

# Rheology of embryonic cell aggregates : Influence of subcellular properties

**T.-V. Stirbat, A. Mgharbel, H. Delanoë-Ayari, J.-P. Rieu\***

*Laboratoire de Physique de la Matière Condensée et Nanostructures*

*Université Lyon 1; CNRS, UMR 5586, Domaine Scientifique de la Doua, F-69622*

*Villeurbanne cedex; France*

\*jean-paul.rieu@univ-lyon1.fr

Embryonic cell aggregates have proven to be good models for embryonic tissues. Their fluid like behavior can increase the understanding of tissue organization in the fields of embryology, oncology and tissue engineering.

In this study we have investigated the physical properties of these aggregates. Hence we have been able to measure aggregates' fluid characteristics. Tissue surface tension was obtained using a compression tensiometer based on the Laplace formula applied to compressed aggregates<sup>1</sup>. The recording of the kinetics of two fusing aggregates has given us a measurement of the apparent viscosity. We have also characterized the different rheological timescales (elastic, viscous and plastic) through aggregates compression-relaxation experiments<sup>2</sup>.

With the purpose of better describing the role of contractility in these rheological properties and thus linking the microscopic properties to the macroscopic ones, we have extended these studies to cancer cell lines genetically invalidated for the stable expression of proteins responsible for the binding cytoskeleton-cadherins. In parallel, the use of different drugs acting on the cytoskeleton has completed these results. Tissue surface tension strongly depends on cell contractility while tissue viscosity seems to scale as the ratio of cell cohesion over cell protrusion activity.

[1] A. Mgharbel, H. Delanoë-Ayari and J. Rieu, *Measuring accurately liquid and tissue surface tension with a compression plate tensiometer*. HFSP J (2009)

[2] Philippe Marmottant, Abbas Mgharbel et al., *The role of fluctuations and stress on the effective viscosity of cell aggregates*. PNAS (2009)