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USE OF DERMIC SUBSTITUTES IN CULTIVATED CELLS

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Dermal substitutes are matrices that fulfill the cutaneous dermal layer, and promote control of pain and new tissue growth while enhancing wound healing. Current available dermal substitutes are designed to replace damaged skin areas helping to establish a barrier to infection and water loss while improving wound healing and diminishing pain. The purpose of this research has been to compare different types of dermal substitutes regarding skin cell viability. The dermal substitutes Integra™, Matriderm™, and Pelnac™ were cut (diameter of 13 millimeters), placed in 24 well culture plates (TCP) and fixed with O'rings. In order to obtain the PCL scaffold from electrospinning for comparison, a solution of 30% PCL in 80% acetic acid was prepared. To perform the method, the distance of the syringe (23G) from the plate was 15 cm, with a velocity of 0.28 mL/h, the eletric potential difference of 22 kV and the scaffolds were sterilized with Ultraviolet Radiation (UV) for 1h each side. Immortalized human keratinocytes (HaCat) were seeded in a cell density of 50,000 cells/well in Dulbecco's Modified Eagle's Medium (DMEM) with high glucose in a well plate (control) or plated over dermal substitutes and PCL scaffolds. Cell viability was evaluated by Cell Counting Kit-8 (CCK-8) and Live/Dead assays. The scanning electron microscopy (SEM) of dermal substitutes Integra™, Matriderm™ and Nevellia™ showed the ultrastructure of the substitutes used and the ES scaffold as well. The results of cell viability with CCK-8 after two days of the normalized mean of absorbance and the standard error of the mean (SEM) obtained were 100.0 ± 3.9% using the control well, 42.8 ± 0.9% using Integra™ ($p < 0.01$), 41.9 ± 0.2% using Matriderm™ ($p < 0.01$), 42.4 ± 0.5% using Pelnac™ ($p < 0.01$), and 134.7 ± 0.9% using PCL ($p < 0.01$). In addition, the live/dead assay showed a visible increase in the number of HaCaT cells in TCP and PCL scaffolds. The SEM images of the Integra™ and the Nevellia™ showed a more laminar protein structure and larger pore sizes, which can increase the difficulty of cell adhesion in the structure. Matriderm™ demonstrated a more solid structure with less and smaller pores and the ES scaffold had more pores than the Matriderm™. The PCL presented fibrillary structures, this seems to facilitate cell anchorage and penetration to some extent. These results indicated that the despite successes in the use of dermal substitutes, more progress is necessary and hence further research is required not only to strengthen scientific evidence regarding their effects but also to develop new technology and products.