

The Development of Vaccines

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The world is finally starting to recover from the Covid-19 pandemic. Vaccines were already being rolled out during early 2021 and ever since then, thousands of people get vaccinated every day and general acceptance for the vaccine is now at a high. However, despite the high acceptance of the vaccines, there are still a lot of people who are hesitant about getting the vaccine even today and not without reason. The most common reason being that people don't believe that the Covid-19 vaccines are safe nor efficacious. However, these concerns about safety and efficacy can be cleared up when you actually explore how vaccines are developed, how they are created, and how they are tested for safety. Believe it or not, all vaccines go through a long and thorough process that ensures that a vaccine is safe and efficacious. To prove this, all we need to do is to look at how vaccines are actually made.

Of course, the first step in developing a vaccine is the creation of the vaccine itself. This step consists of finding the right ingredients like the correct preservatives, the correct adjuvants, and more. However, the main challenge for this step is finding the right antigen to use. An antigen is basically a part of the virus and it's the most important ingredient of a vaccine. The reason why they are so important in a vaccine is because antigens actually have the ability to cause the human body to develop an immunity to the virus it belongs to. So, the challenge of creating a vaccine mostly consists of finding the right antigen however, it's easier said than done. An antigen has to be strong enough to actually create an "immune response" but, it also has to be weak enough in order for recipients of the vaccine to not fall seriously sick when they receive it. That, along with other conditions that an antigen needs to meet, makes the process so difficult. Scientists search for the correct antigen by testing potential antigens on animals. Once the correct antigen is found, the antigen is then added with the other ingredients of the vaccines and the scientists move on to the second step of developing a vaccine. Let's take the Covid-19 vaccines as an example for this step. Thankfully, the creation of the Covid vaccines only took about a few months and not a few years like other vaccines. This was due to the fact that other coronaviruses already existed. However, despite this, the scientists still went through the same process of testing antigens to see which ones met the various conditions that an antigen needs to meet.

After finding the correct antigen and after the vaccine itself is created, the next step is to test the vaccine on human volunteers. This step is actually divided into 3 phases. Phase 1 of testing involves administering the vaccine to a small group of volunteers who are usually healthy adults. The main goals for this phase are to confirm that the vaccine is even safe for humans, to confirm that the vaccine does cause an “immune response” for humans, and to confirm the dosage of the vaccine that’s needed. After phase 1, phase 2 begins. Phase 2 involves testing the vaccine on a larger group of people. Apart from the size of the group that the vaccine is being tested on, phase 2 introduces a few new things that ensure more accurate results. First of all, the group of people themselves have the same characteristics as to the people who the vaccine is targeted to. This is to ensure that the vaccine works on it’s intended demographic. Furthermore, in phase 2, some people in the group aren’t actually administered the vaccine. This group of volunteers who weren’t administered the vaccine acts as a control group to make sure that the changes that happen to the group of vaccinated people happen because of the vaccine and not just by random chance. Keep in mind that neither the scientists nor the individuals in the control group are actually told who did and didn’t get the vaccine which is to ensure that both the scientists and the individuals aren’t “influenced in their assessments”. After phase 2, phase 3 of testing is conducted. Phase 3 involves testing the vaccine on an even larger group of people and, in some cases, involves conducting tests across different countries. The characteristics of the group of volunteers are still the same from phase 2 and the second group of volunteers who weren’t administered the vaccine is still used as a control group. After phase 3 of testing is over, all the results from all the phases of testing are then evaluated and reviewed to see if the vaccine was efficacious and safe. If the results are good enough and if the vaccine reaches a certain level of efficacy and safety, the vaccine gets approved and can now be administered to the public. Keep in mind that the “bar” for the safety and efficacy of vaccines is very high which ensures that the vaccines that do pass the evaluations and reviews are very efficacious and safe.

After the vaccine is approved, the final step is to mass-produce the vaccine. This step is fairly straight forward and yet, precautions are still put in place in order to ensure that the vaccine’s safety and the efficacy is maintained. The ingredients that are needed for the vaccine are produced and combined together thus, producing the vaccine in bulk quantities. The vaccine is then stored in strong and separate glass bottles or “vials” that can protect and maintain the vaccine through its journey. The glass vials of the vaccine are then transported to other places using special equipment. Keep in mind that throughout their journey, the vaccines need to be stored in freezers that can keep the vaccines at a certain temperature or else the vaccines might lose their efficacy. So, they are transported in freezers that can keep the vaccines at a certain temperature. Once they arrive at their destination, they are then stored in freezers once again until they are ready to be administered to people. Let’s take the Pfizer vaccine as an example for this

step. Once the Pfizer vaccine finished the 3 phases of human testing and once they were approved, mass-production of the vaccines increased. Basically, once the vaccine is produced in mass quantities, the vaccine is then packaged in glass “vials” and then, they are transported and stored in freezers that can maintain the vaccines at a temperature between 2 to 8 degrees Celsius. And of course, when the time comes, they are then taken out of storage to be administered to the people of the area.

So, as I've said before, vaccine development is a very long and thorough process that ensures that a vaccine is efficacious and safe. It goes through a long creation process of finding the correct ingredients for the vaccine which can take years, an even longer testing process that tests the vaccine on actual people all to ensure the vaccine's safety and efficacy, and it is then mass-produced with care and precaution. Despite the shorter time they took to develop, the Covid-19 vaccines weren't spared from this process. The Covid-19 vaccines that we see today also went through the steps in developing a vaccine and because of that, we can trust that they are safe and efficacious. I know I've said this a lot already, but the truth is, all vaccines, including the Covid vaccines, are made to be efficacious in making people immune to the virus it's supposed to combat and, most importantly, they are made to be safe for the general public. So, now that Covid vaccines are available to practically every country in the world, what are you waiting for? Now that we know that the vaccines are safe and efficacious, all we need to do now is to actually take the vaccine.

Reference List:

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