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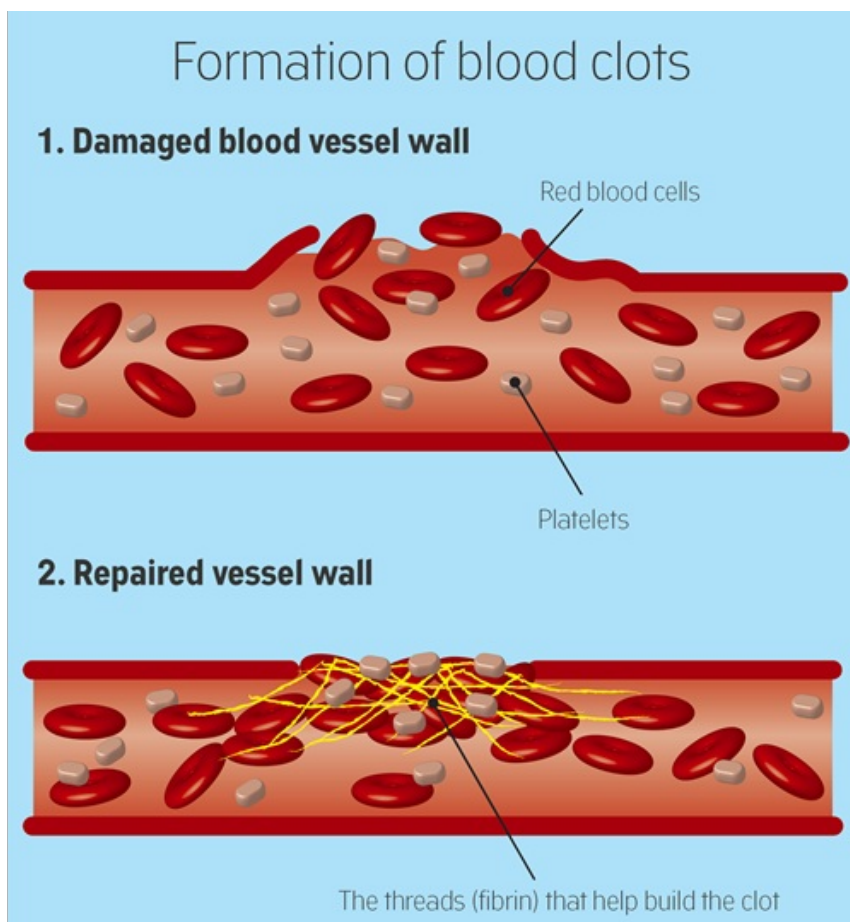
Starch-based Materials to Stop Blood Loss

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Why in News

Recently, scientists from the **Institute of Nano Science and Technology (INST)** have developed a **starch-based 'hemostat' material** that **concentrates the natural clotting factors in blood by physically absorbing excess fluid.**

Hemostat materials absorb excess fluid by concentrating the natural clotting factors in the blood that are critical for stopping the blood flow.



Key Points

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- The product is made by microparticles known as '**calcium-modified carboxymethyl-starch**'.
 - When the microparticles combine, they create an **adherent gel** that can remain on the wound until slowly dissipating as healing proceeds.
 - These microparticles are prepared by **modifying some of the chemical hydroxyl groups on starch to carboxymethyl groups** while also incorporating the beneficial calcium ions, which encourages the aggregation of red blood cells and platelets and their activation to generate the fibrin protein network that forms a stable blood clot.
 - **This modification increases the ability of the molecules to interact with water.** This is the basis of its impressive ability to absorb fluid from the blood and hence concentrate the clotting factors.
 - The **product has increased absorption capacity and adhesion, it is inexpensive, non-toxic, biocompatible as well as biodegradable.**
 - Presently, no single hemostatic agent exists that can work in all situations and current hemostat materials are very expensive and available mostly in developed countries.

Blood Clotting

- Clotting is a necessary process that can **prevent too much loss of blood when there is cut or injury.**
- A blood clot is a **clump of blood** that has changed from a liquid to a gel-like or semisolid state.
- Blood clots are healthy and lifesaving when they stop bleeding. But unnecessary clotting causes serious medical problems which include a heart attack, stroke, etc.
E.g If a clot formed inside one of veins breaks free and travels through veins to heart and lungs, it can get stuck and prevent blood flow.
- An injury or a trauma stimulates the **platelets (also called thrombocytes)** in the blood to release certain factors which activate the mechanism of clotting.
Calcium ions, Fibrinogens, a protein and Vitamin K are also needed for clotting.

Starch

- Starch is a **carbohydrate** extracted from agricultural raw materials.
- The starch molecule consists of a large number of glucose units joined by glycosidic bonds.
- It is the most important carbohydrate in the human diet.
- Because it is renewable and biodegradable it is also a perfect raw material as a substitute for fossil-fuel components in numerous chemical applications such as plastics, detergents, glues etc.

INST is an **autonomous institution** of the **Department of Science and Technology**, Government of India under the **Society Registration Act, 1960**.

Source: PIB