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Nucleation and growth of cell contacts[1]

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Living cells develop adhesive contacts with their environments. We present experiments which are dedicated to measure geometric and density evolutions of these contacts in living cells. We focus on two contacts: focal contacts, formed between a cell and the extracellular matrix, and adherens junctions, assembled between neighbouring cells. Both include: (i) a transmembraneous protein dictating the given adhesive junction assembly, (ii) a specific protein complex with tens of different components, (iii) an actin cytoskeletal structure. Our experiments involve the observations of fluorescently labelled proteins of these contacts in living cells, local force application, force measurements, and optical development such as evanescent wave excitation. These adhesive cellular entities are usually described as a result of activation of signalling events. However cell adhesive contacts can be seen as discrete *particles* aggregates, which undergo nucleation and growth like in a first order phase transition. We will show that self-assembly processes are indeed imposing contacts shapes and dynamics. Far from being two antagonistic ways of describing cells dynamics, signalling pathways and cell self-assembly complement each other to dictate contacts shapes. In addition, eventhough focal contacts and adherens junctions involve different proteins, we will show that they share common features such as mechanosensitivity. Via these contacts, cells behave as climbers seeking to probe the resistance of their environment in order to reinforce appropriately specific adhesive areas.

[1]including PhD works of Julien Brevier and Hélène Delanoë-Ayari