Straighten curly hair with keratin peptides

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Chemical straightening curly human hair fibres involves the use of strong reducing agents at alkaline pHs. These treatments damage the hair fibre, reduce the cross-linking density and decrease hair's physico mechanical properties [1]. Human hair is made of keratin and the fixation of fibres shape involve the reduction and reformation of new disulphide bonds between keratin molecules. t is known that cysteine has been applied as a reducing agent for the substitution of environmentally harmful chemicals[2]. Here, we propose an alternative and green methodology using peptide sequences derived from human keratin genome. These peptide fragments have been designed by nature to interact with keratin and will penetrate on hair reducing and reforming the disulphide bonds at neutral pHs without the use of external harsh reducing agents. We tested 8 decapeptides which were selected from over 1235 decapeptides representing the all human genome of keratin and keratin associated proteins. All the peptides contain 2 or more cysteine residues in their composition and the 8 peptides were select based on their affinity for human hair keratin solutions. Here we found that 3 of the 8 selected peptides have high affinity towards hair keratin (measured as hair uptake) that it can re-shape disulphide bonds (as proven by MALDI-TOF/TOF) and change straighten hair. The proposed solutions presented here replace harsh reducing agents at alkaline pHs for peptide formulations acting at neutral pHs to change the shape of hair. These green solutions are therefore expected to have an high impact on haircare cosmetic industry with direct benefits for environment and humans (especially ethnic Africans).

References

[1] Dyer, J. M., Bell, F., Koehn, H., Vernon, J. A. et al., Redox proteomic evaluation of bleaching and alkali damage in human hair. International Journal of Cosmetic Science 2013, 35, 555-561.
[2] Wang, K., Li, R., Ma, J. H., Jian, Y. K. et al., Extracting keratin from wool by using l-cysteine. Green Chemistry 2016, 18, 476-481.