[Talk 19] Anomalous diffusion inside stem cells

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A cell is in constant interaction with its environment, it responds to external mechanical, chemical and biological signals. The response to these signals can be of various nature, for instance intra-cellular movement, intra-cellular mechanical re-arrangements, cell-cell interactions, or cellular reinforcements. Optical methods are quite attractive for investigating the micro-rheological landscape inside living cells and optical traps are the only nano-tool capable of reaching into a living cell while manipulating, measuring forces, or perform micro-rheological measurements locally inside the cell. Stem cells are undifferentiated cells that can undergo self-renewal or differentiate into any specialized cell of the organism. During development they are exposed to biochemical, molecular and mechanical cues which determine their fate. During the committing steps the stem cells change not only their genetic regulation and expression, but also mechanical properties. In this talk new and yet unpublished results will be presented on how the micro-rheological properties, as measured by optical tweezers, of embryonic stem cells change during the developmental step from epiblast to endodermal primed cells. Interesting, it appears the cytoskeleton plays an essential role for this committing step. The observed micro-rheological changes might explain the segregation of epiblast and endodermal cells occurring in the developing blastocyst.