

# Viruses, Man & Ebola

Christopher Barbara

Have you ever asked yourself how many viruses there are on earth? The answer is  $10^{31}$ , that is about one hundred billion trillion viruses. The majority of these are found in the oceans. 80% of the biomass in the oceans consists of bacteriophages and these are vital to the biofilms contaminating our seas. Hence the blue green algae are preserved and so is the oxygen supply on our planet.

On the other hand, there are those viruses which are notorious for the diseases they cause. These may infect man directly, or else effect the food we consume such as plants, vegetables and animals.

New and emerging viruses have led to outbreaks, epidemics and even pandemics. When man encountered the virus for the first time he showed no or little immunity against it. This, together with the fact that during the Neolithic period man congregated into communities made the transmission of these viruses much easier. Also man developed farming and agricultural skills and to combat diseases such as potato blight. Also viruses may exhibit the ability of "jumping species", e.g., an avian virus or a swine virus may suddenly infect man or other animals or primates. The newly formed re-assorted virus has the potential to infect us humans as our immune system has no protection against such a new virus. A classical example is the Influenza virus which has led to epidemics and pandemics.

Two of the oldest recorded viruses which led to outbreaks were smallpox and measles. Initially smallpox was thought to infect only rodents, but it 'jumped species' to infect man. Millions of people succumbed to this deadly disease and it was not until the discovery of the smallpox vaccine by Jenner in 1798 that man started to develop ways to protect himself against these infective agents. Today we have quite a large collection of vaccine preventable diseases and with the launch of each novel vaccine, there has been a corresponding dramatic decline in the disease thanks to Jenner and the vaccine, smallpox has today been eradicated globally.

In spite of the protection afforded by vaccines and the number of complications and deaths prevented, many are those who are sceptical of the use of vaccines because of some documented adverse effects or because of some unfounded articles published in the media and on the net. This unwillingness to get vaccinated has unfortunately led to the re-emergence of diseases which had been almost eradicated:- the best example is the recent measles outbreaks. In Europe and the UK "following scares of autism from the MMR (Measles,

mumps, rubella) vaccine.

A major development in the 20<sup>th</sup> century was the onset of the silent epidemic of HIV and AIDS which in sub-Saharan Africa infected over 70 million people, and is today spread globally. Up to the present moment we are still challenged by the hypervariable region of the virus to produce an effective vaccine for it, but even though research results appear promising we are still without an effective HIV vaccine.

At present, many of us are closely following the escalation of the Ebola virus outbreak on the local and international media. Health services all over the world are preparing for a possible scenario in case health care workers need to handle someone infected with Ebola.

Malta is no exception to this and although we have never had a patient with Ebola on our shores the Health Authorities have issued guidelines on practices and algorithms to be followed just in case there is an imported case.

Sentinels for disease surveillance have been placed at sea ports and at the Malta International Airport and clinicians are being alerted on the symptomatology of the disease. These include headache, sore throat, muscle pain, sudden fever and intense weakness at an early stage. At an advanced stage the patient may present with vomiting and diarrhea, a skin rash, internal and external bleeding and impaired liver and kidney function. The incubation period varies from 1 to 21 days.

These symptoms, together with a history of recent travel to affected countries (Guinea, Sierra Leone, Liberia and Nigeria) should alert the clinician and he should immediately contact the public Health Medical Officers on hotline 21324068.

Blood samples are collected by the Public Health Officer, who is bound to take all the standard precautions necessary in order to eliminate contact with any blood or body fluids. An EDTA bottle is sent to the Molecular Diagnostics Section at Pathology at Mater Dei using the triple packaging systems supplied by the laboratory.

Using molecular techniques (polymerase chain reaction) the virus may be detected within 6 hours from the time the sample arrives at the laboratory.

In the first few days of the incubation period the viral load may still be very low and one may obtain a false negative result. Hence if the clinical suspicions are still high the test should be repeated again within 3-5 days. During this low viral load stage the patient is not or unlikely to be infectious .

If a patient is confirmed positive for Ebola, he is

transported to the new section of the Infectious Disease Unit at Mater Dei Hospital using the newly procured isolator tent. This tent, equipped with high pressure efficiency (HEPA) filters, isolates the patient from health care workers, thus eliminating the risk of contagion. All hospital infection control guidelines will be followed during the patient's hospital stay.

Treatment includes supportive care with:

- Fluid and electrolyte management
- Haemodynamic monitoring
- Ventilation
- Steroids for adrenal crisis
- Treating secondary bacterial infections.

Anticoagulants, intramuscular infections, acetyl salicylic acid and non steroidal anti inflammatory agents are contraindicated.

Also one has to manage severe bleeding complications using:

- Cryoprecipitate
- Platelets
- Heparin for disseminated intravascular coagulation (DIC) and fresh frozen plasma.

Antivirals, such as Ribavirin, have no documented benefit for Ebola Virus disease (EVD). However ZMapp, developed by Mapp Biopharmaceutical Inc., is a product which consists of monoclonal antibodies that bind to the protein of Ebola virus. This has not yet been tested for safety and effectiveness in humans and trials are currently being conducted.

In case the patient succumbs to EVD, arrangements have been made for the transfer of the body to the hospital morgue. Prayers and funeral service will be held at the Morgue and the body will be placed in double body bags with formalin granules filling the space between each bags. The bags will then be placed in a zinc lined coffin. Burial will then proceed to a selected site at the Addolorata cemetery.

While we cannot ever avoid to live in the midst of bacteria and viruses it is important for us not to underestimate the potential of virulence exhibited by some of these microorganisms. So I would recommend that we are always prepared for any eventuality. We should prevent disease by advocating vaccination and should keep ourselves and our immune system healthy in order to be able to defend and withstand attack.

### **Cover Picture:**

The Pharmacist

**By Christian Camilleri**

I was born in Malta in 1989. My passion for art began in my childhood. I was self taught and began drawing scenes of rural areas in Malta in my early teens. In my early twenties I began painting watercolour portraits. I find inspiration in Baroque art. Some of my work has been displayed in the recent MCC exhibition in Summer 2014. I am also a medical doctor, graduated in 2012.

Painting is a passion I enjoy during the free time I have left.