Non-Toxic Fixative to Stabilize Protein Scaffolds in Bioprosthetic Implants

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Technology description

Crosslinks with Gelatin to Provide a Cost-Effective, Alternative Chemical Fixative for Various Medical Implants

This tissue fixation technique uses natural aldehyde alternatives, such as cinnamaldehyde solution or vanillin solution, to cross-link protein scaffolds, thereby increasing the viability of medical implants. Healthcare professionals in the medical device industry use protein-based implants for a variety of applications, such as wound healing or heart valve replacement. However, some techniques for stabilizing the proteins in medical prostheses are unsuitable for long-term use. The common fixative for heart valve implants, glutaraldehyde, can cause implant calcification and cell death. Additionally, available chemical fixatives for bioprosthetics can provoke an immune response, increasing the likelihood of implant rejection.
Researchers at the University of Florida have developed a procedure that stabilizes protein scaffolds in bioprosthetic implants. The protein fixative solution utilizes a non-synthetic aldehyde, reducing immunogenicity and toxicity and increasing the long-term stability of implanted medical devices.

Application area

Protein scaffold fixative that improves long-term viability of heart valves and other biomedical implants
Aromatic, natural aldehydes derived from cinnamon, cinnamaldehyde or vanillin combines with a non-toxic volatile solvent to create a solution. This solution, in either liquid or vapor phase, at various concentrations at room temperature, cross-links electrospun gelatin protein nanofibers, forming stable protein scaffolds. The resulting protein scaffolds are suitable for various tissue engineering and bioprosthetic applications.

Advantages

Prevents implant calcification, reducing overall toxicity and saving time and cost of demineralization
Creates more stable protein scaffolds, increasing their aqueous, thermal, and mechanical integrity
Crosslinks protein nanofibers using vapor or liquid phase fixative

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