Title: Exosomes in Cancer: Use them or Target them?

Authors: Nuno Bastos, Carolina F. Ruivo, Soraia Silva, Sonia A. Melo

PII: S1084-9521(16)30479-7
DOI: http://dx.doi.org/doi:10.1016/j.semcdb.2017.08.009
Reference: YSCDB 2318

To appear in: *Seminars in Cell & Developmental Biology*

Received date: 21-5-2017
Revised date: 3-8-2017
Accepted date: 3-8-2017

Please cite this article as: Bastos Nuno, Ruivo Carolina F, Silva Soraia, Melo Sonia A.Exosomes in Cancer: Use them or Target them?.*Seminars in Cell and Developmental Biology* http://dx.doi.org/10.1016/j.semcdb.2017.08.009

Exosomes in Cancer: Use them or Target them?

Nuno Bastos[1,2], Carolina F. Ruivo[1,2], Soraia Silva[1,2], Sonia A. Melo[1,2,3*]

[1]Instituto de Investigação e Inovação em Saúde, Universidade do Porto, Portugal (i3S), Porto, Portugal
[2]Institute of Molecular Pathology & Immunology of the University of Porto (IPATIMUP), Porto, Portugal
[3]Medical Faculty of the University of Porto (FMUP), Portugal.

Correspondence to: smelo@ipatimup.pt

Abstract

Exosomes are small extracellular vesicles with a significant role in most processes associated with cancer. On one hand, exosomes role in the different hallmarks of cancer has been widely described, highlighting the urge to understand the potential to target communication mediated by exosomes as a novel therapeutic approach in cancer. On the other hand, exosomes stability in circulation and tumor-targeting capacity shows their applicability in the delivery of anti-cancer molecules. This review will discuss the dual applicability of exosomes in cancer focusing on their usage for therapy improvement, or their targeting to block their supportive role in tumor progression and response to therapy. We highlight the current developments and the strategies used to enhance the potential of exosomes to become clinical partners in the treatment of cancer.

1. Introduction

The development of targeted therapies led to a significant advance in cancer treatment over the last years [1]. The ability of targeting cancer cell dependencies has allowed a more effective treatment and an overall increase in patient survival [2, 3]. Targeted therapies developed so far, mainly focus on cancer cell proliferation, cancer cell survival, angiogenesis or triggering the immune response against the tumor [4]. Despite this breakthrough, targeted therapy is not a reality for all cancers [1]. Even targeted therapy-responding tumors ultimately develop resistance leading to tumor progression and cancer-related deaths [5, 6]. Cell-to-cell communication has a crucial role in different steps of tumor progression [7]. Cancer cells have the ability to communicate between them or with the microenvironment in order to proliferate and disseminate [8]. Until recently, cancer cell communication has been associated with: communication junctions, adherent junctions and cytokine interactions [7]. In the past years, extensive research focused on extracellular vesicles (EVs) demonstrating their ability to mediate cell communication with neighbor and/or distant cells [9]. Different types of EVs were described according to their origin, however exosomes are the most widely studied subtype of EVs in health-related research. Exosomes, vesicles of 40-150nm in diameter of endocytic origin, are released by all cell types into the extracellular space and, ultimately, enter circulation [10]. Exosomes membrane is composed of a lipid bilayer enriched in cholesterol, sphingomyelin and ceramide in close association with transmembrane