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Bacterial cellulose-based platform for culture and maintenance of induced pluripotent stem cells

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Induced pluripotent stem cells (iPSCs) hold great promise as a cell source for regenerative medicine yet its culture, maintenance of pluripotency and induction of differentiation remain challenging. The limited options of culture media and growing surfaces for iPSCs make its culture still an extremely expensive and difficult technique. The present study reports preliminary results on the culture of iPS cells on a new growing surface composed of bacterial cellulose. Bacterial cellulose (BC) presents unique properties, such as biocompatibility, purity, fibrous arrangement similar to ECM, as well as tunable application, being capable to form varied structures ranging from thin membranes to tridimensional hidrogels. Our main goal in the present study was to evaluate the feasibility of culturing iPSCs on BC's membrance as well as its capacity to maintain the iPS cells pluripotent state. In order to assess BC's capacity to harbor iPS cells, we seeded BC membranes with FN052 iPS cells, kindly provided by the Laboratório Nacional de Células-tronco Embrionárias – RJ. FN052 cells, maintained on Matrigel®, were passaged to BC membranes and readily attached to them. We maintained the cells for a week in such membranes, and by the end of such period, viability as well as pluripotent state maintenance were assessed through MTT (colonized membranes 0,165 ±0.006 versus uncolonized membranes 0,069 ±0,001), alkaline phosphatase staining and immunostaining essays. Morfology of growing cells in BC membrane was also assessed by MEV. iPS cells cultured in such conditions were viable and capable to metabolize MTT. iPS grew up forming colonies with defined boundaries as observed in standard conditions. BC membranes also promoted the maintenance of iPS pluripotent state, as show by alkaline phosphatase as well as SSEA-4 and Oct-4 expression. These preliminaries studies demonstrated that BC membranes are biocompatible, being able to support iPS cell culture, constituting a new option for pluripotent cell culture. BC membranes present several advantages over standard surfaces, such as low price, biocompatibility, and high diversity in structure what make it suitable for different applications in tissue engineering after specific iPSC differention.

Biography

Carolina Reis de Oliveira was born in Conselheiro Lafaiete (Brazil) in 1987. Graduated in Biochemistry by Federal University of Viçosa in 2009. She has completed her master degree at Biochemistry and Immunology by Federal University of Minas Gerais (UFMG) in 2011. Currently she is Ph.D student of Laboratory of Cellular and Molecular Immunology of UFMG, and she is also a PhD visiting student at University of Medicine and Dentistry of New Jersey, US. She started her research career in vaccine and infectious disease area. Now her interests are in immunological approaches for cell culture, mainly pluripotent stem cell, as well as RPE differentiation and cell therapy application. She has published 2 papers in her short research career.

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