

5 Potential Applications of mRNA Therapy

Scientists have experimented with mRNA for decades, but the COVID-19 pandemic has brought the platform into the limelight. [Pfizer-BioNTech and Moderna's COVID-19 vaccines](#) have become two best-selling drugs in mRNA technology sector.

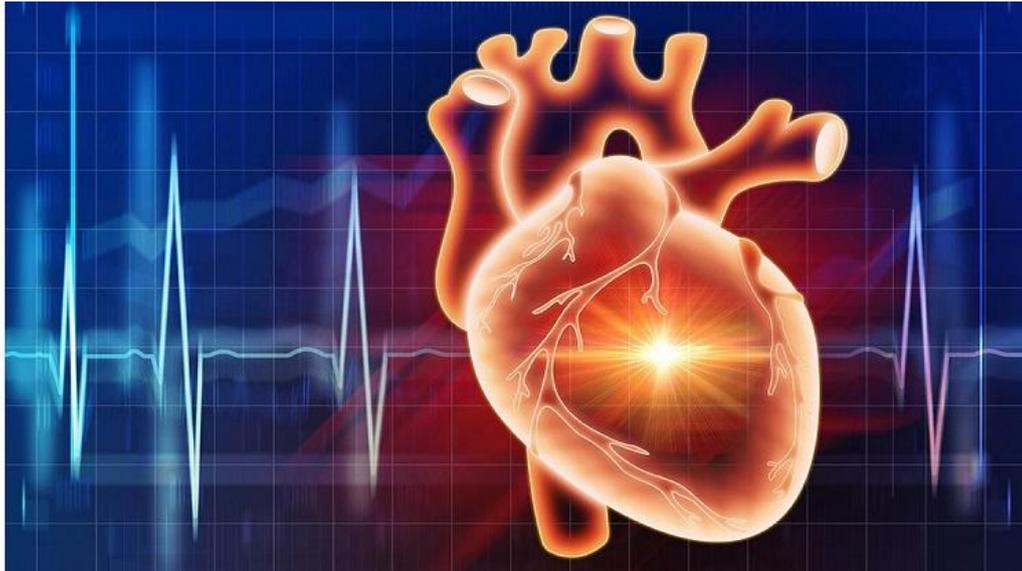
Researchers are now exploring dozens of new possible applications for the [mRNA technology](#) platform. Among them, mRNA therapy is expected to be applied in the following five fields in the next few years.

1. Cardiovascular disease

Researchers at the University of Pennsylvania recently reported positive data regarding the use of mRNA and [CAR-T cell therapy](#) to treat cardiac fibrosis in mouse models.

Last year, AstraZeneca announced positive results from a Phase IIa study involving naked mRNA injections into the hearts of patients undergoing coronary artery bypass surgery.

Earlier in 2013, Moderna researchers published a report in Nature Biotechnology showing that intramyocardial injection of mRNA encoding human vascular endothelial growth factor-A amplified endogenous cardiac progenitor cells in a mouse model of myocardial infarction.



2. Influenza

The basis for making flu vaccines has barely changed in more than half a century. First, pharmaceutical companies predict which strains of the flu virus are likely to dominate months before each flu season. Pharmaceutical companies then grow flu virus strains by using eggs or mammalian cells to inactivate the virus and process it into vaccines. The flu vaccine's effectiveness hovers between 40% and 60%, according to the CDC.

The flexibility of the mRNA platform could improve this process. For example, Pfizer claims it can create an RNA vaccine eight days after the sequence of the flu virus is discovered. The company is working with its partner BioNTech to develop an **mRNA-based influenza vaccine** candidate, BNT161. A phase I study of BNT161 is ongoing.

Moderna's mRNA-1010 flu vaccine candidate completed mid-stage trials in a Phase I study, and the results were positive but impressive -- broadly consistent with data from conventional flu vaccines. Moderna also has two other flu vaccines in development, called mRNA-1020 and mRNA-1030.

Moderna and Novavax are developing a combined COVID-19/flu vaccine. Sanofi also plans to initiate clinical trials for its SP0273 quadrivalent influenza mRNA vaccine candidate this year.



3. Shingles (Herpes Zoster)

The global shingles vaccine market is big and it could be worth \$6.35 billion by 2028, according to the data from Grand View Research.

