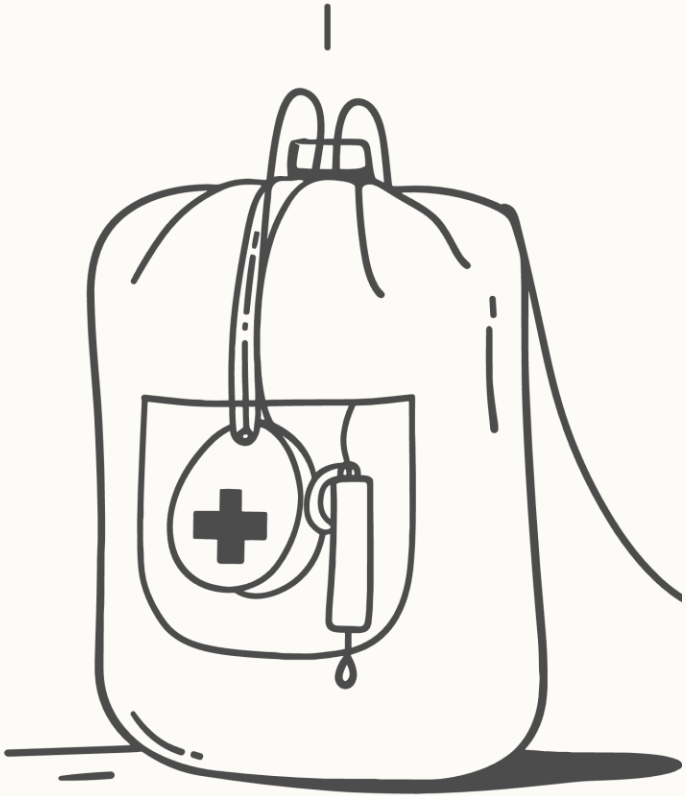
COLMATEK: Innovative Hemostatic and Wound Healing Solutions

Our mission: To bring the latest scientific advancements into personalized medicine, surgery, and emergency care.

Kateryna Komisarenko MD, PhD, CEO of COLMATEK



The Problem: Uncontrolled Bleeding

The Scale

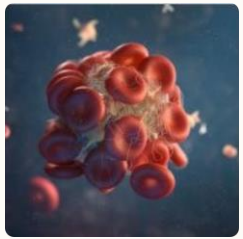
Significant blood loss is a critical, multi-billion dollar problem in trauma, surgery, and war conflicts.

Current Limitations

Existing hemostatic agents fall short in effectiveness and wound healing, and can lead to dangerous complications including thrombosis and strokes.

The Solution: Colmatek

Colmatek is an innovative hemostatic and wound-healing product designed to stop severe bleeding within seconds and promote faster tissue recovery.

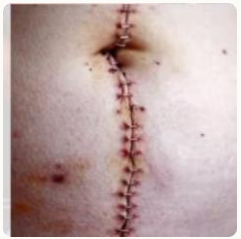


Rapid Blood Clotting Activation

Stops severe bleeding within seconds through targeted clotting activation.

Biodegradable Materials

Fully dissolves within 14 days — no additional surgical intervention required.



Enhanced Wound Healing

Promotes faster tissue recovery and reduces post-surgical complications.

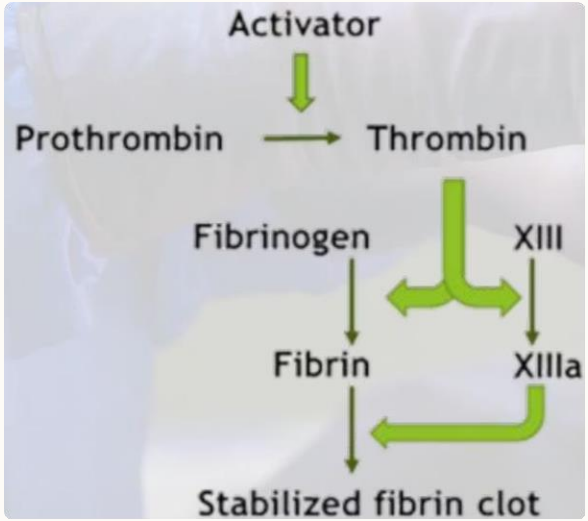
Easy Application & Versatility

Simple to apply across diverse medical scenarios — trauma, surgery, and emergency care.

