

Polyphenol-Introduced Polymer/Metal Ion Complex for Intracellular Antibody Therapeutics

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Vision

- Directly targeting intracellular antigens with antibodies opens new treatment possibilities for hard-to-treat cancers.
- Many cancer drivers inside tumor cells remain beyond the reach of current small molecules and antibody drugs.
- Conventional antibodies face poor cellular uptake and become trapped in endosomes, preventing them from reaching their targets.
- Our technology uses innovative DDS nanoparticles—made from polyphenol polymers and metal ions—to deliver antibodies efficiently into cells and release them from endosomes. This breakthrough approach enables precise targeting of intracellular antigens and offers new hope for refractory cancer therapy.

Marketability

- The global antibody drug market is worth USD 256.28 billion, but almost all products target cell surface antigens. Targeting intracellular antigens could greatly expand treatable cancers and create a new market.
- Triple-negative breast cancer, pancreatic cancer, and small-cell lung cancer cause about 1.13 million new cases worldwide each year. These are cancers with high unmet needs.
- Antibody delivery into cells is still in its early stage worldwide. The main example is a Spanish startup developing preclinical lipid- and polymer-based antibody nanoparticles.

Innovation

- This complex DDS nanoparticle can be easily constructed by simply mixing antibodies, polyphenol polymers, and metal ions in water.
- The buffering effect of the complex disrupts the endosomal membrane and delivers the antibody into the cytoplasm.
- Targeting molecules on the surface of the DDS allow selective targeting of cancer cells.

Partnering

【 Expected partners 】

Pharmaceuticals • Chemical/Fibers • Medical institute • Biotech/Drug Discovery Service • Venture capitals

【 Expectation 】

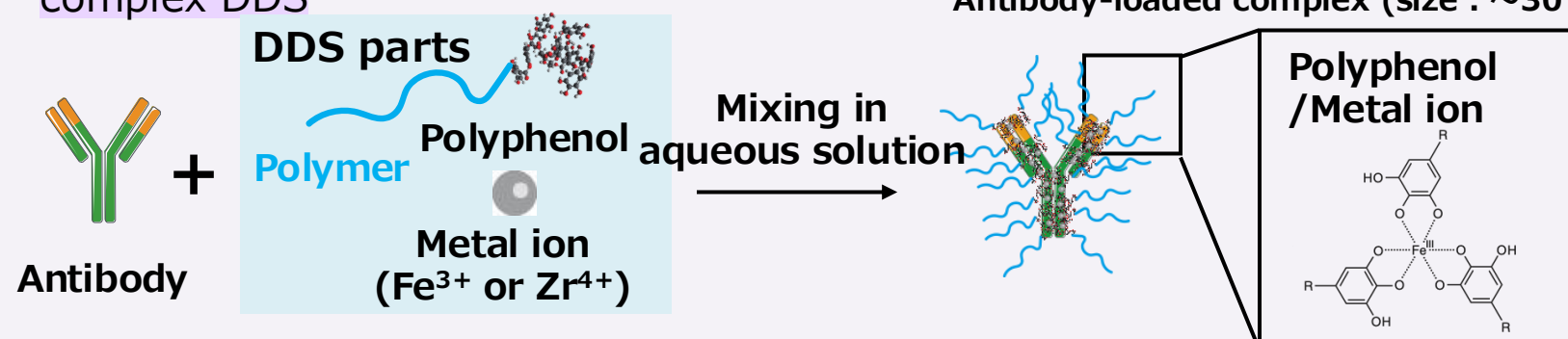
Active pharmaceutical ingredient (API), Contract manufacturing, Clinical trial execution, Startup support, Joint research and development

Research Outline

Key Words: #Intracellular Antibody, #Nanotechnology, #Polyphenol

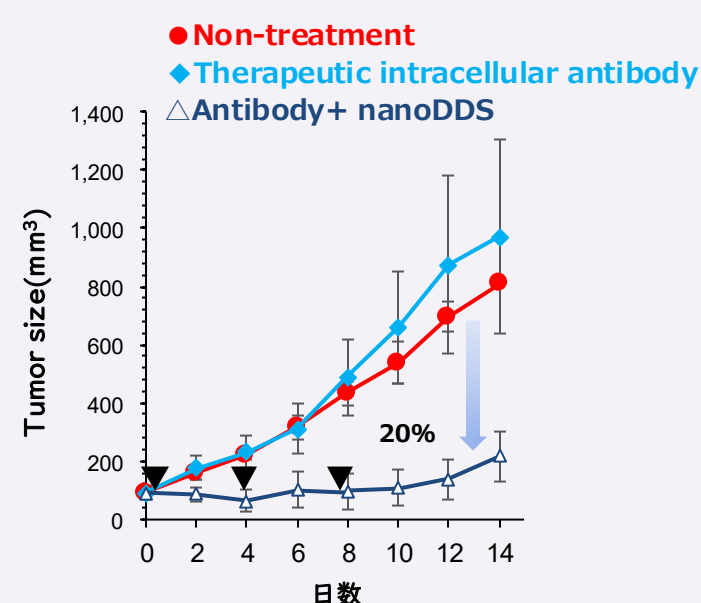
Polyphenol-metal complex DDS nanoparticles boost antibody uptake, promote endosomal escape, and enable effective targeting of refractory cancers.

Antibody-loaded nanocomplex-based on polyphenol polymer/metal ion complex DDS



Anti-tumor effect

4T1 Cell (Triple-Negative Breast Cancer) Orthotopic Transplantation Mouse Model

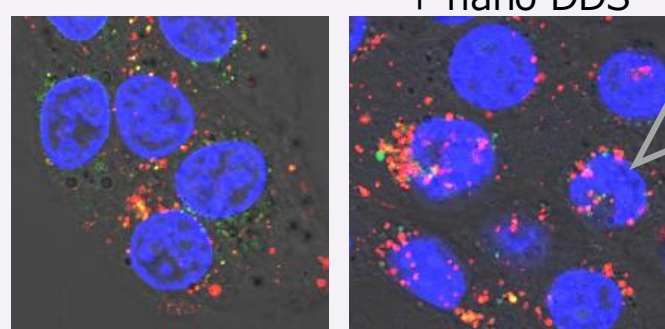


Reference
Y. Honda*, et. al., Journal of Controlled Release, 384, 10, 113929(2025)

Patent
Application Number : PCT/JP2025/3590

Endosomal Escape Behavior in Cancer Cells

Anti-nucleus Antibody (Nucleus/Endosome/Antibody) + nano DDS



Localized on endosomes or the cell membrane

Recognizing endosomal escape nuclei

