Keratin bioactive peptides for the treatment of skin disorders

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Several skin disorders, like chronic wounds and psoriasis involve several steps for skin regeneration. On wound repair keratinocyte migration for reepithelialization is required. Psoriatic lesions result from the interaction between hyperproliferative keratinocytes, inflammatory cells and immune cells. Chicken feather (CF) are composed by keratin and its disposal is a critical problem. It is possible to hydrolyze (CF) to obtain high value keratin peptides minimizing the impact on the environment and giving value to otherwise waste material.

Keratin peptides (KP) were obtained by submerged fermentation using a Bacillus cereus strain (S188D) growing on keratin. Briefly, 1 g of CF was incubated with 100 mL of growing media at 30ºC and 200 rpm for 48h. The KP were subjected to different purification procedures: i) isolated using a C18 column (stage1); ii) eluted using a cut-off of 5kDA and fractioned with different percentages of acetonitrile 20% and 40% (stage2); iii) each fraction was eluted using a Superdex peptide column to obtain different chromatographic picks, P1, P2, P3, P4, and P5 (stage3). The keratinocytes cells were grown in DMEM supplement with 10% of FBS at 37ºC and 5% of CO_2.

Cells were grown till confluence and a scratch was performed; 45 mg/mL of the KP, from the 3 stages of purification were placed in contact with the cells for 24h. When the stage1 KP were in contact with the cells there was a decrease on cell migration in comparison to the control. The second stage peptides (20% and 40%) did not induce any significant changes on the cell migration, but the presence of the peptides significantly decrease cell proliferation in 43% and 54%, respectively. An opposite result was observed for the third stage peptides, S188D 20% P1, P2, P3 and S188D 40% P3, seems to increase cell migration, while S188D P4 and P5 significantly increased cell migration in 20% and 19%, respectively. Only S188D 40% P2 significantly increased cell proliferation. Depending on the fraction of KP it is possible to obtain opposite effects regarding cell migration. It is possible to modulate the cellular response of the keratinocytes, by using simple fractioning. The KP used on this study were sequenced and the mechanisms that behind these results are being evaluated.