A new chapter could be in the offing in bone tissue engineering

Mucins are large glycoproteins that coat the surfaces of many cell types and can be secreted to form mucus gels which have important physiological roles. The increasing understanding of the structure and function of the protein has led to an interest in investigating its use as building blocks for functional biomaterials. Some of the established properties of mucin from which mucin based biomaterials can benefit are excellent barrier properties, hydration and lubrication properties, unique chemical diversity, and bioactivities of mucins. In one such attempt to understand this protein in the perspective of bone tissue engineering, the group of Dr Mamoni Dash at the Department of Biotechnology's Bhubaneswar-based Institute of Life Sciences (ILS) is studying the interaction of mucin with collagen, which is the most abundant protein in the bones. The researchers performed in-silico modelling and docking studies to understand the molecular and residual interactions between the two proteins. An analysis of the docked complexes showed that they had significant affinity with each other in the in-silico docking environment. The residue level interactions showed a proper intermolecular hydrogen bonded contacts between charged residues of arginine, glutamates of mucin and prolines and hydroxy prolines of collagen. A plenty of pi-pi and vander waal's interactions between the hydrophobic residues like tyrosine and phenylalanine of mucin and glycine and hydroxy prolines were also observed. These interactions suggest a possible strong affinity between the collagen and mucin in both in vitro and in vivo environments. This forms a strong basis to process the protein mucin as a possible biomaterial. The research team is now focusing on making 3D scaffolds consisting of mucin and analyzing its biological performance as a bone graft.

Contact Person & Contact Details:

Dr Mamoni Dash (Communication officer)