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# Two examples of influence of cell-cell interactions on populations: migrating cancer cells and magnetic manipulation for tissue engineering

Cell interactions can have a strong influence on the behaviour of their population, qualitatively as well as quantitatively. Often, the link between the microscopic law of their interaction and the macroscopic behaviour is not straightforward, and requires computer simulations and/or analytic techniques which can be successfully borrowed from condensed matter physics.

Here we give two examples of experimental situations where a macroscopic mathematical model for the population of cells was derived (in a non-rigorous way) from postulated microscopic interactions. In both cases, the aim is two-fold. Since the models succeed in reproducing the experiments, they can make predictions about more complicated, or even unattainable, experimental conditions. On the other hand, in a context where the microscopic mechanisms at stake are difficult to investigate directly, the quantitative match of the macroscopic models with the experiments indicate that the underlying microscopic hypotheses may be true.

In the first experiment, the excluded volume and adhesion, or contact inhibition, interactions between migrating cancer cells governs the way they collectively spread, making it far from a simple diffusion. In the second one, heaps of cells were prepared using magnetic nanomanipulation. The shape of the heaps and their evolution depend on the contact interactions, and can be understood thanks to simulations and to a mathematical model.