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Letter to the Editor

Muscle Metastases and its Applications in Cancer Biology

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The rare occurrence of muscle metastasis is as low as 0.8% and is often correlated to muscle characteristics like contractile action and local pH environment [1], however there is less evidence for this. The role of MyoD protein gives us a better insight towards muscle metastases. In general tumor metastases are mainly related to and dependent on tumor angiogenesis. This provides the tumor cells with a dedicated supply of oxygen and nutrient supply. This, in turn helps in growth of the tumor cells to a larger size. Muscle cells, which have well developed vascular supply, should hence be equally subjected to metastases as any other cells. But the incidence of muscle metastases is low. Low incidence of muscle metastases has also been correlated to terminal differentiation of tissues. Terminal differentiation of a cell is where the stem cells differentiate into progenitor cells, then an immature cell and then finally a terminally differentiated cell which has the capability of proliferating into only one type of cells [2]. Since the nerve cells which are also terminally differentiated, yet undergo proliferative changes (cancers), it can be inferred that terminal differentiation can play a variable role in determination of metastases occurrence and cannot be considered a definitive factor. The MyoD proteins, on the other hand are considered to play an important role since they are the key factors of muscle cell regulation. MyoD protein is a Myogenic Regulation Factor (MRF) that acts along with other basic-helix-loop-helix factors, which include Myf 5 (Myogenic factor 5), Myf 6 (Myogenic factor 6) and Myogenin[C] [3]. These play a key role in committing mesodermal stem cells to skeletal lineage. The MyoD protein also has a role in removing cells from cell cycle by enhancing the transcription of p21 protein, which is a Cyclin Dependent Kinase (CDK-1) that regulates the cell cycle progression [4]. The p21 protein inhibits CDK's. CDK's inhibit MyoD protein. Hence, it can be said that the MyoD protein is capable of enhancing, as well as, regulating its own activity [5]. This feature can be of potentially enormous significance if it is directed toward research for cancer metastases. Since the rare occurrence of muscle metastases is mainly associated to MyoD protein, its self-regulatory enhancement and control of proliferation can help in achieving treatment for cancer metastases. Hypothetically, it could also help in using cancer cells for wound healing and regenerative purposes by utilizing the ability of MyoD protein to control and regulate proliferation. This could be a major advancement in the field of medicine.

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