The vaccines for COVID-19 currently available in the U.S. use a synthesized piece of the virus’s genetic code. Because this is such a small piece, only a fraction of single gene, the vaccines themselves are not infectious. This piece of the virus’s genetic code is used to provoke an immune response and protect us from getting sick.

This genetic piece of the virus is mRNA, or messenger RNA, which is simply a set of instructions that tells your cells what to build. The mRNA in the COVID-19 vaccines carries instructions to make a small part of the spike protein, which is what coronaviruses use to gain access to cells. The mRNA has the instructions to make enough of spike to enable the immune system to recognize the virus if it appears, but it is missing most of the spike’s functional features, rendering it harmless.

The mRNA vaccine is injected into the upper arm.

Once the mRNA reaches a cell, the cell unpacks and reads the genetic information and constructs the spike protein to display on its exterior. The mRNA instructions are then broken down by your body.

Your body learns to recognize the displayed spike protein fragment as a signal that the virus is trying to invade, rallying an immune response. This is like uploading a criminal’s mugshot to a surveillance network so it knows what to look for. Antibodies are created to block the spike protein from accessing cells and T-cells are activated to destroy the spike protein.

At the end of this process, your body recognizes the coronavirus spike protein. If you’re exposed to the coronavirus in the future, your body will respond quickly and has the antibodies and T-cells ready to combat the virus.

Reference: Centers for Disease Control and Prevention