Effective Development of Medical Silicone Compounds

Biomodics, a Danish medical device production company, has been able to accelerate and target product development through cooperation with two universities. With the help of researchers, Biomodics succeeded in analyzing its most successful product, an antibacterial catheter, on the molecular level. The resulting insights into the material offer the company a new roadmap for potential future innovation.

Some products simply work, but it is not always clear why. This was true of Biomodics' groundbreaking catheter. The catheter dispenses antibiotics locally via a controlled release from a balloon filled with fluids, and the balloon keeps the catheter in place in the bladder. The antibiotics prevent urinary tract infection, which often plagues hospital patients. Biomodics knew they had a fantastic product, and by closely examining the semipermeable silicone compound of which the catheter is made, they hoped to find out exactly why.

Better Understanding Leads to Better Products

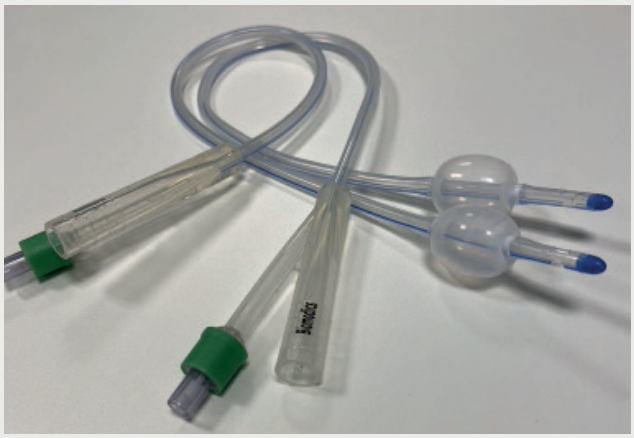
A precise silicone formula controls the structure of a finely masked molecular network, which regulates how and how much medicine is released into the patient's bladder. The problem is, the minuscule details of the catheter's material are invisible not only to the human eye but to even the most powerful microscopes.

With the LINX Association (an innovation platform that helps companies find innovation partners and project financing) helping to establish contact and propel the project, Biomodics entered into a partnership with the University of Copenhagen (KU) and Delft University of Technology (TU Delft).

With assistance from TU Delft, KU employed neutron radiation functioning like an incredibly powerful microscope. Using computer models developed exclusively for Biomodics, KU was able to describe the networks' structures on a molecular level.

The results revealed that the silicone compound balloon is divided into water-repellent silicone and hydrogel, a water-conductive auxiliary material. This extremely valuable discovery will help Biomodics determine how to construct future specialized medical products. It also makes it easier to conduct early product tests during development.

Biomodics' next task is to compare new materials with already used materials in order to examine whether and how molecules of the silicone compound change over time. This will help in determining durability and product guarantees, resulting in fewer defective products and more satisfied customers.



Future catheters composed of hydrogel will be able to release antibiotics slowly, to counter urinary tract infections.

Medicine is always most effective when injected into a targeted area of the human body.

When fluids seep through a product, the process is often invisible to the naked eye. In medical equipment, that seepage may be the controlled release of antibiotics into a human body. Neutron radiation can be used to reveal the process in detail. Using microscopic measurements of molecules, we can examine how effective a product is over time – useful and important data for evaluating cause and effect as well as durability.

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