How It Works: The Clotting Pathway

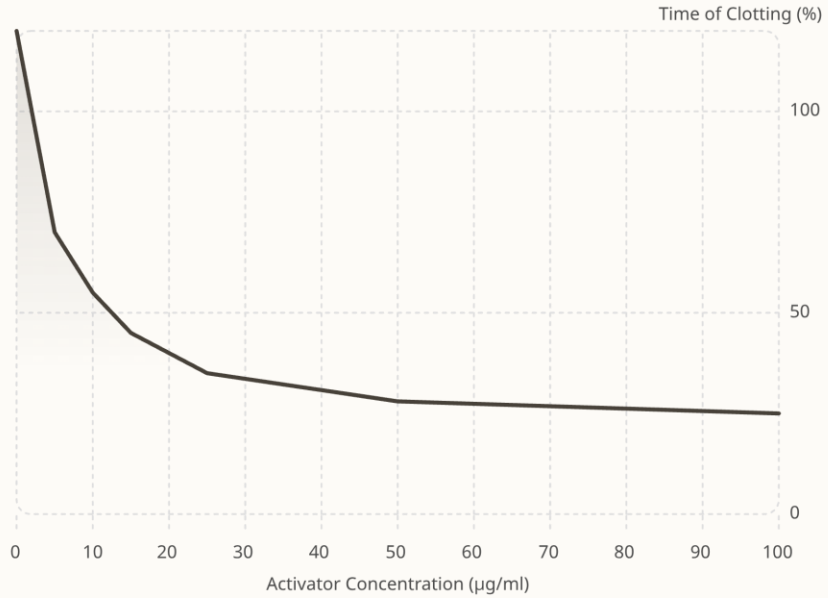
Biochemical Mechanism

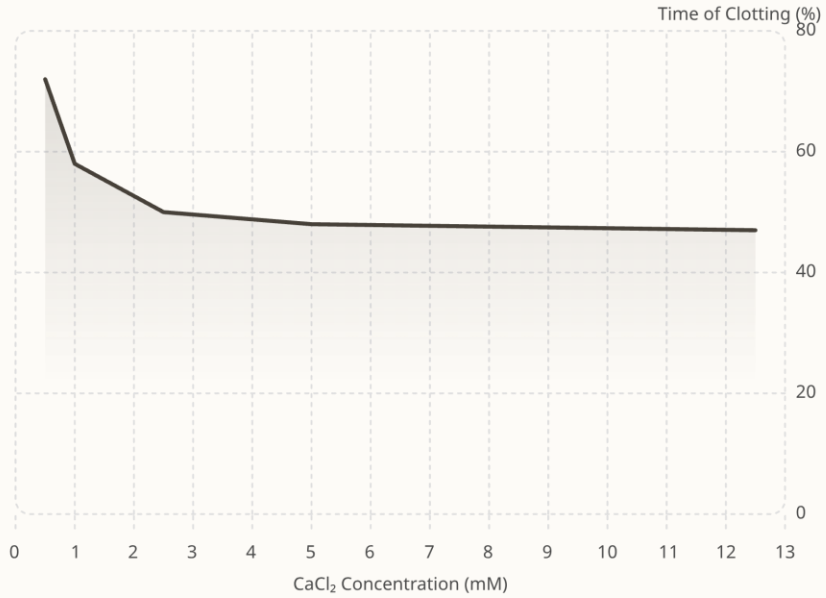
The activator converts prothrombin into thrombin. Thrombin then acts on fibrinogen and factor XIII, converting fibrinogen to fibrin, which forms a **stabilized fibrin clot**. Factor XIIIa further crosslinks and stabilizes the clot — achieving rapid, targeted hemostasis without systemic effects.



Activator Concentration & Clotting Time

As activator concentration increases, clotting time drops sharply — leveling off at approximately 25% of baseline — demonstrating potent, dose-dependent hemostatic action.

