Bezwada Biomedical, LLC

908.281.7529
15 Ilene Court
Suite 1
Hillsborough, NJ 08844
info@bezwadabiomedical.com

Striking the right balance between bioabsorbable polymer strength and degradation rate

Bioabsorbable polymers are designed to be there when you need them and gone when you don't need them anymore. But striking the right balance between adequate mechanical strength during the medical device's useful life and suitable degradation rate can be challenging.

If the polymer degrades too fast, the device will lack the required mechanical integrity which can lead to product failures and patient risk. Think about bioabsorbable sutures that degrade before the wound or surgical incision has had time to heal. On the other hand, if the polymer degrades too slowly, the synthetic biomaterial sticks around in the body longer than it needs to, which may cause long term inflammation and other health risks. Another example is controlled drug release implantable devices where their degradation rate determines the drug dose that is released in the patient. Too fast degradation would result in too high drug dose while too slow release would be inadequate.

Out of the well-known and often-used bioabsorbable polymers, polycaprolactone is expected to degrade slower than polyglycolic acid, and poly-lactic-co-glycolic acid blends degrade faster with higher glycolic to lactic acid ratio. So while there is some flexibility in selecting the desired degradation rate, medical device manufacturers are still limited in available polymer options and often sacrifice mechanical strength in exchange for faster degradation rates.

But what if you need both? What if your device needs to degrade fast but also have high mechanical strength during its useful life? Or what if you have very specific degradation rate and mechanical strength requirements that can't be met with poly(lactic-co-glycolic acid), PLGA, blends?

Having spent decades developing novel absorbable polymers for medical applications, Bezwada Biomedical is a leader in tackling the most challenging product design requirements. To meet the challenge of an absorbable polymer that has high mechanical strength, high compliance, and completely tunable degradation rate, Bezwada Biomedical developed bioabsorbable polyurethanes with hydrolysable hard segments that strike the perfect balance between the toughness and mechanical properties of commercially available medical grade nonabsorbable polyurethanes and absorbability of commercial biodegradable polymers such as PLGAs.

Our bioabsorbable polyurethanes contain degradable linkages derived from glycolide, lactide, polydioxanone and caprolactone monomers and ethylene glycol. These linkages allow for a finely tuned degradation profile and safe and biocompatible degradation products. So with this technology, you don't have to sacrifice high tensile strength and compliance to get faster degradation rates that can range from 3 months to 2 years. These bioabsorbable polyurethanes can be designed to meet challenging requirements that common bioabsorbable polymers cannot satisfy.