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Perspectives in Cancer Research

Motility, Shape and Fibrillar Organelles of Normal and Neoplastic Cells

Proceedings of a Workshop of the EORTC Tumor Invasion Project Group's Working Party on Cell Motility, held in Zürich on 9 and 10 November 1978

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Abstract—*Cell motility, mainly in the form of locomotion, is considered to be one of the mechanisms contributing to tumor invasion. To be able to migrate within a tissue, a cell must do two things: generate a propulsive force and adapt its shape to the texture of the environment. These two activities are closely interconnected. Their display requires a motor and a skeleton, and there is good evidence that both together are represented by the cell's fibrillar organelles: microtubuli, microfilaments and intermediate filaments. Just which organelles serve which part of the machinery is not altogether clear yet, and a considerable functional overlap among the differentiations of the cytoplasm responsible for motility and shape must certainly be taken into account. In mechanical terms, this apparatus can be expected to operate along the same lines in normal and neoplastic cells, although differences must be anticipated in the regulatory mechanisms. Contractility in non-muscle cells is a relatively new research area in cell biology, at least with regard to vertebrate cells. Therefore, the emphasis of the workshop was put on the mechanophysiology—and possibly mechanopathophysiology—of cell motility, whereas a thorough discussion of control mechanisms was postponed. Within this limited approach, joint consideration of normal and neoplastic cells was regarded to be indispensable. Thus, the aim of the workshop was:* (1) *to collect the available basic data on motility, shape and fibrillar organelles of cells in general, and of a few representative types of normal and neoplastic cells;* (2) *to integrate these data into a heuristic concept of cell motility, particularly locomotion;* (3) *to evaluate cell motility as an element of tumor invasion.*

The first two contributions are minireviews presenting the fundamental information on motility, shape and fibrillar organelles of cells in general.

Cell Motility and Cell Shape

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OUR PRESENT knowledge of cellular motility and cellular shape stems mostly from investigations carried out *in vitro* by allowing the cells to settle on a flat surface, frequently glass, in a culture chamber. Under these conditions, many cell types, like fibroblasts and epithelial cells, normal as well as malignant, spread and become flat. White blood cells, on the other hand, keep their spherical configuration, provided they are not compressed. After having established contact with the substrate, the cells can display two types of motility: a stationary and a translocative form. For the study of the interrelation of motility and configuration, the concurrent use of microcinematography (MCM) and of scanning electron microscopy (SEM) is of particular value. While the phase contrast optics employed for MCM allow the recognition of the overall

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