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Ana Colette Maurício

University of Porto (UP), Portugal

MSCs conditioned media and umbilical cord blood plasma metabolomics and composition: Importance for MSCs scale-up expansion for clinical applications

Human mesenchymal stem cells (hMSCs) from umbilical cord blood (UCB) and umbilical cord matrix are tested clinically for a variety of pathologies but in vitro expansion is essential to achieve appropriate cell numbers for clinical use and most applications still need culture media containing fetal bovine serum (FBS). Until today, there is no reliable serum-free medium and the animal sera have several disadvantages. Human umbilical cord blood plasma (hUCBP) can be used as a supplement for hMSCs from the umbilical cord (UC) Wharton's jelly culture, since UCB is rich in soluble growth factors and due to worldwide increase in the number of cryopreserved UCB units in public and private banks. On the other hand, the culture media enriched in growth factors produced by these hMSCs in expansion (Conditioned medium - CM) can be an alternative to hMSCs application. The CM of the hMSCs from the UC Wharton's jelly might be a better therapeutic option compared to cell transplantation, as it can benefit from the local tissue response to the secreted molecules without the difficulties and complications associated to the engraftment of the allo- or xeno-transplanted cells. These facts drive us to know the detailed composition of the hUCBP and CM, by 1H-NMR and Multiplexing LASER Bead Technology. hUCBP is an adequate alternative for the FBS and the CM and hUCBP are important sources of growth factors, which can be used in MSCs-based therapies. Some of the major proliferative, chemotactic and immunomodulatory soluble factors (TGF- β , G-CSF, GM-CSF, MCP-1, IL-6, IL-8) were detected in high concentrations in CM and even higher in hUCBP. The results from 1H-NMR spectroscopic analysis of CM endorsed a better understanding of hMSCs metabolism during in vitro culture, and the relative composition of several metabolites present in CM and hUCBP was obtained. The data reinforces the potential use of hUCBP and CM in tissue regeneration and focus the possible use of hUCBP as a substitute for the FBS used in hMSCs cell culture and expansion.

Biography

Ana Colette Maurício has a degree on Veterinary Medicine since 1995, a PhD on Veterinary Sciences since 1999 from Faculdade de Medicina Veterinária (FMV) - Universidade Técnica de Lisboa (UTL) and Habilitation in Veterinary Sciences (ICBAS-UP) since 2011. At the present, she is an Associated Professor with Habilitation, from the Veterinary Clinics of ICBAS - UP. She also belongs to the Scientific Council of ICBAS-UP and to the Ethic Commission for Health Sciences from University of Porto (UP). She belongs to the Scientific Committee of the Veterinary Sciences Doctoral Program at ICBAS-UP. She is the Scientific Coordinator of Regenerative Medicine and Experimental Surgery sub-unit from CECA-ICETA fro UP. She is one of the founding shareholders of Biosckin, Molecular and Cell Therapies, S.A since 2007 for development of new cell therapies and medical devices. For the past 12 years she coordinates a multidisciplinary research group of Experimental Surgery and Regenerative Medicine, working with several biomaterials and cellular therapies. She coordinates a multidisciplinary team, including Veterinaries, Engineers, Medical Doctors that through Experimental Surgery have a crucial role in the development of biomaterials and cellular therapies, allowing a close share of knowledge between biomaterials design, development of cellular systems, and surgeons needs when related to specific clinical cases. This group has several recent relevant publications in the research areas of nerve, bone, musculoskeletal and vascular tissue regeneration. She is the supervisor of several PhD, Post-Doctoral and Master students, she is the co-author of a large number of scientific articles (Maurício AC) and scientific book chapters. She was the principal researcher of several national and international scientific projects.

ana.colette@hotmail.com, acmauricio@icbas.up.pt

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