



Collagen-The Biomaterial

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Opinion

Collagen-The biomaterials for their enhanced biocompatibility and improved controllable biodegradability has immense and vital role in biomedical field for Drug and gene carrier, tissue engineering and wound dressing [1-4]. Collagen acts as a structural scaffold in tissues. Collagen scaffolds have also shown to accurately deliver cells, proteins, drugs and nucleic acids on a predictable and long-term basis Sano A et al. [5]. Finally, a recent clinical trial using adenovirus in collagen gel has cleared the path for future clinical studies on gene therapy delivered by collagen matrix Muller WE [6]. Because of collagen's biodegradability and low immunogenicity nature, collagen is used as substrate for topical and internal pharmaceutical application. The evidence from recent studies shows the importance, diverse applications and benefits of implants delivering antibiotics Adhirajan [7]. The delivery properties of collagen-based biomaterials also display great potential for ulcer treatment and abdominal wall defect reconstruction Jaynthy C [8]. Collagen plays a key role in each phase of wound healing. The issues of elevated levels of MMPs are main problem in wound dressing. This problem is addressed uniquely by Collagen which acts as a "sacrificial substrate". In addition, collagen based dressings have the ability to absorb wound exudates and maintain a moist wound environment. Cyclodextrins are non-toxic bucket-shaped oligosaccharides produced from starch. Cyclodextrins, unique inner-ring hydrophobic structure has ability to form host-guest complexes with hydrophobic molecules than hydrophilic molecules. In this *in silico* study, we employ cyclodextrins as a proteoglycan substitute which interacts with collagen like peptide (CLP) or collagen mimic peptide (CMP), as a preparatory step for synthesis of biomimetic collagen-based matrix. The incorporation of cyclodextrin in collagen membrane increases the thermal stability of collagen and reduced collagen fibro genesis Jaynthy C [8]. The focus on small collagen like peptide systems commonly referred to as collagen mimetic peptides (CMPs) have been used significantly

to unravel the mystery of collagen complex structure. The field of collagen mimics has given us a much greater understanding of the basic elements which drive the structure and stability of collagen triple helices and factors that contribute to its stabilization. A rapidly emerging understanding of the mechanical and structural properties of native collagen fibrils will guide further development of artificial collagenous materials for nanotechnology. Recently, biomaterial structures that are obtained from various reviews have been extensively studied, and their potential for biomedical applications has emerged. In particular, the use of common amino acids in the collagen like peptides is a promising approach, because they are highly expected to bear high biocompatibility and flexibility in molecular designs.

References

1. Friess W (1998) Collagen-biomaterial for drug delivery. *Eur J Pharm Biopharm* 45(2): 113-136.
2. Shakespeare P (2001) Burn wound healing and skin substitutes. *Burns* 27(5): 517-522.
3. Nimni ME, Cheung D, Strates B, Kodama M, Sheikh K (1987) Chemically modified collagen: a natural biomaterial for tissue replacement. *J Biomed Mater Res* 21(6): 741-771.
4. Yannas IV (1995) Regeneration templates. In: Bronzino JD (Ed.), *The biomedical engineering handbook*. Boca Raton, (3rd edn), CRC Press, Florida, United States, p.1619.
5. Sano A, Maeda M, Nagahara S, Ochiya T, Honma K, et al. (2003) Atelocollagen for protein and gene delivery. *Adv Drug Deliv Rev* 55(12): 1651-1677.
6. Muller WE (2003) The origin of metazoan complexity: poriferaas integrated animals. *Integr Comp Bio* 43(1): 3-10.
7. Adhirajan N, Shanmugasundaram N, Shanmuganathan S, Babu M (2009) Collagen-based wound dressing for doxycycline delivery: *in vivo* evaluation in an infected excisional wound model in rats. *J Pharm Pharmacol* 61(12): 1617-1623.
8. Jaynthy C, AsitBaran M (2013) Influence of cyclodextrins on the physical properties of collagen. *Int J Pharm Bio Sci* 4(4): 795-806.