

1056-92-614

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Cell motility is an essential process in the life cycle of many organisms, with implications in areas such as wound healing, the immune response, embryonic development, and cancer cell metastasis. Severe consequences such as mental retardation, vascular disease, tumor formation, and metastasis may occur when a cell's motility mechanisms malfunction. Therefore, an understanding of these mechanisms may lead to the development of novel therapeutic strategies for controlling, for example, invasive tumor cells.

Integrins are cellular surface receptors which serve both as the physical linkage between a cell and its surroundings and as signal carries to and from the cell's environment. As a cell moves across a substrate, integrins diffuse throughout the cell and cluster to help form protein complexes known as focal adhesions. In migration, these focal adhesions serve as the "feet" of the cell. Many questions exist as to how initial clustering takes place and, further, how initial clusters result in larger, more stable focal adhesions. Here we present a mathematical model to describe the initial process of integrin clustering, in effort to better understand early stages of cell motility. (Received September 14, 2009)