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Antibacterial, sustained drug release and biocompatibility studies of electrospun poly (ε-caprolactone)/ chloramphenicol blend nanofiber scaffolds

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Controlled drug release and antibacterial properties of electrospun nanofiber depend on slow release of drug molecules to the targeted area by diffusion and antibacterial properties of drug embedded in the nanofiber. In the present study, chloramphenicol (CAP), an antibacterial drug has been incorporated in poly (ε-caprolactone) (PCL) nanofibers in the weight content of 5-20 wt% by electrospinning. It was found that the fiber diameter and hydrophilic nature of nanofibers increased with increase in CAP content. The latter phenomenon is expected to facilitate biocompatibility of scaffolds. The scaffolds showed excellent antibacterial properties against gram-positive as well as gram-negative bacterial strains commonly associated with wound and burn infections. *In vitro* drug release studies were carried out in phosphate buffer saline at pH ~7.4. The release was found to be saturated in about 20 days and the maximum release was ~80%. Nanofiber scaffolds with 5 wt% CAP contents showed the highest release rate among the scaffolds studied, which could be attributed to the smaller fiber diameter of this scaffold leading to higher surface area. The composite nanofiber scaffolds were further studied for cell adhesion, proliferation and toxicity using human colon colorectal epithelial cells (HCT 116 WT) *in vitro*. The cells are found to show excellent adhesion and proliferation on both PCL and CAP embedded scaffolds in large numbers. However, CAP loaded scaffolds showed better cell proliferation than that of neat PCL counterpart.

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