Hello students, welcome to this e-learning session in Microbiology and Biochemistry one.

In this session we will talk about desiccation. I am Valerie Gonsalves.

We will learn about desiccation as a method for microbial control. We will learn about the principle, applications and limitations of dessication. We will also learn about the factors that affect the survival of microbes after desiccation. And we will learn about the preservation of cultures by lyophilization.

By the end of this module, you will be able to explain the principle of desiccation for microbial control. Elucidate the application of microbial control by desiccation. Explain the limitations of desiccation as a method for control of microorganisms. State the factors affecting survival of cells after desiccation. Elaborate on lyophilization and state its applications.

Desiccation refers to dehydration or removal of moisture from cells. Water is vital for cell survival. In fact, in the absence of water, life ceases to exist. When cells are desiccated, their metabolic activities cease. Growth and reproduction comes to a halt. Thus, there is a decline in total viable population of cells. However, when water is made available. These dried cells can resume growth.

Desiccation has been used since time immemorial for drying of foods. It has been used to control growth of microorganisms in dried foods such as fish, food additives for cereals and also in preparation of instant coffee. Implications of desiccation are important in hospital settings. Certain pathogenic microorganisms and endospores are found viable in dried state. Dust, clothing, bedding and dressings might contain these infectious materials. Infectious materials may be present in dried mucus, urine, pus and feces. As microbiologists, we have been using this technique of desiccation for preservation of microorganisms.

Limitations. Desiccation does not cause sterilization of the sample because when water is made available, these dried cells can revive and desiccation is affected by a number of factors. Such as the type of organisms. It is known that *Neisseria gonorrhoeae*, the causative agent of gonorrhea, remain viable for a long period of time and tubercle bacilli remain viable for an even longer period of time. Viruses and endospores are known to be highly resistant to desiccation.

Factors affecting survival of microbes after desiccation. Here are a list of factors that affect the survival of microorganisms post desiccation process. These include the species of microorganism, the materials in, or on which the organism is dried, the completeness of the drying process, physical conditions that the organisms are exposed to after desiccation.

We have learned earlier that one of the applications of desiccation is preservation of microbial cells. Preservation of cultures is done by a process called lyophilization. Lyophilisation is a technique of freeze drying cells for their preservation. Here, the cells are subject to rapid freezing. This is done by placing the vials containing the microbial cells in dry ice and ethanol mixture at a temperature of negative 78 degrees Celsius. When this is done, the cells are frozen. And it is this frozen state that the cells are dehydrated under vacuum. This process of dehydration is done using a lyophilizer. Here a process of sublimation occurs where the water from the solid state directly moves to the gaseous state. Thus the cells are not damaged.

Then the cells which are present, in the vials, are sealed in vacuum and it is stored for further use. Lyophilized cultures of microorganisms remain viable for a number of years. In fact, there are reports that they remain viable for even upto 30 years.

Let us summarize this unit. Desiccation is a physical method of microbial control. It involves the removal of moisture from the cells. Desiccation finds applications in food preservation, hospital setting and microbial cell preservation. Desiccation has its limitations in that it does not cause sterilization and is influenced by a number of factors. Lyophilization is a technique of freeze drying cells for their preservation.

Here is a list of references.

Thank you.