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Design and characterization of bioinks with hyaluronic acid for tissue and bone-3D bioprinting

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Statement of the Problem: The 3D bioprinting of tissues and organs represents a major breakthrough in regenerative medicine and tissue engineering. Cartilage and bone regeneration provides an alternative in the treatment of diseases such as degenerative osteoarthritis, injuries of articular cartilage, osteonecrosis and bone fractures, among others. The purpose of this study is to describe the design, development and preparation of a bioink with hyaluronic acid (HA) to manufacture cartilage and bone by 3D bioprinting.

Methodology & Theoretical Orientation: For the formulation of bioinks, two hyaluronic acids were studied: high molecular weight sodium hyaluronate (bioinkA) and low molecular weight sodium hyaluronate (bioinkB), both of intra-articular grade. The HA was combined with alginate and human chondrocytes. The biopaper studied was the polylactic acid (PLA). Cell viability was studied for each bioink.

Findings: The results obtained showed that the HA concentration before and after the bioprinting process did not affect chondrocyte viability. Additionally, cells remained in proliferation after 5 weeks. The rheological properties of each bioink showed mild differences between bioinkA and bioinkB.

Conclusion & Significance: Considering the mild differences in rheological properties between the two experimental bioinks, it may be concluded that both formulations can be used for cartilage and bone bioprinting.

Biography

Patricia Galvez-Martin completed her PhD in 2014, MSc in Drug Development (2008) and MSc in Clinical Trials (2012). She has participated in several clinical trials, with great experience in the pharmaceutical industry, as a qualified person and Quality Control Manager. She is expert in the design and development of new medicines with cells, genes and tissues to treat different pathologies. She is currently working in the biotech company, Bioibérica as the Director of Advanced Therapies Unit.

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