Pfizer and its partner BioNTech have announced their plans to develop an mRNA-based shingles vaccine. The two companies may launch Phase I trials this year.

Currently, GlaxoSmithKline's Shingrix, a recombinant adjuvanted vaccine, is the only shingles vaccine approved by FDA.

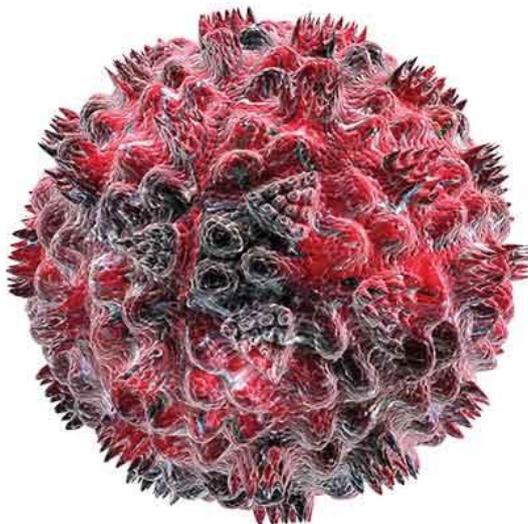
4. HIV

Although researchers have been trying to develop an HIV vaccine for nearly four years, there are currently no such vaccines approved for marketing. Researchers are continuing to work on preventive and therapeutic HIV vaccines. While the first type may stop infection, the second type slows the progression of HIV in infected individuals.

Moderna has two HIV vaccine candidates in preclinical development: mRNA-1644 and mRNA-1574.

Last year, NIH researchers working with Moderna scientists announced positive results from an investigational HIV vaccine.

In August, Moderna announced a Phase I study to test two versions of its mRNA-1644 vaccine.



**Human
Immunodeficiency
Virus
(HIV)**

5. Cancer

Researchers have been skeptical that mRNA could be a promising oncology technology platform for a long time. In fact, research into the prospect of **mRNA technology for**

cancer is intensifying. In fact, research into the technological prospects for mRNA applications in cancer is intensifying.

Last year, Mayo Clinic researchers announced promising data for the use of **mRNA technology** in combination with immunotherapy. "We found that by introducing mRNA into immune cells, useful proteins can be produced to enhance their antitumor activity without trying to alter the genome itself," said Haidong Dong, PhD, professor of immunology at Mayo Clinic.

There are also several investigational oncology therapies in development in Moderna's pipeline, including mRNA-4157, a personalized cancer vaccine in Phase II trials. In a phase I study, mRNA-4157 in combination with Keytruda (pembrolizumab) was well tolerated and resulted in tumor shrinkage in unresectable solid tumors and resected cutaneous melanoma.

Other experimental vaccines include the KRAS vaccines mRNA-5671 and mRNA-2752, which may target solid tumors and lymphomas.



BioNTech also has oncology product candidates including [BNT111 for advanced melanoma](#), [BNT112 for prostate cancer](#), [BNT113 for HPV16+ head and neck cancer](#) and BNT115 for ovarian cancer. BNT111 and BNT113 are in Phase III studies.

BioNTech is also collaborating with Sanofi to develop SAR441000, a cocktail of four mRNAs targeting solid tumor indications.

In addition, BioNTech's BNT122 is in Phase II studies for the treatment of first-line melanoma and colorectal cancer. BioNTech is working with Roche subsidiary Genentech to develop BNT122.

Finally, CureVac's experimental CV8102 mRNA vaccine showed promise in phase I clinical trials.

In conclusion, BioNTech and Moderna, as the leaders of mRNA technology, are in an absolute dominant position in the application research of this technology.

As a reliable worldwide supplier of PEG & [ADC linkers](#), **Biopharma PEG** supplies a variety of high purity PEG derivatives, PEG linkers to empower drug research & development. We supply the some PEG products used in [COVID-19 vaccines](#). For more information, please read [PEGs for COVID-19 Vaccines](#).

Related articles:

[1] [Application of mRNA Technology In Cancer Therapy](#)

[2] [mRNA Technology: Development And Three Major Applications In Future](#)

[3] [mRNA Technology: Current Trends and Prospects](#)