

Can Good Bacteria Survive a Drying Storm?

Imagine a future medicine that contains living bacteria. These bacteria are the active part of the product and may help support health or even treat disease. But this raises a practical question: how can we make a medicine when the living cells themselves must survive the process?

One possible answer is to turn the bacteria into a dry powder. A powder is easier to handle than a liquid and can be used in forms such as capsules or mixtures. But there is a problem: drying is harsh. Drying takes away the water that living cells need. It is a bit like asking a fish to live outside water. If the drying is too harsh, the bacteria may be weakened or die.

This project studied whether a gentler drying method could help. The method is called low-temperature vacuum spray drying. In simple terms, a liquid containing bacteria is sprayed into tiny droplets and dried into powder. By lowering the pressure inside the drying chamber, water can evaporate at a lower temperature. This means the process may be less damaging than ordinary hot drying.

The main challenge was to find the right balance. If the drying process is too strong, the powder becomes drier, but more bacteria die. If the process is too gentle, more bacteria survive at first, but the powder may still contain too much available water, which can make storage more difficult. A good process therefore needs to protect the bacteria while still producing a stable powder.

In the experiments, probiotic bacteria were mixed with protective sugar-based ingredients and dried under different conditions. The dried powders were then tested to see how many bacteria survived after drying and after short-term storage. The results showed that the bacteria could survive the process, but the drying conditions made a clear difference. The best outcome was not simply the driest powder or the mildest process. Instead, it came from a middle-ground condition that balanced bacterial survival and powder stability.

This work shows that low-temperature vacuum spray drying is a promising route worth improving. With further optimisation, this type of process could help make future live bacterial products faster to manufacture, easier to store, and more practical to use.