Cell Adhesion Peptide from Bovine Tendon Type I Collagen: potential candidate for biomaterial applications

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Cell adhesion peptides are playing tremendous role in improving the biocompatibility of implants, cell culture platforms and wound dressings material. Several cell adhesion peptides have been screened from various sources and their signaling mechanism are being studied. In an earlier work, a region containing 22 amino acid residues was isolated from bovine Achilles tendon type I collagen was found to improve cell adhesion in HeLa. Using bioinformatics tools a minimal binding region in the larger peptide was identified. This work aimed at confirming the cell adhesion and proliferative property of the identified peptide GKNGDDGEA. The peptide coated surface showed an enhanced cell adhesion and proliferation in comparison with uncoated control surface in NIH3T3 and HaCaT cell lines. Cell adhesion was observed to increase with increasing coating concentration up to its optimum coating density i.e. 621nmoles/cm^2 after which the cell adhesion as well as cell viability decreased, which was confirmed through cell proliferation and apoptosis assay. To validate the role of peptide in integrin mediated signaling pathway, expression of focal adhesion-related proteins like paxillin and pFAK Tyr397 were confirmed by immunoblotting and immunofluorescence microscopy respectively. mRNA transcription levels of cell spreading proteins and cell membrane receptors integrins were analysed. The peptide could find application in improving cell adhesion properties of biomaterials and tissue scaffolds.

Recent Publications

1. Isolation and identification of cryptic bioactive regions in bovine Achilles tendon The Protein Journal, 2012, 31, 374-86, Pradipta Banerjee and G.Suseela Rajakumar, C.Shanthi
2. Isolation of novel bioactive regions from bovine Achilles tendon collagen having angiotensin I-converting enzyme-inhibitory properties, Process Biochemistry, 2012, Pradipta Banerjee, C. Shanthi - Volume 47, Issue 12, December 2012, Pages 2335-2346
3. Screening for novel cell adhesive regions in bovine Achilles tendon collagen peptides, Banerjee, Alka Mehta, C. Shanthi Biochemistry and cell Biology 91: 1–15 (2013
4. Investigation into the cyto-protective and wound healing properties of cryptic peptides from bovine Achilles tendon collagen, Chemico-Biological Interactions (2014), P. Banerjee, A. Mehta, C. Shanthi 211 (2014) 1–10
5. Wound healing activity of a collagen-derived cryptic peptide. Amino Acids Volume 47, Issue 2, February 2015, Pages 317-328, P. Banerjee, L.Suguna, C. Shanthi
6. Cryptic Peptides from Collagen: A Critical Review. Banerjee P, Shanthi C. Protein Peptide Letters. 2016;23(7):664-72

Biography



Dr Shanthi completed her PhD at the Central Leather Institute, Chennai, India and later worked as a Post-doctoral fellow at the leather Research Institute, Texas Tech University. Currently she is working as Professor in the School of Biosciences and Technology at Vellore Institute of Technology, India. Her area of interests are protein based biomaterials, protein purification and recycling of protein wastes. Presently she is working in the area of bioactive peptides from collagen. She has several publications to her credit in her area of work. Her work has been funded by DST, India