



# ClotGuard

Using freeze-dried platelets, delivered by nanobots, to prevent traumatic hemorrhage

## Traumatic hemorrhage deaths can be prevented

Hemorrhage, or uncontrolled bleeding, is a major cause of preventable deaths, especially when the body is affected by traumatic injuries. It's estimated that hemorrhage accounts for 1.5 million global deaths every year, while excessive blood loss in injuries accounts for roughly 2 million deaths each year, for civilian-related accidents. On the battlefield, roughly 81.5% of fatalities were due to hemorrhage, and all fatalities occurred before the casualties reached a medical facility. Around 80% of 'Died of Wounds' on the battlefield (DOW) deaths were caused by hemorrhages from major trauma. Current methods to treat hemorrhages, both in civilian accidents and on the battlefield, are not suitable for traumatic injuries of that scale.

## Extending the survival period from initial injury occurrence

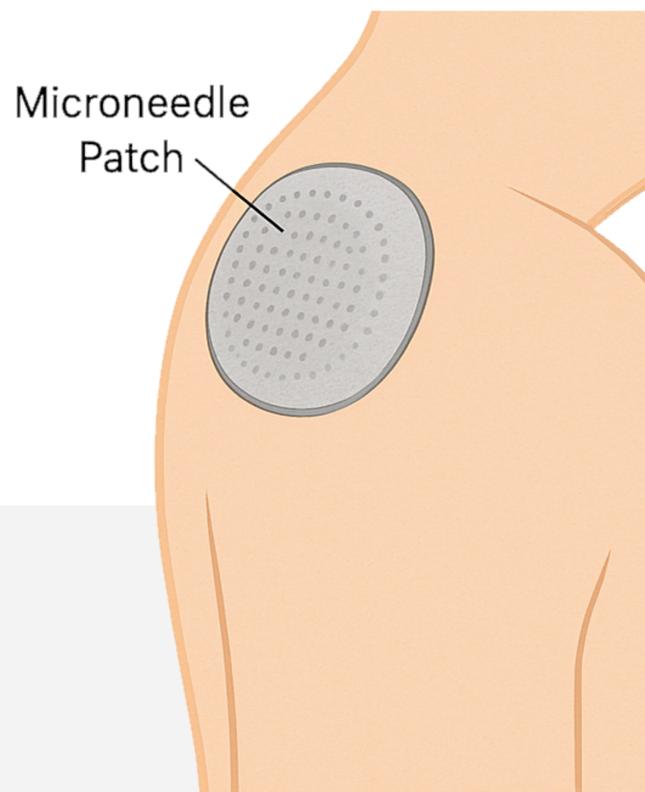
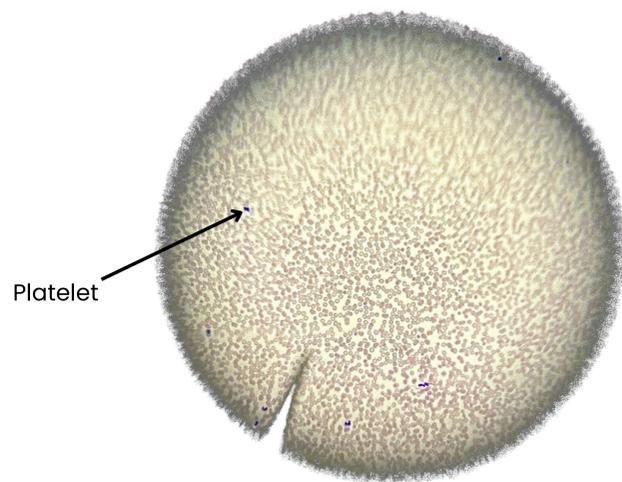
ClotGuard proposes a unique anti-blood loss system that transports clotting agents using nanocarriers to the site of bleeding to create clots and prevent bleeding, saving crucial time for paramedics to treat the injury. All the technology used is stored in a patch, similar to that of a diabetes sensor. The 'patch' includes a storage cartridge where freeze-dried platelets attached to nanobots are stored, is equipped with sensors that detect different bleeding biomarkers such as thrombin and oxygen saturation, and has already secured tubes for immediate platelet delivery. When bleeding is detected, the patch provides the dosage of nanobots and platelets into the body through the tubes, which will travel to the bleeding site and create blood clotting to prevent further excessive blood loss.

## Advantages

ClotGuard patches can be specifically applied before military personnel go onto the battlefield for immediate reaction to detected bleeding when traumatic injury occurs. The freeze-dried platelets can be stored at varying temperatures until needed and can last for up to three years before needing a replacement. ClotGuard patches can also be 5x-10x cheaper than the constant supply of gauze for a year because of their reusable and long-lasting methods, as well as technology.

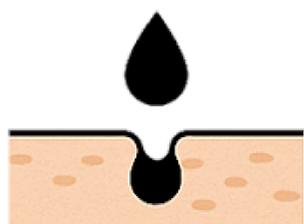
## Our Process

- 1 Creating Platelets for ClotGuard Patch**  
Freeze-dried platelets are sourced from synthetic lab processes. Platelets are preserved using cryoprotectants, then lyophilized (freeze-dried) for long-term storage (3 years) inside the patch. These platelets are stored in sterile, single-use microchambers within the patch.
- 2 Creating Nanobots for ClotGuard Patch**  
Nanobots are made using biocompatible materials (like PLGAs or smart polymers). Each nanobot is programmed to: Detect vascular damage, migrate toward the injury site, and activate as well as assist with clot formation. They carry clotting agents such as platelets, which will assist the hemostasis process.
- 3 ClotGuard Patch Activation**  
The patch contains biosensors that detect blood velocity, blood pressure drop, and tissue pH change. Upon detection, it deploys nanobots through the patch's microneedles that would be attached to clotting agents, encapsulated in PLGA.
- 4 Preventing Blood Loss Method**  
Nanobots and platelets start to work hard together: Platelets initiate the clotting cascade, and nanobots amplify clotting signals and seal microtears. Microneedles will provide the initial delivery to external wounds. For internal hemorrhage, bots circulate and target the source of bleeding.
- 5 Deactivation of Nanobots After Blood Clotting**  
After clotting is achieved, nanobots detect clotting factor levels and pressure normalization. They also become biodegradable, breaking down into harmless byproducts.

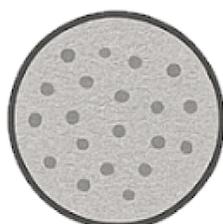
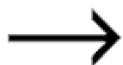


## Platelets

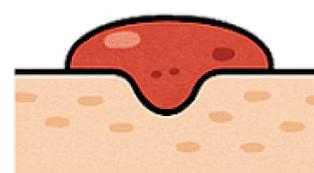
Tiny blood cells in blood that form clots and stop or prevent bleeding. Platelets can be easily freeze-dried for long-term storage until use. Once the freeze-dried platelets are released into the bloodstream, they will reactivate and become active for effective use at the damaged area.



Rapid blood Loss



Release of freeze-dried platelets



Blood clotting at the wound

Impact

**5 - 10x**  
more effective than current treatments

**30 - 60%**  
slower bleeding

**10 - 30min**  
extended survival time

