

New hyaluronan-based hydrogel as disposable antibacterial coating for prevention of implant-related infection in orthopaedics

Autori: Davide Bellini¹, Joachim Meraner¹, Angela M. Battista¹, Anna C. Sacchetta¹, Giovanna Pitarresi², Fabio S. Palumbo², Gaetano Giammona²

¹Novagenit Srl, Italy – ²Dipartimento STEBICEF, Università degli Studi di Palermo

E-mail: d.bellini@novagenit.com

DAC[®] product is obtained by chemical derivatization of hyaluronic acid (HA) with poly-D,L-lactide (PLA). After hydration the powder changes into a hydrogel due to the network generated by the contemporary presence of hydrophobic PLA side chains on the hydrophilic HA backbone. The chemical, physical and rheological characteristics of the hydrogel are suitable for the disposable coating of orthopaedic implants with structured surfaces. In addition the hydrogel can be loaded with antibiotic agents, for example vancomycin, which are rapidly released after implantation due to gradual product degradation. Therefore, DAC[®] was tested for its suitability as an antibacterial resorbable coating to be used in orthopaedic surgery for the prevention of implant-related infections. Accelerated stability testing has shown that the product has a shelf life of 24 months at refrigerated conditions (2-8°C). *In vitro* and *in vivo* studies carried out in accordance to standard ISO 10993-1 demonstrated full biocompatibility of DAC[®] hydrogel. An efficacy study on animal model performed in the presence of an inoculum dose as high as 10⁶ cfu has shown that vancomycin loaded DAC[®] hydrogel is highly effective both in reducing the local contamination and in inhibiting the systemic spreading of the infection when compared to the actual clinical standard prevention alone, i.e. the systemic antibiotic administration.