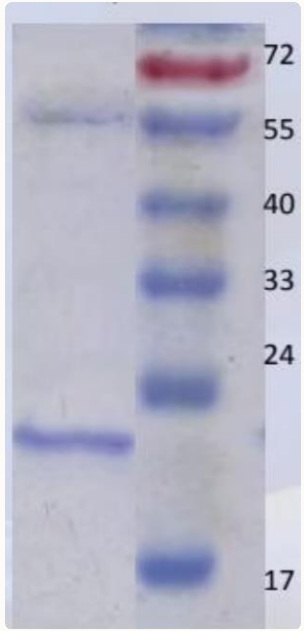




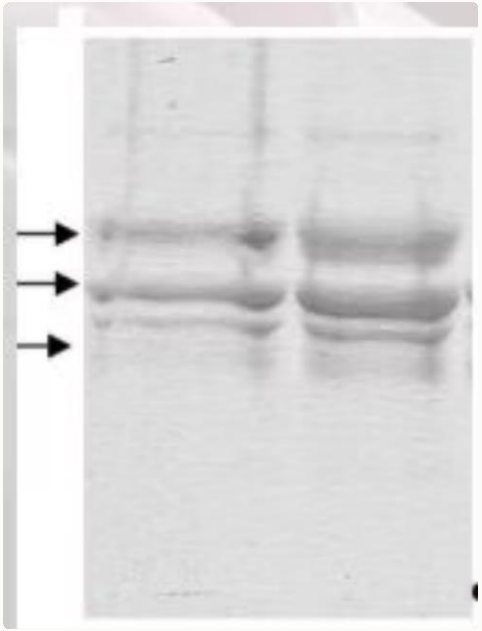
$CaCl_2$ concentration also reduces clotting time, plateauing near 48%, confirming calcium's co-factor role.

Purified Activator: Specificity & Safety

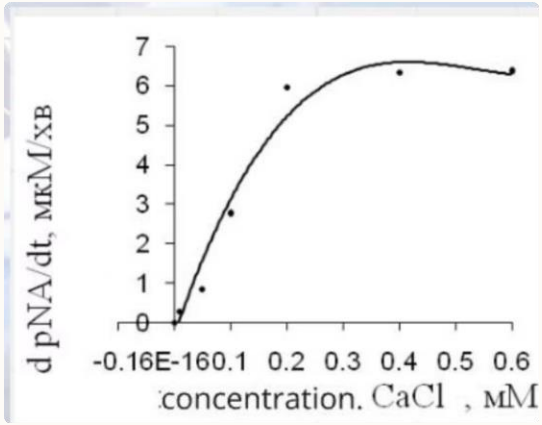
The electrophoretically pure activator was isolated and fully characterized. It specifically activates prothrombin — **without any effect on fibrinogen or platelets directly** — ensuring targeted clotting with no systemic thrombotic risk.



SDS-PAGE of purified enzyme — single band at ~72 kDa confirms purity.



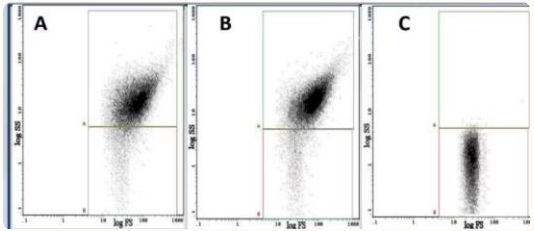
SDS-PAGE showing fibrinogen chains (α, β, γ) after 2-hour incubation with activator — confirming fibrin conversion.



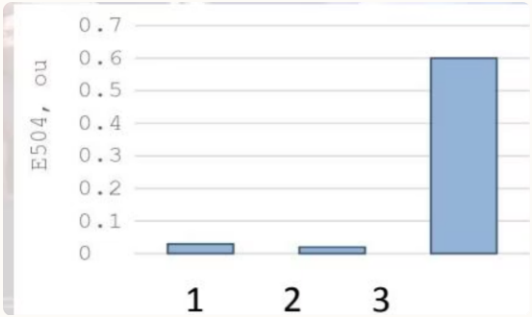
Prothrombin activation peaks at 0.4 mM $CaCl_2$ — demonstrating calcium-dependent efficiency.

Safety: No Hemolysis, No Platelet Activation

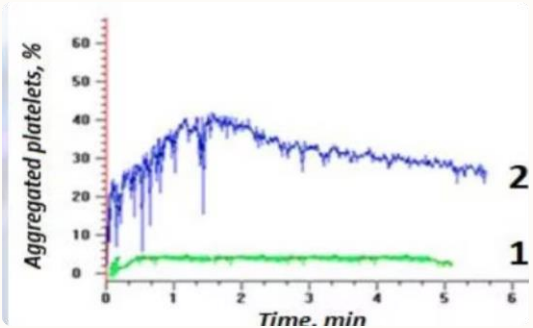
On washed human red cells and platelets, the enzyme activator **does not cause hemolysis or platelet activation**, and cannot directly induce platelet aggregation — a critical safety advantage over competing agents.



Flow cytometry: Platelet morphology unchanged by activator (B) vs. thrombin positive control (C).



