

Big or small, in the kitchen or in an emergency room, flesh wounds and the subsequent bleeding need quick treatment to prevent infection and further complications. The body seals up wounds by creating a clot made of fibrin protein that prevents infection and further loss of blood. Commercial products such as Tisseel and Quikclot Combat Gauze can reduce the time to form a fibrin clot, but these can fail when a patient has impaired blood clotting, hypothermia, or blood that is more acidic than usual. Although usually harmful, snake venom may offer a surprising solution.



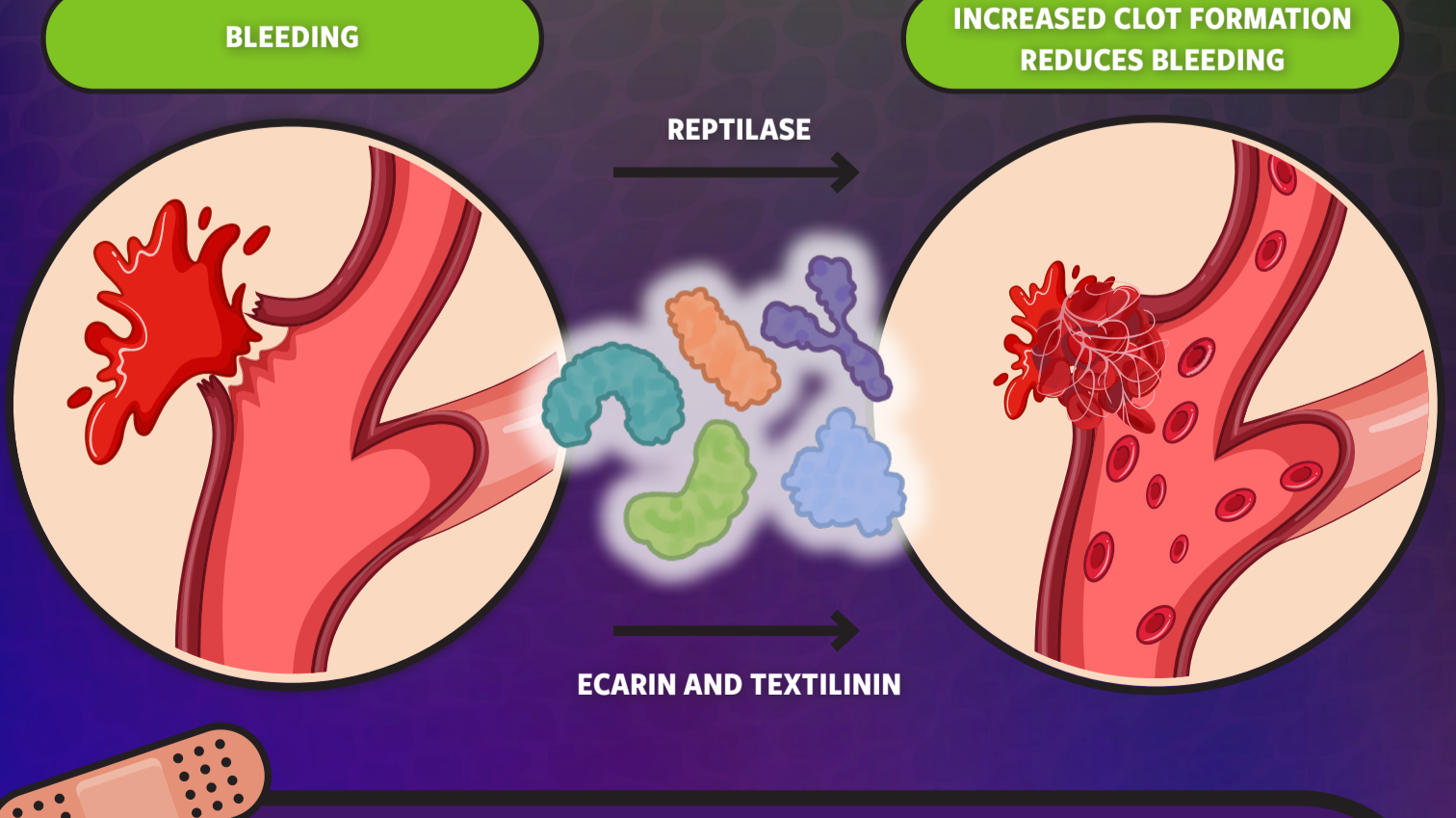
Snake venoms are complex mixtures of proteins that can affect a number of human systems, including the central nervous system, the muscular system, and the cardiovascular system. Some venoms are deadly because they create blood clots that circulate through the body as haemostatic clots, or prevent clots from forming at a wound, leading to fibrinolysis and excessive blood loss. In recent years, researchers harnessed the wound sealing properties of snake venom to form stable fibrin clots at the sites of injuries.



Reptilase, an enzyme made by pit vipers, rapidly creates fibrin when mixed with blood. When researchers mixed reptilase with a crosslinking agent, they created a bioadhesive that sticks to a wound and slowly releases reptilase to form a fibrin clot (1). The bioadhesive dramatically reduced the amount of blood lost and shortened the coagulation time compared to no treatment in animal models.

Another research group used two enzymes found in snake venom as a wound sealant. The first enzyme, ecarin, helps form blood clots. The second, textilinin, helps prevent the body from breaking down clots too quickly. Using mouse models and a hydrogel containing ecarin and textilinin, they found that the hydrogel slowed bleeding and reduced blood loss compared to untreated wounds. They also saw shortened bleeding times and less blood loss in a mouse model of a bleeding disorder (2).

COAGULATION OF BLOOD WHEN EXPOSED TO SNAKE VEMON



These types of bandages can be used in different environments to reduce bleeding times and blood loss. The researchers hope that using snake venom to help rather than hurt will usher in a new age of bandages.

References

- Guo Y. et al. Snake extract-laden hemostatic bioadhesive gel cross-linked by visible light. *Sci Adv* 7, eabf9635 (2021).
- Yegappan R. et al. Snake Venom Hydrogels as a Rapid Hemostatic Agent for Uncontrolled Bleeding. *Adv Healthc Mater*, 2200574 (2022).