

INTRODUCTION

What is a hemostat?

A hemostat is a medical device or dressing used to control bleeding from blood vessels in the body. It is used in surgeries as well as in emergency bleeding control. The word traces roots in the Greek language, wherein "haemo" denotes "blood" and "stat" means "stop". So, the literal meaning of the word hemostat is 'to stop bleeding'.

What is haemostasis?

The process of stopping the flow of blood from a blood vessel is called haemostasis. **Ideal Characteristics** of haemostatic agents for clinical application:

- Has potential to stop any kind of moderate to severe bleeding within minutes of application
- Ready to use and do not require mixing or any kind of time-consuming pre-application preparation
- Easy to apply
- Painless removal
- Longer shelf life
- Sterile and Non toxic
- Biocompatible
- Cost effective
- Long-time durability and lightweight.

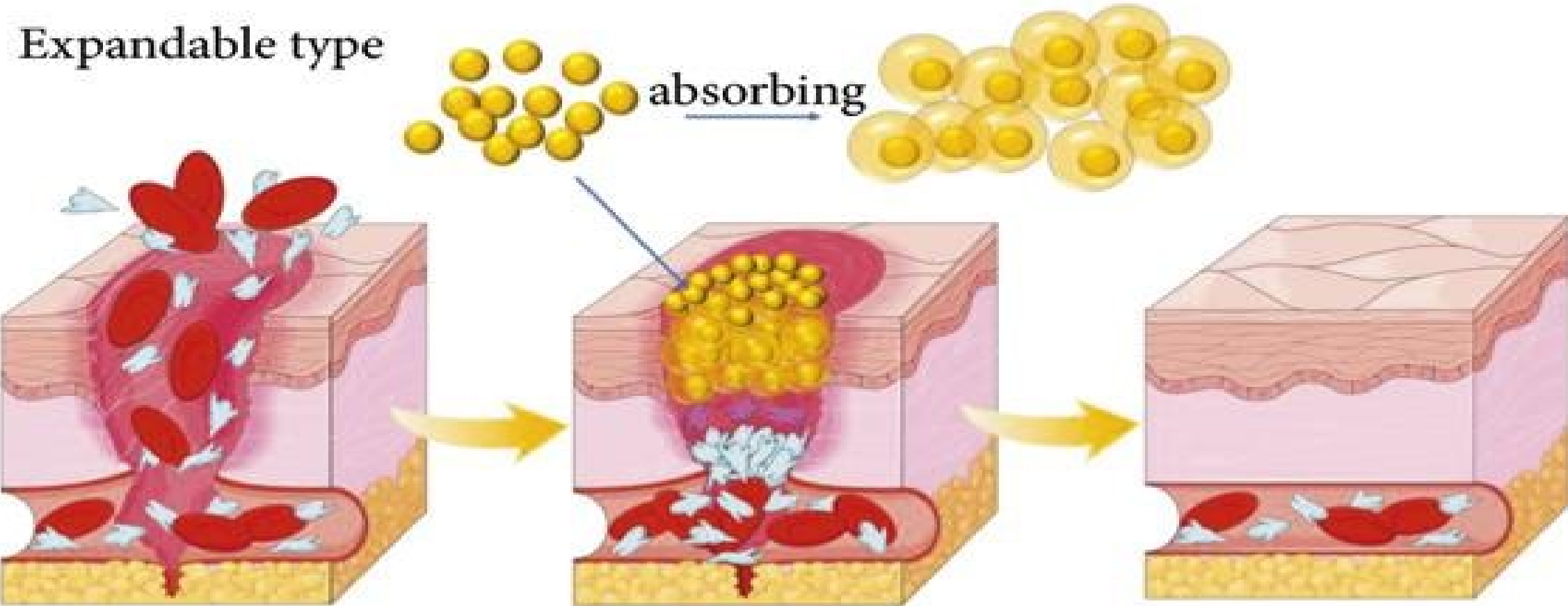
CLASSIFICATION OF HEMOSTATS

Local hemostatic agents can be classified as: 1. Passive hemostatic agents 2. Active hemostatic agents

Newer Hemostatic Agents	Hemostatic Solutions
Chitosan- based products	Styptics
Polysaccharide based hemostat	Tannic Acid
Poly-N-acetylGlucosamine based	Lysine Analogs
QuickClot (inorganic hemostat)	Tranexamic acid

Hemostatic Agents		Tissue sealants
Passive Hemostats	Active Hemostats	<ul style="list-style-type: none"> • Bovine albumin with glutaraldehyde • Cyanoacrylate • Polyethylene glycol
<ul style="list-style-type: none"> • Gelatin • Oxidized regenerated cellulose • Microfibrillar collagen • Chitosan 	<ul style="list-style-type: none"> • Fibrinogen and thrombin • Thrombin 	
Combination Gelatin and thrombin		

MECHANISM OF ACTION



RECENT ADVANCES

1. Gelatin with Chitosan (Named - Hemcon Chitosan) In forms of bandages

- Advantages:
- gelatin - Improved mechanical and chemical stability due to cross linking of polymer
 - Good viscosity
 - High absorbent
 - Mimics porous natural scaffold
 - Higher platelets aggregation

2. Combination with hemostatic gelatin (named - Spongostand)

3. Gelatin + Ca P-Hyaluronic acid

- Advantages:
- Promote better fibrin polymerization than individual part
 - Effective blood clotting
 - No tissue degradation
 - One step socket preservation agent

FLOWABLE HEMOSTATIC AGENT

Surgiflo® is a DRY, porcine gelatin-thrombin haemostatic matrix that can be absorbed by the body.

