

What is F-68 in PolyMem and what are surfactants?

1. Pluronic® F-68 is the BASF Chemical Corporation's trademarked name for Poloxamer 188.
2. F-68 is a synthetic copolymer of ethylene oxide and propylene oxide with the following structure:
$$\text{HO}(\text{C}_2\text{H}_4\text{O})_{80}(\text{C}_4\text{H}_4\text{O})_{27}\text{H}$$
3. Ferris Mfg. Corp. uses the pharmaceutical grade of F-68 in the manufacturing of PolyMem wound dressings. The pharmaceutical grade of F-68 is the purest quality available.
4. F-68 is a non-ionic surfactant. Non-ionic surfactants are very unique in the world of surfactants.
5. Shur-Clens is a 20% solution of Poloxamer 188. Shur-Clens is a wound cleanser that has been sold in the United States for over 15 years.
6. F-68 is used in a variety of pharmaceuticals, IV solutions, and cosmetics. F-68 is also used as an emollient laxative because of its biological safety combined with its surfactant properties.
7. The word "surfactant" is a contraction of the technical term "*surface active agent*." The term *surface active agent* designates molecules that, because of their chemical structure, actually seek to locate at the interface of surfaces that have differing surface tensions.

Examples of surfaces that have different surface tensions are oil and water, water and air, land and water.

Surface active agents seek to form into a single layer (monolayer) between the surfaces with differing surface tensions.

The existence of this single layer of the surfactant between the two differing surfaces lowers the surface tension between the two differing surfaces.

8. A common example of a surfactant monolayer is a single drop of soap placed into a pan of water. The soap will spread out as much as possible on the surface of the water to form a single layer.
9. In the case of lungs, the body naturally produces lung surfactant. Lung surfactant is required to prevent the alveoli from collapsing completely when a person exhales. The alveoli are the location in the lung where the actual exchange of oxygen and carbon dioxide takes place between the inhaled air and the blood in the lungs. Without the lung surfactant, when a person exhaled, the surface tension in the small alveoli would be so great that the alveoli space would collapse and the alveoli would not be able to re-inflate when a person inhaled. In addition, the large alveoli would over-inflate when a person inhaled.

Below is an excellent summary of these actions:

“Lung surfactants act physiologically to reduce respiratory work, stabilize small alveoli against collapse, make alveolar inflation more uniform, and reduce the hydrostatic driving force for pulmonary edema.” *Chapter 6 Discovery of Endogenous Lung Surfactants and Over View of its Metabolism and Actions In Lung Surfactants, Basic Science and Clinical Applications* by R.H Notter published by Marcell Dekker, Inc. New York, NY, 2000, page 149

Both Neonatal Respiratory Distress Syndrome (RDS) and Acute Respiratory Distress Syndrome (ARDS) are both caused by defects of the lung surfactant system. Both conditions are often treated by instilling surfactants into the lungs.

10. F-68 is an integral component of the PolyMem wound dressing matrix. The F-68 is a soluble component of the matrix which is slowly released as a liquid from the dressing into the wound bed as wound exudate is drawn into the dressing.
11. In the case of wounds, different surface interfaces, which have different surface tensions, exist in multiple locations. The key locations to consider are:
 - a. Between the dressing and the wound----When you reduce the surface tension between the dressing and the wound you reduce the friction. Friction between the dressing and the wound bed can damage the wound and slow the healing process
 - b. Between the existing tissue and the new forming cells----When the surface tension between the existing tissues and the new forming is reduced, the lowered surface tension speeds the cell migration process that is required to actually heal the wound. The wound is healed by cells migrating into the opening and closing the wound.

Remember, that F-68 is a very unique surfactant because it also supports healing at the cellular level, speeds the growth rates of healing tissues, increases cell membrane strength and elasticity. Many of the benefits of F-68 in the wound healing environment are detailed in the *Comparison and Analysis of Wound Dressing Physical Properties*.

- c. Between the dead tissue and the living tissue---when the surface tension between the live and dead tissue is reduced, autolytic debridement is speeded up.

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