

Cryopreservation of stem cells

Cell therapies based on the utilization of stem cells, often require effective methods of preservation that permit the completion of safety and quality control testing, transportation to the site of use and coordination of the therapy with defined periods of patient care regimes.

Cryopreservation is a process where [cells](#) or whole [tissues](#) are preserved by cooling to low, sub-zero [temperatures](#), such as $-196\text{ }^{\circ}\text{C}$ (the boiling point of [liquid nitrogen](#)). At these low temperatures, any biological activity, including the biochemical reactions that would lead to [cell division or cell death](#), are effectively stopped.

Following, cells can be stored for indefinite periods provided a temperature of less than -135°C is maintained. Such ultra-low temperatures can be attained by immersion in liquid or vapor phase nitrogen.

There has been a large amount of developmental work undertaken to ensure successful cryopreservation and resuscitation of different cell types. Computerized equipment can perform a highly controlled rate freezing, taking care of a basic principle of successful cryopreservation, which is a slow freeze in the presence of cryoprotectants. The use of these compounds (dimethyl, sulphoxide or glycerol) helps protect the cells from rupture by the formation of ice crystals.

Storage in liquid phase nitrogen allows the lowest possible storage temperature to be maintained with absolute consistency. However, storage in the liquid phase of nitrogen creates potential hazards, such as cross contamination by virus pathogens. For these reasons, storage is most commonly in vapor phase nitrogen.