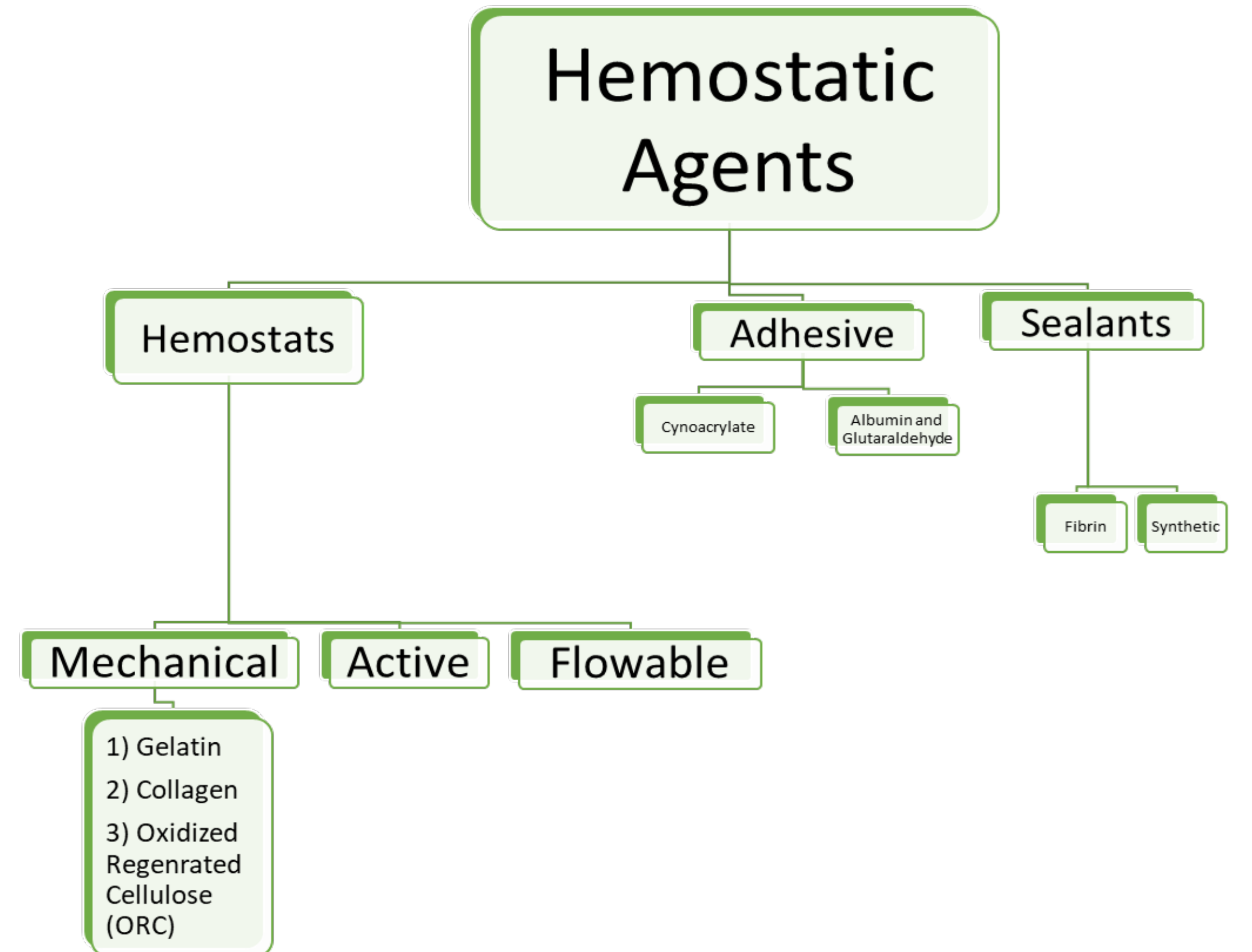


Another one is Floseal®, a gelatin-based granule that forms a thrombin-gelatin matrix and enters and expands in small cavities.

It's expansion exerts mechanical pressure and compression onto the bleeding site.



Classification of Hemostatic Agents



PATHOPHYSIOLOGY

Pathophysiology :

Hemostatic agents containing gelatin are saturated with pure thrombin and are available in a variety of forms, including sponge and liquid.

Studies by (Sae-Jung and Apiwatanakul, 2018) have shown the absorbent capability of gelatin sponge is characterised by its ability to absorb liquids 40 times its own weight and increase its volume by 200%, allowing local platelets to concentrate on the bleeding surface.

During blood absorption, the platelets enter the sponge's empty spaces, allowing additional coagulation factors to be released, including prothrombin kinase, which is essential to the hemostasis cascade and to ultimately stop bleeding.

ACTIVE HEMOSTATIC

A popular Gelfoam - managing post-operative bleeding after dental extraction and periodontal surgeries. It liquefies in the oral cavity in a week and absorbs completely in 4-6 weeks with minimal tissue response.

First- a clot develops on a scaffold made of Gelfoam.

Second- large extraction sites, it helps in primary closure; placed into the socket and secured with sutures.



CHITOSAN BASED HEMOSTATIC AGENT

HemCon is able to stop bleeding without the need for additional gauze pressure or suture (like gel foams). HDD is chitin, which is manufactured from freeze dried shrimp shells. Chitosan has a positive charge and attracts red blood cells (RBC) and platelets, which are negatively charged through ionic interaction; thus, a strong seal is formed at the wound site.¹⁶ This supportive, primary seal allows the body to activate its coagulation pathway effectively, initially forming organised platelets. HDDs are designed to maintain this seal and serve as a frontline support structure as the platelets and RBC continue to aggregate until haemostasis is achieved

