Influence of extracellular vimentin on cell proliferation, migration and adhesion

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Vimentin is a cytoskeletal protein of the family of intermediate filaments which plays a role in cell migration, adhesion and signaling due to its ability to interact with various proteins. Apart from its presence in the cytoplasm, it is also found in the extracellular spaces around various cells, especially in the case of inflammation. Extracellular vimentin has been shown to be involved in processes such as viral infections, cancer progression, inflammation and axonal growth in astrocytes by activating the IGF1 receptor in the same signaling pathway as IGF1. The IGF1/IGF1-R pathway plays significant role in general cellular functions such as cell migration, proliferation, adhesion and invasion.

In this study, we demonstrate the functional similarities of extracellular vimentin and IGF1 in context of cell proliferation, migration and adhesion. Using a MTT proliferation assay, we show that extracellular vimentin increases the proliferation rate in MCF-7 cells. Furthermore, we carried out wound healing assays which suggest that extracellular vimentin promotes MCF-7 cell migration similar to IGF1. We quantified the number of focal adhesions after vimentin treatment in MCF-7 cells and measured the maximum adhesion strength of cells using FluidFM technique. Our results suggest that recombinant vimentin enhances these functions in MCF-7 cells. Consequently, it might be useful for altering and stimulating these cellular functions which would open up the possibility for treating various disease conditions.