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## Dynamic adhesive environment alters the differentiation potential of young and ageing mesenchymal stem cells

George Altankov<sup>1, 2</sup> and Maria Valeska Bianchi<sup>2</sup> <sup>1</sup>Institució Catalana de Recerca i Estudis Avançats, Spain <sup>2</sup>Institute for Bioengineering of Catalonia, Spain

Engineering dynamic stem cell niche-like environment offers opportunity to obtain better control of the fate of stem cells. We identified, for the first time, that periodic changes in the adhesive environment of human adipose derived mesenchymal stem cells (ADSCs) alters dramatically their asymmetric division but not their ability for symmetric renewal. Hereby, we used smart thermo-responsive polymer (PNIPAM) to create a dynamic adhesive environment for ADSCs by applying periodic temperature cycles to perturb adsorbed adhesive proteins to substratum interaction. Cumulative population doubling time (CPDT) curves showed insignificant decline in the symmetric cell growth studied for up to 13<sup>th</sup> passages accompanied with small changes in the overall cell morphology and moderately declined fibronectin (FN) matrix deposition probably as a functional consequence of ADSCs ageing. However, a substantial alteration in the differentiation potential of ADSCs from both early and late passages (3<sup>rd</sup> and 14<sup>th</sup>, respectively) was found when the cells were switched to osteogenic differentiation conditions. This behavior was evidenced by the significantly altered alkaline phosphatase activity and Ca deposition (Alizarin red) assayed at 3, 14 and 21 day in comparison to the control samples of regular TC polystyrene processed under same temperature settings.

## Biography

George Altankov is an ICREA Research Professor in the Institute for Bioengineering of Catalonia. He is a well-recognized Scientist in the field of cell-biomaterials interaction and ECM organization. He has obtained his MD in 1974 from Varna Medical Institute, Bulgaria, where he also accomplished his PhD in 1984 and Post-doctorate in 1993 from Southwestern Medical School at Dallas, performing studies on the molecular mechanisms of cell adhesion. During his subsequent work in the Bulgarian Academy of Sciences, he was promoted as Full Professor, Head of Department and Deputy Director of the Institute of Biophysics in Sofia. His studies performed in close collaboration with GKSS Research Center, Germany. He has more than 100 publications in peer reviewed journals and books.

altanko@vbv.bg