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Effects of vitamin D containing nanofibers on wound healing in a humanized mouse model

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Surgical site infections constitute nearly 25% of all healthcare-associated infections (HAIs) and are the most common cause of infections in patients undergoing surgery. Current treatment plan utilizes wound dressings that deliver antibiotics, but their use can lead to selection and survival of drug-resistant microorganisms. The increasing frequency of multidrug-resistant bacterial species highlights the need for new approaches with distinct modes of action in order to boost the antimicrobial treatment modules used for prevention of surgical site infections. In collaboration, we and others have demonstrated that 1,25-dihydroxy vitamin D₃ [(1,25(OH)₂D₃); an active and more potent form of vitamin D] induces expression of cathelicidin antimicrobial peptide (*CAMP*) gene, the encoded hCAP18 protein and secretion of the antimicrobial peptide LL-37 that is cleaved from the C-terminal end of hCAP18 in human immune cells, epithelial cells and skin keratinocytes. We recently demonstrated that local sustained delivery of 1,25(OH)₂D₃ by biocompatible and biodegradable, nanofibrous dressings can induce expression of endogenous antimicrobial peptide hCAP18/LL-37 *in vitro* in keratinocytes and immune cells, *in vivo* in skin wounds from a humanized transgenic mouse that expresses a human *hCAMP* gene, and in *ex vivo* human skin wounds. We also showed that nanofibers loaded with Calcipotriol, a low calcemic analog of 1,25(OH)₂D₃ can accelerate cutaneous wound healing and promote efficient wound closure *in vivo* in the humanized mouse model expressing the human *CAMP* gene (*hCAMP*) in place of the mouse counterpart. The cellular and the molecular mechanisms underlying efficient wound healing following treatment with Vitamin D₃ loaded nanofibers is currently being investigated.

Biography

Arup K Indra has done his PhD in 2001 from Jadavpur University, Kolkata, India and did his postdoctoral training on Nuclear receptor signaling in Institut Génétique Biologie Moléculaire Cellulaire (IGBMC), ILLKIRCH, France under the guidance of Prof Pierre Chambon. He is currently an Associate Professor in the OSU/OHSU College of Pharmacy and co-director of the OHSU-OSU Cancer Prevention and Control Initiative. He has published more than 43 papers in reputed journals and has been serving as an editorial board member in many journals. He regularly serves on the grant review panel for NIH, DOD and Wellcome Trust, UK.

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