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miRNA based advanced differentiation therapy

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Abstract

Cancer is a disease of the genome. For a long time, it has been established that cancer mutations are determinant to induce tumor genesis, but recent evidences also point to epigenetic alterations as direct causes of cancer. It is now widely accepted that epigenetic changes are key in the reprogramming of stem and somatic cells into cancer stem cells (CSCs), which constitute the only subset of cancer cells truly immortal and capable of supporting cancer progression. Recent evidences from our group have demonstrated how miRNAs act as potent drivers from pluripotency to expanded differentiation potential, while they block reprogramming from somatic to stem cells. Mechanistically, we have described that these effects are mediated by direct repression of de novo DNA methyltransferases (Dnmt3a and Dnmt3b), leading to a resetting of the epigenetic memory. Given that experimental induction of pluripotency and tumor genesis entail obvious similar pathways, here we speculate that epigenetic changes induced by such miRNAs might unlock the cellular differentiation programs that are normally inactivated in cancer stem cells and at the same time, block the reprogramming from somatic to cancer stem cells, therefore dropping the CSC population in the tumor. Our hypothesis, if confirmed, would shed light on the differentiation-based antitumoral therapy and present those microRNAs as a promising tool for directly confronting the tumormaintaining and regeneration capability of cancer cells.

Biography

Maria obtained her degree in Biochemistry in 2004 and since then, she has worked in several institutions, both in national centers (Autonoma University, Complutense University -in which she obtained her Doctorate in 2011-, Spanish National Cancer Research Center) and in foreign institutions, such as MRC Protein Phosphorylation Unit (University of Dundee, UK) and Harvard Medical School (Massachusetts, US).

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