



Evaluation of shrinkage temperature of bovine pericardium tissue for bioprosthetic heart valve application by differential scanning calorimetry and freeze-drying microscopy.

ABSTRACT:

Bovine pericardium bioprosthesis has become a commonly accepted device for heart valve replacement. Present practice relies on the measurement of shrinkage temperature, observed as a dramatic shortening of tissue length. Several reports in the last decade have utilized differential scanning calorimetry (DSC) as an alternative method to determine the shrinkage temperature, which is accompanied by the absorption of heat, giving rise to an endothermic peak over the shrinkage temperature range of biological tissues. Usually, freeze-drying microscope is used to determine collapse temperature during the lyophilization of solutions. On this experiment we used this technique to study the shrinkage event. The aim of this work was to compare the results of shrinkage temperature obtained by DSC with the results obtained by freeze-drying microscopy. The results showed that both techniques provided excellent sensitivity and reproducibility, and gave information on the thermal shrinkage transition via the thermodynamical parameters inherent of each method.