Targeting Breast Cancer with Aptamer Constructs for Expedited Delivery

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Breast Cancer Affects Over 12% of Women
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Traditional Chemotherapy

Targeted Cancer Therapy

Courtesy to: National Breast Cancer Foundation, Inc
Nucleolin Receptors are Overexpressed in Cancer Cells

Normal Breast Cell

Nucleus

Receptor
Nucleolin Receptors are Overexpressed in Cancer Cells

Normal Breast Cell

Breast Cancer Cell

Nucleus

Receptor
Nucleolin Receptors are Overexpressed in Cancer Cells

Normal Breast Cell

Breast Cancer Cell

Aptamer

Peptide Backbone

Doxorubicin
Aptamers Accepted by Cellular Uptake

Construct Targets Receptor
Aptamers Accepted by Cellular Uptake

Construct Targets Receptor

Cell Envelops Construct
Aptamers Accepted by Cellular Uptake

Construct Targets Receptor

Cell Envelops Construct

Endosome Forms
Aptamers Accepted by Cellular Uptake

Construct Targets Receptor

Cell Envelops Construct

Endosome Forms

pH Drops
Aptamers Accepted by Cellular Uptake

Construct Targets Receptor

Cell Envelops Construct

Endosome Forms

pH Drops

Drugs Enter Nucleus
Comparing Targeted and Non-Targeted Drug Delivery

Targeted: Aptamer
Comparing Targeted and Non-Targeted Drug Delivery

Targeted: Aptamer

Non-targeted: Peptide backbone
Comparing Targeted and Non-Targeted Drug Delivery

Targeted: Aptamer

Non-targeted: Peptide backbone

Drug Alone
Preparing Aptamer Constructs

Step 1. Activate Peptide Backbone
Preparing Aptamer Constructs

Step 1. Activate Peptide Backbone

Step 2. Attach Doxorubicin
Preparing Aptamer Constructs

**Step 1.** Activate Peptide Backbone

**Step 2.** Attach Doxorubicin

**Step 3.** Attach Aptamer
Introduce Aptamers and Incubate for Designated Time
Rinse Excess Constructs
Measuring Cellular Uptake
Comparing Cellular Uptake

Peptide-Doxorubicin-Aptamer

Peptide-Doxorubicin

Doxorubicin

Cells Only
Aptamers Expedite Cellular Uptake of Doxorubicin
Doxorubicin Alone Lacks Significant Cellular Uptake
Peptide Construct Alone Lacks Significant Cellular Uptake
Fluorescence Microscopy Confirms Successful Cellular Uptake

5 min

1 hour
Aptamers Offer a Promising Future
Thank you to our wonderful mentor Anusha Pusuluri, Prof. Mitragotri, and Prof. Soh.