

Video Summary

Step 1.7 – Vaccine Development – The First Steps

Professor Rino Rappuoli talks about human evolution and how in the last 4 or 5 years we have learnt a lot more about this due to genomics and genome sequencing. For 3 million years, humans had a life expectancy of 25 to 35 years. Back in 1750 it started to increase, and soon it may be 90 years old.

Why is this?

Prof Rino Rappuoli explains that percentage of deaths from infectious diseases has been decreasing year by year. For example, in 1900 thousands of people were dying from diphtheria. Today that is not the case. By conquering different diseases, we've gained 35 years of life expectancy and vaccines have played a major part in enabling humans to do this.

During the last 30 years, several new technologies made possible vaccines that were previously impossible. The future of vaccines is exciting because of new technology that's available. Since the introduction of the UK MenC vaccine in 1999, over 17,000 cases have been prevented. However, MenB was different to MenC and could not be solved using the same technology. To find a vaccine for MenB, reverse vaccinology was used. The MenB genome was sequenced and over 600 potential antigens were tested for antigenicity. Candidate sequences were expressed in E-coli which showed 90 surface located proteins that were not known previously, of which 29 could induce antibodies able to kill the bacteria. Using this approach, the best antigens discovered were selected and trialled in vaccines that proved to be successful. In 2000, two papers were published on reverse vaccinology, however the vaccine for MenB only became available for public use in Europe in 2013. The 13 years in-between were used to ensure the vaccine was safe and efficacious for public use.

With technology that wasn't available in 1980, we've created vaccines which are eliminating meningitis. Classic vaccinology was based around growing pathogens, in reverse vaccinology, vaccines are designed from information and made in a completely different way. Vaccines will continue to contribute to our society by conquering new diseases – it's exciting and who knows what the future holds.

