



A CUP OF HEALTH WITH CDC

Shepard Award Winners, Part 2: Dr. Terrence M. Tumpey

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[Announcer] This podcast is presented by the Centers for Disease Control and Prevention. CDC — safer, healthier people.

[Dr. Gaynes] Welcome to this special edition of *A Cup of Health with CDC*, a feature of the MMWR, the Morbidity and Mortality Weekly Report. I'm your host, Dr. Robert Gaynes.

This is the second in a short series of interviews with recipients of the prestigious Charles C. Shepard Award, which is presented annually to a CDC scientist in recognition of his or her work and the impact of that work on public health. We are privileged to be speaking with Dr. Terrence Tumpey, this year's winner of the Shepard Science Award for his publications in Laboratory and Methods.

Dr. Tumpey is a Senior Microbiologist in CDC's Influenza Division. Congratulations and welcome to the show, Terry.

[Dr. Tumpey] Thank you very much.

[Dr. Gaynes] Terry, how long have you been with CDC?

[Dr. Tumpey] I actually started in 1997 where I was fortunate enough to start as a postdoctoral fellow with the Influenza Division, working on influenza after I finished my graduate degree at the University of South Alabama in Mobile. I came on as a two-year postdoctoral fellow, ASM postdoctoral fellow, and I actually arrived at the right time during the first bird flu outbreak of H5N1 in Hong Kong. So I got exposed right way to working with these highly virulent or highly lethal influenza viruses.

[Dr. Gaynes] So, how did you actually come to work in the field of influenza? What was the personal attachment to that area for you?

[Dr. Tumpey] During my graduate school work, I actually was working on a virus that affects the eye, herpes simplex virus type 1, and although I was interested in that virus, I became very interested in influenza during my course work in graduate school. And some of the courses actually talked about the devastating pandemics that affected us in the last century, particularly the 1918 pandemic, and at that time, I would hear figures of anywhere from twenty to fifty million deaths worldwide as a result of this pandemic, and I knew at that time that I really wanted to study influenza. One of our professors gave an example of, well if you have three individuals in a particular closed room, one of them has ebola, the other one has HIV, and the other one has flu and you walk into that room and spend some time in that room and you walk out, which virus will you end up most likely contracting? And the answer was influenza. Just because of the highly contagious nature of influenza, I became very interested in this virus and I

wanted to learn more about it and and try to develop future vaccines and antivirals to combat this virus.

[Dr. Gaynes] Terry, you've done some ground-breaking work on influenza and immunity. First, can you tell us the importance of studying the influenza virus that caused the 1918 pandemic?

[Dr. Tumpey] Well, the 1918 pandemic was exceptional, with estimations of anywhere from twenty to fifty million deaths, making it the worst infectious pandemic known. And because of that and other reasons, it's important to actually study a pandemic virus to help us better understand other influenza viruses with pandemic potential, such as the bird flu H5N1 virus. So we're actually using the 1918 virus as a model to better understand other influenza viruses with pandemic potential. And why not study this pandemic virus of 1918 that obviously spread globally and resulted in devastating pandemic during the fall of 1918. And this is the main reason why we're studying this virus.

[Dr. Gaynes] Terry, briefly tell us the specifics of your research findings and the significance of those findings concerning this influenza virus?

[Dr. Tumpey] Our overall approach to studying the 1918 virus is to better understand why these pandemic viruses are so virulent, number one, and number two how they transmitted so efficiently. Some of the success in our research recently has been along the lines of the transmission of the 1918 virus where we're using it as a model to understand how the virus spread so efficiently throughout the population. And what we found through our model, animal modeling of this particular pandemic strain, is that there's one protein that's particularly important for an influenza strain to transmit efficiently from an infected animal to an uninfected animal. These were striking results; this was the first time that anybody's identified this particular protein within the influenza virus, which is the hemagglutinin, or HA, to be important for transmission. This allows us to better understand the transmission of influenza, even for strains such as the seasonal strains that infect us each year. And now we can start to work on ways to abolish the transmission or affect the transmission of influenza. Once we understand how the virus works, then we can work on different modalities to stop the transmission of influenza.

[Dr. Gaynes] Terry, what's been your proudest or most satisfying accomplishment through all of this?

[Dr. Tumpey] Well, I think the reconstruction of the 1918 virus has been the proudest and most satisfying accomplishment. This was a project that was ongoing for about ten years in collaboration with Dr. Jeffrey Taubenberger at the Army Forces Institute of Pathology where his task was to sequence the 1918 virus and with that information we were able to put bits and pieces of the 1918 virus gene together and try to understand the virulence of the 1918 virus. But once we had all the parts and pieces together in 2005 we were able, for the first time, to reconstruct the 1918 virus and this was a virus that was responsible for the deaths of anywhere from twenty to fifty million people, and we think that this, having this virus in hand will allow us to better understand pandemic viruses that may affect us in the future.

[Dr. Gaynes] And can you give us some insight on your current efforts?

[Dr. Tumpey] We're continually trying to understand exactly all the virus genes that are involved in the transmission of influenza and all the virus genes that are involved in the lethality or the high virulence -the disease-causing effect, so to speak, of these pandemic viruses. And we've gained a lot of information regarding the virus genes that are important. One in particular is the polymerase proteins. Once you have that information, then that particular gene or protein becomes a target for future interventions of antivirals. So, this has been a proud aspect of this work in that other scientists have now redirected their research towards understanding the polymerase proteins in developing antivirals towards those proteins.

[Dr. Gaynes] And Terry, personally, can you tell us a little bit of what your future goals are?

[Dr. Tumpey] Well, I would like to continue working with this virus, this 1918 pandemic virus, and even try and understand other pandemic viruses that affected humans over the last century, such as the 1957 pandemic strain that spread globally, as well. This was an H2N2 subtype virus, and it may contain different characteristics than what we see with the reconstructed 1918, which is an H1N1 subtype virus. This is important for us to understand all the different pandemic traits that viruses possess in order to develop future vaccines, as well as antivirals.

[Dr. Gaynes] Terry, once again, congratulations on this great honor, and thanks for taking the time to visit with us.

[Dr. Tumpey] Thank you.

[Dr. Gaynes] That's it for this special edition of *A Cup of Health with CDC*. Be sure and join us each week for our regular podcasts. Until then, be well. This is Dr. Robert Gaynes for *A Cup of Health with CDC*.

[Announcer] For the most accurate health information, visit www.cdc.gov or call 1-800-CDC-INFO, 24/7.