

# Improving immunotherapy with mRNA delivery

## The Need

The central mission of cancer immunotherapy treatments is to aid the immune system in detecting and degrading cancer cells. For twenty years, the use of monoclonal antibodies (mAbs) as anti-tumor drugs has been successful in managing cancer disease and increasing patient lifespan. These treatments are capable of inducing strong responses in patients with advanced cancers, but each of these treatments only benefit a subset of patients. This limitation occurs in-part because mAb-based treatments are only effective if target cancer cells express the antigen bound by the mAb. Therefore, if the population of cancer cells expressing an antigen grows, then the efficacy of mAb-based treatment also grows.

Furthermore, mAb-based treatments will have limited efficacy if the method of treatment is limited to the antibody without consideration of its target antigen population. For example, efficacy of treatment for a mAb with perfect antigen specificity and affinity cannot be improved if the target antigen population is already saturated with antibody. Therefore, if both the proportion of antigen-expressing cancer cells and also the antigen density increases, then it is possible to increase the efficacy of mAb-based treatments used in cancer immunotherapy.

## The Technology

Researchers at the Ohio State University led by Yizhou Dong have developed a method and set of new compositions that enhance the efficacy of mAb-based treatment by modulating the population of target antigens. This set of new compositions consists of pairing an established immunotherapeutic mAb with a lipid-like nanoparticle delivery system that delivers antigen-encoding mRNA. In vivo data demonstrates that this technology markedly enhances cancer survival rates compared to standard mAb treatment. Also, given that the nanoparticles are loaded with mRNA specified by the user, this technology can be extended to support any mAb-based cancer treatments, as well as many immunotherapy treatments for cancer, autoimmune conditions, and other diseases. By acting on the antigen population rather than the mAb, these compositions and method establish a new approach to regulating the immune system for treating cancers and other disorders of the immune system. Therefore, this technology constitutes a new paradigm for treatments that will both support and enhance cancer immunotherapy.

## Commercial Applications

- Development of a new family of drugs to improve mAb-based cancer immunotherapy
- Development of drugs to treat autoimmune disorders
- Development of nanoparticle-based techniques for introducing mRNA transcripts to patients



## Tech ID

T2019-149

## College

[College of Pharmacy](#)

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## Categories

- [Life Sciences](#)
- [Therapeutics](#)