

1.2 Working safely in the lab

If you are going to work with viruses, you cannot just sit at the laboratory bench and start right away. It is necessary to know the risks that you can run and take the necessary precautions to avoid them. This is called laboratory safety.

Safety in the lab applies not only to highly infectious known viruses. All chemical and radioactive products and pathological samples, such as blood, serum, cell cultures, or viruses, should be handled with extreme care.

The main routes by which pathogens, chemical substances or radioactive materials can enter the human body are:

1. **By mouth** such as by eating, drinking and smoking in the laboratory, pipetting by mouth or when transferring microorganisms to the mouth with contaminated fingers. Needless to insist that all these activities are absolutely prohibited in a Virology laboratory.
2. **Through the skin** such as piercing with needles, sharp instruments, or glass, by bites of animals and scratches or cuts and other types of scratches.
3. Another route is **through the conjunctiva** by splashing infectious material into the eyes, or transferring microorganisms to the eyes with contaminated fingers.
4. And also **through the lungs** by inhalation of airborne microorganisms.

Knowing these routes makes it easy to define guidelines to minimize the risk of exposure. Some of these requirements may seem excessive or simplistic, but experience has shown that fatal accidents are often due to the non-application of basic biosecurity measures.

When working with infectious materials, microorganisms or even with laboratory animals it is extremely important to know the level of adequate protection. The laboratory personnel, as well as the environment and the local community should be protected from possible infections.

You've probably seen on TV virology laboratories. Sometimes you may have seen only an open laboratory, where the staff is working with few special measures. Other times you've seen virologists with full protective clothing with independent air supply. You've guessed it intuitively that not all viruses are equally dangerous to workers or to the community.

The protection measures that laboratory activities require are defined as biosafety levels or biological safety. Levels of biological security are classified from one to four and are selected based on the agents or organisms object of the research or work. Each level is based on the previous level, adding more controls and barriers.

The different levels of biosecurity include safe work practices, special protection equipment (that it defined as primary barriers) and the design of facilities (known as the secondary barriers).

Biosafety levels are determined by factors such as the severity of the infection, the route of exposure, etc. Don't forget to check the additional information to find out how these factors can affect the biosafety level.

In each country, the authorities for medical research define appropriate laboratory practices and the containment and adequate facilities for microbiological handling. The Advisory Committee on Dangerous Pathogens or ACDP has classified microorganisms into four risk groups, which match the four levels of biosecurity. The criteria have been the pathogenicity to humans and animals, the risk for laboratory workers, the transfer to the community, and if there is effective prophylaxis available.

Read in the additional material the description of the different levels of biosecurity which microorganisms can be handled in each of them, which laboratory practices can be done and

the primary and secondary barriers which are necessary. Also, perform the activities that we propose. I will get together again with you in the following video on the cultivation of viruses.

Thank you for your attention!