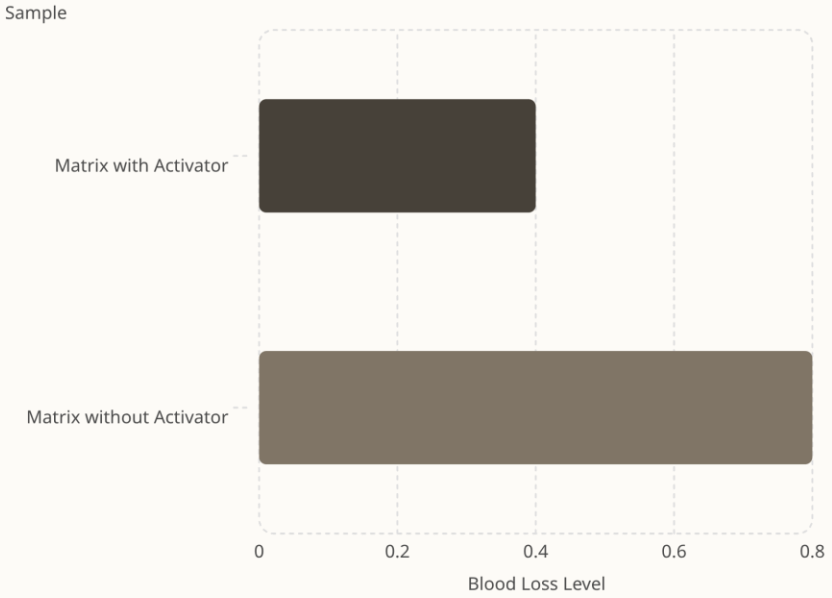
Hemolysis assay: Activator (2) shows negligible E504 vs. Triton X-100 positive control (3, ~0.6).



Platelet aggregation: Activator (1) remains near 0% vs. ADP positive control (2) peaking at ~40%.

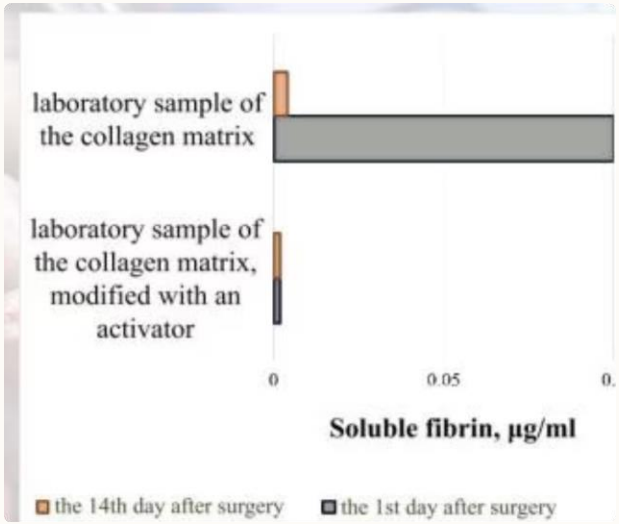
Hemostatic Effect: Blood Loss Reduction

In parenchymal bleeding models in rats, the collagen matrix **modified with activator reduced blood loss by ~50%** compared to the matrix without activator — a clinically significant improvement.



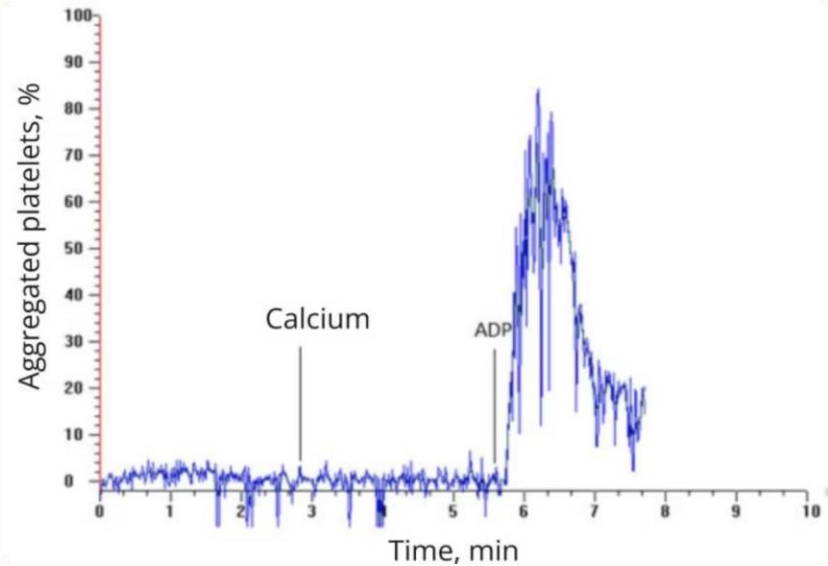
Thrombophilia Safety

Soluble fibrin (thrombophilia marker) in rabbit blood plasma remained at **~0.01 µg/ml** for both matrix variants on day 1 and day 14 — confirming no thrombotic risk from either formulation.

