

***An overview of mathematical models for cell migration***, Luigi Preziosi, Department of Mathematical Sciences, Politecnico di Torino, Italy

***Abstract***

Cell-extracellular matrix interaction and the mechanical properties of cell nucleus have been demonstrated to play a fundamental role in cell movement across fibre networks and micro-channels. From the point of view of application understanding this process is important on the one hand to describe the spread of cancer metastases and on the other hand to optimize medical scaffolds that can be used to cure chronic wounds. From the point of view of mathematics, the problem can be addressed using different methods. In fact, in the talk, I will describe several mathematical models developed to deal with such a phenomenon, starting from modelling cell adhesion mechanics to the inclusion of influence of nucleus stiffness in the motion of cells, through continuum mechanics, kinetic models and individual cell-based models.

In particular, an energetic approach is used in order to obtain a necessary condition for which cells enter cylindrical structures. The nucleus of the cell is treated either (i) as an elastic membrane surrounding a liquid droplet or (ii) as an incompressible elastic material with Neo-Hookean constitutive equation. The results obtained highlight the importance of the interplay between mechanical deformability of the nucleus and the capability of the cell to establish adhesive bonds.