

Fast, Effective Thrombolytic Agent for Arterial Blood Clots

Current therapies offer limited success

Cardiovascular events are a leading cause of death in the United States. Many of these events are caused by arterial thrombosis, which is when a clot forms in an artery and stops the flow of blood to major organs, often leading to a stroke or heart attack.

Depending on how a clot is formed, it can either be primarily composed of platelets and von Willebrand Factor (VWF, a glycoprotein that helps with platelet adhesion), or polymerized fibrin. The current clinical standard for treating a stroke is either mechanical thrombectomy or an intravenously delivered tissue plasminogen activator (tPA), which breaks down fibrin-rich coagulation clots but is not the most effective agent for dissolving VWF-platelet-rich clots. Additionally, tPA can also cause bleeding complications. The critical unmet need persists for a safe and effective agent to dissolve blood clots in the immediate wake of a major adverse cardiovascular event.

A promising treatment for dangerous blood clots

While studying the thrombolytic capabilities for N-acetylcysteine (NAC)—a medication used to thin mucus in conditions such as asthma and cystic fibrosis—researchers determined that N,N'-diacetyl-L-cystine (DiNAC), the disulfide dimer of the amino acid cystine, has the potential to be a highly efficient thrombolytic agent. During *in vitro* testing to study the efficacy of known and proposed thrombolytic agents, DiNAC dissolved thrombi in as quickly as 90 seconds.

Specifically, perfusion of DiNAC, reduced the diameter and surface area of VWF-platelet-rich thrombi by 50–95 percent. Researchers observed macroscopic fissures in the thrombus body, followed by the formation of tethered fragments and finally an eventual break with tolerable micro emboli passing downstream. These results indicate that DiNAC could possibly act as an effective thrombolytic agent against arterial blood clots, with the potential to mitigate life-threatening side effects of hemorrhage associated with current thrombolytic therapies.

Summary Bullets

- The disulfide dimer of the amino acid cystine, has the potential to be a highly efficient thrombolytic agent for treating dangerous arterial blood clots.
- During *in vitro* testing DiNAC dissolved thrombi in as quickly as 90 seconds and reduced the diameter and surface area of certain thrombi by 50–95 percent.
- DiNAC has the potential to treat multiple conditions associated with arterial thrombus formation and to mitigate life-threatening side effects.

Solution Advantages

- **Effective:** Has the potential to reduce the diameter and surface area of VWF-platelet-rich arterial thrombi by 50–95 percent
- **Fast acting:** Dissolves thrombi within five minutes and as fast as 90 seconds during experimental *in vitro* testing
- **Targets multiple indications:** Beyond its potential to treat and prevent thrombus, may treat multiple associated diseases and disorders such as stroke, myocardial infarction, and heart failure

Potential Commercial Applications

- Stroke
- Myocardial infarction
- Leg ischemia
- Sickle-cell anemia
- Disseminated intravascular coagulation
- Extracorporeal circulation
- Heart failure
- Valvular disease
- Aortic stenosis
- Venous thrombosis

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IP Status

<p>The following patent application has published and additional international coverage is pending</p>:
WO2022067248A1

Publications

[Lysis of arterial thrombi by perfusion of N,N'-Diacetyl-L-cystine \(DiNAC\)](#), PLoS One - February 25, 2021

Images

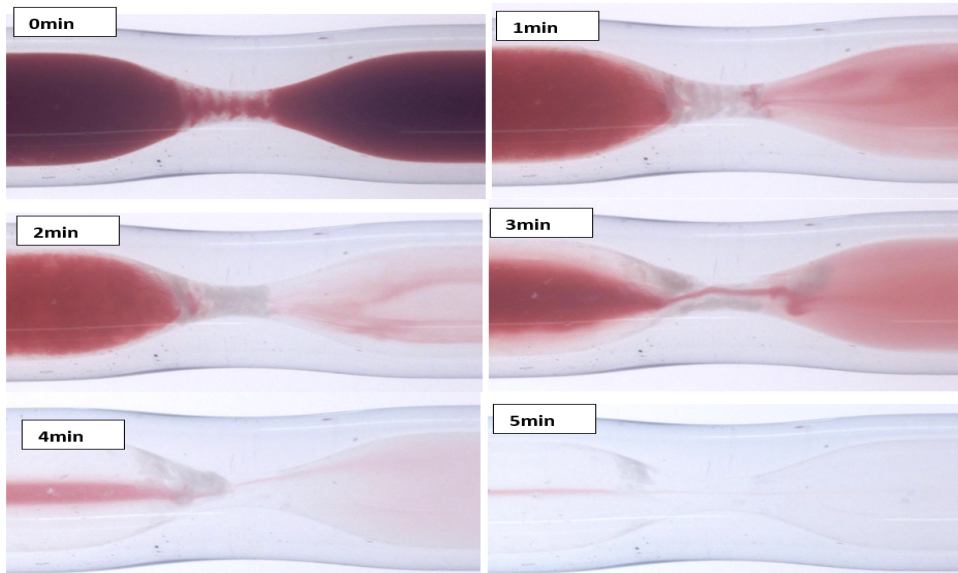


Image sequence demonstrates a VWF-platelet-rich clot breaking up within 5 minutes of DiNAC perfusion.

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