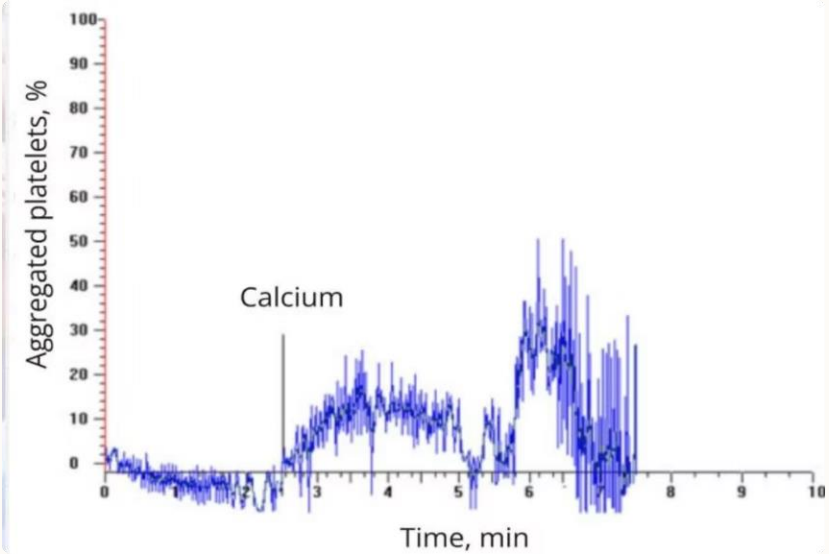


Platelet Aggregation Efficiency

In human platelet-rich plasma, the collagen matrix enhanced with activator triggers robust platelet aggregation upon $CaCl_2$ addition alone — demonstrating superior hemostatic activation without requiring additional ADP stimulus.



Matrix without activator: Aggregation requires ADP addition at 5 min, peaking ~85%.

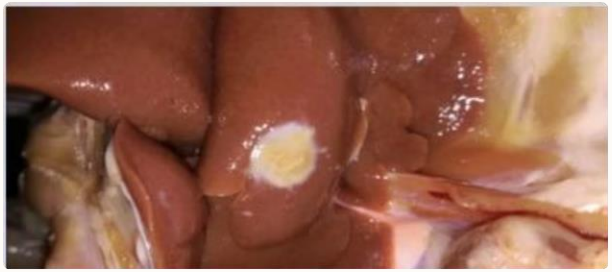


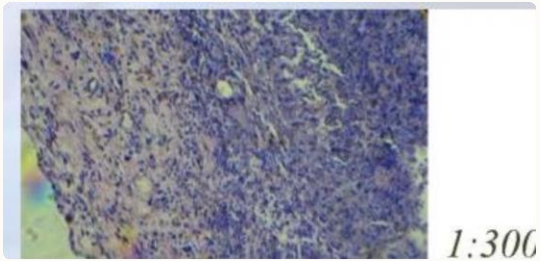
Matrix with activator: $CaCl_2$ alone triggers sustained aggregation peaking ~50% — no ADP needed.

Wound Healing & Tissue Repair

Laparoscopic and histological analysis at day 14 confirms superior healing with the activated matrix — no inflammation, no edema, and active penetration of reticular and endothelial cells into the wound volume.

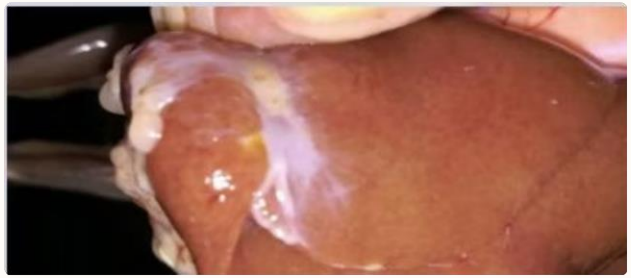
Modified with Activator

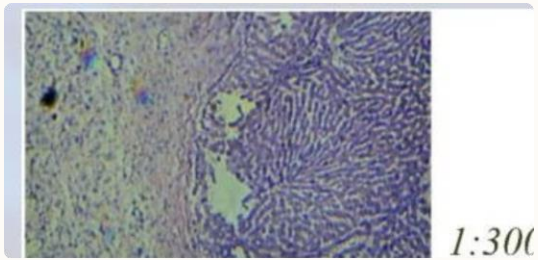




Dense cellular network — active tissue regeneration. Scale 1:300.

