www.elsevier.com/locate/developmentalbiology

Extracellular Matrix dynamics during Mesenchymal Stem Cells Differentiation

Thais Assis-Ribas, Maria Fernanda Forni, Sheila Maria Brochado Winnischofer, Mari Cleide Sogayar, Marina Trombetta-Lima

PII: S0012-1606(17)30696-6
DOI: https://doi.org/10.1016/j.ydbio.2018.03.002
Reference: YDBIO7706

To appear in: *Developmental Biology*

Received date: 6 October 2017
Revised date: 5 February 2018
Accepted date: 2 March 2018

Cite this article as: Thais Assis-Ribas, Maria Fernanda Forni, Sheila Maria Brochado Winnischofer, Mari Cleide Sogayar and Marina Trombetta-Lima, Extracellular Matrix dynamics during Mesenchymal Stem Cells Differentiation, *Developmental Biology,* https://doi.org/10.1016/j.ydbio.2018.03.002

Extracellular Matrix dynamics during Mesenchymal Stem Cells Differentiation

Thais Assis-Ribas[1,*], Maria Fernanda Forni [2,*], Sheila Maria Brochado Winnischofer[3], Mari Cleide Sogayar[1,2], Marina Trombetta-Lima[1,**].

[1] NUCEL-NETCEM-Faculdade de Medicina, Departamento de Clínica Médica, Universidade de São Paulo, São Paulo, SP, 05360-120, Brazil
[2] Instituto de Química, Departamento de Bioquímica, Universidade de São Paulo, São Paulo, SP, 05508-000, Brazil
[3] Departamento de Bioquímica e Biologia Molecular, Universidade Federal do Paraná, Curitiba, PR, 81531-990, Brazil

* Both authors contributed equally to this manuscript
** To whom correspondence should be addressed. Tel: +55-11-26480227; e-mail: marina.lima@usp.br

Present Address: Marina Trombetta-Lima, NUCEL-NETCEM-Faculdade de Medicina, Universidade de São Paulo. Rua Pangaré, 100 (Cidade Universitária) São Paulo, SP 05360-120, Brazil.

Abstract

Mesenchymal stem cells (MSCs) are stromal cells that display self-renewal and multipotent differentiation capacity. The repertoire of mature cells generated ranges but is not restricted to: fat, bone and cartilage. Their potential importance for both cell therapy and maintenance of *in vivo* homeostasis is indisputable. Nonetheless, both their *in vivo* identity and use in cell therapy remain elusive. A drawback generated by this fact is that little is known about the MSC niche and how it impacts differentiation and homeostasis maintenance. Hence, the roles played by the extracellular matrix (ECM) and its main regulators namely: the Matrix Metalloproteinases (MMPs) and their counteracting inhibitors (TIMPs and RECK) upon stem cells differentiation are only now beginning to be unveiled. Here, we will focus on mesenchymal stem cells and review the main mechanisms involved in adipo, chondro and osteogenesis, discussing how the extracellular matrix can impact not only lineage commitment, but, also, their survival and potentiality. This review critically analyzes recent work in the field in an effort towards a better understanding of the roles of Matrix Metalloproteinases and their inhibitors in the above-cited events.