

PL 4 - Influence of Chitosan on MMP-2 Activity of Human Melanoma Cells

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Matrix-metalloproteases (MMPs) are involved in various processes in animals and humans. Among other they play a crucial role for the remodeling of the extracellular matrix (ECM) during angiogenesis and tumor spreading. In this process MMP2 plays a pivotal role regarding ECM remodeling and tumor spreading. Chitosan is known to improve tissue reconstruction that finally supports wound healing. Therefore, an influence of chitosan on MMP regulation may explain partially the role of chitosan during ECM remodeling. Aim of the research is to elucidate the mechanisms that are responsible for the bioactivity of chitosan in order to improve chitosans by chemical and biological modifications, respectively.

We found that the application of a series of chitosan (DA 2 %- DA 66%, Mw ~ 500000 g/mol) to human melanoma cells results in a decrease of MMP2 activity and a reduced amount of MMP2 in the cell supernatant as shown by zymography and western blot analysis. We therefore expected an attenuation of invasion activity of melanoma cells upon chitosan incubation. However, we found an enhancement of the invasion activity of the human melanoma cells upon chitosan stimulation using our cell based invasion assay. An explanation of this contradictory result may be an upregulation of other MMPs such as MMP9 and MT-1 MMP.

In conclusion, we could demonstrate that chitosan modifies melanoma cell behaviour as shown by a decrease of MMP2 activity and by an enhancement of melanoma invasion activity.