Without Activator

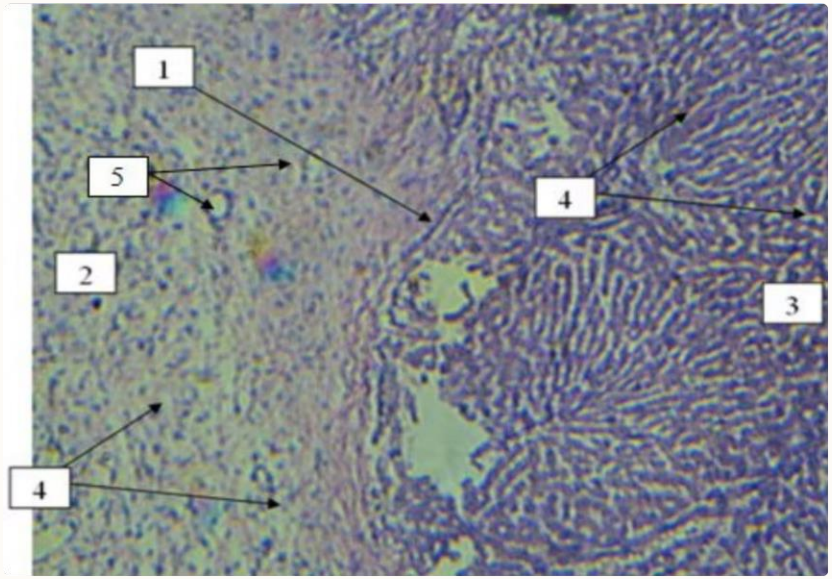




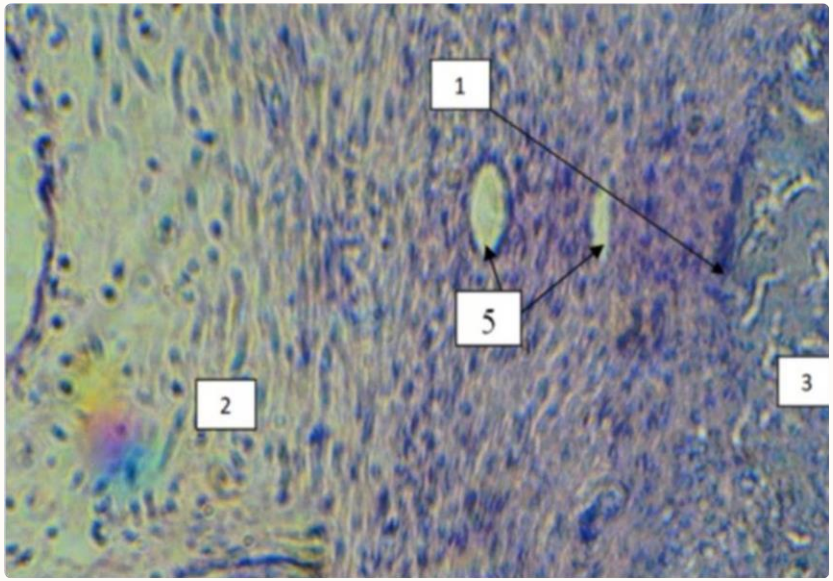
Less dense cellular infiltration — slower repair. Scale 1:300.

Histological Repair: Day 14

Liver repair on day 14 shows clear tissue regeneration at the collagen matrix application site. The activated matrix (vs. commercial product) demonstrates a more organized boundary between liver tissue and regenerating tissue, with visible sinusoids and blood vessels.



Colmatek (modified with activator): Organized regeneration. 1–Boundary; 2–New tissue; 3–Liver; 4–Sinusoids; 5–Blood vessels. H&E, 1:300.



Commercial collagen product: Less organized neoplasm formation. H&E, 1:300.

