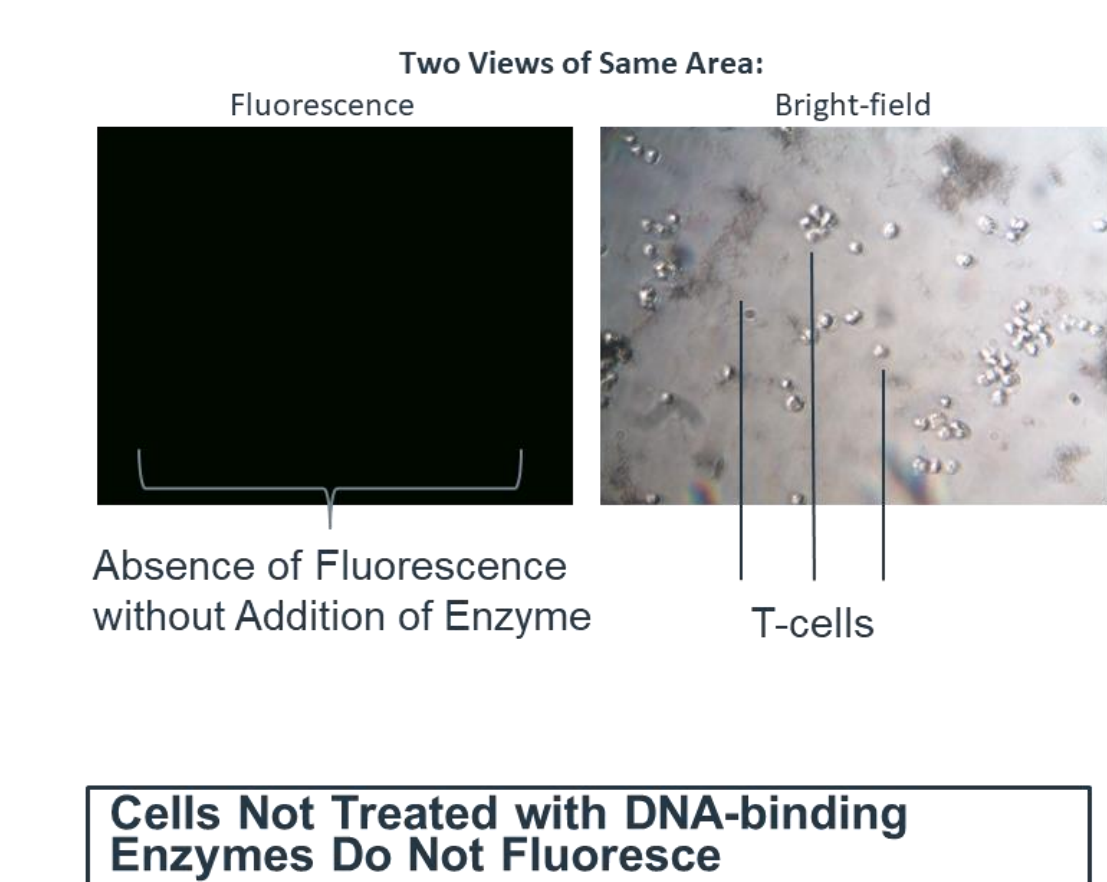


DNA-Binding Enzyme (Fluorescent-tagged) Loaded on MGMR and Incubated with Stem Cells

