Delineating the metal ornamented nanocomposite and role of transcriptional pathway during in vitro wound healing

Metal- and nanocrystal-based regenerative medicine is gaining popularity as there is a continuous demand for the development of tissue regeneration. Unfortunately, no or very little research is being carried out on antioxidant doped nanocomposites and its interaction on the signaling axis during the post-injury action. Hence, cytotoxicity, metal toxicity, nanocrystal stability, size expansion, antioxidant assay, and signal transduction arm of C phycocyanin primed silver nanohybrids (AgPCPN) were evaluated towards in vitro wound healing phenomenon. Physiologically relevant ionic solutions did not exhibit adverse effect on the nanocrystal stability; however, acidic, alkali, and chlorinated sodium completely teratized the AgPCPN conjugates. Signal transduction RTI-PCR array demonstrated the NFκB and P38 pathway associated genes significantly (>2.5) upon AgPCPN than AgNP group. Specific inhibitor of NFκB (NfKb) and P38 (Lys4002) pathways confirmed the involvement of NFκB and P38 signaling axis. In vitro wound healing assay demonstrated that NFκB pathway plays the prime role in the fibroblast cell migration during process. In conclusion, the present investigation reveals surface functionalization by antioxidant-sensitive Cytochrome-C suppresses the AgNPs mediated stress responses and associated signaling axis in fibroblast cell during the cell migration scenario in vitro wound healing model.