

Stiffening Agents

Stiffening agents are used primarily in topical preparations to increase the viscosity of the preparation. They also frequently find application as sustained-release carriers and, in oil-wax blends, to minimize sweating and bleeding.



The Ideal Stiffening Agents

- No systemic toxicity.
- Does not cause allergic reactions.
- It also has sufficient sclerosing effect on the thickest blood vessels, but does not cause local tissue damage when overflowing outside the blood vessels.

Classification of Stiffening Agents

The stiffening agents currently in use include three types:

Cleaning Stiffening Agents

The detergent hardeners are all surfactants, which have fixed hydrophilic and lipophilic groups, which can be aligned on the surface of the solution and can significantly reduce the surface tension of the liquid. The common chemical structure is fatty acid salt, fatty acid ester or fatty alcohol ether. By changing the energy distribution of the interface, the cell surface protein will be

precipitated in a few seconds, which will destroy the lipid bilayer of the cell membrane and cause the cell membrane to rupture. Lasts from a few minutes to a few hours. The detergent hardeners all have good foaming properties.

Penetrating Stiffening Agents

Osmotic sclerosing agent ruptures red blood cells and adjacent endothelial cells at the injection site through osmotic dehydration.

Hypertonic saline: Depending on the size and reactivity of the vein, the concentration used is between 11.7% and 23.4%. Hypertonic saline is easy to obtain, cheap, and rarely allergic; but it can cause burning pain, and cause obvious hemosiderin stains due to hemolysis of red blood cells, which may cause skin ulcers, and it is easy to dilute, which limits the use of application in large veins.

Chemical Stiffening Agents

Chemical stiffening agent cleavage intercellular adhesion substance through its direct corrosion effect, destroy cell surface protein and change the chemical bond of vein wall to exert hardening effect. Common chemical irritating hardeners include glyceryl chromate, iodine polyiodide, 20% sodium salicylate, 50% quinine uratan, and 95% ethanol.

Glyceryl Chromate: Compared with other sclerosing agents, this sclerosing agent has very weak hardening effect and is mainly used for the sclerosing treatment of small blood vessels. The main advantage is that it rarely causes hyperpigmentation and capillary dilatation of blood vessels, and rarely causes extravascular necrosis. The main disadvantages include extremely viscous solution and difficulty in injection; severe pain during injection; chromic acid is highly sensitizing; occasional reports of renal colic and hematuria.

Iodine polyiodide: After being injected into the blood vessel, it ionizes rapidly to form protein-bound iodine, which may play a role by lysing cell surface proteins in situ. In the body, the iodide ion loses its hardening effect after being converted to iodide, so its hardening effect is limited to the injection area. The disadvantages of this sclerosing agent include a high tendency to cause extravascular necrosis, the sclerosing effect is limited to a certain range from the injection site, and the risk of allergic reactions and nephrotoxicity.

Source: <https://www.formulationbio.com/products/stiffening-agents.html>