CHAPTER 12

Environmental Factors Influencing the Performance of Cells During Tissue Engineering

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Summary

Regeneration of tissues or restoration of organ functions remains as one of the biggest medical challenges. Regenerative medicine strategies are based primarily on models where cells are located and maintained in an appropriate environment that allows de novo synthesis of tissues or major organ functions. Cells are ultimately the main players in any approach taken for tissue regeneration. Cells are not just passive passengers that keep unaltered structure and functions regardless of manipulation, indeed cells are very susceptible to changes to their surroundings, and therefore to keep the correct phenotype of cells represent one of the biggest issues in tissue engineering. As a role, profound changes start to happen in cells from the moment they are harvested from the body, and it turns fundamental to understand the physiological responses occurring on cells when they are exposed to biochemical or physical stimuli. In this chapter we review some the environmental parameters that can influence the behaviour of cells during tissue engineering, ranging from cell-cell and cell-matrix interactions, the effect of different oxygen tensions, the presence of serum, the use of growth factors and the importance of mechanical stimuli. The correct integration of the different factors that may influence the performance of cells will probably guide us to the generation of good quality tissues and hence, to long-lasting solutions for tissue reconstruction.

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