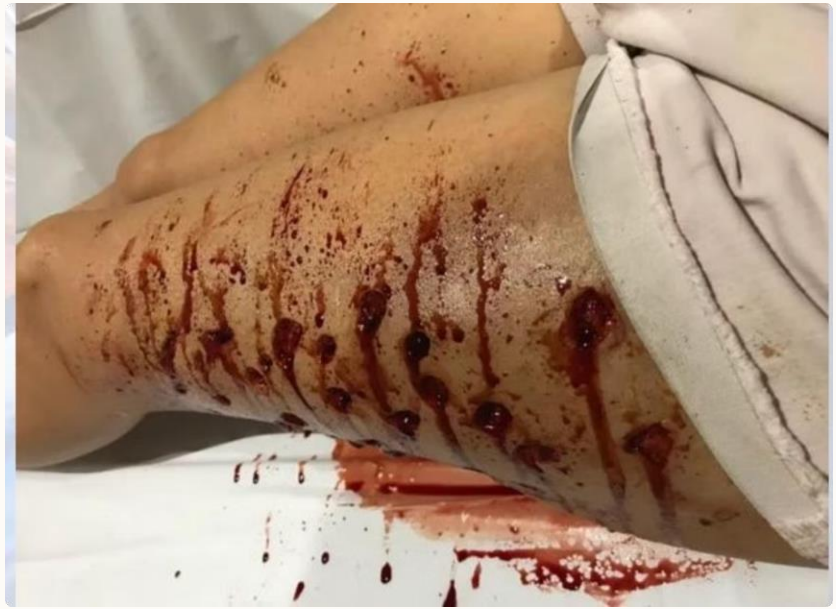
Use Cases

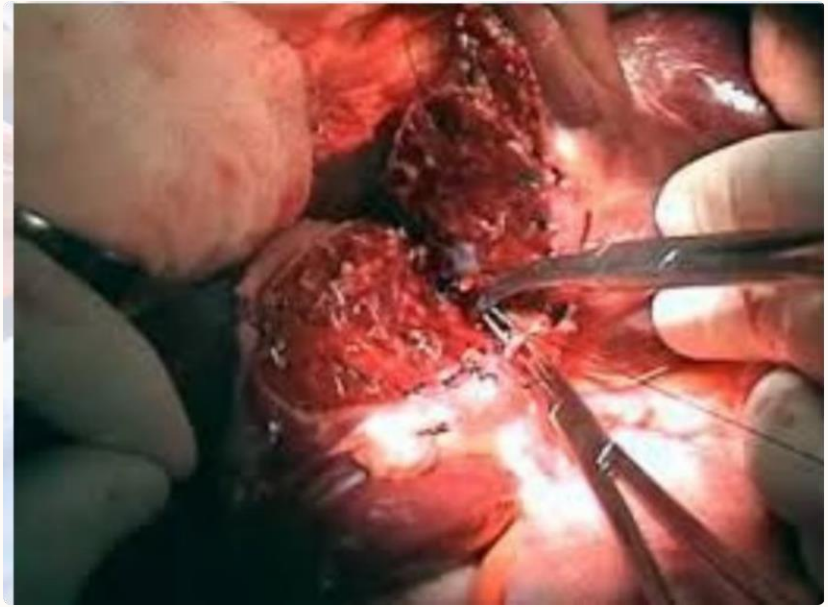
Case 1: Gunshot & Shrapnel Wounds

Tampon format with collagen matrix and activator. Stops even **arterial bleeding within seconds** (up to 20 sec for extensive wounds). Simple to use — open package and press to wound.

Case 2: Internal Organ Surgery

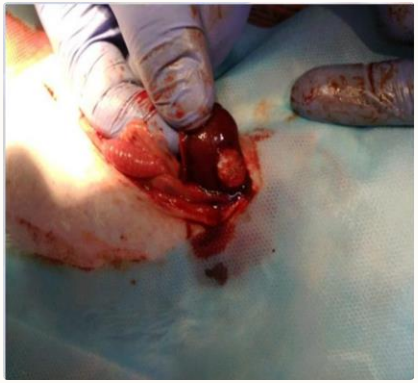
Applied as a patch to bleeding liver tissue after partial resection. Stops bleeding within **10 seconds**. No clot formation via prothrombin activation. Matrix fully dissolves within **14 days** — no re-operation needed.



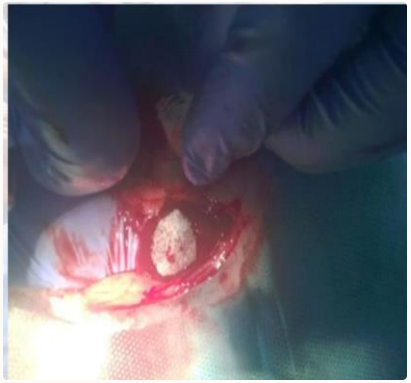


Surgical Hemostatic Action

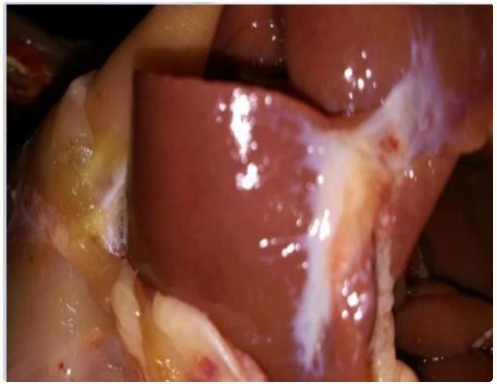
Intraoperative application of the Colmatek collagen matrix demonstrated high sorption capacity and effective blood absorption . The activated formulation achieved **rapid bleeding cessation with no significant leakage**.



