

## Sustained Release Aquasome for Fibrinolytic Protein Therapy

Technology Domain: Pharmaceutical

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### Technology Summary:

This invention introduces a novel aquasome formulation for sustained delivery of fibrinolytic proteins, like nattokinase, to treat thrombosis. The key technical solution involves a multi-component nanocarrier: ceramic nanoparticles (e.g., hydroxyapatite) form a core, coated with a carbohydrate layer (e.g., cellobiose), encapsulating the protein.

The key inventive feature is the precise component ratio (1:3:0.00004 core:carbohydrate:protein) and unique coating/encapsulation, ensuring a slow and continuous release over 48 hours post-injection. This sustained release prolongs the protein's circulation, enhancing clot interaction while minimizing excessive bleeding risks.

Results show optimal particle size ( $392.6 \pm 1.9$  nm), high stability ( $-44.0$  mV zeta potential, 90-day stability at  $4^\circ\text{C}$ ), and significant retained enzymatic activity ( $20.79 \pm 0.62\%$ ). The use of this injectable aquasome offers a safer, more effective, and bioavailable treatment for thrombosis and cardiovascular conditions, bypassing oral limitations and reducing drug dosage.

