Histide AG

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Cell Recoding Peptides for medical device applications in spinal fusion

Histide's Cell Recoding Peptides provide a powerful tool as therapeutic agents for tissue regeneration.

Histide is a Swiss biotech and intellectual property–platform company founded in 2014 that has pioneered a new class of nonmutagenic extracellular therapeutic agents called Cell Recoding Molecules (CRMs). CRMs are the foundation of Histide's Recoding Therapeutics, a groundbreaking approach pioneered by the company that goes beyond traditional cell-, gene- or RNA-based therapies to cure diseases.

CRMs harness cells' capacity to sense and process environmental signals in order to precisely fine-tune and adapt their physiology to their surroundings. Histide has used CRMs to create an innovative platform of complex microenvironments with the capacity to dictate the precise commitment of various cell types. These include cells from different tissue origins and in contrasting stages of differentiation, ranging from stem cells to specialized mature cells.

The first generation of CRMs developed by Histide are the Cell Recoding Peptides (CRPs). Peptides are well suited as therapeutic agents and present many advantages compared with other small molecules owing to their unique intrinsic properties, such as high biological activity associated with low toxicity.

The CRPs developed by Histide can activate a variety of biological functions by providing targeted extracellular signals with high specificity. As a result, they are well suited to efficiently stimulate cells' natural capacity to redirect their own fate.

Controlled cell response is increasingly required in the medical device field, and in particular for orthopedic applications. Most orthopedic devices are indeed composed of polymers or metals that provide mechanical support but lack a biochemical signal. This has triggered the development and use of 'biologics' associated with devices as a next generation of combination products. These 'biologically enabled' devices increase graft efficacy and represent a major advancement for the field.

One of the best-known examples of such a product available on the market is the recombinant human bone morphogenetic protein-2 (rhBMP-2), as part of Medtronic's Infuse bone graft associated with the LT-Cage Lumbar Tapered Fusion Device. This combination device has been designed to aid in the treatment of degenerative disc disease. However, an important concern has emerged regarding the clinical outcome and effectiveness of this product. Furthermore, a meta-analyses study sponsored by the Yale University Open Data Access (YODA) Project has revealed that the use of rhBMP-2 in spinal fusion is associated with important side effects, higher complication rates as well as an increased risk of cancer development.

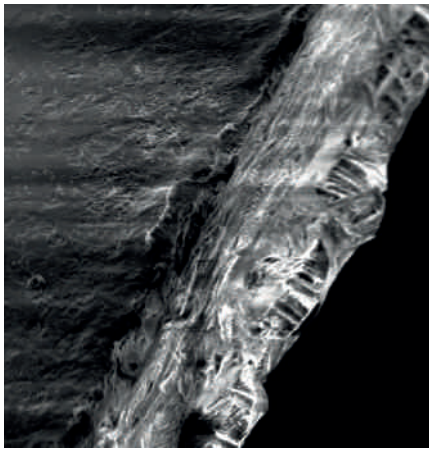

Figure 1: Histide's Cell Recoding Peptides (CRPs) provide a new dimension to implant surgery. Scanning electron microscopy image of bone matrix synthesized by induced bone cells on CRP-coated titanium.

As a result, the use of rhBMP-2 has decreased in recent years. According to Omar F. Zouani, cofounder and CSO at Histide, "The role of rhBMP-2 in spinal surgery is still controversial and remains to be precisely defined."

Histide's medical device approach

In light of the issues surrounding the use of protein 'biologics' in the medical device field, peptides are emerging at the forefront of the new technologies that could revolutionize this domain. Peptides have the potential to mimic precisely only the protein domain of interest, which dramatically increases the specificity of the targeted cellular response and significantly decreases the risk of complications.

Histide is therefore introducing CRPs for applications in the medical device field. Among the CRPs developed by Histide, certain types are active only when grafted to a surface. This imposes specific molecular dynamics constraints that have been extensively studied and characterized by Histide's scientific team as part of the drug design process. These CRPs have been conceived through rational design and can be grafted via their C or N termini to various surfaces for an *intelligent* interaction with the cells. The CRP-loaded devices can subsequently guide the fate of the surrounding cells, and especially of adult stem cells, for a tissue-specific regeneration outcome.

CRPs for spine surgery

Being an intellectual property–platform company, Histide's business model is based on license selling and establishment of spin-offs and joint ventures for various applications and medical indications. One of the six classes of CRPs developed by Histide is particularly suitable for application in bone regeneration. In addition, certain CRPs have proven to be especially efficient in driving spinal bone reconstruction.

"Histide's technology is impressive and the CRPs hold the potential to revolutionize the spine surgery field."

Gianluca Maestretti, HFR Fribourg

Based on this, Histide has decided to launch its first spin-off company to promote the use of CRPs in medical devices for spinal fusion. The main goal of this technology is to enhance osteoinduction in this process. The two major products marketed by the spin-off company are cervical and lumbar 3D-printed titanium fusion implants covalently coated with CRPs. An experienced management team, together with expert scientists, has been assembled in the spin-off, all committed to providing a significant advancement in the medical device domain.

According to Dr. Gianluca Maestretti, team leader spine surgery at HFR Fribourg, Switzerland, "Histide's technology is impressive and the CRPs hold the potential to revolutionize the spine surgery field. This could be the future development for all the medical devices, with important outcome for the patients."

In parallel to the spine applications, Histide is currently discussing partnership opportunities involving licensing deals for the development of first-in-class medical devices for other orthopedics indications.

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