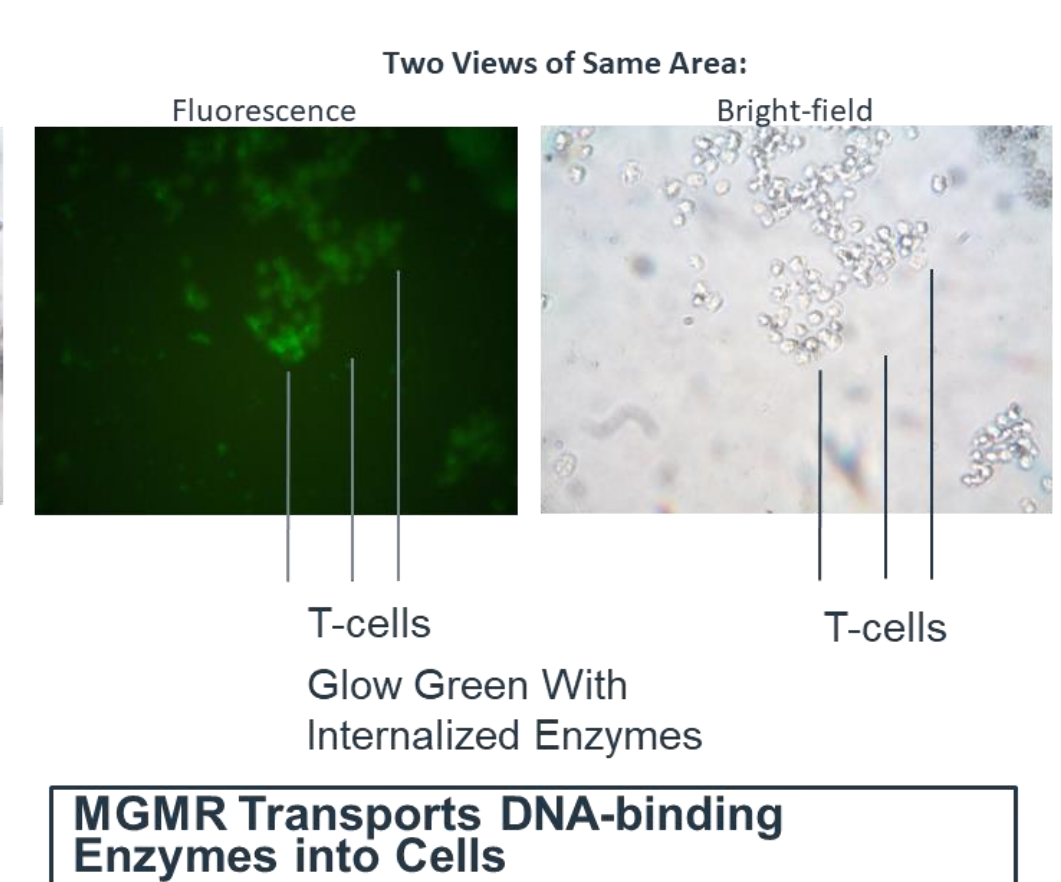


MGMR® Delivery DNA-binding Enzymes in T-cells

Untreated T-cells



DNA-Binding Enzyme (Fluorescent-tagged) Loaded on MGMR and Incubated with T-cells



MGMR® Next-generation Transfection Technology

Cargo	MGMR™	Viral Vectors	Polymers	Liposomes
Small Molecules	+	-	+	0
Peptides	++	+	+	0
Nucleic Acids	++	++	+	0
Proteins	++	+	+	0
Lipopolysaccharides	++	-	+	0
Log(P) Independent	+	+	-	-
Properties				
Non-immunogenic	+	-	+	+
Non-GMO	+	-	+	+
Simple Optimization	++	-	0	-
Scalable	++	+	0	-
Eukaryotes	+	-	0	0
Prokaryotes	+	-	0	-
Plants	+	-	0	-

Key

- ++ Advantage
- + Compatible
- 0 Limited Compatibility
- Non-Compatible

How can MGMR® improve cell engineering?

- Eliminates** viral-mediated transfection
 - No risk of insertional mutagenesis
 - No viral toxicity and immunogenicity
 - Non-replicative
- Streamlines** manufacturing and quality processes
 - Non-biological transfection technology reduces variation
 - Readily extractable from final cell product
 - Eliminates need for new vector development – Single transfection vehicle for all cellular gene-editing systems
- Versatile** loading profile effective for intracellular delivery of:
 - Gene-editing complexes
 - Oligonucleotides
 - Peptides/Proteins
- Improves** cell yield
 - Reduced toxicity vs. viral or detergent-mediated transfection
 - Improved cell proliferation

MGMR® Discover its Value in Your Process

Seamlessly Combine MGMR® with your Technology in 3 Phases

- Send Biopact Your Payload Molecule**
 - Provide Biopact with your gene-editing technology:
 - CRISPR
 - TALEN
 - ZFN
 - Biopact loads MGMR with your payload at **No Cost**
- Biopact Evaluates Performance**
 - Biopact will determine:
 - Loading efficiency on MGMR
 - Transfection efficiency in your target cell
 - Biopact reports performance of MGMR to you at **No Cost**
- Put MGMR® to the Test**
 - Order MGMR loaded with your molecule (\$10k-\$20k)
 - Readily sufficient for *in vitro*, *ex vivo* or *in vivo* testing
 - Evaluate MGMR loaded with your payload in your own studies

biopact™