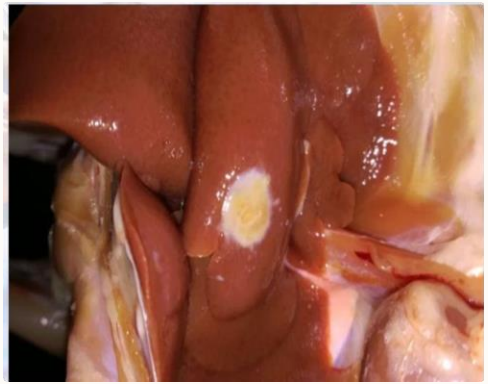
Standard matrix: High sorption capacity and effective blood absorption.



Activated matrix: Rapid bleeding cessation, no significant leakage.



Day 14: Adhesion formation noted, no inflammation or edema.



Day 14: No adhesion formation, no inflammation or swelling

Our Partners

Scientific Partners

Palladin Institute of Biochemistry

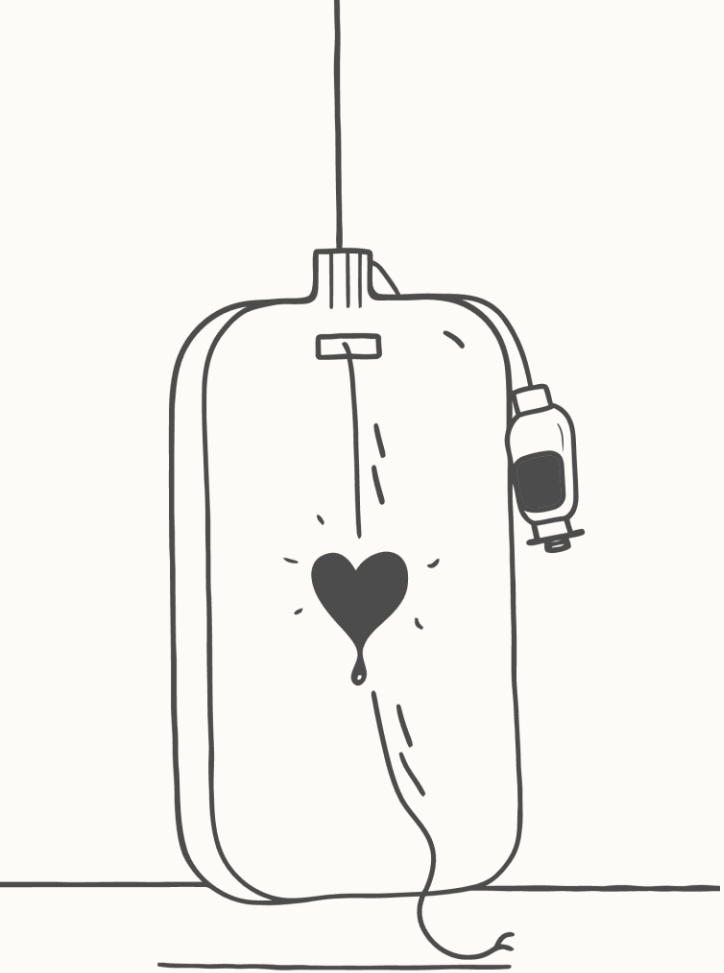
State Institution "Institute of Traumatology and Orthopedics" — National Academy of Medical Sciences of Ukraine

Military Partners

Marcantonio Global — USA Department of Defense
NDA — Ukraine Military

Certification Partners

MCRA — an IQVIA business
Supporting regulatory pathway and clinical certification for global market access.



COLMATEK: Saving Lives Through Science

Stops Bleeding in Seconds

Arterial and parenchymal bleeding halted within 10–20 seconds across trauma and surgical settings.

Safe & Biodegradable

No thrombosis risk. No hemolysis. Fully dissolves in 14 days — no re-operation required.

Proven Efficacy

Validated through biochemical, histological, and in vivo studies with leading scientific and military partners.

Colmatek is advancing personalized medicine, surgery, and emergency care — bringing next-generation hemostatic science to the field.